Integrating the Healthcare Enterprise

IHE

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IHE Cardiology
Technical Framework Supplement

Image-Enabled Office
(IEO)

10

Trial Implementation

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20 Date: August 29, 2013
    Author: IHE Cardiology Technical Committee
    Email: cardio@ihe.net

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Foreword

This is a supplement to the IHE Cardiology Technical Framework 5.0. Each supplement undergoes a process of public comment and trial implementation before being incorporated into the volumes of the Technical Frameworks.

30   This supplement is submitted for trial implementation as of August 29, 2013 and may be available for testing at subsequent IHE Connectathons. The supplement may be amended based on the results of testing. Following successful testing it will be incorporated into the Cardiology Technical Framework. Comments are invited and may be submitted at http://www.ihe.net/Cardiology_Public_Comments.

35   This supplement describes changes to the existing technical framework documents and where indicated amends text by addition (**bold underline**) or removal (**bold strikethrough**), as well as addition of large new sections introduced by editor's instructions to "add new text" or similar, which for readability are not bolded or underlined.

"Boxed" instructions like the sample below indicate to the Volume Editor how to integrate the
40   relevant section(s) into the relevant Technical Framework volume:

> *Replace section X.X by the following:*

General information about IHE can be found at: www.ihe.net.

45   Information about the IHE Cardiology domain can be found at: http://www.ihe.net/IHE_Domains.

Information about the organization of IHE Technical Frameworks and Supplements and the process used to create them can be found at: http://www.ihe.net/IHE_Process and http://www.ihe.net/Profiles.

50   The current version of the IHE Cardiology Technical Framework can be found at: http://www.ihe.net/Technical_Frameworks.

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Introduction

This Supplement introduces a new Image-Enabled Office Profile for the integration of an ambulatory office EHR system with an imaging suite. This Profile is added to the IHE Cardiology Technical Framework, with the overall design in Volume 1 and specific transactions
130   in Volume 2. This Profile relies heavily on transactions specified in the IHE Radiology and IHE IT Infrastructure Technical Frameworks, although no changes are introduced to those documents.

The specification of this Profile in the IHE Cardiology Technical Framework should not be viewed as limiting its application in other clinical domains. It is potentially applicable to all
135   domains that involve imaging in the ambulatory office, including radiology, oncology, obstetrics/gynecology, gastro-enterology, ophthalmology, orthopedics, and dentistry.

Profile Abstract

An increasing number of clinicians have diagnostic imaging equipment and electronic health record systems in their offices. This equipment needs to be integrated into the ambulatory office
140   workflow, and the imaging results need to be seamlessly integrated into the EHR system.

The workflow and result integration efforts of IHE Cardiology have to this point been directed primarily towards the in-patient environment. However, there is a critical need for simplified integration in the ambulatory environment.

Note that the systems in an office environment must in many ways be more technically
145   sophisticated than in an in-patient environment, as they must operate with less IT-savvy human supervision, and combine features that would otherwise be distributed across multiple systems.

This profile addresses one aspect of imaging – the production of diagnostic images in an ambulatory environment. Not in the scope of this profile is review in an office based system of images produced in another organization, e.g., review of in-patient imaging such as a cardiac
150   catheterization procedure in the cardiologist's practice office, or referral of a patient with imaging studies for consultation with specialist in another institution (see "Relationship to Cross-Enterprise Exchange Profiles" below).

This Profile is therefore only part of a solution for the full functionality of the image-enabled office.

155 ## Derivation from Other Profiles

Much work in IHE has already been directed to both general interoperability (in the IT Infrastructure Domain) and to imaging specifically (in the Radiology Domain). This Profile leverages that previous work, and reuses many of the transaction specifications from the Technical Frameworks of those Domains. In particular, it uses the ITI Retrieve Information for
160   Display Profile, and transactions from the Radiology Scheduled Workflow, Evidence Documents, and Patient Information Reconciliation Profiles.

This Profile also uses transactions from the IHE Cardiology Displayable Reports Profile Supplement for Trial Implementation, which is being reissued at the same time as this Supplement.

165   A good background in the ITI, Radiology, and Cardiology profiles, actors, and transactions is important for full understanding of this Profile.

Relationship to Cross-Enterprise Exchange Profiles

A major use case for the image-enabled office is to review images that have been acquired in other locations, and to share images acquired locally with other institutions. The office EHR thus
170   needs to be able to exchange reports and associated images with other providers' EHR and image management systems. However, that capability is already fully specified in the Cross-Enterprise Document Sharing (XDS), the Cross-Enterprise Document Sharing for Imaging (XDS-I), the Portable Data for Imaging (PDI), and the Import Reconciliation Workflow (IRWF) profiles.

This profile therefore considers only the in-office workflow. Implementers and users are directed
175   to the IHE XDS and PDI family of profiles for cross-enterprise information exchange.

Relationship to Content Profiles

Image-Enabled Office is a *workflow* profile – it is agnostic with respect to the clinical content of the data produced and handled. However, systems that are produced for specific specialties may have very specific requirements with regard to the clinical data used in those specialties. Thus,
180   for instance, an image display system for the women's health center market will have requirements with regard to managing and appropriate display of mammography and obstetric/gynecological ultrasound images. Such specialty specific interoperability requirements are described in IHE Technical Frameworks as *content* profiles.

The concept of content profiles has been evolving over the past several years, and therefore they
185   are inconsistently specified in the various domain Technical Frameworks. IHE Patient Care Coordination has developed separate content profiles dealing with specific templates for CDA documents used in narrow clinical contexts (e.g., Antepartum Record, and Preprocedure History and Physical). IHE Cardiology has historically created some profiles that are a combination of workflow and content (e.g., Cath Workflow and Echo Workflow), while it has identified other
190   content profiles as options to a workflow profile (e.g., the Stress and CTA/MRA options to the Evidence Documents Profile). IHE Radiology has created content profiles that include specific actor behaviors using conditional requirements on general workflow transactions (e.g., Mammo Image and NM Image), and others using unique transactions (e.g., Consistent Presentation of Images).

195   This profile is being developed at same time that a more consistent approach for content profiles is being developed. The goal is to specify IHE Profiles whose purposes are clear to users and developers, and are easy to find. Thus products may ultimately need to claim compliance to both workflow and content profiles (e.g., Image-Enabled Office Workflow *and* Cardiology Content). However, content profiles are not within the scope of this Supplement.

Implementation Considerations

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While IHE tries to specify profiles, actors, and transactions in an implementation-independent manner, the existing capabilities of systems available for clinical practice necessarily inform the profile design. For the Image-Enabled Office Profile, the IHE Cardiology Technical Committee has made some broad assumptions about implementations:

205
- Imaging modalities should operate the same in the office environment as they do in the in-patient environment. An imaging modality claim of conformance to Radiology Scheduled Workflow, Echocardiography Workflow, Stress Workflow, etc. profiles should be sufficient for support of the Image-Enabled Office Profile.

- Electronic Health Record Systems (EHR-S) should not require image management and
210 archive capabilities to be built in; they should be able to integrate with a separate system (PACS) for those features.

- EHR-S's do need to be augmented with functionality to manage the imaging suite so that modalities can operate in their standard manner. This functionality may be designed into the EHR-S, or it may be achieved with an integration engine (or broker), or the EHR-S may
215 integrate with an imaging workflow manager (identified in this Profile as a "DSS/OF").

Volume 1 – Integration Profiles

Add the following bullet to the end of the bullet list in section 1.7

220 1.7 History of Annual Changes

- Added the Image-Enabled Office Profile which specifies integration of an imaging suite with an ambulatory office EHR system.

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230 The National Electrical Manufacturers Association (NEMA) has granted permission to the IHE to incorporate portions of the DICOM standard.

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Add the following subsection to the Technical Framework and renumber any subsequent subsections on section 1.

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250

Add the following to Table 2-1

2.1 Dependencies among Integration Profiles

Table 2-1: Cardiology Integration Profiles Dependencies

Integration Profile	Depends on	Dependency Type	Comments
…			
Image-Enabled Office	ITI-TF Retrieve Information for Display	The EHR-S actor, or the Integrated EHR-S actor, is required to be grouped with the Information Source actor of RID	

255

Add the following section to section 2.2

2.2.X Image-Enabled Office (IEO)

The Image-Enabled Office (IEO) Profile specifies the integration of an imaging suite (modalities, storage server, and workstations) with an electronic health record system in an
260 ambulatory office setting. This is a fully bi-directional integration, including ordering/scheduling of an imaging exam, status reporting for that exam, report creation, and web-based imaging exam review integration.

Add the following section to section 2.3

265 ## 2.3 Actor Descriptions

…

> **Electronic Health Record System** – A system that supports patient administration, scheduling, clinical records management, decision support, and orders and referrals.

> **Integrated Electronic Health Record System** – An Electronic Health Record System that
270 additionally supports imaging workflow management

…

Table 2.3-1: Integration Profile Actors

Integration Profile / Actor	…	IEO
Acquisition Modality		**X**
ADT Patient Registration		
Department System Scheduler/Order Filler		**X**
Evidence Creator		**X**

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Integration Profile / Actor	…	IEO
Image Archive/Image Manager		**X**
Image Display		**X**
Order Placer		
Performed Procedure Step Manager		**X**
Report Creator		**X**
Report Display		
Report Manager		
Report Repository		
Time Client		
Display		
Information Source		**(note 3)**
Electronic Health Record System		**X**
Integrated Electronic Health Record System		**X**

Note: **3. The Information Source actor is not formally part of the IEO Profile, but must be grouped with the EHR-S and Integrated EHR-S actors in that Profile.**

275

Add the following section to section 2.4

2.4 Transaction Descriptions

…

Notify Study Access – The Image Manager/Image Archive notifies the EHR-S actor about
280   the availability of access to a DICOM Study for viewing. [CARD-14]

Invoke Image Display Service – An EHR-S invokes a web service of an Image
Manager/Image Archive for interactive display of DICOM Studies. [CARD-15,
derived from ITI-11]

Outpatient Update – The EHR-S informs the Department System Scheduler/Order Filler of
285   new information for a particular outpatient. The Department System Scheduler may
then further inform the Image Manager. [CARD-16, derived from RAD-12]

The following table shows ~~which~~ **the** transactions **that** are used in ~~which~~ **each** Integration
Profile~~s~~.

290

Table 2.4-1: Integration Profile Transactions

Transaction	Integration Profile / …	IEO
Patient Registration [RAD-1]		**X**

Transaction / Integration Profile	…	IEO
Placer Order Management [RAD-2]		**X**
Filler Order Management [RAD-3]		**X**
Procedure Scheduled [RAD-4]		**X**
Query Modality Worklist [RAD-5]		**X**
Modality Procedure Step In Progress [CARD-1]		**X**
Modality Procedure Step Completed [RAD-7]		**X**
Modality Images/Evidence Stored [CARD-2]		**X**
Storage Commitment [CARD-3]		**X**
Patient Update [RAD-12]		
Procedure Update [RAD-13]		**X**
Query Images [RAD-14]		**X**
Query Evidence Documents [RAD-44]		**X**
Retrieve Images/Evidence [CARD-4]		**X**
Instance Availability Notification [RAD-49]		
Maintain Time [ITI-1]		
Retrieve Specific Info for Display [ITI-11]		
Retrieve ECG List [CARD-5]		
Retrieve ECG Document for Display [CARD-6]		
Notify Study Access [CARD-14]		**X**
Invoke Image Display Service [CARD-15]		**X**
Outpatient Update [CARD-16]		**X**

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10 Image-Enabled Office (IEO) Integration Profile

The Image-Enabled Office (IEO) Profile specifies the integration of an imaging suite (modalities, storage server, and workstations) with an electronic health record system in an ambulatory office setting. This is a fully bi-directional integration, including ordering/scheduling

300 of an imaging exam, status reporting for that exam, report creation, and web-based imaging exam review integration.

The intent of this profile is to

- Increase the integration of imaging-related assets with the office EHR
- Reuse best-practice from the in-patient setting to maximize efficiency in the out-patient

305 setting

The strategy employed is twofold:

- Leverage as much as practical from the existing IHE (in-patient) scheduled workflow profiles, building on the experience base of workflow interoperability from the in-patient environment

310 - Recognize the unique workflow realities and the established or expected nature of the IT systems in the office environment

From a PACS and imaging device perspective, this facilitates the adoption of IHE in the office environment, because the imaging assets can be deployed with almost no changes.

