

The Rapidly Growing Role of AI in Medical Imaging

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Artificial intelligence is taking all industry sectors by storm globally, and for good reason. AI holds immense potential to drive productivity and efficiency gains for organizations. The healthcare industry is following suit, with the FDA listing 521 individual AI-enabled medical devices as of October 2022¹.

Healthcare providers will be interested in the capabilities of AI in medical imaging. For providers, AI can increase the accuracy and detectability of diseases, leading to earlier diagnosis and better patient outcomes. For medical personnel, AI can also be useful to help overcome chronic overworking and burnout:

1. Nurses and doctors are under immense pressure. The US Surgeon General highlights how 35%-54% of nurses and physicians² reported symptoms of burnout such as exhaustion, depersonalization, and anxiety in 2019. Most poignant is how this research took place before the start of the COVID-19 pandemic, which will have magnified this problem.
2. During the COVID-19 pandemic, the number of nurses and physicians reporting burnout increased to 62.8%³ in 2021, which set a record. For comparison, this figure was only 38.2% in 2020.
3. Sadly, these staffing problems will only get worse. Nearly 0.5 million healthcare sector workers were lost between Feb 2020 to Nov 2021⁴. A further 33% of physicians, APP's, and nurses plan to reduce their working hours according to survey data from July to December 2020 by Mayo Clinic⁵. The final confusion for care providers is that 20% of physicians, and 40% of nurses plan to stop practicing altogether⁶.

This is where AI can offer hope, despite the obvious and glaring challenges. Several AI ecosystems are now available for healthcare providers to integrate algorithms and deploy workflow enhancements for clinicians.

In this whitepaper, TeraRecon focuses on the role of AI in medical imaging and its modalities – such as X-ray, CT scans, and MRI. The Eureka Clinical AI platform aims to reduce healthcare burdens for clinicians through a list of AI solutions and empower healthcare professionals to deliver better quality care while reducing burnout.

Importance of Adjudicating AI Results

It is important to remember that AI is not designed to replace physicians. Instead, AI wants to serve as the radiologist's companion.

Radiology image adjudication processes are commonly used by radiographers to lower the risk of variation and image defects. This is performed by 'readers' who use quality assurance (QA) to reduce variations in image interpretation – if two doctors interpret images differently, the wrong treatment could be administered, or underlying conditions missed.

As clinical decision makers, radiologists are accountable for what ends up in the final patient record. The accuracy of patient records is vital for coordinating integrated care. Therefore, it makes sense to put the decision back in the hands of radiologists using AI as a co-pilot, a joint image adjudication partnership between computers and clinicians.

AI Center of Excellence Starts with AI Consolidation

To truly unlock the immense potential of AI, healthcare providers should consider creating an Artificial Intelligence Center of Excellence (CoE).

1 <https://www.fda.gov/medical-devices/software-medical-device-samd/artificial-intelligence-and-machine-learning-aiml-enabled-medical-devices>

2 Page 7 - <https://www.hhs.gov/sites/default/files/health-worker-wellbeing-advisory.pdf>

3 <https://www.ama-assn.org/about/leadership/reducing-physician-burnout-must-be-urgent-national-priority>

4 <https://ritms.rutgers.edu/news/why-health-care-workers-are-quitting-in-droves/>

5 [https://www.mcpiqjournal.org/article/S2542-4548\(21\)00126-0/fulltext](https://www.mcpiqjournal.org/article/S2542-4548(21)00126-0/fulltext)

6 [https://www.mcpiqjournal.org/article/S2542-4548\(21\)00126-0/fulltext](https://www.mcpiqjournal.org/article/S2542-4548(21)00126-0/fulltext)

A solid case study for this is the UK government, which aims to be a world leader in medical AI and machine learning by 2025⁷. As of 2019, five AI CoEs exist⁸ to assist the UK NHS in medical imaging and digital pathology. Furthermore, outside of the healthcare industry, 37% of large companies in the US⁹ already have an AI CoE; it is imperative to not be left behind.

