



SAMPLE



Digital Imaging Adoption Model for Enterprise Imaging

Gap Overview for: **Sample Hospital**

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Digital Imaging Adoption Model for Enterprise Imaging

HIMSS Analytics® has created the Digital Imaging Adoption Model for Enterprise Imaging (DIAM-EI), an eight-stage model to evaluate the maturity of IT-supported processes in medical imaging in hospitals around Europe and across the world. This eight-stage (0 – 7) maturity model drives hospitals' organizational, strategic and tactical alignment towards imaging-IT maturity.

The Digital Imaging Adoption Model for Enterprise Imaging is a progressively sophisticated roadmap enabling quality, safety, and operational efficiency for healthcare providers.

STAGE	 Digital Imaging Adoption Model Cumulative Capabilities	
7	All three	Stages 5-7 are non-hierarchical and can be adopted in any order: A. Advanced imaging analytics B. Clinical decision support and value-based imaging C. External image exchange and patient engagement
6	Two of three	
5	One of three	
4	Fully integrated image management with efficient enterprise-wide image sharing across different service areas	
3	Imaging governance and strategy; workflow and process safety	
2	Electronic image management covering a variety of images across the enterprise	
1	Electronic image management covering the service area(s)	
0	No or limited electronic image management	

Digital Imaging Adoption Model for Enterprise Imaging structure ensures objectivity:

- Stage 0 indicates low imaging IT maturity; Stage 7 represents an advanced Imaging IT environment with the highest patient safety and work efficiency standards.
- Each DIAM stage has specific requirements and will be considered achieved if at least 70% of those requirements are fulfilled. In addition to the 70% rule some mandatory ("must-have") criteria exist. Organizations not meeting those "must-haves" will not be able to accomplish certain DIAM stages despite having achieved 70% or more of other stage-relevant criteria.
- From Stage 0 – 4 the model has sequential compliance goals, i.e. organizations need to meet the requirements of lower stages before they are able to move up on the model. Those stages basically describe a hierarchy for planning and implementation of imaging IT.
- Stages 5 – 7 are non-hierarchical and show different options for making use of advanced software-related features in imaging. To reach Stage 5, an institution is required to achieve at least one of the three possible options (5A, 5B or 5C). Stage 6 requires two out of the three options, while all three must be achieved to reach Stage 7.

Cooperation partners



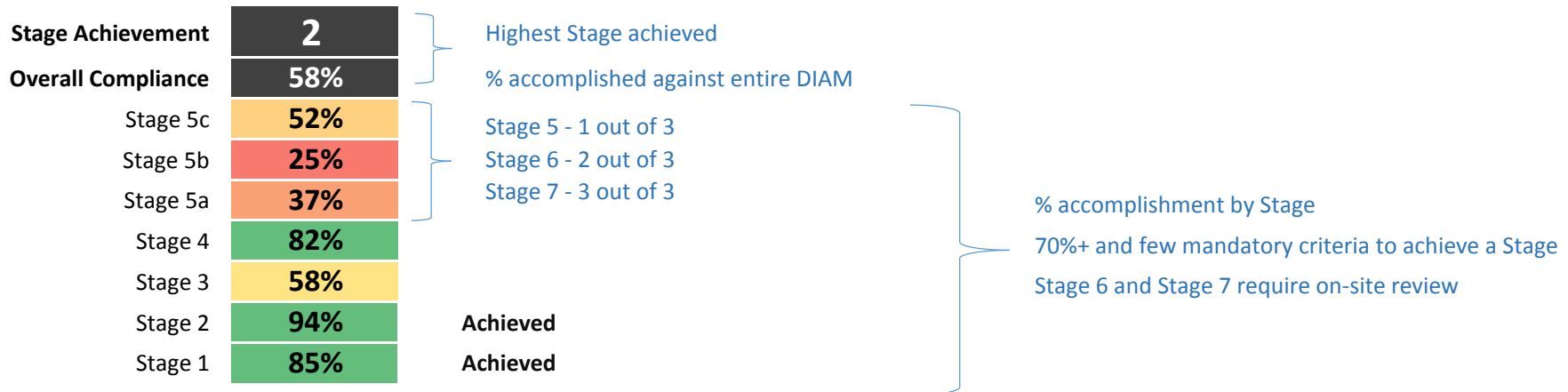
Methodology

To be assessed against the DIAM a healthcare organization completes a survey which comprises of a list of criteria statements. The organization completes the survey by self-assessing their performance against each criteria statement (mostly) using the following Likert scale response options:

- Not Enabled* The capabilities referenced in the criteria statement are **not typically available or only with significant limitations**
- Somewhat Enabled* The capabilities referenced in the criteria statement are **available to some extent, but are not yet fully satisfying**
- Fully Enabled* The capabilities referenced in the criteria statement are **(almost) always available and (almost) fully satisfying**
- Not Applicable* The capabilities referenced in the criteria statement **do not apply or are not relevant**

Using a proprietary scoring methodology the survey responses are tabulated to derive accomplishment for each stage, each imaging service, and against the overall model. To achieve a given stage an organization must meet a few mandatory criteria AND score 70% or better for overall accomplishment for that stage and all previous stages. This allows flexibility in the model to accommodate different types of organizations, cultures, and approaches to maturity.

Example:



DIAM for Enterprise Imaging - Overall Achievement (>=70% per stage and selected "must-have" criteria)

Overall DIAM Score and Compliance

Stage Achievement	1		
Overall Compliance	58%		
Stage 5c	50%	Gap:	External Image Exchange and Patient Engagement
Stage 5b	57%	Gap:	Clinical Decision Support and Value-based imaging
Stage 5a	31%	Gap:	Advanced Imaging Analytics
Stage 4	66%	Gap:	Fully integrated image management with efficient enterprise-wide image sharing
Stage 3	62%	Gap:	Imaging Governance and Strategy; Workflow and Process Safety
Stage 2	75%	Progressive with critical gap:*	Electronic Image Management covering a variety of images across the enterprise
Stage 1	92%	Achieved:	Electronic Image Management covering the service area(s)

* One or more mandatory criteria which are relevant for this DIAM stage are not achieved yet. Please see below for more details.

Your organisation in review

DIAM Achievement	Compliance Pattern
<p>Your current DIAM Stage is 1 with an overall compliance of 58%. Your organisation has already crossed the 70% compliance requirement for higher stages. However, due to a critical gap (i.e. mandatory requirements) higher stages cannot be achieved yet. Without critical gaps your organisation would already be scored Stage 2 and you could work on initiatives to master Stage 3 as the next logical step.</p>	<p>Your DIAM stage compliance pattern is non-linear. One higher stage shows greater compliance (in %) than found on lower stages. This indicates that you are progressive in advanced areas but some basic capabilities are still missing. Thus, your potential to fully benefit from more advanced imaging IT capabilities can be limited. It is recommended to concentrate on the gaps of the next higher stage when planning future actions instead of jumping to more high-level items before the basis is working.</p>

Critical Items ('Must-have') to achieve Stage 2

The following compliance criteria are mandatory in order to achieve the next higher DIAM-EI stage. If one of these items does not fully meet the requirements, the institution will remain on the lower stage even though it meets the 70% criteria.	not accomplished for	your rating
<ul style="list-style-type: none"> A formalized enterprise imaging roadmap with clear goals and timelines exists to some extent At least 3 different services need to capture >=95% of their images (natively) in digital format Images from at least 3 different services can seamlessly be accessed by >50% of authorized users across the whole enterprise 	Enterprise-wide	<p>✘</p> <p>✔</p> <p>✔</p>

DIAM for Enterprise Imaging - Service Area Achievement

Breakdown by service area (selected for profiling by the organization):