From the office EHR perspective, the profile provides integration to the imaging suite using

315 commonly used interface technologies, including HL7v2 messages and web services.

From an in-patient imaging IT perspective (RIS / CVIS / broker), the DICOM-related imaging workflow management assets can be packaged for integration with office EMRs in two different architectural approaches.

This is of particular interest to those providers and vendors who want to bring their existing in-

320 patient experience into the office domain. It also provides a roadmap as to how those providers and vendors in the office space can leverage capabilities from the in-patient domain to deliver effective imaging workflows to the end-user.

10.1 Actors/ Transactions

Figure 10.1-1 shows the actors directly involved in the Image-Enabled Office Integration Profile

325 and the relevant transactions between them. The Retrieve Information for Display (RID) Profile actors are shown in gray, since the EHR-S actor must be grouped with the Information Source actor in the RID Profile (see sections 2.5 and 6.1.1.1). Other actors that may be indirectly involved due to their participation in related profiles are not shown.

Several of the transactional relationships are labeled in italics; these represent multiple similar

330 types of transactions that are formally specified in IHE Technical Frameworks with distinct

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transaction IDs, but whose differences are inconsequential for the purposes of this diagram. Specific transaction requirements are specified in table 10.1-1.
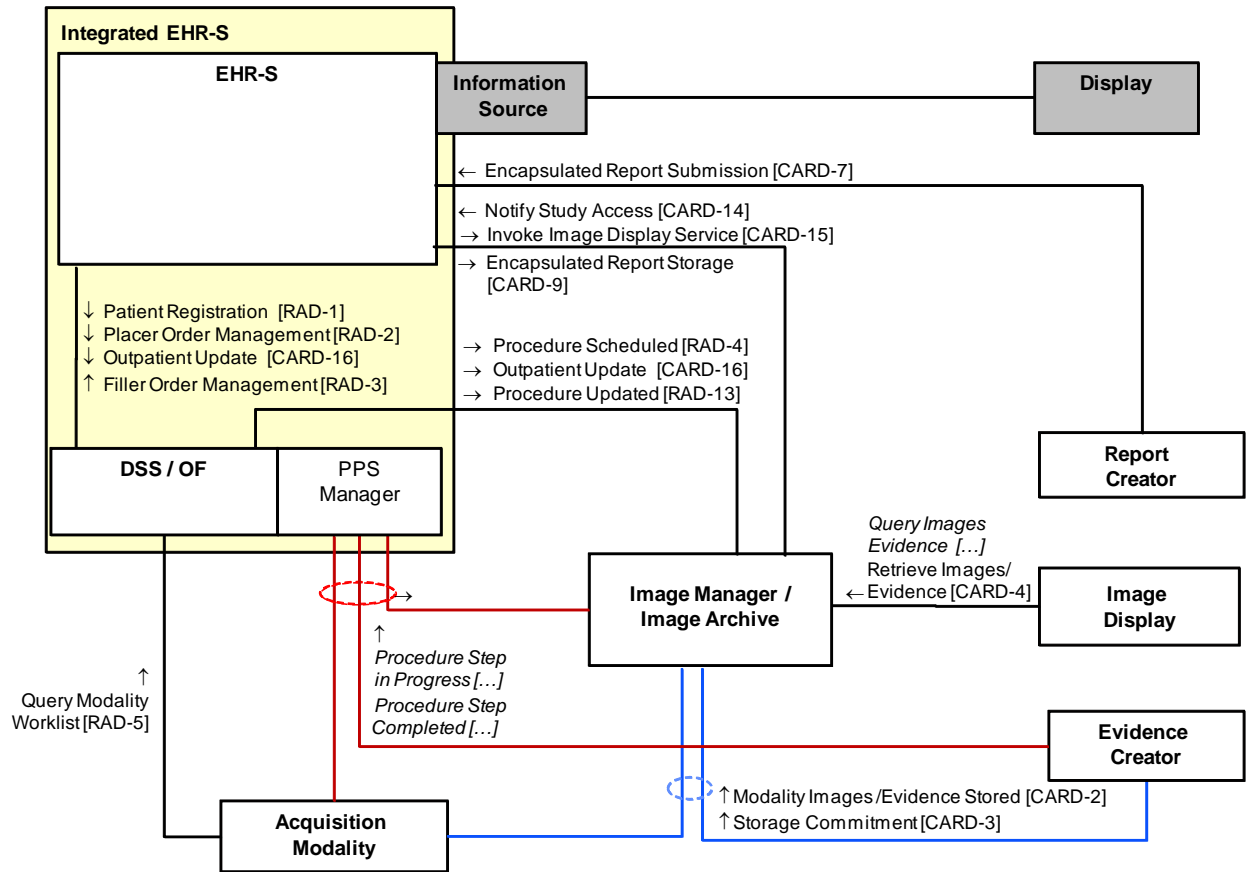
335

Figure 10.1-1: Image-Enabled Office Actor/Transaction Diagram

Table 10.1-1 lists the transactions for each actor directly involved in the Image-Enabled Office Profile. In order to claim support of this Integration Profile, an implementation must perform the
340 required transactions (labeled "R"). Transactions labeled "O" are optional. A complete list of options defined by this Integration Profile and that implementations may choose to support is listed in section 10.2.

Table 10.1-1: Image-Enabled Office Integration Profile - Actors and Transactions

Actors	Transactions	Option-ality	Section in Vol. 2
EHR-S	Encapsulated Report Submission [CARD-7]	R	CARD-TF- 2: 4.7 [Sup-DRPT]
	Notify Study Access [CARD-14]	R	CARD-TF- 2: 4.14 [Sup-IEO]

Actors	Transactions	Option-ality	Section in Vol. 2
	Invoke Image Display Service [CARD-15]	R	CARD-TF-2: 4.15 [Sup-IEO]
	Encapsulated Report Storage [CARD-9]	O	CARD-TF- 2: 4.9 [Sup-DRPT]
	Patient Registration [RAD-1] (as ADT actor)	R	RAD-TF 2: 4.1
	Outpatient Update [CARD-16]	R	CARD-TF-2: 4.16 [Sup-IEO]
	Placer Order Management [RAD-2] (as Order Placer actor)	R	RAD-TF 2: 4.2
	Filler Order Management [RAD-3] (as Order Placer actor)	R	RAD-TF 2: 4.3
DSS/OF (grouped with Performed Procedure Step Manager)	Patient Registration [RAD-1]	R	RAD-TF 2: 4.1
	Placer Order Management [RAD-2]	R	RAD-TF 2: 4.2
	Filler Order Management [RAD-3]	R	RAD-TF 2: 4.3
	Procedure Scheduled [RAD-4]	R	RAD-TF 2: 4.4
	Query Modality Worklist [RAD-5]	R	RAD-TF 2: 4.5
	Outpatient Update [CARD-16]	R	CARD-TF-2: 4.16 [Sup-IEO]
	Procedure Updated [RAD-13]	R	RAD-TF 2: 4.13
Performed Procedure Step Manager (grouped with DSS/OF)	Modality Procedure Step In Progress [RAD-6]	R	RAD-TF 2: 4.6
	Modality Procedure Step Completed [RAD-7]	R	RAD-TF 2: 4.7
	Creator Procedure Step In Progress [RAD-20]	R	RAD-TF 2: 4.20
	Creator Procedure Step Completed [RAD-21]	R	RAD-TF 2: 4.21
Integrated EHR-S	Encapsulated Report Submission [CARD-7]	R	CARD-TF- 2: 4.7 [Sup-DRPT]
	Notify Study Access [CARD-14]	R	CARD-TF- 2: 4.14 [Sup-IEO]
	Invoke Image Display Service [CARD-15]	R	CARD-TF- 2: 4.15 [Sup-IEO]
	Encapsulated Report Storage [CARD-9]	O	CARD-TF- 2: 4.9 [Sup-DRPT]
	Procedure Scheduled [RAD-4] (as DSS/OF actor)	R	RAD-TF 2: 4.4
	Outpatient Update [CARD-16]	R	CARD-TF-2: 4.16 [Sup-IEO]
	Procedure Updated [RAD-13] (as DSS/OF actor)	R	RAD-TF 2: 4.13
	Query Modality Worklist [RAD-5]	R	RAD-TF 2: 4.5
	Modality Procedure Step In Progress [RAD-6] (as PPS Manager and DSS/OF actors)	R	RAD-TF 2: 4.6
	Modality Procedure Step Completed [RAD-7] (as PPS Manager and DSS/OF actors)	R	RAD-TF 2: 4.7
	Creator Procedure Step In Progress [RAD-20] (as PPS Manager and DSS/OF actors)	R	RAD-TF 2: 4.20
	Creator Procedure Step Completed [RAD-21] (as PPS Manager and DSS/OF actors)	R	RAD-TF 4.21
Acquisition Modality	Query Modality Worklist [RAD-5]	R	RAD-TF 2: 4.5
	Modality Procedure Step In Progress [RAD-6]	R	RAD-TF 2: 4.6
	Modality Procedure Step Completed [RAD-7]	R	RAD-TF 2: 4.7
	Modality Images/Evidence Stored [CARD-2]	R	CARD-TF 2: 4.2
	Storage Commitment [CARD-3]	R	CARD-TF 2: 4.3

Actors	Transactions	Option-ality	Section in Vol. 2
Image Manager/Image Archive	Procedure Scheduled [RAD-4]	R	RAD-TF 2: 4.4
	Modality Procedure Step In Progress [RAD-6]	R	RAD-TF 2: 4.6
	Modality Procedure Step Completed [RAD-7]	R	RAD-TF 2: 4.7
	Creator Procedure Step In Progress [RAD-20]	R	RAD-TF 2: 4.20
	Creator Procedure Step Completed [RAD-21]	R	RAD-TF 2: 4.21
	Modality Images/Evidence Stored [CARD-2]	R	CARD-TF 2: 4.2
	Storage Commitment [CARD-3]	R	CARD-TF 2: 4.3
	Encapsulated Report Storage [CARD-9]	R	CARD-TF- 2: 4.9 [Sup-DRPT]
	Outpatient Update [CARD-16]	R	CARD-TF-2: 4.16 [Sup-IEO]
	Procedure Updated [RAD-13]	R	RAD-TF 2: 4.13
	Notify Study Access [CARD-14]	R	CARD-TF- 2: 4.14 [Sup-IEO]
	Query Images [RAD-14]	R	RAD-TF 2: 4.14
	Query Evidence Documents [RAD-44]	R	RAD-TF 3: 4.44
	Retrieve Images/Evidence [CARD-4]	R	CARD-TF 2: 4.4
	Invoke Image Display Service [CARD-15]	R	CARD-TF- 2: 4.15 [Sup-IEO]
Image Display	Query Images [RAD-14]	R	RAD-TF 2: 4.14
	Query Evidence Documents [RAD-44]	R	RAD-TF 3: 4.44
	Retrieve Images/Evidence [CARD-4]	R	CARD-TF 2: 4.4
Evidence Creator	Creator Procedure Step In Progress [RAD-20]	O	RAD-TF 2: 4.20
	Creator Procedure Step Completed [RAD-21]	O	RAD-TF 2: 4.21
	Modality Images/Evidence Stored [CARD-2]	R	CARD-TF 2: 4.2
	Storage Commitment [CARD-3]	R	CARD-TF 2: 4.3
Report Creator (grouped with Image Display or Acquisition Modality)	Encapsulated Report Submission [CARD-7]	R	CARD-TF- 2: 4.7 [Sup-DRPT]

345   In each of the transactions assigned in Table 10.1-1, actors shall implement the HL7 v2.5.1
Message Semantics when such semantics are defined. Those transactions are:

- Patient Registration [RAD-1]
- Placer Order Management [RAD-2]
- Filler Order Management [RAD-3]

350
- Procedure Scheduled [RAD-4]
- Procedure Updated [RAD-13]

10.1.1 Actor Groupings

This section describes required grouping of defined actors within the IEO Profile (see also
section 2.5 for discussion of grouping of actors in an implementation).

355 **10.1.1.1 Electronic Health Record System / Information Source**

Electronic Health Record System (EHR-S) is an actor supporting the functions of patient administration, scheduling, clinical records management, decision support, and external orders and referrals.

360
> Note: See, for instance, the HL7 Electronic Health Record System Function Model standard for specification of EHR-S functionality.

