Health Imaging

AUGMENTED INTELLIGENCE
THE NEXT FRONTIER

White Paper
THOUGHT LEADER’S PERSPECTIVE
Enterprise Imaging is key to enabling intelligent workflows
In Loving Memory of Ada Lovelace

Ada Byron (1815–82)

Countess of Lovelace, was the daughter of the poet Lord Byron. At the age of 19, she met Charles Babbage who arguably invented computers.

Their partnership was the birth of computer science, as he invented the hardware, while she has gone down in history as the first programmer.

The computer language Ada is called after her.
The field of medical imaging has witnessed a revolution thanks to the digital transformation initiatives and availability of advanced clinical applications in imaging. New imaging techniques are helping Radiologists, Cardiologists, Oncologists, and other diagnosticians with greater anatomical and clinical details, highlighting the need for fast access to imaging reports and results, collaborative workflows and Augmented Intelligence.

Augmented Intelligence is the intersection of machine learning and advanced applications, where clinical knowledge and medical data converge on a single platform. The potential benefits of Augmented Intelligence are realized when it is used in the context of workflows and systems that healthcare practitioners operate and interact with. Unlike Artificial Intelligence, which tries to replicate human intelligence, Augmented Intelligence works with and amplifies human intelligence.

Agfa HealthCare’s approach of building an ecosystem of Augmented Intelligence powered by Machine Learning, Cognitive Reasoning and Task-based rules engine will help enable delivery of innovative solutions to enhance care delivery. Agfa HealthCare Enterprise Imaging platform is standards-based, designed for interoperability and enables a leading-edge approach to seamlessly embed machine learning algorithms.
Enterprise Imaging is key to enabling intelligent workflows

While Radiology has been leading from the front when it comes to digital transformation with transition from film to PACS (Picture Archiving and Communication Systems), this transition in other medical imaging specialties has been slow, or followed a standards based approach.

Even within Radiology, the challenge of enabling collaborative workflows between Oncologists and Radiologists, or within Cardiology between invasive and non-invasive workflows remained unaddressed with departmental PACS solutions.

When it comes to Pathology, the digital transformation has left a lot to be desired and has been preeminently non-standard based, unlike Radiology where we benefited from DICOM protocols.

Physicians and some of the brightest minds specializing in the field of Machine Learning and Cognitive Computing are facilitating conversations and exploring the potential of Augmented Intelligence in clinical practice.

At Thought Leadership industry events and international conferences, the physician community, academia, young graduates and industry leaders interested in the intersection of machine learning, and medicine, are discussing application of Augmented Intelligence into the practice of medicine.

Agfa HealthCare’s Thought Leadership in the field of medical imaging is well recognized and we envision following factors to consider when it comes to enabling intelligent workflows in medicine:

- Helping reduce care variance
- Leveraging clinical data for learning and decision making
- Task-based workflow optimization
- Role of medical imaging in helping improve quality of care
- Facilitating early adoption of AI and smart technology for care providers
The Agfa HealthCare approach
A modular Enterprise Imaging platform with the power of Cognitive, AI and Machine Learning

From Enterprise Imaging to Augmented Intelligence

THOUGHT LEADER'S PERSPECTIVE
We reached out to senior Radiologists, Surgeons, Academics, Clinical Leaders, Department Chairs, Operations Directors and Industry Analysts around the world, and have included their responses in the following five perspectives.
Remove departmental imaging silos and consolidate Imaging Health Records

What did we learn from EMRs? (Electronic Medical Records)

With EMRs, care organizations were successful in consolidating patient centered medical record data, however, a consolidated imaging health record gap still remained unaddressed, because images remained in their own vertical silos.

Keeping in mind the recent advancements in medical imaging, and as radiology moves out of the traditional basement to operating rooms, to the point of care and even patient’s home, thanks to smart applications and devices; the traditional departmental PACS approach has created not only clinical collaboration challenges, but Information Technology infrastructure and integration issues as well.

