IHE Work Item Proposal (Detailed)

# Proposed Work Item: Image Based AI Workflow

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Date: see wiki

Version: see wiki

Domain: Radiology

**Summary**

With the introduction of AI (Artificial Intelligence) based actors into the Radiology workflow, there is a significant challenge in integrating the workflow steps with the existing Radiology actors (as outline outlined in the SWF, CDS-OAT, and PAW) and defining the transactions which need to be supported for the workflow.

The current approach for many AI Server vendors is focused on introducing proprietary transactions and integrations which lead to a significantly fragmented workflow and introduce multiple new interoperability challenges.

The proposed IHE work-item will outline well-defined transactions and content to support the integration of AI based actors leveraging existing standards-based operations, supporting the workflow and interoperability across these actors

# The Problem

With the introduction of AI (Artificial Intelligence) based actors into the Radiology workflow, there is a significant challenge in integrating the workflow steps with the existing Radiology actors (as outline outlined in the SWF, CDS-OAT, and PAW) and defining the transactions which need to be supported for the workflow.

The current approach being taken by many vendors is focused on introducing proprietary transactions and integrations which lead to a significantly fragmented workflow and introduce multiple new interoperability challenges. The proposed IHE work-item will outline well-defined transactions to support the integration of AI based actors leveraging existing standards-based operations to support the workflow and facilitate interoperability across these actors

# Use Cases

The primary workflows which could be addressed using existing standards for the integration of AI workflows. The primary focus of this profile is use cases 3, 4, (possibly 5) and 6.

1. **AI Imaging Service Assists Ordering**

Clinical Decision Support may be used by an ordering physician to determine the proper imaging modality/protocol to use (see Rad CDS-OAT and PCC GAO).

An AI Service may be included in an order by an ordering physician for post-acquisition processing of an ordered imaging procedure (see SWF).

* 1. The post-acquisition workflow could be implicit (see SWF).
  2. The post-acquisition workflow could be explicit (see PAW).

1. **AI Imaging Service Assists Scheduling**

A Scheduling Assistant support service may be used by the scheduler to optimize the departmental workflow.

1. **AI Imaging Service Assists Image Acquisition**

A technologist may interact with an AI Service to optimize the image acquisition (UPS or PAW like).

* 1. Acquisition Modality provides preliminary images to AI Server.
  2. AI service provides interim results to technologist (iterative)
  3. Acquisition Modality accepts results as final to the AI Server
  4. Acquisition Modality sends images and AI artifacts to Image Archive

1. **AI Imaging Service Assists Image Read**

A Radiologist may interact with an AI Service with the image read (UPS or PAW like).

* 1. PACS provides preliminary images to AI Server.
  2. AI service provides interim results to Radiologist (iterative)
  3. Radiologist accepts results as final to the AI Server
  4. AI artifacts sent to Image Archive

1. **AI Imaging Service Results change Reading Workflow Priority**
   1. Priority Notification could be updated via MPPS (see SWF)
   2. Priority Notification could be updated via UPS (see PAW)
2. **AI Imaging Service Artifacts are readable with the images**
   1. Standardized artifacts, using DICOM SR and AIM (AIM to SR conversion, see DICOM and AIM)
3. **EMR and Financial Tracking of AI Imaging Services Performed**
   1. Technical charges and services tracked/captured (See CDS-OAT and Charge Posting)

The Integration profiles sited above provide useful references to existing profiles that may be adapted for AI. Note that the focus is use cases 3, 4 & 6.

# Standards & Systems

The existing systems include:

1. Acquisition Modalities(US, MR, CT, etc)
2. Imaging Information Systems (PACS, RIS, etc)
3. AI Imaging Servers (cloud-based and in-house servers)

The relevant standards include:

1. DICOM, including DICOMweb
2. HL7, including FHIR
3. AIM
4. IHE PAW (and other profiles listed above)

DICOM Application Hosting transactions are worth consideration for future release.

# Technical Approach

For the AI Imaging Service Assists Image Acquisition and Image Read, the DICOM UPS should be most appropriate. PAW Integration profile has the most applicable transactions profiling the necessary workflow.

**New actors**

None

**Existing actors**

See PAW

**New transactions (standards used)**

<Describe possible new transactions (indicating what standards would likely be used for each. Transaction diagrams are very helpful here. Feel free to go into as much detail as seems useful.>

<Point out any key issues or design problems. This will be helpful for estimating the amount of work.>

<If a phased approach would make sense indicate some logical phases. This may be because standards are evolving, because the problem is too big to solve at once, or because there are unknowns that won’t be resolved soon.>

<Indicate how existing / /transactions might need to be modified.>

**Impact on existing integration profiles**

<Indicate how existing profiles might need to be modified.>

**New integration profiles needed**

<Indicate how existing profiles might need to be modified.>

**Breakdown of tasks that need to be accomplished**

<A list of tasks would be helpful for the technical committee who will have to estimate the effort required to design, review and implement the profile.>

# Risks

<List technical or political risks that will need to be considered to successfully field the profile.>

# Open Issues

# Effort Estimates

<The technical committee will use this area to record details of the effort estimation.>