This profile specifies only the interoperability requirements of the EHR-S within the office workflow, and the functionality immediately associated with that interoperability. These requirements are defined by the IHE transactions and the expected actions of IHE actors specified as the end-points of those transactions.

365 EHR-S interoperability includes functionality that in the in-patient workflow context would be handled in an ADT actor or an Order Placer actor. This profile reuses transactions specified in other IHE Domains with transaction end-points defined by those actor names. For the purpose of this profile, therefore, the EHR-S actor acts as the ADT actor end-point of the Patient Registration transaction, and as the Order Placer actor end-point of the Placer Order

370 Management transaction. No inferences should be drawn from those transaction actor names as to implied functional requirements, e.g., there is no "admission" functionality in the office environment implied by the transaction end-point named ADT.

The IHE IT Infrastructure Retrieve Information for Display (RID) Profile describes a simplified method for web-based integration of an Information Source (server) and a Display (client) for

375 access to patient clinical data. The EHR-S is required to be grouped with the RID Information Source actor to make the patient's clinical data available to a Display actor (e.g., an imaging workstation or a modality claiming the RID Profile). Such a capability allows a user to have access to the patient record while performing imaging-related tasks in the imaging suite.

10.1.1.2 DSS/OF / PPS Manager

380 In the IEO Profile, the Department System Scheduler / Order Filler (DSS/OF) actor is grouped with the Performed Procedure Step Manager (PPS Manager) to manage the workflow transactions with the imaging suite (Acquisition Modalities, Image Manager / Image Archive, image display workstations, etc.) based on orders from the EHR-S. This grouping includes the functionality of re-distributing Performed Procedure Step information to the Image Manager that

385 is handled by the PPS Manager actor.

No inferences should be drawn from the DSS/OF actor name as to implied functional requirements, e.g., scheduling may be performed by the EHR-S actor and imaging procedure schedules conveyed in the Placer Order Management transactions.

390
> Notes: 1. In other IHE profiles, the PPS Manager grouped with the DSS/OF is capable of being disabled and a PPS Manager grouped with the Image Manager/Image Archive actor is enabled. For consistency of implementation, in the IEO Profile the PPS Manager grouped with the DSS/OF is always enabled.

395
> 2. The PPS Manager handles two variants of transactions using the DICOM Modality Performed Procedure Step SOP Class, specified in the IHE Radiology Technical Framework as Modality and Creator Procedure Steps; Creator Procedure Steps are a subset of Modality Procedure Steps. It may need to support additional variants based on other profiles to which it claims conformance, e.g., the [CARD-1] transaction for Stress Testing Workflow (see section 10.7.2), or [RAD-59] and [RAD-60] for the Import Reconciliation Workflow Profile,

3. The DSS/OF in this Profile is only required to support the outpatient trigger events of the Outpatient Update [CARD-16] transaction, rather than the full set of trigger events of the general Patient Update [RAD-12] transaction used in other Profiles,

400   4. Support for ECG acquisition modalities requires the Enhanced Modality Worklist [CARD-12] transaction.

10.1.1.3 Integrated Electronic Health Record System

The Integrated Electronic Health Record System combines the functionality of the EHR-S, DSS/OS, and PPS Manager actors in an integrated implementation. In such an integrated implementation, the transactions between the EHR-S and the DSS/OF are not externalized; i.e.,
405 patient and order management are solely the internal responsibility of the Integrated EHR-S implementation. All other transactions of the EHR-S, DSS/OS, and PPS Manager actors to other actors are required.

Like the EHR-S, the Integrated EHR-S is required to be grouped with the RID Information Source actor to make the patient's clinical data available to a Display actor.

410   Note: While the Integrated EHR-S includes the DICOM MWL/MPPS capability associated with the DSS/OF and PPS Manager actors, this does not preclude implementation by a component such as an interface engine ("broker") with non-IHE specified interfaces to the EHR-S. From the perspective of the IEO Profile, such internal architectural design is solely the responsibility of the vendor providing the Integrated EHR-S.

10.1.1.4 Image Manager / Image Archive

415 While the Image Manager and Image Archive are formally separate actors (see Section 2.3), they are grouped with each other and treated as a single actor.

The Image Manager/Image Archive actor shall support all the variants of DICOM image and evidence object storage transactions using DICOM Storage SOP Classes as specified in Content Profiles claimed by the implementation in its IHE Integration Statement. This may include
420 Modality Images and Presentation States, Creator Images and Presentation States, Evidence Documents, Key Image Notes, and import objects. In the absence of a claimed Content Profile, supported content types shall be stated in the Integration Statement, either explicitly, or by reference to its DICOM Conformance Statement.

      Notes: 1. An Image Manager/Image Archive actor may have specific content-related behavior requirements if it also
425   claims conformance to a Content Profile (e.g., echocardiography content requires support for particular compressed transfer syntaxes for ultrasound objects).

                 2. The Image Manager/Image Archive has requirements in the IEO Profile for integration with the EHR-S that go beyond the requirements of other Radiology and Cardiology Profiles. This includes use of an HL7-based Notify Study Access transaction similar to the DICOM Image Availability Notification [RAD-49] transaction, as well as
430   a web service based access to imaging data for EHR-S displays.

                 3. In other profiles, the Image Manager/Image Archive is required to be grouped with the PPS Manager, and the PPS Manager must be able to be disabled. In the IEO Profile, the active PPS Manager is always grouped with the DSS/OF. The Image Manager/Image Archive is still required to receive the Modality and Creator Procedure Step transactions forwarded from the PPS Manager.

435 ### 10.1.1.5 Report Creator

The Report Creator actor shall be grouped with either an Image Display actor or an Acquisition Modality actor. This allows the Report Creator to have access to the images and evidence in the creation of the report.

An implementation may group the Report Creator with the Display actor of the RID Profile. This
440 allows access to the patient record stored in the EHR-S at the point of reporting.

> Note: Report creation functionality may also be available in the EHR-S, where the images and evidence would be
> available through the Invoke Image Display Service [CARD-15] transaction. However, as both report creation
> and report management are functions of the EHR-S, and hence there are no externalized transactions between
> those functions, there is no need to identify a Report Creator actor within the EHR-S.

445 ## 10.1.2 Support for Multiple Actor Instances

An installation of systems supporting the IEO Profile may include multiple instances of several
types of actors. In particular, there may be multiple instances of the following:

- Acquisition Modality
- Image Display
450 - Evidence Creator
- Report Creator

Actors that engage in transactions with these actors must support such multiple instances.

The IEO Profile does not require support for multiple instances of the Image Manager/Image
Archive. However, there may be installations, such as large, multi-specialty clinics, that require
455 multiple Image Managers. Implementers of all other actors, which all have transactions with the
Image Manager, should consider whether their market requires support for multiple Image
Managers.

The IEO Profile does not require support for multiple instances of the EHR-S actor. Again,
implementers of other actors that have transactions with the EHR-S should consider whether
460 their market requires support for interactions with multiple EHR-Ss.

10.1.3 Support for Variant Workflow Transactions

Certain transactions have variant forms (with distinct transaction IDs) reflecting a subset or
superset of the capabilities of another transaction for particular use cases. In table 10.1-1, the
capability required for each actor is identified; those transactions are described in this section
465 together with variant transactions that provide similar functionality.

> Note: Where applicable, this profile has selected transaction variants specified in the Cardiology Technical Framework.

10.1.3.1 Modality Images/Evidence Stored

The Modality Images/Evidence Stored [CARD-2] transaction is a superset of the Modality
Images Stored [RAD-8], Creator Images Stored [RAD-18], and Evidence Documents Stored
470 [RAD-43] transactions. Options specified in those transactions are not used in the IEO Profile;
implementations may claim conformance to those options by claiming conformance to other
profiles (see Section 10.7).

For the IEO Profile, Acquisition Modality actors that claim conformance to the [RAD-8]
transaction and Evidence Creator actors that claim conformance to the [RAD-18] or [RAD-43]

475 transactions (e.g., through the Radiology Scheduled Workflow Profile or the Evidence Documents Profile), are equally conformant to the [CARD-2] transaction.

10.1.3.2 Storage Commitment

The Storage Commitment [CARD-3] transaction is identical to the Storage Commitment [RAD-10] transaction, with the addition of an "option" on the Image Manager/Image Archive to

480 support intermittently connected modalities. For the IEO Profile, this option is required for the Image Manager/Image Archive (see section 10.2). There is no difference for Acquisition Modality and Evidence Creator actors.

Acquisition Modality and Evidence Creator actors that claim conformance to the [RAD-10] transaction (e.g., through the Radiology Scheduled Workflow Profile) are equally conformant to

485 the [CARD-3] transaction.

10.1.3.3 Retrieve Images/Evidence

The Retrieve Images/Evidence [CARD-4] transaction is a superset of the Retrieve Images [RAD-14] and Retrieve Evidence Documents [RAD-45] transactions. Options specified in those transactions are not used in the IEO Profile; implementations may claim conformance to those

490 options by claiming conformance to other profiles (see Section 10.7).

For the IEO Profile, Image Display actors that claim conformance to the [RAD-14] and [RAD-45] transactions (e.g., through the Radiology Scheduled Workflow Profile or the Evidence Documents Profile), are equally conformant to the [CARD-4] transaction.

> Note: Image Display actors in this profile are required to support query/retrieve of both Images and Evidence
495   Documents. However, the specific SOP Classes supported are not specified, and may be determined by
>   compliance to other Profiles (see section 10.7).

10.2 Image-Enabled Office Integration Profile Options

Some Transactions have Options defined in order to accommodate variations in use across

500 domains or implementations. Options that may be selected for this Integration Profile are listed in the table 10.2-1 along with the Actors to which they apply. Certain of these Options are required for implementation by Actors in this Profile (although they may be truly optional in other Profiles).

Table 10.2-1: Image-Enabled Office - Actors and Options

Actor	Option Name	Option-ality	Vol. & Section
Acquisition Modality	Patient Based Worklist Query	R	RAD-TF 2: 4.5 CARD-TF 1: 10.2.2 [Sup-IEO]
	Broad Worklist Query	R	RAD-TF 2: 4.5 CARD-TF 1: 10.2.2 [Sup-IEO]
	PPS Exception Management	O	RAD TF-2: 4.7
Image Manager/Image	Intermittently Connected Modality	R	CARD-TF 2: 4.3

Actor	Option Name	Option-ality	Vol. & Section
Archive	PPS Exception Management	O	RAD TF-2: 4.7
EHR-S	DICOM Report Storage	O	CARD-TF- 1: 10.2.1 [Sup-IEO]
DSS/OF	PPS Exception Management	O	RAD TF-2: 4.7
Integrated EHR-S	DICOM Report Storage	O	CARD-TF- 1: 10.2.1 [Sup-IEO]
	PPS Exception Management (as DSS/OF)	O	RAD TF-2: 4.7
Image Display	*No options defined*		
Evidence Creator	*No options defined*		
Report Creator	*No options defined*		

505

10.2.1 DICOM Report Storage Option

The DICOM Report Storage Option requires the EHR-S (or Integrated EHR-S) actor to store a copy of a clinical report (CDA or PDF) in the Image Manager/Image Archive in a DICOM Encapsulated Document information object.

510 If the EHR-S supports this option, it uses an Encapsulated Report Storage [CARD-9] transaction.

10.2.2 Modality Worklist Options

An Acquisition Modality in this Profile must implement both the Patient Based Worklist Query and the Broad Worklist Query options associated with the Query Modality Worklist [RAD-5] transaction.

515 10.3 Image-Enabled Office Process Flow

The process flow of the IEO Profile is similar to the Radiology Scheduled Workflow and Patient Information Reconciliation Profiles, except that the patient management and order entry functionality is consolidated in the EHR-S.

10.3.1 Explicitly Ordered Exam and Exam Performance

520 The patient is referred to the imaging office for a consultation or a specific diagnostic procedure. When the appointment is scheduled in the EHR-S, an explicit order is created in the EHR-S under the authorization of the referring physician or the local specialist. This may be a "standing order", created for every scheduled patient visit for a particular purpose.

The EHR-S sends the order to the DSS/OF, which creates a Requested Procedure (and associated 525 study identifiers), and one or more Modality Scheduled Procedure Steps as appropriate to the study type.

Note: An EHR-S may also support the capability to receive an externally created order via an HL7 ORM or OMG message. This is not a required feature of the IEO Profile.