The AI CoE consists of technical experts that know how to advise, guide, and oversee AI projects within a clinical environment. Below are several tasks and benefits to establishing an AI CoE for healthcare providers:

- ✓ Outline organizational problems, and identify ways in which AI can solve those problems
- ✓ Determine AI maturity level, and what is needed to level-up AI maturity
- ✓ Plan and develop IT infrastructure to support the use of medical imaging and AI algorithms
- ✓ Build implementation roadmaps for AI radiography projects; ensure the best tools and technologies are used, and actionable targets and KPIs are in place to measure project success
- ✓ Coordinate and orchestrate AI development and adoption across clinical sites and departments
- ✓ Standardize AI practices and processes in pursuit of scaling up and out

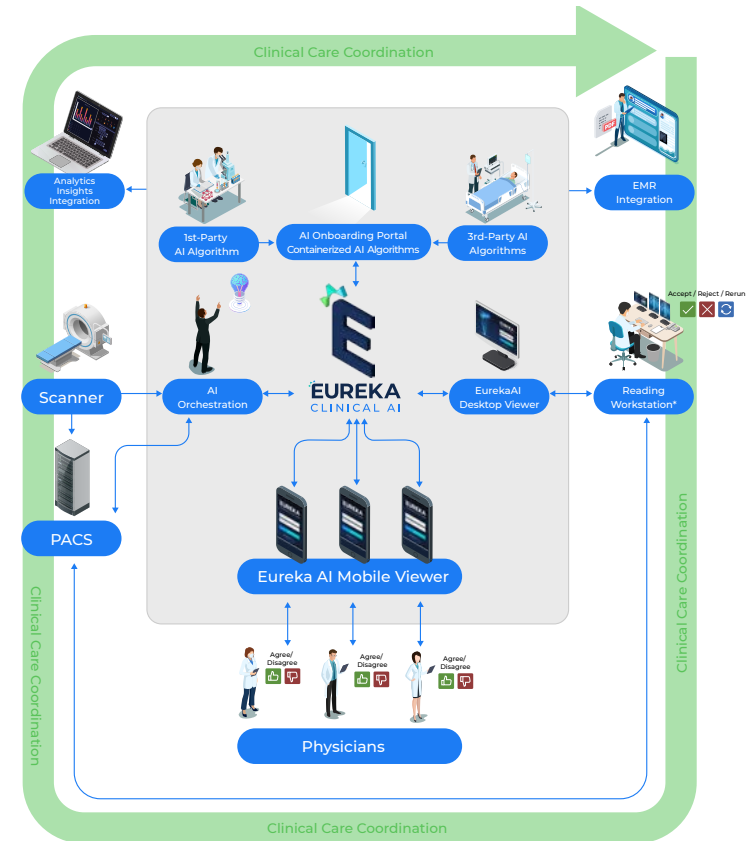
What is AI Consolidation?

Consolidation is about taking multiple disconnected solutions and bringing them together in one enterprise-wide ecosystem.

TeraRecon excels at aggregating multiple AI algorithms and visualization tools and making them easily accessible through a single pane of glass. As our number of AI partners grows, we hope to become your go to partner for all clinical and operational AI needs.

How do we achieve this?

- 7 <https://www.longtermplan.nhs.uk/nhs-aims-to-be-a-world-leader-in-artificial-intelligence-and-machine-learning-within-5-years/>
- 8 <https://www.gov.uk/government/news/artificial-intelligence-to-help-save-lives-at-five-new-technology-centres>
- 9 <https://hbr.org/2019/01/how-to-set-up-an-ai-center-of-excellence>



*Optional PACS-integrated launch of Eureka viewer available.