	Enterprise Capabilities	Radiology	Cardiology	Gastroenterology / Otolaryngology	Wound Care	Other	Overall (for reference; details on previous sheet)
Stage Achievement	<i>not applicable</i>	6	6	2	1	0	1
Overall Compliance	60%	76%	74%	44%	34%	23%	58%
Stage 5c	<i>n/a</i>	70%	70%	25%	30%	18%	50%
Stage 5b	<i>n/a</i>	83%	74%	40%	18%	10%	57%
Stage 5a	<i>n/a</i>	48%	48%	9%	9%	4%	31%
Stage 4	72%	79%	79%	68%	47%	25%	66%
Stage 3	60%	79%	81%	41%	27%	35%	62%
Stage 2	50%	100%	100%	83%	58%	50%	75%
Stage 1	<i>n/a</i>	100%	100%	100%	100%	60%	92%
Impact Factor*	30%	23%	19%	9%	5%	14%	100%

* Impact of an imaging service is influenced by the size of its relative imaging volume (weight is calculated based on preference analysis).

Your service areas in review

Achievement - Enterprise Capabilities	Achievement - Imaging Services Capabilities
<p>Imaging capabilities that are relevant for the whole enterprise appear to be intermediate in terms of DIAM-EI compliance.</p> <p>You are most progressive in the fields of Software Capabilities and Functions as well as Software Applications.</p> <p>Most improvements can be made in the focus area of Enterprise Imaging Governance.</p>	<p>You evaluated 5 different imaging services.</p> <ul style="list-style-type: none"> DIAM Stages: Some imaging services differ significantly from the overall DIAM-EI Stage (1). Radiology and Cardiology are >= 2 stages higher. Overall Compliance: The compliance rates for some imaging services differ significantly from the overall DIAM-EI compliance (58%). Radiology and Cardiology are >= 10 points higher and Wound Care, Gastroenterology / Otolaryngology and Cardiology are >= 10 points lower.
Most Progressive Service Area	Least Progressive Service Area
<p>Radiology is your top imaging service in terms of compliance (76%). This has an impact of 23% on your overall DIAM-EI compliance (highest impact of all imaging services). The next Stage to consider is 5a. For that stage it is recommended to focus to improve capabilities related to Quality Management, Workflow Management and Patient Safety, Imaging Analytics, Personalized Medicine.</p>	<p>Other is the least progressive of your imaging services in terms of compliance (23%). This has an impact of 14% on your overall DIAM-EI compliance (3rd highest impact of all imaging services). The next Stage to consider is 1. For that stage it is recommended to focus to improve capabilities related to Image Capture, Image Exchange, Data Ingestion and Interoperability, Image Interpretation & Notes, Quality Management, Workflow Management and Patient Safety.</p>

Opportunities - Top Level Overview




Relevant focus areas for DIAM Stage 3 (your next higher and 'logical' stage below the 70% threshold)





























































- based on DIAM Stage 3 - Imaging Governance and Strategy; Workflow and Process Safety

The table below indicates the weight of each listed focus area and the impact of the different imaging services on the next higher DIAM stage. You might want to prioritize focus areas and imaging services with higher weights and impact in order to progress quickly through the DIAM stages. Please remember that at least 70% compliance are needed in order to "achieve" a stage. Please note that the impact of an imaging service is influenced by the size of its relative imaging volume (weight is calculated based on preference analysis*).

* share of all imaging studies / sum of ranked imaging services x reverse rank of individual imaging service






Legend:

-  **High Potential** - high focus area impact | high stage impact | many gaps
-  **Low Potential** - low focus area impact | low stage impact | few gaps
-  **No Potential / Not Relevant**




















Focus Areas (sorted by stage impact)	Your current Stage Compliance (Overall)	Focus Area Impact for Stage 3					
		Enterprise-wide	Service-specific				
			Radiology	Cardiology	Gastroenterology / Otolaryngology	Wound Care	Other
Quality Management, Workflow Management and Patient Safety	58%						
Enterprise Imaging Governance	11%						
Software Capabilities and Functions	92%						
Image Viewing	100%						
Imaging Analytics	40%						
Software Applications	100%						
Image Capture	0%						
Image Exchange, Data Ingestion and Interoperability	80%						
Clinical Decision Support	40%						
Multidisciplinary Collaboration	0%						