---

530 Alternatively, the patient is being seen by an in house healthcare professional (not on referral), who creates an order during the encounter for a specific exam for immediate or subsequently scheduled performance.

The order results in a Procedure Scheduled message to the Image Manager/Image Archive, which may stage relevant prior exams into short term storage. This is important to efficiency in Image Archive implementations that use off-site storage accessed over a relatively slow wide
535 area network.

When the patient reports to the imaging exam room, the performing technologist or healthcare professional uses the modality user interface to retrieve the Scheduled Procedure Steps via the Query Modality Worklist transaction with the DSS/OF actor.

The acquisition is performed and statused through Modality Performed Procedure Step to the
540 DSS/OF, which relays it to the Image Manager/Image Archive and notifies the EHR-S. The modality may produce a variety of images and other evidence (waveforms, analysis reports, etc.) that are stored to the Image Manager/Image Archive.

> Note: The content of the images/evidence may be constrained by a separate Content Profile to which the Acquisition Modality claims compliance.

545 When the Performed Procedure Step is Complete or Discontinued, and the images/evidence identified in the MPPS have been stored to the Image Manager/Image Archive, the IM/IA sends a Notify Study Access message to the EHR-S; this can be used to link to an initial web page that allows navigation and display of the images in the exam. Note that the IM/IA can send this Notify Study Access without consideration for whether the exam data acquisition is totally
550 "complete"; e.g., in a two stage nuclear medicine stress test, there may be a Notify Study Access message for each stage.

The modality requests the Image Manager/Image Archive to confirm the safe storage of the images with the Storage Commitment transaction, and when the data has been confirmed it can be automatically purged from the modality's hard disk.

555
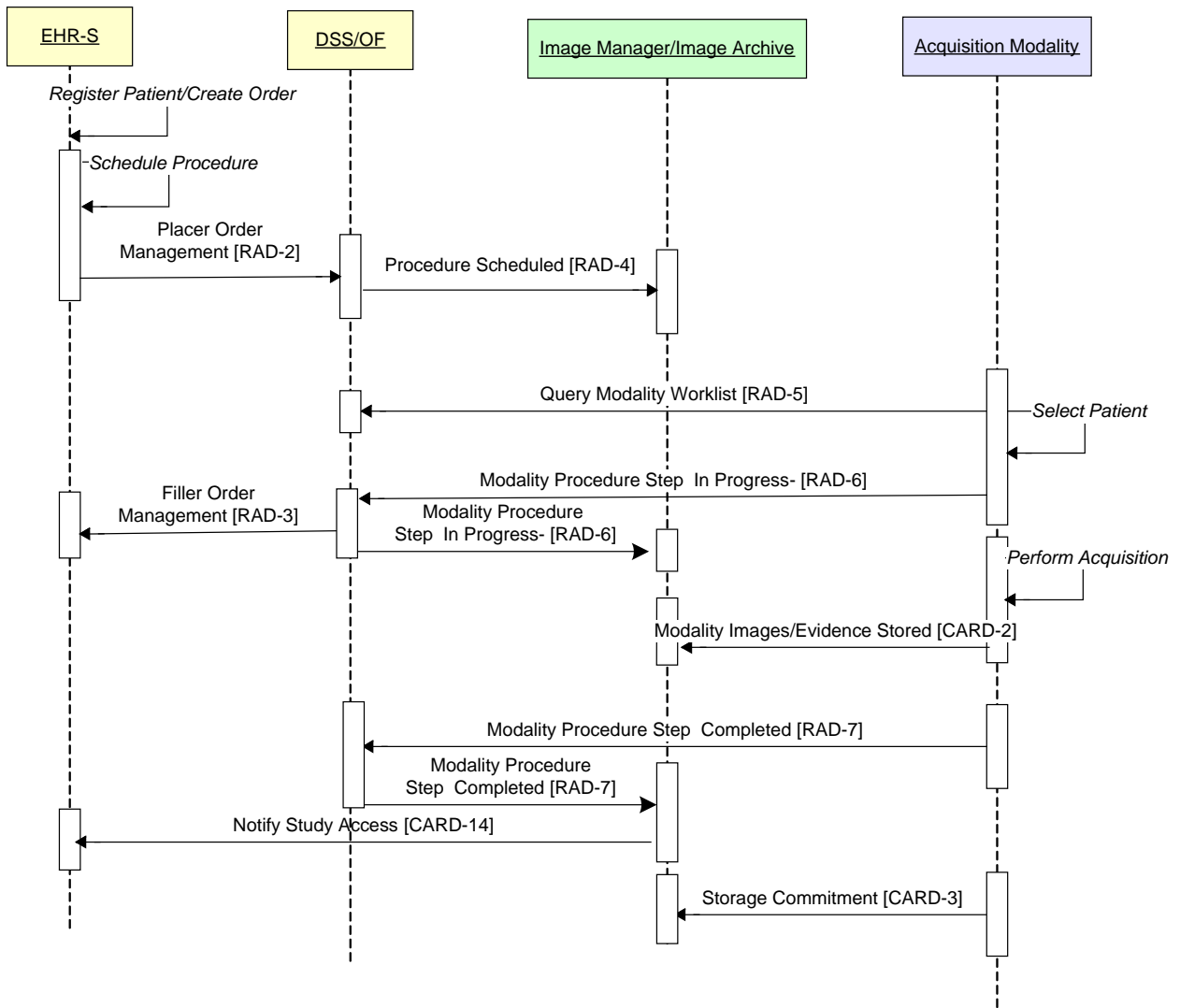
Figure 10.3-1: Explicitly Ordered Exam: Acquisition and Procedural Process flow

10.3.2 Imaging Study Analysis / Reporting at Imaging Workstation

560   Images acquired during an exam may be further processed at an image analysis workstation to produce derived images and non-image information, such as measurements and CAD results as DICOM Structured Report (SR) objects. Production of this evidence may be handled by a technician (e.g., sonographer or X-ray tech), and is included in the study data set. The IEO Profile does not describe explicit workflow transactions for managing imaging study post-

565   processing or analysis, which in the ambulatory office environment is typically handled by informal processes or standard operating procedures. E.g., it may be standard procedure that after an ultrasound exam the sonographer produces a measurements report.

_____

In the IEO profile, the analysis workstation is denoted an Evidence Creator actor, which is typically bundled with an Image Display actor. The Evidence Creator may notify the Performed
570 Procedure Step Manager actor of the status of its evidence production, and the PPS Manager relays that status to the DSS/OF. The evidence objects are stored to the Image Manager/Image Archive, and may be subsequently retrieved at Image Display actors or through web access techniques at the EHR-S.

The physician reads the study, including any additional evidence and prior comparison studies, at
575 the imaging workstation. She may use medical specialty-related applications to create the diagnostic report at that workstation and send it to the EHR-S. In this role the workstation is denoted a Report Creator. Extracts from the Evidence Documents and Key Image references may be included in the diagnostic report, although the mechanism for that extract and inclusion process is not specified by this profile.

580   Note: There may be requirements on the content, display, and processing of Evidence Documents specified by a separate Content Profile to which the Evidence Creator, Image Display, or Report Creator claims compliance.

The EHR-S stores the report, and records the completion of the order. It may extract relevant discrete data elements (e.g., fetal growth measurements, or cardiac function measurements) into an internal flowsheet, database, or similar patient clinical management tool.

585   Notes: 1. The EHR-S may also send the report to a referring physician or to the patient's Personal Health Record system, but those transfers are not defined within the scope of the IEO Profile. See Section 10.5.

               2. The extraction of standard data elements from the report may be facilitated by a separate Content Profile to which both the Report Creator and Report Manager claim compliance

The EHR-S makes the report available through the Retrieve Information for Display (RID)
590 Profile, as it is grouped with the Information Source of that profile. It may also optionally store the report (PDF or CDA) encapsulated in a DICOM object in the Image Manager/Image Archive.

_____
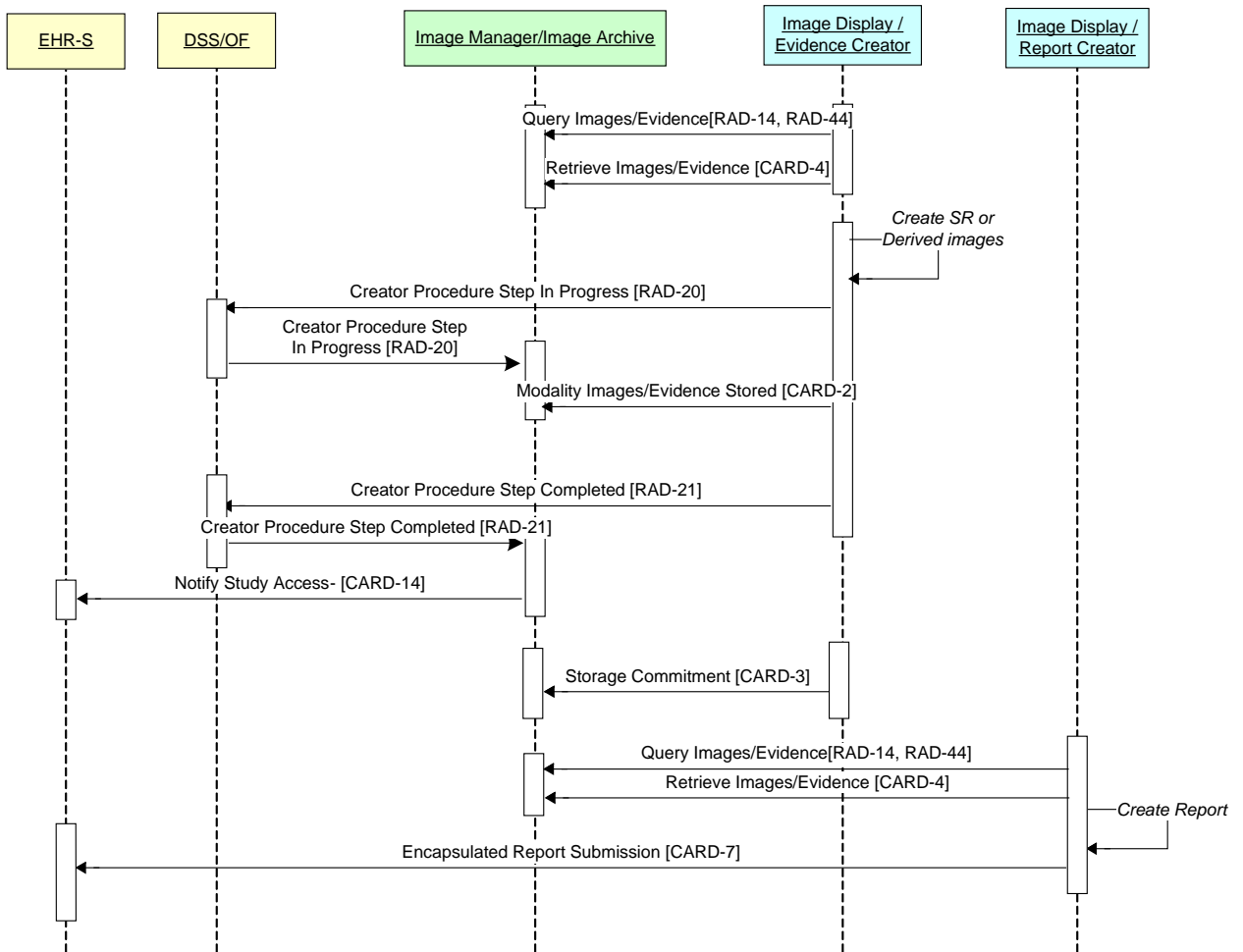
Figure 10.3-2: Imaging Study Analysis / Reporting Process Flow

595

10.3.3 Unordered Exam

For exams which are neither explicitly nor implicitly ordered, i.e., for which the DSS/OF will not have Scheduled Procedure Step data with which to respond to a Modality Worklist query, the
600 modality will allow manual data entry of patient demographics, at minimum the patient ID.

In this process flow, the modality creates its own Study Unique ID, which is used for data acquisition and for statusing through Modality Performed Procedure Step. The DSS/OF will relay the MPPS of the unscheduled exam to the Image Manager/Image Archive. The DSS/OF will create an order based on the MPPS data and known patient demographics, notify the EHR-S
605 with a New Order message, and provide a Procedure Scheduled notification to the Image Manager/Image Archive. Since the manual entry of patient demographics may have been incomplete, the Image Manager will use the updated demographics from the Procedure Scheduled notification in subsequent query/retrieve transactions.

