Integrating the Healthcare Enterprise

IHE

IHE Radiology
Technical Framework Supplement

Import and Display of External Priors (IDEP)

Revision 1.1 – Trial Implementation

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Foreword

This is a supplement to the IHE Radiology Technical Framework V17.0. Each supplement
30 undergoes a process of public comment and trial implementation before being incorporated into
the volumes of the Technical Frameworks.

This supplement is published on May 13, 2019 for trial implementation 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 Radiology Technical
35 Framework. Comments are invited and can be submitted at
http://www.ihe.net/Radiology_Public_Comments.

This supplement describes changes to the existing technical framework documents.

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

40 | *Amend section X.X by the following:* |
    |---|

Where the amendment adds text, make the added text **bold underline**. Where the amendment
removes text, make the removed text **bold strikethrough**. When entire new sections are added,
introduce with editor's instructions to "add new text" or similar, which for readability are not
bolded or underlined.

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

Information about the IHE Radiology domain can be found at 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://ihe.net/IHE_Process and http://ihe.net/Profiles.

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

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Introduction to this Supplement

It is common for patients to move between healthcare facilities that serve a shared patient population. Many of these healthcare facilities already have a shared secure network
190   infrastructure. Upon receipt of an order for a new imaging study, the IHE Radiology Import and Display of External Priors (IDEP) Profile provides a method to automatically retrieve images and reports throughout the shared network, independent of a common Patient Identifier. The exchange includes "localizing" the data such that both the radiology images and reports may be displayed in the same system in the expected manner for side-by-side comparison and report
195   display.
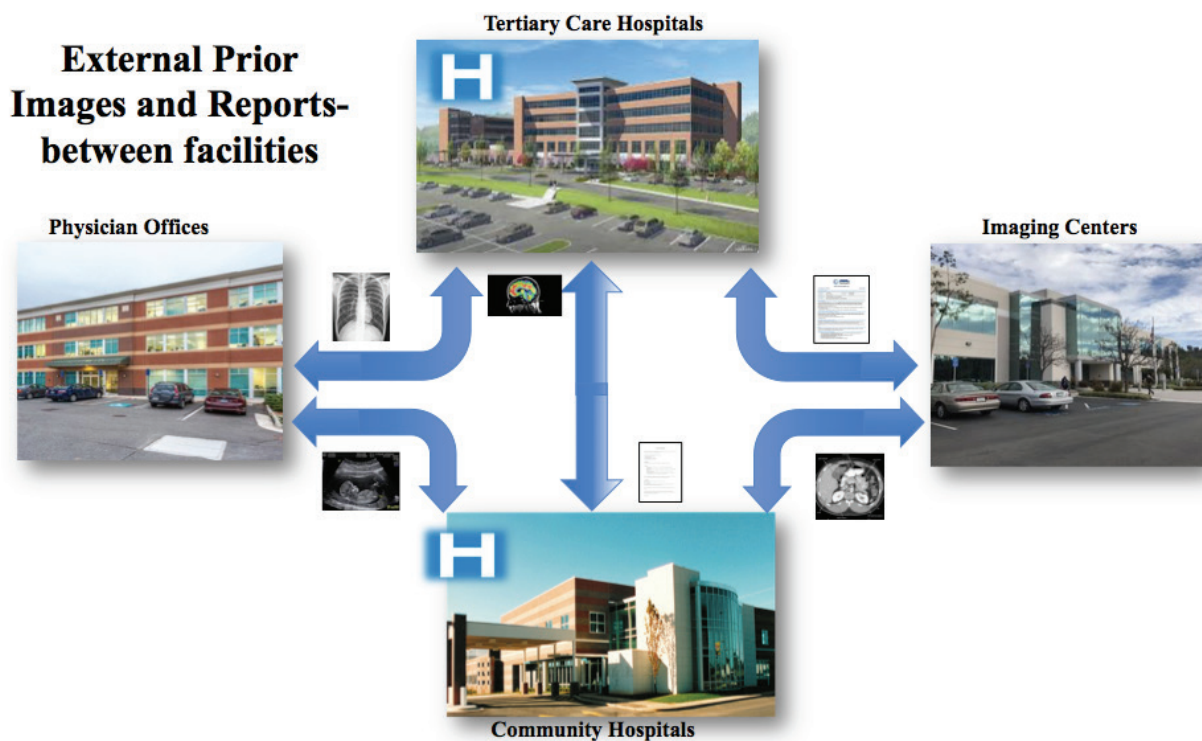
Figure 1: Flow of external prior images and reports between facilities

Note: this supplement makes use of the following IHE Radiology supplements for Trial
200   Implementation:

- Import Reconciliation Workflow (IRWF.b):
  https://www.ihe.net/uploadedFiles/Documents/Radiology/IHE_RAD_Suppl_IRWF.b.pdf

- Results Distribution (RD):
  https://www.ihe.net/uploadedFiles/Documents/Radiology/IHE_RAD_Suppl_RD.pdf

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Closed Issues

Issue:	Status/Resolution:
HL7[1] v2 Query was considered but decided against because it is not widely implemented in the real world by a wide range of products.	**No HL7 v2 Query used.**
In the Report Format/Transport Conversion table, it is possible to convert a DICOM[2] Secondary Capture to a PDF and transport as either an HL7 ORU or an XDS Scanned Document. However, the resulting PDF/SD will be **very large in terms of number of bytes** which means that in HL7 ORUs, continuations will be required. Does this conversion really make sense or is it not feasible in the real world?	**Decision to focus on PDF and text.**
Should we add a "PowerPoint-type" into the Intro to this supplement per Charles Parisot's suggestion prior to Publish for TI?	**Added in Intro.**
What if, during the "verify all images already local" (Images Availability Query [RAD-11]), the study is already found (same SIUID). There is a risk that the study present in the local system has not been properly tag morphed. It is not clear that anything can be done to correct the situation other than trying to resend the study every time and hope the Image Manager overwrites the exist study, which may not be realistic on installed base systems anyway. The current solution to this problem effectively assumes that the "images already locally store" have already been tag morphed. This profile could require the images always be resent anyway, but that appears to be a waste of resources.	**This scenario is possible but will not be addressed in this profile.** No clear mechanism for detecting incorrect data or forcing Image Manager to delete it.

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[1] HL7 is the registered trademark of Health Level Seven International.

[2] DICOM is the registered trademark of the National Electrical Manufacturers Association for its standards publications relating to digital communications of medical information.