Opportunities - for next logical DIAM stage

Rating - Legend

-  **No gap** - your institution fully meets the requirement, no action needed
-  **Partial gap** - your institution has done first steps towards meeting the requirement but there is space for improvement
-  **Gap** - your institution does not meet the requirement, improvements might be considered
-  **Not applicable** - the line item is not relevant for a specific service area and/or based on assessment logic
-  **No response** - your institution did not provide information for that requirement

Opportunities to achieve Stage 3 - Enterprise-wide

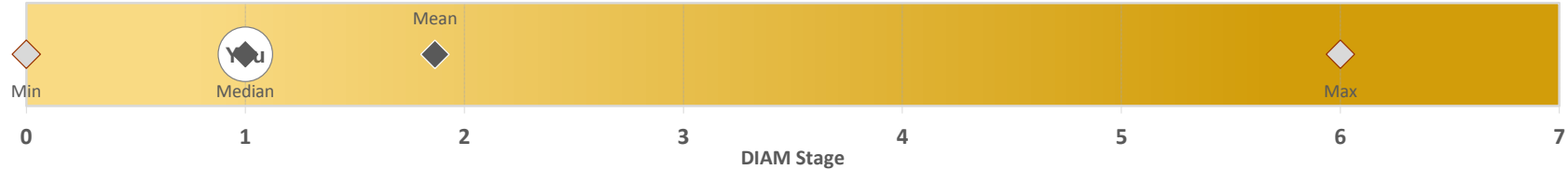
Criteria Statement	your rating
Focus Area: Enterprise Imaging Governance	
• A governance body with stated mission and charter dedicated to enterprise imaging exists	
• Participation in enterprise imaging governance is multidisciplinary	
• A formalized enterprise imaging roadmap with clear goals and timelines exists to full extent	
• The enterprise imaging strategy includes encounter-based (non-order-based) imaging and the mapping of crucial metadata	
• Clinical image acquisition and communication workflows (for all types of images, video, multimedia) are formalized and implemented to some extent	
• The enterprise imaging strategy and program is systematically reviewed (at least once per year) to some extent	
• Human and financial resources are allocated to allow the organization to further grow the Enterprise Imaging program to some extent	
Focus Area: Software Applications	
• Universal Viewer / Enterprise Viewer is live and operational	
• Only one Enterprise Viewer is in use	
• Universal Viewer / Enterprise Viewer is at least partially integrated	
• At least 50% of all imaging modalities using radiation send dosage information into the Dose Management System	
Focus Area: Software Capabilities and Acquisition Workflows	
• A Universal / Enterprise Viewer is deployed so that it supports multiple formats, incl. DICOM, waveforms, videos, multimedia content	
• A Universal / Enterprise Viewer is deployed so that it provides access to images from multiple imaging specialties	
• A Universal / Enterprise Viewer is deployed so that it supports key objects and presentations states	
• A Universal / Enterprise Viewer is deployed so that it provides remote access to images from our organization (view from anywhere)	
• A Universal / Enterprise Viewer is deployed so that it supports "zero clinical footprint" viewing	
• A Universal / Enterprise Viewer is deployed so that it supports basic functions to take measurements, annotate or edit images	
Focus Area: Business Continuity, Disaster Recovery and IT Security	
• User/Account provisioning is in place	
• A complete audit trail of individuals having accessed medical images and associated reports/notes is available	