The Image Manager will send a Notify Study Access to the EHR-S when the images arrive, as in
610   the explicitly ordered exam process flow.

Notes: 1. This process flow is similar to that of the IHE Radiology Patient Information Reconciliation workflow case 3
           (see RAD-TF 1:4.4.3), except that in the office environment the patient is known, and hence there is no required
           Patient Update transaction.

615   2. The acquisition Modality may have alternate means of obtaining patient demographics, e.g., from prior exams
           for the patient retrieved from the Image Manager/Image Archive, or from a Patient Demographics Query (see
           section 10.6).
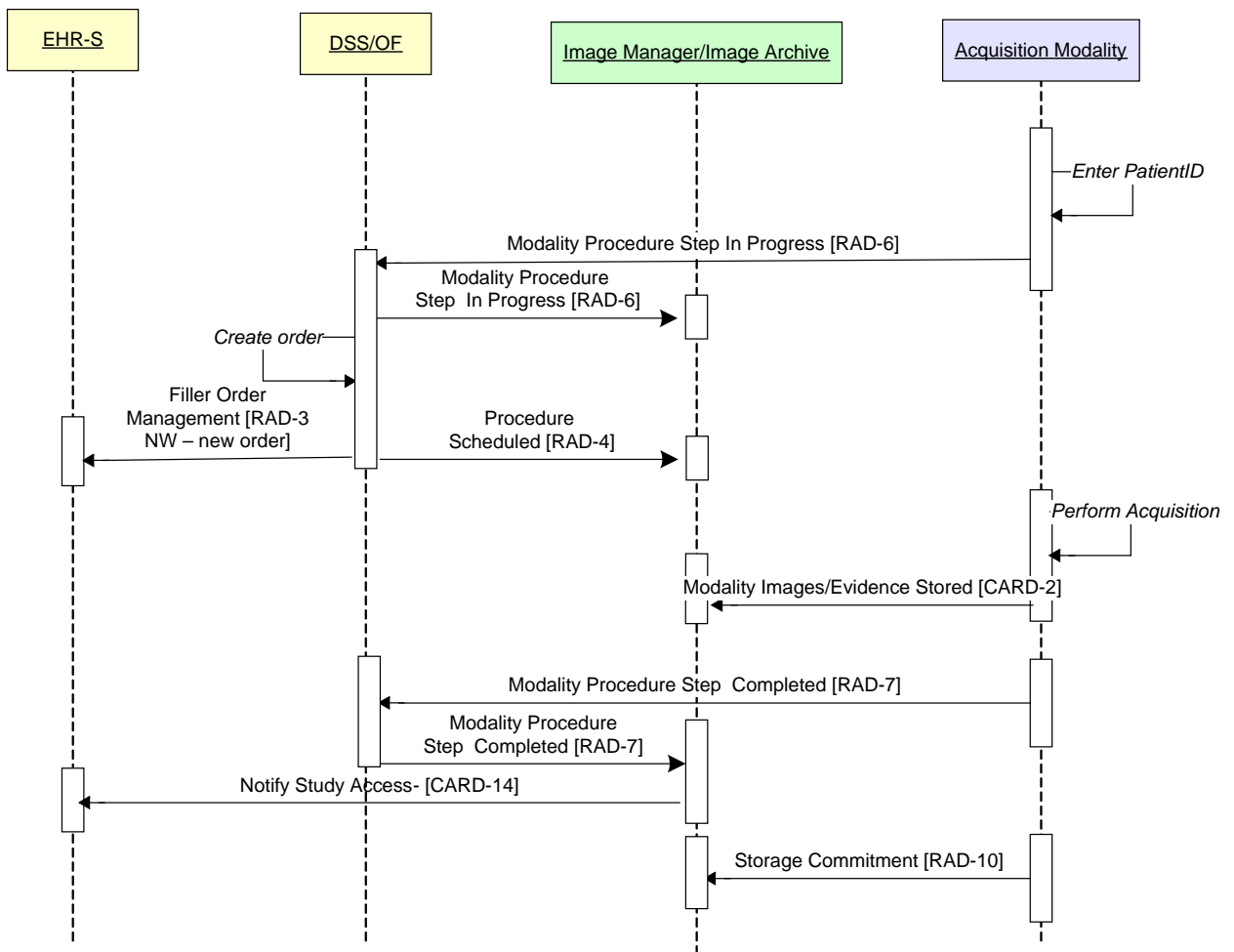
620   **Figure 10.3-3: Unordered Exam Process Flow**

10.3.4 Exam Reviewed / Reported at EHR-S Workstation

The Notify Study Access message from the Image Manager/Image Archive to the EHR-S
enables use of a web service-based study image/evidence access method. A user at an EHR-S

625   workstation can open this link to review the study data on that workstation (rather than a native DICOM Image Display workstation) using the Invoke Image Display Service transaction.

> Note: The Image Manager/Image Archive may support a full functionality image review client that can be hosted on the EHR-S. Such a client application may or may not qualify as an Image Display Actor using DICOM transactions with the Image Manager/Image Archive. It may be synchronized to other EHR-S applications using the Patient
> 630   Synchronized Applications Integration Profile (based on the HL7 CCOW standard) as specified in the IHE IT Infrastructure Technical Framework.
>
> IHE does not preclude the use of such an integration technique, but does require the Image Manager/Image Archive and the EHR-S to support a basic web service-based integration capability.

The physician at the EHR-S may use its clinical documentation functions to create a report
635   directly in the EHR-S, rather than at an imaging workstation, although since that functionality is totally internal to the EHR-S it is not specified by this profile.

The EHR-S stores the report, and records the completion of the order. The EHR-S makes the report available through the Retrieve Information for Display (RID) Profile, as it is grouped with the Information Source of that profile.

640   Reports created on the EHR-S may also be encapsulated in a DICOM object, stored in the Image Manager/Image Archive, and then be available for retrieval and display at an imaging workstation (a Report Reader actor of the DRPT Profile – see section 10.6.6), or be available for export with the DICOM study information on an exchange media through the PDI Profile or by network exchange through the XDS-I Profile (see section 10.5).

645
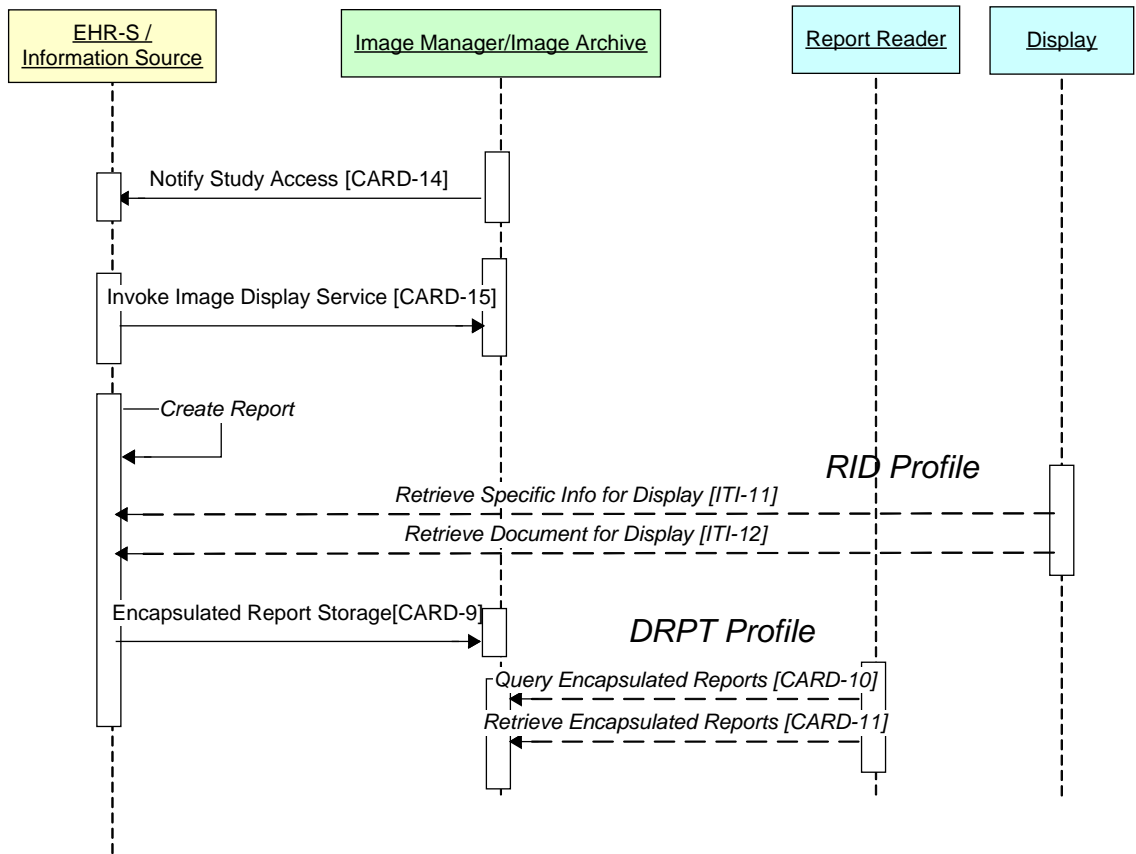
Figure 10.3-4: Study Review / Reporting in EHR-S Process Flow

10.3.5 Patient Update

650   When the EHR-S changes patient information, e.g., correcting the patient name or changing the patient ID, it notifies the DSS/OF with an Outpatient Update message, which relays it to the Image Manager/Image Archive. The Image Manager/Image Archive updates this information in the metadata for stored DICOM objects so that there is a consistent set of identifiers between the EHR-S and the IM/IA presented to all workstation applications and users.

655   Only the ADT triggers A08 (Update Patient Information) and A40 (Patient Merge) are required in this transaction.

10.3.6 Procedure Update

When the EHR-S changes procedure (order) information, e.g., changing the scheduled time or the procedure code, it notifies the DSS/OF with an order (ORM) message; the DSS/OF notifies
660   the Image Manager/Image Archive with a Procedure Update message. The Image Manager/Image Archive uses this updated information in its database and process control.

10.4 Image-Enabled Office Security Considerations

The Image-Enabled Office Profile may be used in a variety of environments, from small ambulatory practices, to large multi-specialty clinics. The threat models for those environments may vary widely, and hence the IEO Profile does not require any specific security protections, except as described below.

The minimal assumptions of this profile are:

- The component systems of an image-enabled office are on a secure local area network protected by a firewall.
- The EHR-S requires user logon authentication to access patient data, and records access in an audit log.
- The Image Manager/Image Archive records access in an audit log.

For the low threat model of an ambulatory office, within the office LAN all nodes might be trusted by the other nodes. For example, while workstations may implement user logon authentication, such workstations typically are trusted by the image manager/image archive, and no additional network security negotiations occur between those units. Similarly, no security negotiations are mandated between imaging modalities and a worklist server, even though modality worklist necessarily provides protected health information and the office-based modality may not even have user logon enabled. The typical office environment and its systems and network are often considered adequately protected by administrative policies on system use, physical safeguards, and user authentication for access to the primary clinical data in the EHR system.

For environments where more rigorous security is desired, the IHE ITI Audit Trail and Node Authentication (ATNA) Profile is recommended. Secure Node actors in that profile require user logon authentication, network data transfers require node authentication, and all significant transactions are logged in an audit trail. Implementers and purchasers of IHE compliant systems should read the ATNA Profile (ITI-TF 1:9) to determine if their products or installed systems should implement that profile.

The IEO Profile does require web access to patient imaging data from the EHR-S to be logged for audit purposes on the Image Manager/Image Archive.

10.5 Relationship to PDI, XDS and XDS-I Profiles

A major use for the image-enabled office is as a provider and receiver of diagnostic imaging consultation services with other healthcare providers. Referrals and results, including imaging results, are exchangeable on media or over the network.

For image exchange via media, systems operating in an office (IEO) environment can claim support for one or more actors in the IHE Radiology Portable Data for Imaging (PDI) and Import Reconciliation Workflow (IRWF) Profiles. In order to support image export via media, a system implementing some IEO actors (such as the Image Display, or Image Manager/ Image Archive) would also claim conformance to the Portable Media Creator actor of the PDI Profile. To support

700   image import, a system would claim conformance to the Portable Media Importer actor of the PDI Profile, and possibly also to the Importer actor of the IRWF Profile.