Issue:	Status/Resolution:
There is a potential IDEP use case that searches for priors 'on demand': User initiates search for priors Importer initiates patient lookup and federated query Importer filters search results based on relevancy rules Importer returns localized search results User chooses studies to retrieve Importer retrieves / localizes selected studies and reports	**Out of scope in this profile.** While this scenario is possible and steps 1-5 can be done relatively quickly, step 6 will typically be a slower operation.
Should the IDEP Importer and Report Converter actors be combined to reduce the number or transactions? OR should there be a mechanism for a product to incorporate both the Importer and Report Converter such that those transactions do not need to be exposed? The Report Converter was kept as a separate actor because extensive time was sent consider deployment options and it was decided that there may be a 1:1 local Report Manager to Report Converter correspondence.	**Yes.** There is no compelling reason to separate them.
Are there any attributes in the Clinical Trial Module (C.7.2.3) which should be recommended to be considered for relevancy logic? It seems like this could be interesting if clinical trials were performed across multiple sites?	**No.** Clinical trial use is out of scope. The Clinical Trial Module is not of use to the primary use case.
Should IDEP be using MHD or going straight to HL7 FHIR®[3] Diagnostic Report Query? Note that MHD contains the XDS <-> FHIR mapping which will have to be reproduced potentially if it is not inherited.	**MHD**

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[3] FHIR is the registered trademark of Health Level Seven International.

Issue:	Status/Resolution:
Should the Importer send orders to the Image Manager / Report Manager or the DSS?	**Image Manager / Report Manager.** Purpose of order is to ensure data is accepted and viewable and not for billing / reporting.
Which TEXT / PDF wrapper formats are in scope?	**The Importer will retrieve MHD DocumentReference Resources and store them as HL7v2 ORU objects.** No other wrapper formats are in scope.
RAD-16 has explicit display requirements and is tied to "modality images". **Would RAD-73 (MIMA) – or a new transaction – be more appropriate for the DICOM Retrieval use case?** See also CP RAD-189	**Use RAD-16.** CP-189 removes display requirements.
Is RAD-Y1 sufficient for relevancy filtering?	**Yes.** Using the Hanging Protocol Definition Sequence (0072,000C) as a reference, this includes: 1. Modality 2. Anatomic Region Sequence 3. Procedure Code Sequence 4. Reason For Requested Procedure Code Sequence 1-4 are currently required return keys.
Do we need an explicit/defined "Bandwidth limited Option"? Is that just a product differentiation if an implementation can come up with clever methods to mitigate the bandwidth limits? If so, what recommendations do you have on how this Option should be defined? OR- do we just describe it in the Deployment Concepts section (as is already done in Appendix K)?	**No.** Mentioned in deployments (related issue – operational performance of IA/IM actors)

Issue:	Status/Resolution:
IDEP with DIMSE Q/R: Are there any gaps in existing transactions?	**No.** Transactions sufficient for use cases.
IDEP with Reports: Are there any gaps in existing transactions?	**No.** Transactions sufficient for use cases.
IDEP with XDS-I Q/R: Is XDS query sufficient for determining relevancy?	**Yes.** Three of four key relevancy attributes are available in XDS-I. This is sufficient for this use case.
In the XDS-I Report use case, should CDA®4 (wrapped text) reports be supported?	**Yes.** Expected workflow: • Retrieve CDA document • Extract text Wrap text in ORU (XDS metadata is assumed to contain all key elements from CDA wrapper)
In the XDS-I report use case, should CDA (structured heading) reports be supported? If so, how should they be wrapped?	**Yes, as named option (CDA Imaging Report with Structured Headings).** Support for this requires the importer to convert CDA to ORU as one of: • Single text segment • One OBX segment per section
Should XDS be mandatory for Importer? XDS is not in use in all regions. Regions that use XDS can require support for this named option.	**No**

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[4] CDA is the registered trademark of Health Level Seven International.

Issue:	Status/Resolution:
Should MPPS be included in this profile? MPPS is currently required for both the Importer and the Image Manager actors. In practice, this is not widely used even for Scheduled Workflow and the IDEP Profile can function without it. Is the value sufficient to justify the higher implementation burden?	**Yes** The purpose in this use case is to allow the Image Manager to know when the transfer of a particular study or report is complete in order to make appropriate decisions.
For Proxy ORI, should additional patient identifiers be in PID-3 or in PID-4?	**PID-3** IDEP is intended to use HL7 v2.5.1. See RAD TF-2: Appendix D (Sup SWF.b)
For ORU, should additional patient identifiers be in PID-3 or in PID-4?	**PID-3** IDEP is intended to use HL7 v2.5.1. See RAD TF-2: Appendix D (Sup SWF.b)
For localized DICOM studies, should additional patient identifiers be added to the Other Patient IDs Sequence?	**Yes**
Should the Importer be one actor or two? One alternative might be to split Importer into Importer and Report Importer or add Reports as named option.	**Importer remains a single actor.**
Should this supplement include details of other (optional) report conversions?	**No.** An informative appendix on other report conversions has been extracted into a separate document.
Are there any Query Return Keys in RAD-Y1 Query for Patient Studies which are R+ but should be optional due to lack of support by existing systems? One of the goals of this profile is to make it relatively easy to support for existing Image Manager / Image Archive actors.	**Yes.** Enhanced Query Option defined that includes additional query attributes.

Issue:	Status/Resolution:
Should Patient Root C-FIND be removed or made optional due to lack of support? Currently it is used for discovery of remote patient identifiers if PIX / PDQ is not available.	**Made optional.**
Should Study Root C-FIND be included as a method for discovery of remote patient identifiers? Study Root C-FIND could be used to perform a patient demographics query. This is more widely supported but may enable overly-broad queries from external institutions – could cause security and / or performance issues. Would participating sites be comfortable with external sites having Study Root C-FIND access to their image archive?	**Yes.** New transaction [RAD-134] defined to cover this use case.
Should Purge External Images capability be mandatory for Image Manager and Report Manager actors? Currently this is optional, but it may be required by policy at most sites.	**Keep optional.**
Should XDS and MHD both be options with Importer and Report Manager actors required to support at least one? Currently MHD is mandatory and XDS is optional. In an XDS environment MHD is not likely to be needed.	**Keep MHD mandatory and XDS optional.**
Should an Importer in an XDS environment require all of the DICOM operations? In an XDS environment DICOM query transactions are not likely to be used.	**Yes.** Already supported by most implementors. This does not mean these transactions need to be enabled at a given site.
Should DICOM SR be a defined report option? Currently IDEP allows DICOM SR instances to be included in external prior studies but still requires support for MHD / ORU for the exchange of reports.	**No.** Added X.4.1.6.1 DICOM SR Report Format to describe how this use case can be supported by this profile.