- ✓ Full support and interoperability with PACS, VNA, RIS, EMR, DICOM, HL7 reporting systems and frameworks
- ✓ Combine multiple customer-developed, TeraRecon-developed, and third-party AI algorithms and orchestrate them via a single platform
- ✓ Readily accessible tools for physicians across desktop and mobile
- ✓ Monitor usage, performance, and productivity metrics for each AI algorithm in a single dashboard
- ✓ Universal viewer for all algorithms to reduce the learning curve and streamline AI adoption among physicians
- ✓ A curated library of proven, workflow-ready clinical AI algorithms with extensibility for future use cases
- ✓ All the above are included in one simple subscription to the Eureka Clinical AI solution



Benefits of AI Consolidation via the Eureka Clinical AI platform

When operating multiple AI algorithms in tandem, vendor onboarding and ongoing IT infrastructure management activities create mountains of extra effort for healthcare institutions.

The Eureka Clinical AI platform is designed with AI consolidation as a primary goal. The platform greatly simplifies AI vendor and infrastructure-related processes to deliver these benefits:

- Procure multiple AI solutions through a single, trusted vendor
- Reduce the complexity of onboarding and maintaining multiple AI solutions
- Standardize the underlying technology infrastructure foundation to streamline long-term maintenance and scalability
- Significantly reduce the burden of acquiring new AI solutions

Enabling Self-Made, Home-Grown AI Medical Imaging Solutions

While some of the potential of AI has already been unlocked, vast swaths of potential lie in the self-made, home-grown medical AI algorithms waiting to be built.

We urgently need more AI developers to create medical AI algorithms and machine learning models. This includes academic hospitals that deal with large volumes of medical images, and the custom AI solutions they create.

TeraRecon is making strides in its goal to empower AI algorithm developers through the Eureka Clinical AI platform:

- ✓ The [Intuition AI Data Extractor](#) transforms advanced visualization data into a format that is readily accessible for training AI.
- ✓ [Intuition and Eureka AI integration](#) enables in-house AI development capabilities for academic medical centers, the result being new AI algorithms being productized and operationalized for use in clinical environments.
- ✓ TR Analytics can track and monitor AI algorithm performance, and other metrics during development to achieve validation for clinical utility.
- ✓ Ingest AI results into the market leading Intuition advanced visualization software to render photorealistic presentations of 3D models and structures with [Glow Rendering](#) and [Neuro Perfusion Maps](#).
- ✓ Choose your preferred deployment configuration with on-prem single and multi-node.

Integrating Workflows with PACS and Reporting Systems

A key benefit of the Eureka Clinical AI platform is its interoperability.

In practice, this means that the Eureka Clinical AI platform is vendor agnostic, and that data is standardized. This enables the integration of clinician workflows directly with PACS, RIS, and EMR systems. Previously, this would involve uploading images to a vendor neutral archive (VNA) system to standardize the format, which is now regarded as insufficient¹⁰ for modern healthcare needs.

¹⁰ <https://www.bridgeheadsoftware.com/2015/06/its-time-to-retire-the-vna/>

Why is Eureka the best platform for integrating clinician workflows with PACS and reporting systems?

- ✓ The Eureka Clinical AI platform can also enable sharing of AI results via DICOM, HL7 and GSPS communication standards
- ✓ With the Eureka Clinical AI platform physicians can interpret AI results and explore them, before having to commit them to the enterprise system

Coordinating Patient Care Among Multi-Specialty Doctors

For complex and multifactorial conditions, patients require a multi-disciplinary team for integrated care.

In one example involving a stroke victim¹¹, this timeline demonstrates just how many teams are involved in coordinating patient care:

1. Paramedic to take the patient from home to hospital
2. Remote diagnostic machine in ambulance relaying paramedic records to neurologist in real-time
3. Joint assessment between paramedic and neurologist, patient is sent to emergency department
4. Triage and communication with specialist stroke experts in preparation for patient arrival
5. Radiologist performs CT scans and angiography and sends to surgical team for minimally invasive mechanical thrombectomy procedure

In total, that was 6 specialist teams for a single patient. The ability of these teams to collaborate is vital in protecting the lives of patients.