Opportunities to achieve Stage 3 - Imaging service-specific

Criteria Statement	Radiology	Cardiology	Gastroenterology / Otolaryngology	Wound Care	Other
Focus Area: Image Capture					
• An enterprise-wide solution is used to manage (capture, store, distribute) medical images	✗	✗	✗	✗	✗
Focus Area: Image Sharing, Data Ingestion and Interoperability					
• Users from external organizations can access and view images over a secured network/connection to some extent	✓	✓	✗	✓	✓
Focus Area: Clinical Decision Support					
• The system provides access to medical image databases/libraries to some extent	✓	✓	✗	✗	✗
Focus Area: Image Viewing					
• Specialists can access all types of images/multimedia from their primary system that connects them directly to specialty viewers	✓	✓	✓	✓	✓
Focus Area: Quality Management, Workflow Management and Patient Safety					
• A formalized and documented quality management (QM) program is in place	!	!	✗	✗	✗
• Reported (un)avoidable medical errors are systematically tracked and presented to the appropriate senior management	✓	✓	✗	✗	✗
• Medical equipment and apps is regularly calibrated/serviced/updated in order to meet required quality standards	✓	✓	✓	●	✓
• The lifecycle of images from this service area is actively managed by the use of a dedicated software solution	✓	✓	✗	✗	✗
• Substance administration tracking is supported by the use of a dedicated software solution to some extent	✓	✓	✓	●	✓
• The system supports confirmation of image acquisition/exam completion and automated results delivery to some extent	✓	✓	✓	✓	✓
• Outcomes of IT-supported process improvements are systematically monitored and reported to some extent	✓	✓	✓	✗	✗
• Patient identification reconciliation processes/tools are in use	!	!	!	✗	✗
• The software supports cumulative Radiation Dose Monitoring to some extent	✓	✓	●	●	●
Focus Area: Multidisciplinary Collaboration					
• Software tools are in use to support at least personal Multidisciplinary Team Meetings (MDTs)	✗	✗	✗	✗	✗
Focus Area: Imaging Analytics					
• A formal documented Analytics and/or Business Intelligence strategy exists to some extent	✓	✓	✗	✗	✗
• Data governance is in-place and proactively operating to address data quality and KPI targets	✓	✓	✗	✗	✗

Benchmarks - enterprise-wide

Your Overall DIAM Stage, compared to peers (N = 15)

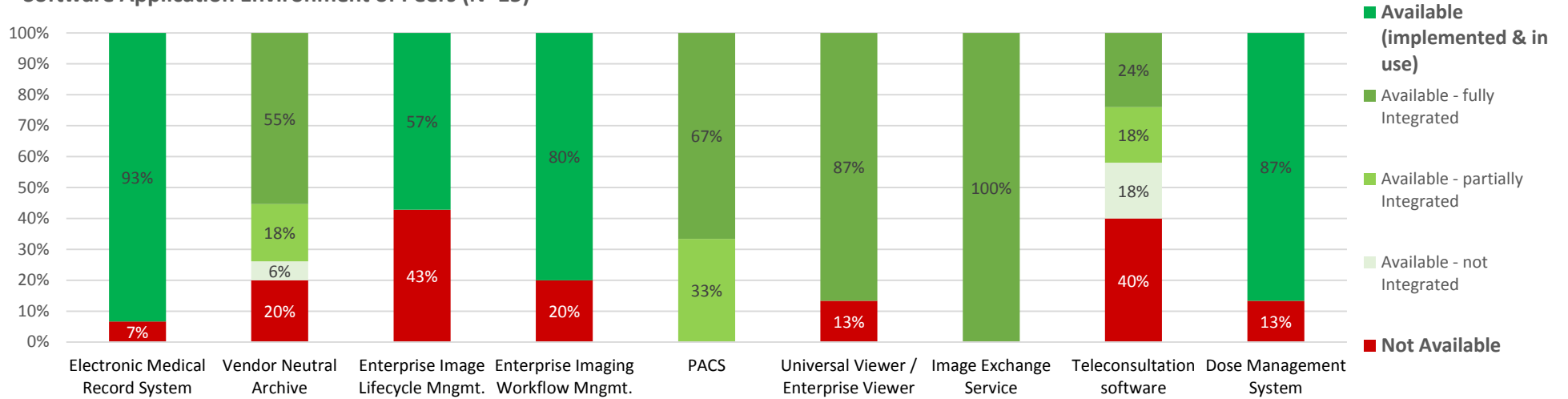


Key Performance Benchmarks	You	Mean	Median	Min	Max	N
DIAM Stage	1	1.9	1	0	6	15
Overall Compliance	58%	59%	58%	40%	84%	15
Size of population in catchment area	3,000,000	3,032,866	1,900,000	500,000	12,000,000	11
Number of users accessing medical images (headcount)	8,000	9,558	6,000	600	40,000	11
Total size of imaging studies stored per year (in terabyte)	25	25	25	25	25	1