Issue:	Status/Resolution:
Should the Image Display and Report Reader actors be included in this profile? Currently they have some Volume 1 requirements but no transactions.	**Yes.** Added some additional display requirements around differentiating local and external priors – such as the use of Institution Name.
Should the 'Proxy Report' be a new transaction rather than a re-use of RAD-4? This use of RAD-4 is at best confusing if not outside of the scope of this transaction.	**Yes.** Added transaction [RAD-135].

General Introduction

210 *Update the following Appendices to the General Introduction as indicated below. Note that these are not appendices to Volume 1.*

Appendix A – Actor Summary Definitions

Add the following new actors to the IHE Technical Frameworks General Introduction Appendix A:

215

Actor Name	Definition
None	

Appendix B – Transaction Summary Definitions

Add the following new transactions to the IHE Technical Frameworks General Introduction Appendix B:

Transaction	Name	Definition
RAD-133	Query for Patient Studies	Find any studies associated with a particular patient.
RAD-134	Study Root Query for Patient ID	Use patient demographics to find the identifier of the corresponding patient
RAD-135	Send Import Notification	Notify a system of an external prior study or report import

220 Glossary

*Add the following **new** glossary terms to the IHE Technical Frameworks General Introduction Appendix D.*

Glossary Term	Definition
External Prior Study	An imaging study that was performed at a different facility that serves as a reference for a local current study.
External Prior Report	An imaging report that was created at a different facility associated with an External Prior Study.

Volume 1 – Profiles

48 Import and Display of External Priors (IDEP) Profile

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The IHE Radiology Import and Display of External Priors (IDEP) Profile specifies the trigger events, transactions, and data mappings necessary to automate the discovery of relevant prior imaging studies and reports and the transfer between different facilities, i.e., "external priors".

230

IDEP is a workflow profile. The new requirements are concentrated in the Importer to minimize the impact on existing Image Managers and Report Managers. Specifically, IDEP provides a method for installed base systems to enable side-by-side display of relevant external priors studies for the same patient and to make those studies automatically appear "local", including the ability to use the proper local display hanging protocols.

48.1 IDEP Actors, Transactions, and Content Modules

235

This section defines the actors, transactions, and/or content modules in this profile. General definitions of actors are given in the Technical Frameworks General Introduction Appendix A. IHE Transactions can be found in the Technical Frameworks General Introduction Appendix B. Both appendices are located at http://ihe.net/Technical_Frameworks/#GenIntro.

240

Figure 48.1-1 shows the actors directly involved in the IDEP Profile and the relevant transactions between them. If needed for context, other actors that may be indirectly involved due to their participation in other related profiles are shown in gray. Actors which have a required grouping are shown in conjoined boxes (see Section 48.3).
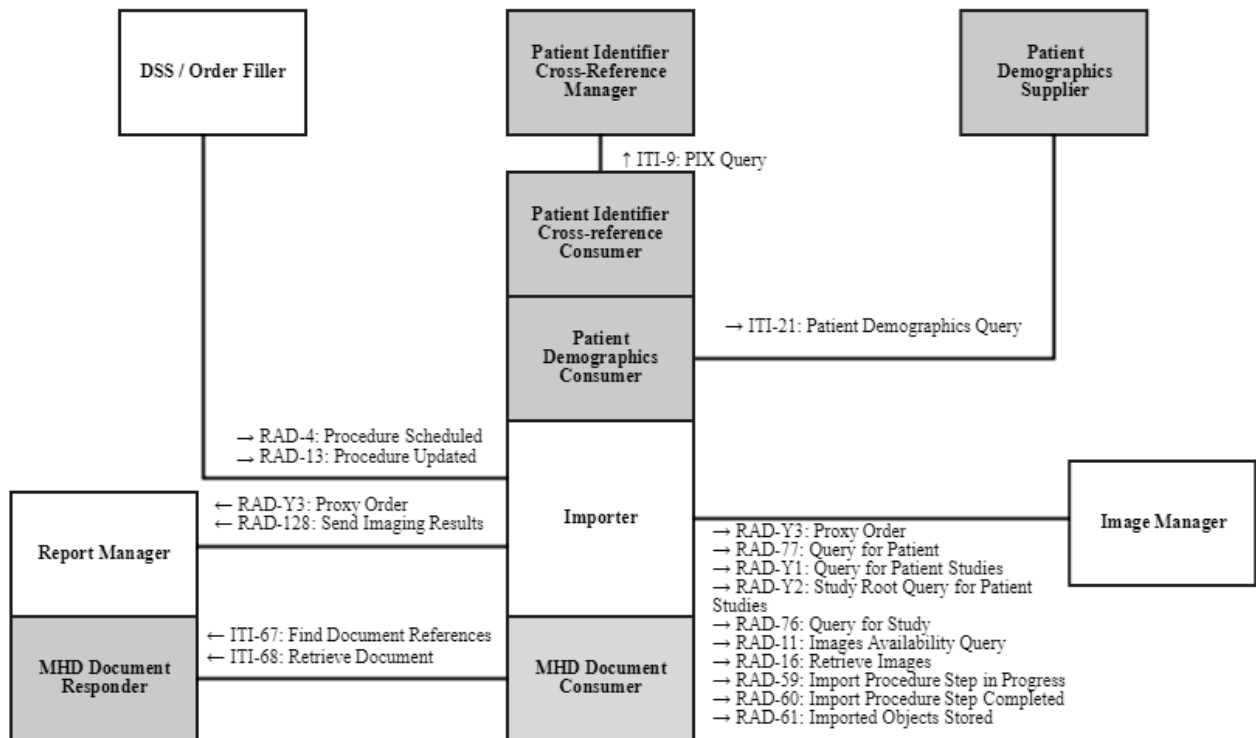
Figure 48.1-1: IDEP Actor Diagram

