IHE Work Item Proposal (Detailed)

# Proposed Work Item: Image Based AI Workflow

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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:

1. **AI Imaging Service Assists Ordering**
   1. 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).
   2. An AI algorithm may be included in an order by an ordering physician for post-acquisition processing of an ordered imaging procedure (see SWF).
2. **AI Imaging Service Assists Scheduling**

An AI Imaging Service may be ordered/scheduled by the RIS or Imaging Workflow Manager.

* 1. The post-acquisition workflow could be implicit (see SWF).
  2. The post-acquisition workflow could be explicit (see PAW).
  3. The AI Imaging Service could be cloud-hosted or RESTful service oriented, using DICOMweb and FHIR.

1. **AI Imaging Service Assists Acquisition**
   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
2. **AI Imaging Service Results available with the Acquired Imaging Study.** 
   1. Results availability could use MPPS (see SWF)
   2. Results availability could use UPS (see PAW)
3. **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)
4. **AI Imaging Service Artifacts are readable with the images by the Radiologist**
   1. Standardized artifacts, using DICOM SR and AIM (AIM to SR conversion, see DICOM and AIM)
5. **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 most important is Step 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 profiles listed above

# Technical Approach

<This section can be very short. Feel free to include as much or as little detail as you like. The Technical Committee will flesh it out when doing the effort estimation.>

<Outline how the standards could be used and refined to solve the problems in the Use Cases. The Technical Committee will be responsible for the full design and may choose to take a different approach, but a sample design is a good indication of feasibility.>

**New actors**

<List possible new actors>

**Existing actors**

<Indicate what existing actors might be affected by the profile.>

**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.>