Top 3 imaging services evaluated by peers	Your Study Volume (in %)	Mean % by Study Volume	Mean Stage	Mean Compliance
Radiology (N = 15)	80%	69%	3.4	64%
Cardiology (N = 14)	10%	17%	2.7	55%
Gastroenterology (N = 3)	n/a	11%	3.0	52%

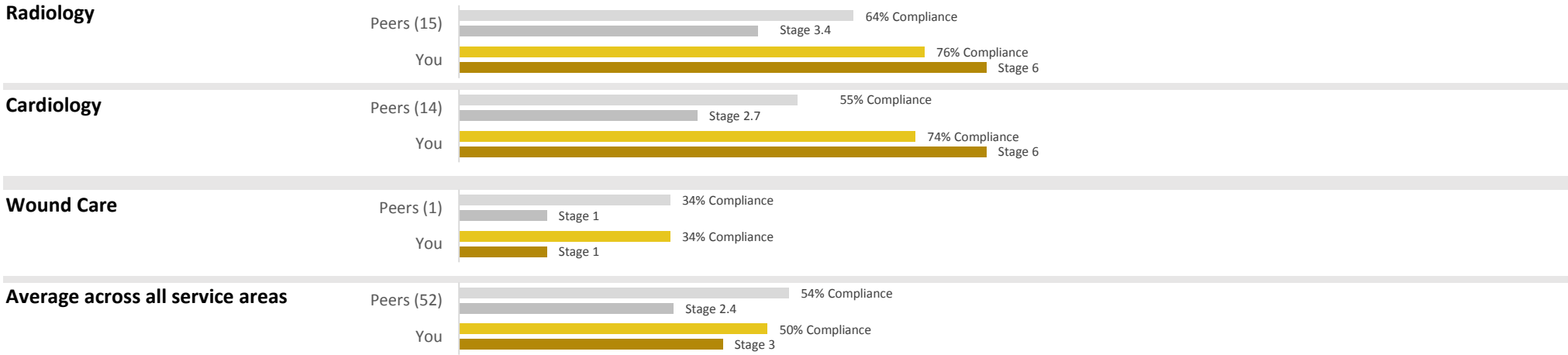
Peer Statistics			
Top 5 countries from which peers are available	USA (8), Saudi Arabia (2), Belgium (1),		
Number of peers available for benchmarking, of which	15		
... from different countries (unique count)	7		
... hospitals vs. (external) imaging centers vs. others	Hospitals: 93%	Imaging Center: 0%	Other: 7%
... non-profit vs. for-profit vs. public-private partnership	Non-Profit: 100%	For-Profit: 0%	Public-Private: 0%
... belong to a group, trust or health region	Part of a group: 0%		Single organisation: 100%
... store clinical images in a cloud or other online storage	Public cloud: 0%	Private cloud: 0%	Other: 100%

Software Application Environment of Peers (N=15)



Software Application Environment	You		Peers (15)				N
	Availability (implemented & in use)	Integration with EMR	Availability, of which...	Not Integrated	Partially Integrated	Fully Integrated	
Electronic Medical Record System (EMR)	Yes	n/a	93%	n/a	n/a	n/a	15
Enterprise Image Repository / Vendor Neutral Archive (VNA)	No	Not integrated	80%	8%	23%	69%	15
Enterprise-wide Image Lifecycle Management	No	n/a	57%	n/a	n/a	n/a	14
Enterprise-wide Imaging Workflow Management / Orchestration	No	n/a	80%	n/a	n/a	n/a	15
Picture Archiving and Communication System (PACS)	Yes	Fully integrated	100%	0%	33%	67%	15
Universal Viewer / Enterprise Viewer	Yes	Fully integrated	87%	0%	0%	100%	15
Image Exchange Service	Yes	Fully integrated	100%	0%	0%	100%	1
Teleconsultation software (for Clinician-Clinician interaction)	Yes	Fully integrated	60%	30%	30%	40%	15
Dose Management System (DMS) (for Imaging)	Yes	n/a	87%	n/a	n/a	n/a	15