245   Figure 48.1-2 shows the actors involved in the IDEP Profile that support either the XDS-I.b Images Option or the XDS.b Reports Option and the relevant transactions between them.
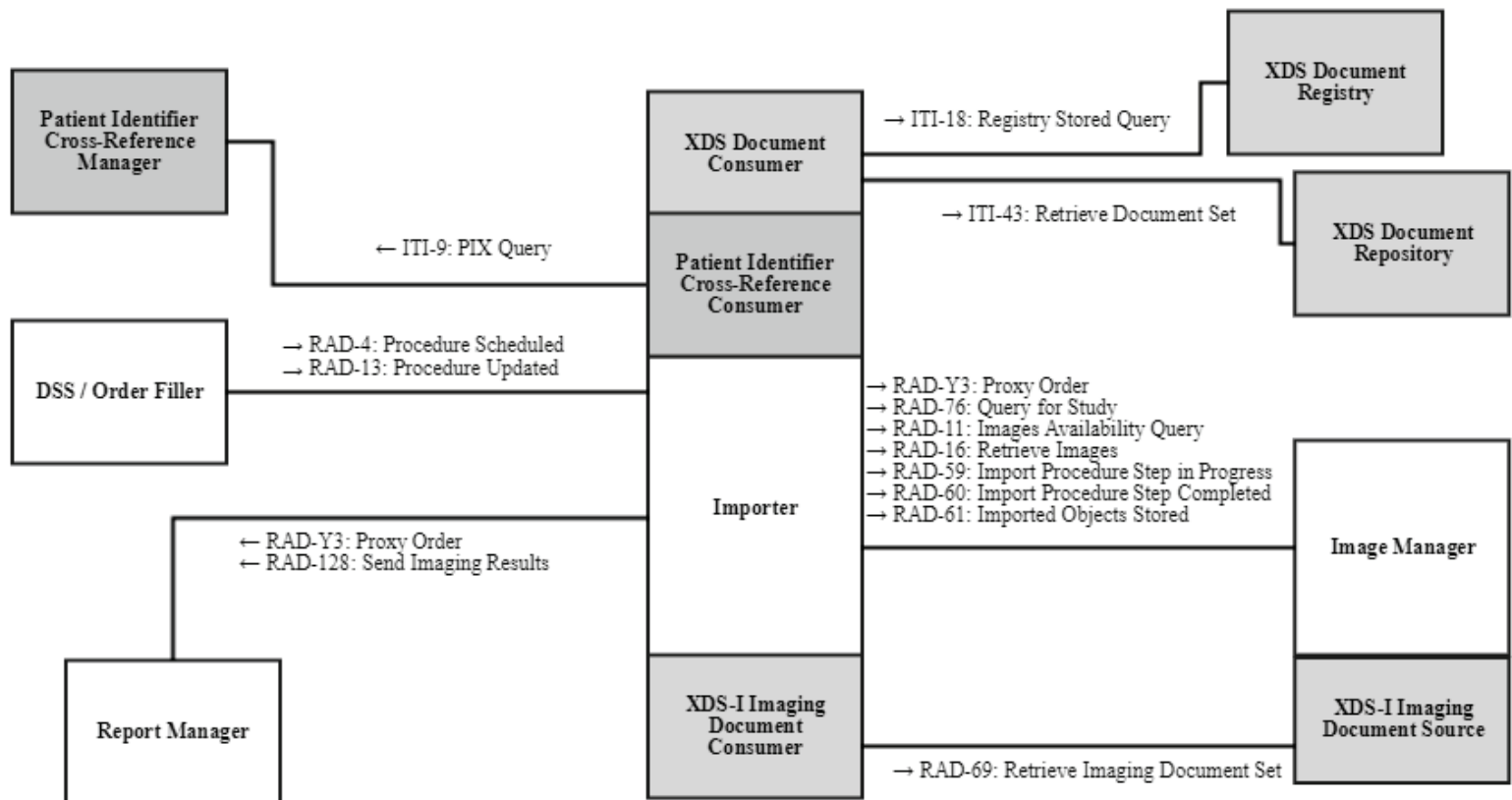
Figure 48.1-2: IDEP XDS Options Actor Diagram

Table 48.1-1 lists the transactions for each actor directly involved in the IDEP Profile. To claim
250   compliance with this profile, an actor shall support all required transactions (labeled "R") and
may support the optional transactions (labeled "O"). See Section 48.3 IDEP Required Actor
Grouping for additional required transactions.

Table 48.1-1: IDEP Profile - Actors and Transactions

Actors	Transactions	Optionality	Reference
Department System Scheduler/ Order Filler (DSS/OF)	Procedure Scheduled [RAD-4]	R	RAD TF-2: 4.4
	Procedure Updated [RAD-13]	R	RAD TF-2: 4.13
Importer	Procedure Scheduled [RAD-4]	R	RAD TF-2: 4.4
	Procedure Updated [RAD-13]	R	RAD TF-2: 4.13
	PIX Query [ITI-9]	R	ITI TF-2a: 3.9

Actors	Transactions	Optionality	Reference
	Patient Demographics Query [ITI-21]	R	ITI TF-2a: 3.21
	Query for Patient ID [RAD-77]	O	RAD TF-3: 4.77 (See IRWF.b Supplement)
	Study Root Query for Patient ID [RAD-134]	R	RAD TF-3: 4.134
	Query for Patient Studies [RAD-133]	R	RAD TF-3: 4.133
	Query for Study [RAD-76]	R	RAD TF-3: 4.76 (See IRWF.b Supplement)
	Images Availability Query [RAD-11]	R	RAD TF-2: 4.11 (See IRWF.b Supplement)
	Retrieve Images [RAD-16]	R	RAD TF-3: 4.16
	Send Import Notification [RAD-135]	R	RAD TF-3: 4.135
	Import Procedure Step in Progress [RAD-59]	R	RAD TF-3: 4.59 (See IRWF.b Supplement)
	Imported Objects Stored [RAD-61]	R	RAD TF-3: 4.61 (See IRWF.b Supplement)
	Import Procedure Step Completed [RAD-60]	R	RAD TF-3: 4.60
Image Manager/ Image Archive (Image Manager)	Query for Patient ID [RAD-77]	O	RAD TF-3: 4.77 (See IRWF.b Supplement)
	Study Root Query for Patient ID [RAD-134]	R	RAD TF-3: 4.134
	Query for Patient Studies [RAD-133]	R	RAD TF-3: 4.133
	Retrieve Images [RAD-16]	R	RAD TF-3: 4.16
	Query for Study [RAD-76]	R	RAD TF-3: 4.76 (See IRWF.b Supplement)
	Images Availability Query [RAD-11]	R	RAD TF-2: 4.11 (See IRWF.b Supplement)
	Send Import Notification [RAD-135]	R	RAD TF-3: 4.135
	Import Procedure Step in Progress [RAD-59]	R	RAD TF-3: 4.59 (See IRWF.b Supplement)
	Imported Objects Stored [RAD-61]	R	RAD TF-3: 4.61 (See IRWF.b Supplement)
	Import Procedure Step Completed [RAD-60]	R	RAD TF-3: 4.60 (See IRWF.b Supplement)
Report Manager	Send Import Notification [RAD-135]	R	RAD TF-3: 4.135

Actors	Transactions	Optionality	Reference
	Send Imaging Result [RAD-128]	R	RAD TF-3: 4.128 (See RD Supplement)
Image Display	No transactions	N/A	Section 48.1.1.4
Report Reader	No transactions	N/A	Section 48.1.1.6

255 ### 48.1.1 Actor Descriptions and Actor Profile Requirements

Most requirements are documented in Transactions (Volumes 2 and 3). This section documents any additional requirements on actors in this profile.