Thought leader care organizations are leading from the front when it comes to enabling Enterprise Imaging workflows and governance models to bring this all together.

“For our medical school, we’re building a data repository for all clinical data that we call a "data lake". The idea is that all of the clinical data will sit in the data lake in a de-identified fashion, available for research and to feed into our machine learning projects.”

Dr. Max Rosen
Chair of the Department of Radiology
UMass Memorial Medical Center, USA

“Data Lake & Machine Learning”
Task-based Workflow Optimization

AI will not replace Radiologists or other physicians, but in fact enhance and streamline their workflow even further by empowering them in their ecosystem, and help them make collaborative and intelligent decisions. If AI or Machine Learning is not embedded into the clinical workflow, the perceived benefits will not be realized.

As technology advances further and diagnostic capabilities improve, so does the impact on how caregivers provide care, demanding more access to diagnosticians in a fast and efficient manner. It is not the Radiologists who are demanding more visibility on the frontlines, it is bidirectional, and there has never been more demand by caregivers and referring physicians, and even patients, seeking consultative dialogue with radiologists.

Radiologists will be at the forefront when it comes to helping deliver quality care, with diagnostic reports and peer collaboration; Enterprise Imaging powered by AI, will help improve radiology tasks even further with task-based workflow optimization. Physicians will benefit from fast access to critical results that require immediate attention, helping reduce wait times and improve referral services for cases that require necessary and urgent patient care coordination.

Our respondents emphasized the need for exploring capabilities of machine learning and AI in addressing certain mistakes and errors that could alert radiographers and radiologists, and automate certain non-essential tasks to ease workload.

“*We should free our experts to undertake expert work by removing as many non-essential tasks for them as possible.*”

Angie Craig
Assistant Director of Operations and Performance
Leeds Teaching Hospitals Trust, NHS UK

“AUGMENTED INTELLIGENCE SHOULD OPTIMIZE A TASK-BASED WORKFLOW”

Agfa HealthCare’s Enterprise Imaging solution includes task-based workflow optimization capabilities, which provide several advantages, compared to not using a workflow engine. The organization of day-to-day work can be optimized to permit hospital workflow specific customizations.

“We should free our experts to undertake expert work by removing as many non-essential tasks for them as possible.”

“*That’s where Artificial Intelligence comes in.*”
Enable Multi-disciplinary visual collaboration

Technology should enable cross-departmental real-time communication and specialist collaboration, to help improve care-pathways.

Agfa HealthCare’s modern Enterprise Imaging platform not only removes traditional barriers to medical imaging, but also enables multispecialty care team collaboration.

Clinicians engaged in academic research will realize more benefits with an Enterprise Imaging solution that helps foster collaborative engagement between clinical and research teams.

THERE IS A NEED FOR MULTI DISCIPLINARY COLLABORATION

40% Fully Agree
60% Partially Agree

Fully Disagree
Partially Disagree
Neither Agree or Disagree
Disseminate Diagnostic Intelligence with AI

As we breakdown silos of imaging workflows and enable multidisciplinary consolidation and collaboration, the power of a consolidated platform results in creation of a vast data lake, ready for analysis by radiologists, diagnosticians, researchers and academics to help improve quality of care by better understanding disease and population health data.

This helps care organizations progress from Descriptive to Predictive Analytics models to improve early detection of diseases, and introduce care plan models that help enforce and improve patient engagement and compliance.

“**A.I. needs to be verified.**”

“One still needs fully trained diagnostician to verify AI. Medicine and Radiology is still (at least partially) an art.”

Dr. Heshan Panditaratne
Consultant Radiologist
Calderdale and Huddersfield NHS Foundation Trust, UK

“**A.I. for triaging and prioritisation.**”

“In my group, we’ve already demonstrated that an AI system for chest x-ray triaging and prioritization can lead to much faster reporting turn around time. We’ve also shown potential diagnostic benefits in early detection of lung cancer.”