> Note: Use of image compression on media requires conformance to the "DVD Media Option" of the PDI Profile.

For network exchange of images between healthcare providers, a system implementing some IEO actors could also claim conformance to the Cross Enterprise Document Sharing (XDS)

705   and/or Cross Enterprise Document Sharing for Imaging (XDS-I) profiles as Document Consumer, Imaging Document Consumer, Document Source, and/or Imaging Document Source actors of the respective profiles. Because of the variety of possible architectures to support XDS, no grouping with IEO actors is specified.

> Notes: 1. Implementers should utilize the most current specification for these profiles (XDS.b and XDS-I.b).

710   2. The XDS family of profiles requires also requires implementation of the Audit Trail and Node Authentication (ATNA) and Patient Identity Cross-Reference (PIX) profiles. Other related profiles may be required to support cross-enterprise health information exchange.

10.6 Relationship to PDQ Profile

715   The Patient Demographics Query (PDQ) Profile describes a service for one actor, the Patient Demographics Consumer, to query a Patient Demographics Supplier actor for the full set of patient attributes based on a partial set (e.g., name and birth date).

In the context of the image enabled office environment, this service could be used by a workstation importing data received on media (through the PDI Profile) to obtain the local

720   patient ID. The PDQ transaction is defined as an optional part of the Import Reconciliation Workflow (IRWF) Profile for this use case, with its Importer actor acting as a Patient Demographics Consumer.

Similarly, in the IEO Unordered Exam process flow (see Section 10.3.4) an Acquisition Modality may need to obtain necessary patient demographics in the absence of a Modality

725   Worklist item for the procedure. This typically occurs when the modality procedure is not explicitly scheduled, e.g., for resting ECG acquisition. For this use, the Acquisition Modality can claim compliance with the PDQ Profile and be grouped with the Patient Demographics Consumer.

To support both the import and unscheduled exam cases, it is a useful synergy for either the

730   EHR-S or DSS/OF to support the PDQ Profile as a Patient Demographics Supplier.

10.7 Relationship to Specialized Workflow and Content Profiles

The actors of the IEO Profile may support specialized transactions defined for the workflow associated with particular imaging modalities. This support is asserted by claims of conformance to another Profile, either a specific workflow profile, or a content profile.

735   Generally such profiles are derivatives of, or complementary to, the IHE Radiology Scheduled Workflow (SWF) Profile, as is indeed the IEO Profile. Actors with identical names appearing in multiple profiles are typically compatible in a single implementation.

The Profiles listed in this section are not exhaustive of the specialized workflow and content profiles that may "overlay" the IEO Profile.

10.7.1 Resting ECG Workflow

The Resting ECG Workflow (REWF) Profile (see Section 9) describes both workflow and content requirements to support resting ("12-lead") ECG acquisition. All of the functionality of that profile may be accommodated by the actors of the IEO Profile. Implementations may thus claim compliance to both the IEO and REWF Profiles, and in doing so support ECG acquisition in the office environment.

Note that this capability requires support for DICOM ECG information objects and ECG object query by the Image Manager/Image Archive and Image Display actors, and support by the DSS/OF and ECG Acquisition Modality for certain query attributes in an enhanced Modality Worklist.

The Image Manager/Image Archive must also, in accordance with the IEO Profile, provide web-based display of the ECG objects; this may be facilitated by compliance to the Retrieve ECG for Display Profile (see Section 5) as an Information Source actor.

10.7.2 Echocardiography and Stress Testing Workflow

The Echocardiography and Stress Testing Workflow Profiles (see Sections 4 and 8) have specific requirements for DICOM object types and content, and image compression methods. For the Stress Testing Workflow Profile, the DSS/OF (or the Integrated EHR-S actor incorporating DSS/OF functionality) is required to support the Multi-Modality Procedure Update Option for the Modality Performed Procedure Step transaction (see CARD TF-2: 4.1.1).

10.7.3 Evidence Documents Options

The transactions of the Evidence Documents Profile (see Section 7) have been incorporated into the IEO Profile. However, specific DICOM SR content requirements have been defined for various use cases as options on the Evidence Documents Profile. Implementations that wish to claim conformance to these options, including Echo, Stress, and CTA/MRA Evidence, need to explicitly claim conformance to the Evidence Documents Profile.

10.7.4 NM Image, Mammography Image, and Key Image Note

The NM Image, Mammography Image, and Key Image Note Profiles (see RAD TF-1 sections 8, 16 and 19) have specific requirements for DICOM object types and content, and image display requirements. There are no workflow requirements beyond the requirements of the IEO Profile.

10.7.5 Mammography Acquisition Workflow

The Mammography Acquisition Workflow (MAWF) Profile describes both workflow and content requirements to support mammography acquisition. In particular, there are code sets specified to be used in Modality Worklist and Modality Performed Procedure Steps, and transactions for an Image Rejection Note.

10.7.6 Displayable Reports

775   While much of the workflow defined in the Displayable Reports (DRPT) Profile (see Section 6) has been incorporated into the IEO Profile, the Report Reader actor and its transactions Encapsulated Report Query [CARD-10] and Encapsulated Report Retrieve [CARD-11] are not included in IEO. An implementation that supports those transactions must explicitly claim conformance to that actor of the DRPT Profile.

780

Volume 2 - Transactions

Add section 4.14

4.14 Notify Study Access [CARD-14]

This section corresponds to Transaction CARD-14 of the IHE Cardiology Technical Framework.
Transaction CARD-14 is used by the Image Manager/Image Archive and Report Manager actors.

4.14.1 Scope

In the Notify Study Access Transaction, the Image Manager/Image Archive provides a study identifier to the Report Manager. The Report Manager can incorporate that ID into a hyperlink to an initial web page that allows navigation and display of the images in the exam.

4.14.2 Use Case Roles
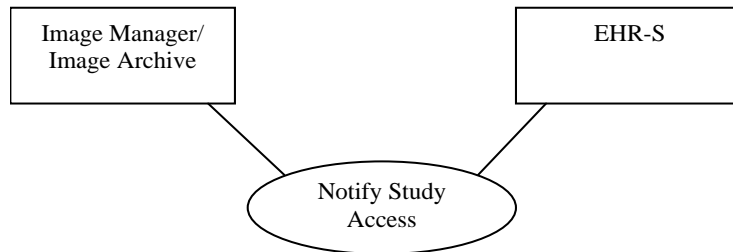
Actor: Image Manager/Image Archive

Role: Generate a Notify Study Access transaction and send it to the EHR-S Actor

Actor: EHR-S

Role: Receive a Notify Study Access transaction and internally store its content

4.14.3 Referenced Standards

HL7 2.6 Chapter 7

4.14.4 Interaction Diagram
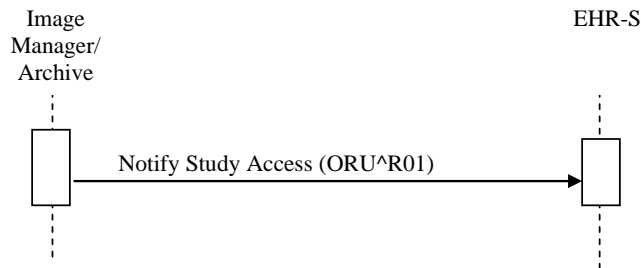
800

4.14.4.1 Notify Study Access Message

This message uses the HL7 ORU^R01 message from an Image Manager/Image Archive to inform the EHR-S about the availability of DICOM instances for viewing.

4.14.4.1.1 Trigger Events

805 The Image Manager/ Image Archive shall send this ORU results notification message once it has determined that is has received all the DICOM instances it expects for the given study. Definition of the exact method to be used by the Image Manager/ Image Archive for determining when all the DICOM instances have arrived is beyond the scope of this transaction. It is possible that the Image Manager/ Image Archive may send multiple Notify Study Access Transactions for
810 the same study.

4.14.4.1.2 Message Semantics

The CARD-14 transaction shall be an HL7 V2 ORU^R01 message from the Image Manager/Image Archive to the EHR-S with a corresponding ACK message back to the Image Manager/Image Archive. Refer to the HL7 2.6 Standard, Chapter 7 Observation Reporting
815 (section on ORU message), for general message semantics.

Table 4.14.4-1: IHE Profile – Notify Study Access Message

ORU^R01	Segment Name	Chapter in HL7 v2.6	Notes
MSH	Message Header	2	
PID	Patient Identification	3	
[PV1]	Patient Visit	3	PV1 is required if use of PV1-19 Visit Number is required per the applicable regional or national appendices to the IHE Technical Framework
OBR	Order detail	4, 7	
{OBX}	Observation Results	7	At least two segments

Refer to sections 4.14.4.1.2.1 through 4.14.4.1.2.4 below for detailed requirements of the ORU
820   message.

4.14.4.1.2.1 MSH Segment

Table 4.14.4-1: IHE Profile – MSH segment

SEQ	LEN	DT	OPT	Rep/#	TBL#	ITEM #	ELEMENT NAME
1	1	ST	R			00001	Field Separator
2	4	ST	R			00002	Encoding Characters
3	227	HD	R2			00003	Sending Application
4	227	HD	R2			00004	Sending Facility
5	227	HD	R2			00005	Receiving Application
6	227	HD	R2			00006	Receiving Facility
7	24	DTM	R			00007	Date/Time of Message
9	15	MSG	R			00009	Message Type
10	199	ST	R			00010	Message Control ID
11	3	PT	R			00011	Processing ID
12	60	VID	R		0104	00012	Version ID
18	16	ID	C		0211	00692	Character Set
21	427	EI	R2	Y		01598	Message Profile Identifier

Adapted from the HL7 Standard, version 2.6

825   The IHE Technical Framework requires that applications support HL7-recommended values for
the fields MSH-1 Field Separator and MSH-2 Encoding Characters.

Field MSH-9 Message Type shall have three components. The first component shall have a value
of "ORU", the second component shall have the value of "R01", and the third component shall
have a value of "ORU_R01".

830   Field MSH-21 Message Profile Identifier shall contain one field repetition with the value
"CARD-14^IHE". The purpose is to provide guidance to the receiver on expected actions
associated with this message.

Implementations supporting sequence number protocol shall be configurable to allow them to
perform this transaction without such protocol.

835   ### 4.14.4.1.2.2 PID and PV1 Segments

Table 4.14.4-2: IHE Profile - PID segment

SEQ	LEN	DT	OPT	Rep/#	TBL#	ITEM#	ELEMENT NAME
3	250	CX	R			00106	Patient Identifier List
5	250	XPN	R			00108	Patient Name
7	24	DTM	RE			00110	Date/Time of Birth

SEQ	LEN	DT	OPT	Rep/#	TBL#	ITEM#	ELEMENT NAME
8	1	IS	RE		0001	00111	Sex
10	705	CWE	RE		0005	00113	Race
11	250	XAD	RE			00114	Patient Address
18	250	CX	RE			00121	Patient Account Number

Adapted from the HL7 standard, version 2.6

840 **Table 4.14.4-3: IHE Profile – PV1 segment**

SEQ	LEN	DT	OPT	Rep/#	TBL#	ITEM#	ELEMENT NAME
2	1	IS	R		0004	00132	Patient Class
19	250	CX	RE			00149	Visit Number
51	1	IS	C		0326	01226	Visit Indicator

Adapted from the HL7 standard, version 2.6

Note: The fields *PID-18 Patient Account Number* and *PV1-19 Visit Number* have requirements for the values in the use of the PID segment in ADT and Order Messages (see, e.g., transactions RAD-3 and RAD-4). In the context of this ORU message, these values may not be known, but if known, shall be included in the message.

845 Field PV1-51 Visit Indicator shall be valued with value "V" if the field PV1-19 Visit Number is present. It may be omitted otherwise.

4.14.4.1.2.3 OBR Segment

Table 4.14.4-4: IHE Profile – OBR Segment

SEQ	LEN	DT	OPT	Rep/#	TBL#	ITEM #	ELEMENT NAME
1	4	SI	R			00237	Set ID OBR
2	22	EI	RE			00216	Placer Order Number
3	22	EI	RE			00217	Filler Order Number
4	705	CWE	R			00238	Universal Service ID
7	24	DTM	R			00241	Observation Date/Time
25	1	ID	R			00258	Result Status = R

850 *Adapted from the HL7 Standard, version 2.6*

Field OBR-7 is the clinically relevant date/time of the observation; i.e., it is the date/time of the procedure, not the date/time of the report.