48.1.1.1 Department System Scheduler / Order Filler (DSS/OF)

The DSS/OF triggers the external priors workflow on the Importer when it schedules a new local
260 order or updates an existing local order.

The DSS/OF shall support the HL7 v2.5.1 Message Semantics for Procedure Scheduled [RAD-4] and Procedure Updated [RAD-13]. See RAD TF-2: 4.4.4.1.2.2 and RAD TF-2: 4.13.4.2.2.

48.1.1.2 Importer

The Importer is central to the IDEP workflow. Readers may find the overview in Section
265 48.4.2.1.2 useful to understand the IDEP workflow and the requirements on this actor.

During an instance of the IDEP workflow, the Importer will interact with a single local Image Manager and one or more remote Image Managers using transactions described in Section 48.1.1.3.

During an instance of the IDEP workflow, the Importer will interact with a single local Report
270 Manager and one or more remote Report Managers using transactions described in Section 48.1.1.5.

The Importer is responsible for:

- receiving new and updated orders that trigger the IDEP workflow

- determining the patient's remote Patient IDs

275 - identifying external prior studies and reports

- determining likely clinical relevancy of priors

- retrieving these external prior studies and reports

- coercing the metadata attributes to local values

- sending the external prior studies and reports to the appropriate destinations

280   The Importer shall support the HL7 v2.5.1 Message Semantics for Procedure Scheduled [RAD-4] and Procedure Scheduled [RAD-13] in RAD TF-2: 4.4.4.1.2.2 and RAD TF-2: 4.13.4.2.2, and the Expected Actions in RAD TF-2: 4.4.4.2 and RAD TF-2: 4.13.4.3.

        The Importer shall support a method to filter the list of external studies returned by the Query for Patient Studies [RAD-133] to avoid retrieving irrelevant studies. Defining this business logic is
285   beyond the scope of this profile, but concepts are described in Section 48.4.1.2.

        The Importer shall support the Enhanced Query Option of the Query For Patient Studies [RAD-133] transaction (see RAD TF-3: 4.133.4.1.2.1).

        Note: The Importer does not need to support the display requirements of the Retrieve Images [RAD-16] transactions. See CP-RAD-189.

290   For the Imported Objects Stored [RAD-61] transaction, the Importer shall support coercion of DICOM attributes as described in RAD TF-2: Appendix A.5: Imported Object Integration – Critical Attributes, RAD TF-2: Table A.5-3 (in the IRWF.b Supplement) with the following additional specifications:

- The Importer shall use the "Trigger Order (OMI)" column in RAD TF-3: Table
295   4.135.4.1.2-1 in place of the "Request Filling of Order ORI" column in RAD TF-2: Table A.5-3.

- The Import shall populate Issuer of Patient ID (0010,0021) and Issuer of Accession Number (0008,0051).

- The Importer may use system configuration to define appropriate values for each external
300   facility based on Calling AE Title or other information.

- The Importer shall identify prior studies as external by:

  o adding the code (IRWF007, IHERADTF, "To be provided as prior") into the Scheduled Protocol Sequence (0040,0008) as an additional sequence item

  o adding Instance Origin Status (0400,0600) with a value of "IMPORTED"

305   - The Importer shall populate the Institution Name (0008,0080), Institution Address (0008,0081), and Institution Code Sequence (0008,0082).
  The Importer may use system configuration to define appropriate values for each external facility based on Calling AE Title or other information.

        See Figure 48.4.2.3.2.4-1 for context and timing of the coercion.

310   The Importer shall be grouped with an MHD Document Consumer. This grouped actor:

- shall issue Find Document References [ITI-67] queries using the external Patient ID and external Accession Number in query keys `patient.identifier` and `related` respectively. For context, see Section 48.4.2.4.

- shall identify matching DocumentReference Resources that have the following `format`
315   values:

- o `urn:ihe:rad:TEXT` (CDA Wrapped Text Report)

- o `urn:ihe:rad:PDF` (PDF Report)

and, if the CDA Imaging Report with Structured Headings Option is supported

- o `urn:ihe:rad:CDA:ImagingReportStructuredHeadings:2013` (CDA Imaging Report with Structured Headings)

- • shall issue Retrieve Documents [ITI-68] requests for the identified documents

Other DocumentReference Resource formats are not required by this profile.

The Importer shall be capable of producing the following payload formats for inclusion in Send Imaging Result [RAD-128] messages:

- • Text

  - • used when the source report format is one of:

    - o `urn:ihe:rad:TEXT` (CDA Wrapped Text Report)

    - o `urn:ihe:rad:CDA:ImagingReportStructuredHeadings:2013` (CDA Imaging Report with Structured Headings)

- • PDF

  - • used when the source report format is:

    - o `urn:ihe:rad:PDF` (PDF Report)

The Importer shall encode HL7 v2.5.1 ORU Send Imaging Result [RAD-128] messages as described in RAD TF-3: Appendix P.

48.1.1.3 Image Manager / Image Archive

During the execution of a single IDEP workflow, a given Image Manager/Archive will act as either a remote Image Manager or a local Image Manager. However, an IDEP Image Manager/Archive implementation is required to support both roles.

Table 48.1.1.3-1 identifies the transactions related to the remote Image Manager role and Table 48.1.1.3-2 identifies the transactions related to the local Image Manager role.

While the list of transactions for the Image Manager is extensive, these transactions are widely implemented. The intent is that existing Image Manager/Archive implementations are minimally affected when adding IDEP capabilities.