TeraRecon strives to help orchestrate multi-specialty teams of doctors by removing digital barriers to collaboration. Some examples of this include:

- ✓ Full access to patient lists on a mobile device

¹¹ <https://www.philips.com/a-w/about/news/archive/standard/news/articles/2022/20221025-how-philips-is-enabling-the-future-of-stroke-care.html>

EUREKA AI

VIEWER(S) & ANALYTICS

Achieve AI Adoption by Empowering Practitioners to Evaluate, Interact and Visualize AI Results

Physician-Centric

Allow physicians to explore AI algorithms and interact with AI results before committing them to the enterprise system.

Maintain Control

Monitor usage, performance and productivity metrics with dedicated Analytics for meaningful and impactful insights.



Explore AI, On-Demand

Enable access to a curated library of workflow-ready clinical AI algorithms with extensibility for future care area suites.

Consistency

One point of access and a single viewer for all AI algorithms reduces the learning curve—streamlining AI adoption.



- ✓ Integrated tools for clinical measurement, treatment planning, and diagnosis
- ✓ Automated large vessel occlusion (LVO) and intracerebral brain hemorrhage (ICH) detection in images, with notifications sent to physicians in real-time
- ✓ View, accept, reject, or modify image findings via desktop; control the final patient record
- ✓ View CT and MR slices with phase scrolling using touch controls on mobile
- ✓ HIPAA compliant instant messaging, group chats, and doctor-to-patient communications
- ✓ Full access to medical insights on any device through to the point-of-care

As a result, these features help multi-specialty teams to improve care coordination. This is essential to deliver integrated, patient-first care regardless of whether they are in hospital or at home.

Most importantly, clinicians retain full control over what ends up in the patient record thanks to TeraRecon's [patented](#) confirmation, rejection, and adjustment tools.

AI is the Long-Term Partner Healthcare Providers Need to Transform Medical Imaging

As strain on the healthcare industry peaks, AI is the long-term solution that healthcare providers need.

The value of doctors and nurses cannot be replaced, but recruitment lead times can reach up to 250 days according to the AAPPR¹² leaving hospitals understaffed. To fill this resource gap, existing doctors and nurses need AI to assist them in completing high-quantity, low-value tasks - so they can focus on where they deliver the most value: caring for patients. The real potential for AI is as an assistant by the side of physicians; tagging images and flagging findings to get to the root cause of disease faster than is possible for humans alone.

From a strategic viewpoint, AI offers immediate benefits in the short-term,

¹² <https://aappr.org/research/benchmarking/>

giving hospitals much needed respite as they resolve long-term issues such as under-staffing and care backlogs.

The Eureka Clinical AI platform is your consolidated foundation to host multiple AI medical imaging algorithms:

- **End-to-End AI Strategy** - We empower AI developers to develop, run, and execute all types of AI (customer developed, TeraRecon developed, and third party resold).
- **On-Demand AI Orchestration** - Healthcare organizations can access a curated library of clinical AI algorithms and care area suites that are rapidly deployable and easy to orchestrate.
- **Integration and Interoperability** - Share AI results with your preferred reporting system via DICOM and HL7 communication standards.
- **Intuitive Integrated Care** - Dual support for desktop and mobile devices, in-app messaging and custom alerts for medical personnel, sharing AI results to optimize care delivery
- **Physician-Centered AI** - Physicians can step in at any stage to accept, reject, or adjust AI findings before they are committed to EMR or PACS.
- **Actionable Insights, Confidence in AI** - Track the performance, productivity, and utilization of individual AI algorithms simultaneously, and increase organizational confidence in AI with enhanced visibility.

We invite you to contact us for a [free trial](#), and test drive the AI-powered future of clinical practice.

Alternatively, you can [reach out](#) to one of our local teams in North Carolina, California, Massachusetts, Japan or Germany for expert advice and guidance.

TeraRecon's AI Ecosystem



Eureka Clinical AI
Vendor-neutral hosting platform for 1st, 2nd and 3rd party AI algorithms to optimize outcomes, reduce burnout, and drive care efficiency.



EurekaAI Viewer
Drive AI adoption by empowering practitioners to evaluate, interact with and visualize AI results.



TR Analytics
Meaningful insights to drive productivity and utilization, as well as assess AI algorithm performance.