The OBR-25 Result Status field shall be populated with the value "R" (Results stored – not verified).

855 ### 4.14.4.1.2.4 OBX Segment 1

Table 4.14.4-5: IHE Profile – OBX Segment with DICOM Study Instance UID

SEQ	LEN	DT	OPT	Rep/#	TBL#	ITEM#	ELEMENT NAME
2	3	ID	R2		0125	00570	Value Type = HD
3	705	CWE	R			00571	Observation Identifier
5	70	HD	R			00573	Observation Value
11	1	ID	R		0085	00579	Observation Result Status = O
14	24	DTM	R2			00582	Date/Time of the Observation

Adapted from the HL7 Standard, version 2.6

The OBX-2 Value Type field shall be populated with the value "HD" (Hierarchical Designator).

860 The OBX-3 Observation Identifier field shall be populated with the value "113014^DICOM Study^DCM".

The OBX-5 Observation Value shall be populated with the DICOM Study Instance UID in component 2, and "ISO" in component 3.

The OBX-11 Observation Result Status shall be populated with the value "O" (Order detail
865 description).

The OBX-14 Date/Time of the Observation field shall be populated with the date and time of the most recent update made to the study content (e.g., most recent addition, deletion or modification of images or objects within the study).

4.14.4.1.2.5 OBX Segment 2

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Table 4.14.4-5: IHE Profile – OBX Segment with Image Access Service URL

SEQ	LEN	DT	OPT	Rep/#	TBL#	ITEM#	ELEMENT NAME
2	3	ID	R2		0125	00570	Value Type = RP
3	705	CWE	R			00571	Observation Identifier
5	1027	HD	R			00573	Observation Value
11	1	ID	R		0085	00579	Observation Result Status = R
14	24	DTM	R2			00582	Date/Time of the Observation

Adapted from the HL7 Standard, version 2.6

The OBX-2 Value Type field shall be populated with the value "RP" (Reference Pointer).

The OBX-3 Observation Identifier field shall be populated with the value "113014^DICOM
875 Study^DCM".

The OBX-5 Observation Value shall be populated with a URI formatted according to the Invoke Image Display Service [CARD-15] Transaction (CARD TF-2: 3.15). The Image Manager/ Image

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Archive shall include the study instance UID associated with the study available for viewing as a parameter in the URL.

880 The OBX-11 Observation Result Status shall be populated with the value "R" (Results entered - not verified).

The OBX-14 Date/Time of the Observation field shall be populated with the date and time of the most recent update made to the study content (e.g., most recent addition, deletion or modification of images or objects within the study).

885 4.14.4.1.3 Expected Actions

Upon receiving the Notify Study Access transaction the EHR-S shall store the Study UID and/or study access service URI value for subsequent access to the study from the Image Manager/ Image Archive. One such access action is to use the UID to construct the Web Service URI according to the Invoke Image Display Service (CARD-15) Transaction (see section 4.15) and
890 use it to display a DICOM Study navigation page.

> Note: One such access action is to use the Web Service URI directly in the Invoke Image Display Service (CARD-15) Transaction. Alternatively, the EHR-S could use the Study UID with a Clinical Context Manager (as used in the Patient Synchronized Applications Profile) to synchronize an electronic health record display application with an image display application.

895 Since it is possible that the Image Manager/ Image Archive may send multiple Notify Study Access Transactions for the same study, the EHR-S shall be able to accept multiple notifications for the same study. If multiple notifications are received, the EHR-S shall use the most recently updated result, as determined by the value included in OBX-14, when initiating subsequent access actions. For example, the URI associated with the Date/Time of the Observation that is
900 most current shall be used in subsequent invocations of the CARD-15 Transaction.

Add section 4.15

4.15 Invoke Image Display Service [CARD-15]

This section corresponds to Transaction CARD-15 of the IHE Cardiology Technical Framework.
905 Transaction CARD-15 is used by the Image Manager/Image Archive and EHR-S actors.

This transaction is derived from Retrieve Specific Information for Display [ITI-11] (see ITI-TF-2: 4.11), but is an independent transaction.

4.15.1 Scope

In the Invoke Image Display Service, the Image Manager/Image Archive provides a web
910 interface to access stored DICOM images and evidence.

_____

4.15.2 Use Case Roles
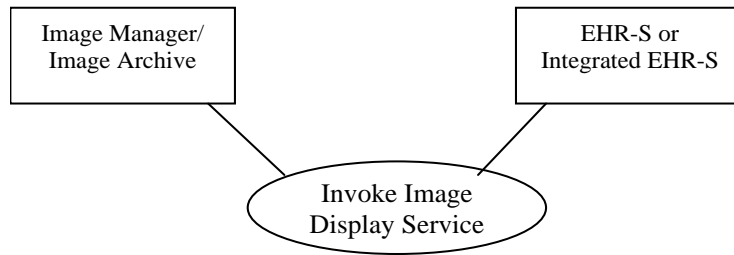
Actor: EHR-S (or Integrated EHR-S)

915   **Role:** A system that requests DICOM study information, and displays it.

Actor: Image Manager/Image Archive

Role: A system that provides DICOM study information in response to the request from the Display Actor, in an interactive web-based format.

4.15.3 Referenced Standard

920   IETF RFC1738, Uniform Resource Locators (URL), http://www.ietf.org/rfc/rfc1738.txt

IETF RFC2616 HyperText Transfer Protocol HTTP/1.1, http://www.ietf.org/rfc/rfc2616.txt

Extensible Markup Language (XML) 1.0 (Second Edition). W3C Recommendation 6 October 2000. http://www.w3.org/TR/REC-xml.

Web Services Description Language (WSDL) 1.1. W3C Note 15 March 2001.
925   http://www.w3.org/TR/wsdl.

4.15.4 Interaction Diagram
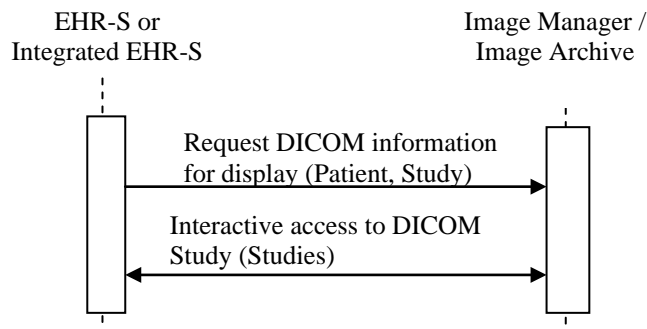
The Invoke Image Display Service transaction is performed by the invocation of a web service. The EHR-S Actor shall generate a web service request whenever a user needs to review the
930   information stored on the Image Manager/Image Archive Actor.

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User access control is managed outside of the specification of this transaction, but this
transaction does make some minimal assumptions about the security environment. The
transaction requires that the EHR-S actor (web service client) implements user access control,
and has user identity information. This transaction also requires that the Image Manager/Image
935 Archive actor (web service server) implements an audit log function, but it does not assume the
server implements user or node authentication.

> Note: It is recommended that actors be grouped with the Secure Node actor of the IHE IT Infrastructure Audit Trail and
> Node Authentication (ATNA) Profile, and that network transactions minimally use secure node authentication.
> However, there are many environments in which management of an ATNA infrastructure is unnecessary and
940 undesirable.

4.15.4.1 Request for DICOM Information for Display - Patient

4.15.4.1.1 Trigger Events

The following event will trigger a Request for DICOM Information for Display - Patient:

- User of the EHR-S Actor needs to review the imaging studies that were acquired on a
945 patient, using the patient ID as a key.

4.15.4.1.2 Message Semantics

To specify the information that needs to be returned, the web service request shall include the
following parameters (keys) to filter the subset of DICOM studies for the patient (See table
4.15.4-1). All parameter names and values are case-sensitive.

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Table 4.15.4-1: Web Service Request Keys – DICOM Patient

Parameter Name	REQ	Description	Notes
requestType	R	requestType specifies what type of information shall be retrieved.	This parameter shall always have the value SUMMARY
patientID	R	This attribute identifies the subject of the studies being requested. Its value shall include identification of assigning authority.	patientID value shall be formatted as HL7 CX data type (including assigning authority) according to the requirements specified for the Patient Identity Feed transaction (see ITI TF-2a: 3.8.4.1.2.3)
lowerDateTime	O	Used to constrain the earliest study date/time.	This value shall be encoded in the XML primitive dateTime format.
upperDateTime	O	Used to constrain the latest study date/time.	This value shall be encoded in the XML primitive dateTime format.
mostRecentResults	R	The numeric value that indicates the number of most recent studies to be included into the response, *i.e.*, 1 indicates to provide the latest study.	Value of 0 indicates that all available results shall be returned.

> Notes: 1. These parameters are identical to those of the Retrieve Specific Information for Display [ITI-11] SUMMARY
> request.

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955   2. If subcomponents of the CX data type are used for the patientID, e.g., in the Assigning Authority component, the HL7 subcomponent delimiter '&' must be escaped to '%26', as & is the delimiter for the web service parameters

Formal definition of the web service in WSDL is provided in Appendix X.

The only binding required for both the EHR-S Actor and Image Manager/Image Archive Actor is
960 the binding to the HTTP-GET. In this binding the sample message will be formatted as follows:

http://<location>/IHERetrieveDICOMInfo?requestType=SUMMARY&patientID=99998410^^^CardioClinic&mostRecentResults=1

The <location> part of the URL is configurable by the implementation, and must contain the host name, an optional port address, and may be followed by an optional path. The path if present
965 may not contain a '?' character. The remainder of the URL, including IHERetrieveDICOMInfo and the following request parameters, are specified by the WSDL and may not be changed. See the discussion about <location> in IHE ITI TF-2a: 3.11.4.1.2.

In addition, the Display Actor shall support the following field of the HTTP request:

970 **Table 4.15.4-2: HTTP Request and Response Fields**

HTTP Field	REQ	Description	Values
Accept-Language	O	This field restricts the set of natural languages that are preferred as a response to the request.	Any valid value according to RFC2616

The Image Manager/Image Archive shall support the following fields of the HTTP response.

Table 4.15.4-3: HTTP Request Fields

HTTP Field	REQ	Description	Values
Expires	R	This field gives the date/time after which the response is considered stale	Shall be 0. This is now deprecated usage, but it is the widely supported means of specifying no caching.
Cache-Control	R	This field indicates that this response should not be cached.	Shall be no-cache

975 If necessary, the EHR-S Actor may perform the request to the web service utilizing HTTPS protocol.

The Image Manager/Image Archive may return HTTP redirect responses (responses with values of 301, 302, 303 or 307) in response to a request. EHR-S Actors can expect to receive an error response, or the data requested, or a request to look elsewhere for the data. An EHR-S Actor
980 must follow redirects, but if a loop is detected, it may report an error.

4.15.4.1.3 Expected Actions

Upon reception of the Request for DICOM Information for Display - Patient, the Image Manager/ Image Archive shall parse the request. The Image Manager/Image Archive shall return

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985   HTTP response code 404 (Not Found) if it cannot locate the requested patientID, or if no studies meet the request key parameters.

If there are no errors, the Image Manager/Image Archive shall begin the Interactive Access to DICOM Study as specified in section 4.15.4.3. The Image Manager/Image Archive shall record in an audit log the requesting client network address and the patient ID.

990   If multiple studies are identified as meeting the request key parameters, the Image Manager/ Image Archive shall provide a mechanism in the response for user selection from the set of matching studies; this may be an XHTML presentation of the list of studies for further user selection, in accordance with the ITI-11 Response with Specific Information – Summary message, as specified in ITI-TF-2: 3.11.3.2.

> Note: The ITI-11 Response message is limited to the features of XHTML Basic 1.1, which is intended to provide broad
995   interoperability, even on mobile/handheld devices. The Image Manager / Image Archive is not constrained to use only XHTML Basic 1.1.

4.15.4.2 Request for DICOM Information for Display - Study

4.15.4.2.1 Trigger Events

The following event will trigger a Request for DICOM Information for Display - Study:

1000   • User of the EHR-S Actor needs to review a specific imaging study, using the study unique ID as a key.