Benchmarks - service-specific



Key Performance Benchmarks by Service Area (unweighted)	Radiology		Cardiology		Gastroenterology / Otolaryngology		Wound Care		Average across all service areas	
	You	Peers (15)	You	Peers (14)	You	No peers	You	Peers (1)	You	Peers (52)
	DIAM Stage	6	3.4	6	2.7	2		1	1.0	3.0
Overall Compliance	76%	64%	74%	55%	44%		34%	34%	50%	54%
What type of images are captured? (by imaging service)										
DICOM images	Yes	100%	Yes	93%	No		No	0%	40%	88%
Digital photos (e.g. as used in wound care)	No	33%	No	21%	No		Yes	100%	40%	55%
Diagnostic visible light images	No	13%	No	21%	No		No	0%	0%	27%
Scope video	No	40%	No	36%	Yes		No	0%	20%	47%
Scope still images	No	40%	No	36%	Yes		No	0%	20%	49%
Digital Waveforms (EKGs, EEGs etc.)	No	20%	Yes	86%	No		No	0%	20%	45%
Documents (pdf, tiff, etc.)	Yes	67%	Yes	71%	Yes		No	0%	80%	75%
Videos (such as from surgery, physiotherapy)	No	27%	No	14%	No		No	0%	0%	29%
Pathology only: Pathology slides	n/a	7%	n/a	7%	n/a		n/a	0%	0%	83%
Multimedia content	No	33%	No	29%	No		No	0%	20%	31%
Non-DICOM 3D images and models (e.g. as used for 3D printing)	No	47%	No	36%	No		No	0%	0%	33%

What's next?

Improved Patient Care and Health IT Insights



AMAM Adoption Model for Analytics Maturity

The HIMSS Analytics Adoption Model for Analytics Maturity (AMAM) is designed to measure and advance an organization's analytics capabilities. Analytics serve to improve many facets of a healthcare business beyond clinical decision support, such as the operational and financial aspects of the organization. This international eight-stage (0-7) model measures the capabilities your organization has gained from installation of technology and surrounding processes. Start on your path to improving healthcare delivery by completing each stage below. Our expert advisors are available with helpful tools to move your organization along its journey.



CCMM Continuity of Care Maturity Model

HIMSS Analytics created the international oriented Continuity of Care Maturity Model (CCMM) to promote coordinated care across the continuum of care served by a health provider or the responsibility of a health authority. With this eight stage (0-7) model, measure and understand your ability to provide continuity of care across types, settings and populations. Manage with a clear strategy for coordinated care.



EMRAM EMR Adoption Model

The HIMSS Analytics Electronic Medical Record Adoption Model (EMRAM) incorporates methodology and algorithms to automatically score hospitals around the world relative to their Electronic Medical Records (EMR) capabilities. This eight-stage (0-7) model measures the adoption and utilization of electronic medical record (EMR) functions. Move your organization closer to achieving a near paperless environment that harnesses technology to support optimized patient care by completing each stage below. Our expert advisors are available with helpful tools to move your organization along its journey.



INFRAM Infrastructure Adoption Model

The HIMSS Analytics Infrastructure Adoption Model (INFRAM) helps healthcare leaders assess and map the technology infrastructure capabilities required to reach their facility's infrastructure goals — and meet International benchmarks and standards. The Infrastructure Adoption Model is an international eight stage (0-7) model for technology infrastructure adoption and maturity. INFRAM services are designed to assist healthcare organizations in assessing and advancing capabilities and technology implementations as related to the organization's infrastructure. By utilizing INFRAM, healthcare provider organizations can help improve care delivery, reduce cyber and infrastructure risk, and create a pathway for infrastructure development tied to business and clinical outcomes.