Table 48.1.1.3-1: IDEP Profile – Remote Image Manager Transactions

Transactions	Purpose
Query for Patient ID [RAD-77]	Supporting discovery of remote patient identifiers by the Importer

Transactions	Purpose
Study Root Query for Patient ID [RAD-134]	Supporting discovery of remote patient identifiers by the Importer
Query for Patient Studies [RAD-133]	Supporting discovery of external priors by the Importer
Retrieve Images [RAD-16]	Supporting retrieval of external priors by the Importer

345 **Table 48.1.1.3-2: IDEP Profile – Local Image Manager Transactions**

Transactions	Purpose
Query for Study [RAD-76]	Determining if external prior is already in local Image Manager
Images Availability Query [RAD-11]	Determining if local copy of external prior is complete
Send Import Notification [RAD-135]	Preparing Image Manager for receipt of external prior
Import Procedure Step in Progress [RAD-59]	Providing status of external prior import
Imported Objects Stored [RAD-61]	Storage of external prior
Import Procedure Step Completed [RAD-60]	Providing content manifest and status of external prior import

The local Image Manager shall treat imported external prior studies in a similar manner to non-imported (local) priors.

Imported external prior studies:

350 • shall be included in responses to local queries, e.g., when a referring physician queries for studies for a patient, the Image Manager will return all studies, local and external, for that patient

• shall not be included on radiologists' interpretation worklist as a "study to be interpreted"

• may be excluded in a search from an external facility. For example, if Facility A imports
355 a study from Facility B, Facility A does not return that study in a search from Facility B (or Facility C)

48.1.1.4 Image Display

The Image Display in the IDEP Profile does not have any required transaction; however, it has specific display requirements.

360 Note that the means of communication between the Image Display and the local Image Manager/Archive is not constrained by this profile.

The following requirements are intended to establish a baseline level of capabilities. Providing more intelligent and advanced capabilities is both allowed and encouraged, and the profile is not intended to be limiting.

365 The Image Display:

- shall display external prior studies in a similar manner to local priors

- shall be capable of simultaneously displaying prior and current studies

- shall be capable of displaying the Accession Number and Study Date on each of the prior and current studies

370 - shall have a visual indication that a prior study is an external prior study, such as:

  o displaying the Issuer of Accession Number

  o displaying the Institution Name

  o displaying a prefix to the Accession Number

These requirements are intended to establish a baseline level of capabilities. Providing more
375 intelligent and advanced capabilities is both allowed and encouraged.

See Section 48.4.1.3 Proper Display and Interpretation using External Priors.

48.1.1.5 Report Manager

During the execution of a single IDEP workflow a given Report Manager will act as either a remote Report Manager or a local Report Manager. However, a Report Manager implementation
380 is required to support both roles.

Table 48.1.1.5-1 identifies the transactions related to the remote Report Manager role and Table 48.1.1.5-2 identifies the transactions related to the local Report Manager role.

Table 48.1.1.5-1: IDEP Profile – Remote Report Manager grouped with MHD Document Responder Transactions

Transactions	Purpose
Find Document References [ITI-67]	Supporting discovery of external reports by the Importer
Retrieve Document [ITI-68]	Supporting retrieval of external reports by the Importer

385 Note: A Report Manager is required to be grouped with an MHD Document Responder. All remote Report Manager transactions in Table 48.1.1.5-1 are inherited from this grouping. See Section 48.3

Table 48.1.1.5-2: IDEP Profile – Local Report Manager Transactions

Transactions	Purpose
Send Import Notification [RAD-135]	Preparing for receipt of external report

Transactions	Purpose
Send Imaging Result [RAD-128]	Receiving external report

The local Report Manager shall treat imported external prior reports in a similar manner to local prior reports, e.g., imported external prior reports shall be included in responses to local queries, etc.

> Note: Imported external prior report status should not be modified by radiologists' interpretation worklist, e.g., a "final" report shall not be treated as preliminary.

The MHD Document Responder grouped with the Report Manager:

- shall support the following Find Document References [ITI-67] query keys:

    o `patient.identifier`

    for searches using the external Patient ID

    o `related`

    for searches using the external Accession Number

    For context, see Section 48.4.2.4.

- shall support DocumentReference Resources that have the following format values:

    o `urn:ihe:rad:TEXT` (CDA Wrapped Text Report)

    o `urn:ihe:rad:PDF` (PDF Report)

    and, if the Report Manager supports the CDA Imaging Report with Structured Headings Option:

    o `urn:ihe:rad:CDA:ImagingReportStructuredHeadings:2013` (CDA Imaging Report with Structured Headings)

- shall respond to Retrieve Document [ITI-68] requests for report documents

> Note: The report documents themselves may be hosted on a different system from the Report Manager / MHD Document Responder.

Other DocumentReference Resource formats are not required by this profile. See Section 48.4.1.6 "Imaging Report Payload Formats and Transmission".

48.1.1.6 Report Reader

The Report Reader in the IDEP Profile does not have any required transactions; however, it has specific display requirements.

Note that the means of communication between the Report Reader and the local Report Manager is not constrained by this profile.

The Report Reader:

- shall display external reports in a similar manner to local reports
- shall be capable of displaying the Accession Number and Study Date on each of the prior and current reports
- shall have a visual indication that a prior report is an external prior report, such as:
  - displaying the Issuer of Accession Number
  - displaying the Institution Name
  - displaying a prefix to the Accession Number

These requirements are intended to establish a baseline level of capabilities. Providing more intelligent and advanced capabilities is both allowed and encouraged.

48.2 IDEP Actor Options

Options that may be selected for each actor in this profile, if any, are listed in Table 48.2-1. Dependencies between options when applicable are specified in notes.

Table 48.2-1: Import and Display of External Priors - Actors and Options

Actor	Option Name	Reference
Department System Scheduler / Order Filler (DSS/OF)	None	--
Image Manager / Image Archive	Purge External Images Option	Section 48.2.1
	Enhanced Query Option	Section 48.2.6
Image Display	None	--
Report Manager	Purge External Reports Option	Section 48.2.2
Report Reader	None	--
Importer	XDS-I.b Images Option	Section 48.2.3
	XDS.b Reports Option	Section 48.2.4
	CDA Imaging Report with Structured Headings	Section 48.2.5
	Enhanced Query Option (Required)	Section 48.2.6

48.2.1 Purge External Images Option

Purging (deleting) external prior studies is important in enterprise data governance planning. See Section 48.4.1.8 for a discussion of considerations around purging external prior studies versus maintaining consistency of studies across multiple systems.

Image Managers that support this option shall provide a purge mechanism for external prior studies. The business logic for purging shall be configurable and is not specified by this profile.