4.15.4.2.2 Message Semantics

To specify the information that needs to be returned, the web service request shall include the following parameters (keys) to filter the subset of information (see table 4.15.4-4). All parameter
1005   names and values are case-sensitive.

Table 4.15.4-4: Web Service Request Keys - Study

Parameter Name	REQ	Description	Notes
requestType	R	requestType specifies what type of information shall be retrieved.	This parameter shall always have the value STUDY
studyUID	R	This attribute identifies the DICOM study being queried for, by unique ID.	This value shall be a properly defined Object identifier (OID) as used for a DICOM Study Instance UID.

Formal definition of the web service in WSDL is provided in Appendix X.

1010   The only binding required for both the EHR-S Actor and Image Manager/Image Archive Actor is the binding to the HTTP-GET. In this binding the sample message will be formatted as follows:

http://<location>/IHERetrieveDICOMInfo?requestType=STUDY&studyUID=1.2.840.113883.19.110.4

The <location> part of the URL is configurable by the implementation, and must contain the host name, an optional port address, and may be followed by an optional path. The path if present

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1015   may not contain a '?' character. The remainder of the URL, including IHERetrieveDICOMInfo
and the following request parameters are specified by the WSDL and may not be changed. See
the discussion about <location> in IHE ITI TF-2a: 3.11.4.1.2.

In addition, the EHR-S Actor shall support the following field of the HTTP request:

1020   **Table 4.15.4-5: HTTP Request and Response Fields**

HTTP Field	REQ	Description	Values
Accept-Language	O	This field restricts the set of natural languages that are preferred as a response to the request.	Any valid value according to RFC2616

The Image Manager/Image Archive shall support the following fields of the HTTP response.

Table 4.15.4-6: HTTP Request Fields

HTTP Field	REQ	Description	Values
Expires	R	This field gives the date/time after which the response is considered stale	Shall be 0. This is now deprecated usage, but it is the widely supported means of specifying no caching.
Cache-Control	R	This field indicates that this response should not be cached.	Shall be no-cache

1025   If necessary, the EHR-S Actor may perform the request to the web service utilizing HTTPS
protocol.

The Image Manager/Image Archive may return HTTP redirect responses (responses with values
of 301, 302, 303 or 307) in response to a request. EHR-S Actors can expect to receive an error
response, or the data requested, or a request to look elsewhere for the data. An EHR-S Actor
1030   must follow redirects, but if a loop is detected, it may report an error.

4.15.4.2.3 Expected Actions

Upon reception of the Request for DICOM Information for Display – Study, the Image Manager/
Image Archive shall parse the request. The Image Manager/Image Archive shall return HTTP
response code 404 (Not Found) if it cannot locate the requested DICOM Study Instance.

1035   If there are no errors, the Image Manager/Image Archive shall begin the Interactive Access to
DICOM Study as specified in section 4.15.4.3. The Image Manager/Image Archive shall record
in an audit log the requesting client network address and the patient ID associated with the
requested study.

4.15.4.3 Interactive Access to DICOM Study

1040   Following successful parsing of a web service request and identification of the study(ies) to be
displayed, the Image Manager/ Image Archive shall provide a web-based client interaction to one
or more windows on the EHR-S actor.

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Any necessary plug-ins shall be automatically downloaded from the Image Manager/ Image Archive, if not already installed on the EHR-S client.

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Note: The area of web interaction technologies is rapidly evolving, and the producers of Image Manage/Image Archive products with web interfaces are very cognizant of the need to display properly on the variety of platforms that are used for EHR systems. The IHE Cardiology Technical Committee has decided that over-specification of this interaction would be counter-productive to innovation in implementation of effective user interfaces. This transaction therefore specifies only the initial web service invocation, and the functional requirement for display

1050

of all study information objects. During Trial Implementation, the committee will monitor whether this approach is achieving the requisite level of interoperability.

Management of change of patient context is out of scope of this profile.

Note: The EHR-S Actor may implement the ITI Patient Synchronized Applications (PSA) Profile based on the HL7 CCOW standard.

1055 The Image Manager/ Image Archive shall provide web-based access and display of all DICOM objects for which it claims compliance in any IHE Content or Workflow Profile. This includes images (single frame and multi-frame), DICOM SR (including Evidence Documents and Key Image Notes), and Presentation State objects with their referenced images.

Note: The Image Manager/ Image Archive documentation should indicate under what conditions or circumstances the
1060 displayed images may be considered to be diagnostic quality when rendered by the EHR-S Actor.

4.15.4.3.1   Trigger Events

This interaction is begun by the Image Manager/Image Archive in response to the Request For DICOM Study for Display web service request.

4.15.4.3.2   Message Semantics

1065 The exact content and format of the access to the requested DICOM Study is determined by the Image Manager/Image Archive. For example, it may contain hyperlinks to individual DICOM objects that can be retrieved by using the WADO Retrieve Transaction [RAD-55].

The interaction shall be able to display all DICOM information objects included in the selected study, except images identified as "for processing", raw data instances, and instances of private
1070 SOP Classes.

4.15.4.3.3   Expected Actions

The EHR-S actor renders the returned data within a display window, and may (through user interaction) close the window at any time.

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> *Add section 4.16*

4.16 Outpatient Update [CARD-16]

This section corresponds to Transaction CARD-16 of the IHE Cardiology Technical Framework. Transaction CARD-16 is used by the EHR-S and DSS/OF actors.

1080   This transaction is identical to Patient Update [RAD-12] (see RAD-TF 2: 4.12), with the ADT actor replaced by the EHR-S, and limited to a subset of the trigger events specified in RAD-12.

4.16.1 Scope

In the Outpatient Update Transaction, the EHR-S provides updated patient demographics to the DSS/OF. The DSS/OF can apply those demographics to Requested Procedures based on orders
1085   previously received from the EHR-S, and forwards the update to the Image Manager. When the EHR-S and DSS/OF functionality is combined in an Integrated EHR-S actor, that actor sends the updated patient demographics to the Image Manager.

4.16.2 Use Case Roles
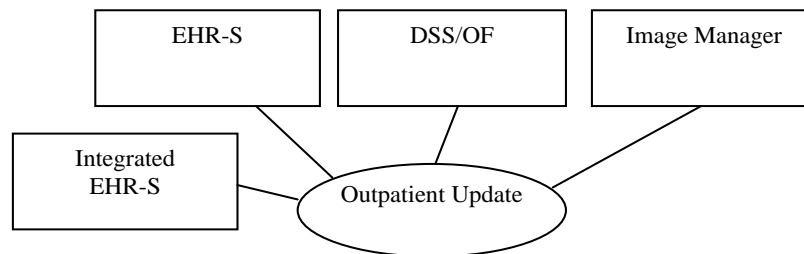
1090   **Actor:** EHR-S

Role: Modifies patient demographic and encounter information.

Actor: DSS/OF

Role: Receives and updates patient and encounter information to maintain consistency with EHR-S system. Shall provide the updated patient and encounter information to the Image
1095   Manager.

Actor: Integrated EHR-S

Role: Modifies patient demographic and encounter information, and provides the updated patient and encounter information to the Image Manager.
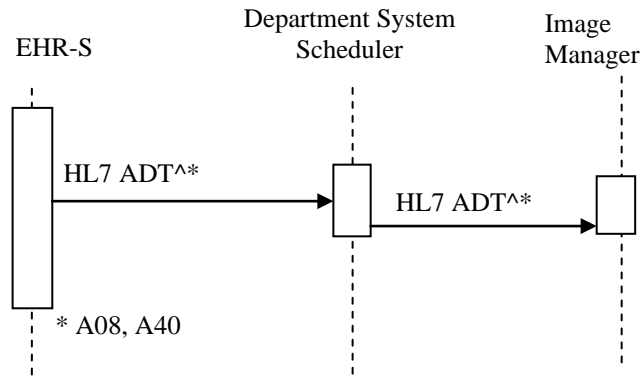
Actor: Image Manager

1100   **Role:** Receives patient and encounter information for use in maintaining its database of images and other evidence documents.

4.16.3 Referenced Standards

HL7 v2.5.1 Chapters 2, 3

4.16.4 Interaction Diagram

1105

4.16.4.1 Patient Management – Patient Information Update

This message uses the HL7 ADT^A08 message. The Trigger Events, Message Semantics, and Expected Actions are identical to the message specified in RAD-TF 2: 4.12.4.3 using HL7v2.5.1 encoding.

1110   #### 4.16.4.2 Patient Management – Patient Merge

This message uses the HL7 ADT^A40 message. The Trigger Events, Message Semantics, and Expected Actions are identical to the message specified in RAD-TF 2: 4.12.4.4 using HL7v2.5.1 encoding.

1115

Appendix X: Web Service Definition for Invoke Image Display
1120 **Service Transaction**

The following is an example WSDL definition of web services used in Transaction CARD-15. This code is provided as an example and is not intended to replace the formal specification of Transaction CARD-15.

```
1125   <?xml version="1.0" encoding="utf8"?>

       <definitions xmlns:http="http://schemas.xmlsoap.org/wsdl/http/"
           xmlns:s="http://www.w3.org/2001/XMLSchema"
           xmlns:s0="http://rsna.org/ihe/IHERetrieveForDisplay"
1130       xmlns:tm="http://microsoft.com/wsdl/mime/textMatching/"
           xmlns:mime="http://schemas.xmlsoap.org/wsdl/mime/"
           targetNamespace="http://rsna.org/ihe/IHERetrieveForDisplay"
           xmlns="http://schemas.xmlsoap.org/wsdl/">

1135     <!-- Defines the types available for the parameters -->
         <!-- May also include the return type definitions -->
         <types>
           <s:schema elementFormDefault="qualified"
       targetNamespace="http://rsna.org/ihe/IHERetrieveForDisplay">
1140         <!-- Add any items that control the returned values list or type here -->
             <!-- Add or remove items in the actual supplied WSDL to show the available types. -->
             <s:simpleType name="DICOMrequestType">
               <s:restriction base="s:string">
                 <s:enumeration value="SUMMARY" />
1145             <s:enumeration value="STUDY" />
               </s:restriction>
             </s:simpleType>

             <!-- Indicates that this item is a returned rows restriction -->
1150         <s:simpleType name="ReturnedResultCount" type="s:positiveInteger" />

             <!-- Please use the string "Search" as a prefix for all search criteria, and list below -->
             <!-- Indicates that this item is a search string -->
             <s:simpleType name="SearchString" type="s:string" />
1155
           </s:schema>
         </types>

         <message name="RetrieveDICOMInfoHttpGetIn">
1160       <!-- Add other parameters here if they are available, using types defined above. -->
           <part name="requestType" type="DICOMRequestType" />
           <part name="patientID" type="SearchString" />
           <part name="lowerDateTime" type="s:dateTime" />
           <part name="upperDateTime" type="s:dateTime" />
1165       <part name="mostRecentResults" type="ReturnedResultCount" />
           <part name="studyUID" type="SearchString" />
         </message>

         <message name="RetrieveDICOMInfoHttpGetOut">
1170       <!-- If a complex type is defined for the return value, then it is suggested that -->
           <!-- it be used here instead of s0:string. If a complex type is allowed as one -->
           <!-- of the options, but an arbitrarily formatted string is also allowed, then create -->
           <!-- a union type here that allows either option. -->
           <part name="Body" element="s0:string" />
1175     </message>

         <portType name="IHERetrieveForDisplayHttpGet">
           <operation name="RetrieveDICOMInfo">
```

```
1180          <input message="s0:RetrieveDICOMInfoHttpGetIn" />
              <output message="s0:RetrieveDICOMInfoHttpGetOut" />
            </operation>
          </portType>

          <binding name="IHERetrieveForDisplayHttpGet" type="s0:IHERetrieveForDisplayHttpGet">
1185        <http:binding verb="GET" />
            <operation name="RetrieveDICOMInfo">
              <http:operation location="/IHERetrieveDICOMInfo" />
              <input>
                <http:urlEncoded />
1190          </input>

              <output>
                <mime:content type="text/html" />
              </output>
1195        </operation>

          </binding>

          <!-- Bind the actual service here -->
1200      <service name="IHERetrieveForDisplay">
            <port name="IHERetrieveForDisplayHttpGet" binding="s0:IHERetrieveForDisplayHttpGet">
              <http:address location="http://localhost/" />
            </port>
          </service>
1205
```