Giovanni Montana
Professor of Data Science
Warwick University, UK
Personalized Medicine and Smart Applications

Care organizations and health authorities across the globe are faced with pressing population health challenges. Whether it comes to detecting cancers, or chronic diseases, Machine Learning and Advanced Analytics will help improve radiologists and diagnosticians focus less on manual repetitive tasks, and more on improving care pathways.

WHERE COULD AUGMENTED INTELLIGENCE HELP TO IMPROVE CARE PATHWAYS?

- Contextual EHR History: 35%
- Comparison with similar cases: 12%
- Preliminary Reports: 18%
- Incidental Findings: 12%
- All of the above: 23%

“I think one of the biggest contributions deep learning / artificial intelligence will realistically make to me as a Radiologist in the near future is not directly helping with image interpretation, but in bringing the relevant information out of the clinical information system (CIS) / electronic medical record (EMR) and presenting it to me in a meaningful way to better inform my clinical judgment. Incorporating this directly into the report will be how we can really add value as Radiologists using deep learning. It not only will streamline my workflow but also be a major step towards more personalized medicine in Radiology.”

“A.I. will streamline my workflow and will be a major step towards more personalized medicine in Radiology.”

“This definitely will help the patient directly but also better inform their clinician about tailored options for their precise care as personalized medicine expands. The image “pre-screening” will be in select areas and grow over time. Where it leads and how quick it gets there is obviously the big question.”

Dr. Bill Anderson
Zone Medical Director Diagnostic Imaging
Alberta Health Services Edmonton Zone, Canada
The Interoperability Challenge

Our Thought Leader customers emphasized the need for standards and interoperability. Data is the new commodity for our millennium. The data ecosystem of today includes PACS, VNA, EMR and Ancillary Systems, Health Records and IT, Personal Health Data and much more. All this further signifies the need for interoperability to unlock the potential and gain valuable clinical insights. Hospitals are a powerhouse of clinical minds and talent, and the confluence of Enterprise Imaging and Augmented Intelligence will help deliver modern healthcare for years to come.

Future of Radiology is Intelligent, explore it with Agfa HealthCare

Machine Learning will not replace Radiologists or other Diagnosticians, but in fact enhance their workflows. Algorithm developers will benefit from a collaborative framework that enables a secure and consolidated ecosystem, is standards based, and improves interoperability.

F R O S T & S U L L I V A N

“One of the top-of-mind questions the radiology community is wrestling with right now is:

“Man versus Machine, or Man-only versus Man+Machine?”

“For our part, we believe the next decade is going to be about the augmented radiologist. The combination of AI with the human intelligence that imaging professionals bring to the table today, with their ability to understand the big-picture of a patient and the context of their disease.”

Nadim Daher
Principal Analyst
Frost & Sullivan

“With our migration from PACS to the Enterprise Imaging platform, including VNA, we are expecting a centralized location not just for our radiology images, but for all patient-related data and information. That’s our vision: An overall view of the patient along the continuum of care.”

Paul Bauwens
ICT Architect
Meander Medical Center, Netherlands

LET’S TALK

As Agfa HealthCare celebrates 150 years of innovation in the field of imaging, join us for a dialogue and allow us to provide you, the thought leaders, a hands-on learning experience to “Explore, Invent and Transform” Radiology through innovation, and create positive impact on patient care.

We encourage you to reach out to us, to discuss your Imaging workflow challenges, and how we may help you transition towards our Next Gen Enterprise Imaging solution powered by Augmented Intelligence.
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Dr. Anjum Ahmed began his clinical career as a practicing GP and over the last 19 years has been focused on change management initiatives and helping set the path to the digital transformation throughout hospitals and health authorities across USA, Canada, Latin America, Europe, Middle East, South Africa and Asia Pacific. Dr. Ahmed leads strategic solution development initiatives at Agfa HealthCare to help healthcare organizations enable value-based care models that are centered around patients, helping healthcare organizations improve care and maximize value with their health IT investments.