Some triggers for purging external prior studies could include:

440
- completion of the order (OMI) that initiated the execution of the IDEP workflow

- expiry of a retention period for external prior studies

There are no transactions associated with this option.

48.2.2 Purge External Reports Option

Purging (deleting) external prior reports is important in enterprise data governance planning. See
445 Section 48.4.1.8 for a discussion of considerations around purging external prior reports versus
maintaining consistency of reports across multiple systems.

Report Managers that support this option shall provide a purge mechanism for imported external
reports. The business logic for purging shall be configurable but is not specified by this profile.

Some triggers for purging external prior reports could include:

450
- completion of the order (OMI) that initiated the execution of the IDEP workflow

- expiry of a retention period for external prior reports

There are no transactions associated with this option.

48.2.3 XDS-I.b Images Option

The Importer that supports the XDS-I Images Option accesses external prior studies using the
455 Cross-Enterprise Document Sharing for Images (XDS-I.b) Profile.

The Importer shall be grouped with an XDS-I.b Imaging Document Consumer.

As described in Section 48.4.2.5 "Image and Report Access using XDS-I":

- The Imaging Document Consumer shall query for and retrieve the manifest and
referenced external prior studies

460
- The Importer shall send retrieved external prior studies to the local Image Manager

48.2.4 XDS.b Reports Option

The Importer that supports the XDS Reports Option accesses external prior reports using the IHE
ITI Cross-Enterprise Document Sharing (XDS.b) Profile.

The Importer shall be grouped with an XDS.b Document Consumer.

465 As described in Section 48.4.2.5 "Image and Report Access using XDS-I":

- The Document Consumer shall query for and retrieve the external prior reports

- The Importer shall send retrieved external prior reports to the local Report Manager via
[RAD-128]

The grouped Document Consumer shall support the FindDocuments and
470   FindDocumentsByReferenceId queries in Registry Stored Query [ITI-18]. See ITI TF-2a: 3.18.4.1.2.3.7.1 and 3.18.4.1.2.3.7.14. It may support other stored queries defined in [ITI-18].

> Note: Only an XDS Document Registry that supports the Reference Id Option is able to respond to FindDocumentsByReferenceId queries, i.e., able to respond for queries on Accession Number.

The grouped Document Consumer shall be capable of querying for and retrieving report with the
475   following formatCode values:

- `urn:ihe:rad:TEXT` (CDA Wrapped Text Report)

- `urn:ihe:rad:PDF` (PDF Report)

and, if the Importer supports the CDA Imaging Report with Structured Headings Option:

- `urn:ihe:rad:CDA:ImagingReportStructuredHeadings:2013` (CDA Imaging Report
480   with Structured Headings)

Other content formats may be supported.

48.2.5 CDA Imaging Report with Structured Headings Option

The Importer that supports the CDA Imaging Report with Structured Headings Option shall be capable of accessing reports with the following XDS formatCode or MHD format value:

485   - `urn:ihe:rad:CDA:ImagingReportStructuredHeadings:2013` (CDA Imaging Report
       with Structured Headings)

The Importer shall encode CDA Imaging Report with Structured Headings documents as HL7 v2.5.1 ORU Send Imaging Result [RAD-128] messages as described in RAD TF-3: Appendix P.

48.2.6 Enhanced Query Option

490   The Importer or Image Manager / Image Archive that supports the Enhanced Query Option shall support the additional matching and return keys for Query For Patient Studies [RAD-133] specified in RAD TF-3: 4.133.4.1.2.1.

48.3 IDEP Required Actor Groupings

An actor from this profile (Column 1) shall implement all required transactions and/or content
495   modules in this profile *in addition to* all transactions required for the grouped actor (Column 3) if the grouping condition (Column 2) is met.

If this is a content profile, and actors from this profile are grouped with actors from a workflow or transport profile, the Content Bindings reference column references any specifications for mapping data from the content module into data elements from the workflow or transport
500   transactions.

In some cases, required groupings are defined as at least one of an enumerated set of possible actors; this is designated by merging column one into a single cell spanning multiple potential grouped actors. Notes are used to highlight this situation.

505 Section 48.5 describes some optional groupings that may be of interest for security considerations and Section 48.6 describes some optional groupings in other related profiles.

Table 48.3-1: IDEP - Required Actor Groupings

IDEP Actor	Grouping Condition	Actor to be grouped with	Reference
Department System Scheduler / Order Filler (DSS/OF)	n/a	None	--
Image Manager / Image Archive	XDS-I.b Images Option	Cross Enterprise Document Sharing for Imaging (XDS-I.b) / Imaging Document Source	RAD TF-1:18
Image Display	n/a	None	--
Report Manager	Always required	ITI Consistent Time (CT) / Time Client	ITI TF-1: 7
	Always required	ITI Mobile access to Health Documents (MHD) / Document Responder	ITI TF-1: 33
Report Reader	n/a	None	
Importer	Always required	ITI Consistent Time (CT) / Time Client	ITI TF-1: 7
	Always required	Patient Identifier Cross-referencing (PIX) / Patient Identity Cross-reference Consumer	ITI TF-1: 5
	Always required	Patient Demographics Query (PDQ) / Patient Demographics Consumer	ITI TF-1: 8
	Always required	ITI Mobile access to Health Documents (MHD) / Document Consumer	ITI TF-1: 33
	XDS-I.b Images Option	Cross Enterprise Document Sharing for Imaging (XDS-I.b) / Imaging Document Consumer	RAD TF-1:18
	XDS.b Reports Option	ITI Cross Enterprise Document Sharing (XDS.b) / Document Consumer	ITI TF-1: 10

48.4 IDEP Overview

Actors in this profile facilitate the exchange of external relevant priors, including both images and reports, between various Image Managers and Report Managers (e.g., PACS systems and Reporting systems), and between facilities.

The intent of the IDEP Profile is to make current, installed base systems work more effectively. For this reason, the "intelligence" resides in the Importer. The IDEP Profile focuses on the trigger events and data mappings to ensure that an external prior imaging study and report "appear local".

This profile does not include mechanisms for discovery of peers since it is presumed that the actors are known (e.g., configured) to one another.

Clinical problem:

Prior imaging studies provide vital information and context to the radiologist when interpreting a current study, even resulting in a change of diagnosis. A "prefetch" step (to locate prior studies for the patient that may be relevant and make them accessible to the radiologist during review) is common in imaging workflows. This works well for priors that were performed locally. However, with the mobility of patients in modern healthcare, it is very common for priors to be located outside the current reading institution.

There have been many improvements in the ability to exchange images between enterprises, such as DICOM CD/DVDs described in the Import and Reconciliation Workflow (IRWF.b) Profile. However, the ability to actively locate, access, and view external prior studies for direct comparison, particularly during the short time frame required for them to be relevant to reading, is still not reliable. Additional issues with current solutions include:

- Separate patient portals - unwieldy, slow to access, and on different monitors

- Web-based viewers - not integrated into the diagnostic workstation such that side-by side image comparison and use of local hanging protocols or viewing tools are not compatible

- CD/DVD imports/viewers - often not timely, sometimes do not import reliably, and are "reactive not proactive"

All these solutions also suffer from issues with different Patient IDs, procedure codes, and retention policies for external prior studies.

A solution for external prior studies has also been demonstrated to reduce re-scanned patients, with cost and radiation implications. (Ref: Nagels, J., Macdonald, D. & Coz, C. J Digit Imaging (2017). https://doi.org/10.1007/s10278-017-9963-8)

48.4.1 Concepts

48.4.1.1 Sources of External Priors

Imaging studies and reports may reside on a variety of systems throughout a hospital, a healthcare enterprise, or even a region.

External priors are outside the system where they are needed to be viewed. The sources for external prior may vary widely. Within a single radiology department or hospital, there may be multiple PACS systems. Systems evolve over time and full replacement or upgrade can be expensive. Only a subset of studies may have been migrated from an older PACS. A separate PACS may have been purchased for CTA/MRA studies. The ED may have its own PACS system, separate from radiology.

Alternatively, one healthcare enterprise may consist of several hospitals, each with a PACS system from a different vendor. One healthcare enterprise may acquire another healthcare enterprise each with several PACS systems. A healthcare enterprise may decide to participate in a regional healthcare exchange. A province may fund the implementation of a central diagnostic imaging repository to facilitate image sharing. All these scenarios create the need to dynamically share "external" priors.

The IDEP Profile is intended to scale to facilitate sharing of external priors within a facility or even within a region under the following assumptions:

- A secure network exists

- Business and legal relationships, including consent, exist to facilitate sharing of patient information

- Data governance and retention rules have been jointly agreed upon

48.4.1.2 Determining Relevancy of Radiology Priors

The IDEP Profile does not prescriptively define relevancy logic. Rather, this section describes considerations for relevancy.

Radiologic studies can be performed over time for many reasons, some of which may or may not be relevant to the interpretation of a new study. An x-ray of a broken ankle five years ago would have little bearing on the interpretation of a CT of the abdomen today. However, a prior ultrasound of the liver may be relevant.

Furthermore, "relevancy" can have different scopes. A broad, or "coarse", scope is like casting a wide net. In other words, when in doubt, assume there could be useful information in a prior study. A narrow, or "fine", scope may seek to dramatically reduce the amount of "noise" or extraneous information presented to the interpreting radiologist. It may be useful for systems to consider broad relevance as that performed by an IDEP Importer which could be analogous to server-side logic, whereas the fine grain determination of relevance may be determined by the local hanging protocols or client-side logic.

Different physicians, sub-specialties, departments, and facilities may each have unique definitions of "relevant". IDEP implementations should consider the levels at which relevancy rules can be applied, which should include "by destination (local) system" at a minimum. For example, studies that are relevant at a cardiac outpatient center may not be considered relevant at an orthopedic surgical center. The Emergency Department in a rural, low-bandwidth setting may

prefer that fewer priors be retrieved. An Oncology Department at an academic center may consider that every possible prior may have value.

Clinical customers should examine the "hanging protocols" defined within their PACS systems. These rules should be considered when defining external relevancy rules. Consider defining the external relevancy rules more broadly than the local rules.

Because heuristics are being used to determine relevancy there will be issues with false positive matches (irrelevant studies being retrieved) that can create clutter, storage, and network bandwidth issues. False negatives (relevant studies which were not retrieved as priors) could change a clinical interpretation but were absent. The goal of the relevancy rules is to create a reasonable operating point.

The requirements for the study content completeness must be determined. (Also see Data Governance, Section 48.4.1.8.)   If a prior MR study contains 10,000 instances, it may not be desirable to retrieve the entire image set when a derived series may be sufficient. In this case, a Series Description of "Diffusion" or "Perfusion" may be examined. Alternatively, only key images may be sufficient for some prior studies. Presentation State objects or measurements may be very helpful even if entire studies are not being retrieved. These examples require more sophisticated clinical knowledge and knowledge of local procedure terminology.

Relevancy can also be driven by the content of the imaging reports. If the report is in the form of a DICOM PS3.20 Level 3 HL7 CDA document, the diagnosis and finding codes will be very straightforward to determine relevancy. If the reports are in the form of unstructured text, natural language processing or some other method may be employed to estimate relevancy.

Finally, relevancy rules may also consider other documents for retrieval, including other prior clinical reports such as pathology reports, surgical reports, or legal documents such as patient consent to share images.

See Appendix J for specific DICOM attributes and contexts for determining relevancy.

48.4.1.3 Proper Display and Interpretation using Priors

When a new imaging study is being interpreted it is crucial to have relevant prior studies, including reports, immediately accessible within the same analysis system. For optimal comparisons, radiologists require side-by-side display of current and prior studies within the same viewer such that similar hanging protocols and measurements tools are accessible, resulting in less variation.

For safety, most viewers will require that patient identification information, such as Patient Name and Patient ID, match prior to side-by-side comparison. Side-by-side display is managed by "hanging protocols". Hanging protocols typically rely on modality, local procedure codes, study date, anatomy, and other information. To ensure that hanging protocols operate properly, this profile specifies "attribute coercion" in various transactions. Modality, Procedure Code, Protocol and other DICOM attributes are often used to define hanging protocols. Modality is

enumerated in the DICOM standard, but the other codes are often locally defined. It is critical that the external codes are mapped into local codes for proper side-by-side display.

620   Oncology is a clinical example in which side-by-side viewing of prior images is crucial. A physician is often tracking the changes in tumor size over time as described in the "Response Evaluation Criteria In Solid Tumors (RECIST)". Small changes in tumor size may dictate the course of patient treatment, so precise comparisons are important.

There is no requirement in this profile for a system to delay interpretation of new studies until all
625   potential priors are available.

Finally, healthcare systems and vendors should consider the RadLex Playbook Procedure codes as a universal code system. RadLex Playbook procedure codes were also harmonized with the LOINC code system and may be directly mapped.

48.4.1.4 IDEP vs. Import Reconciliation Workflow (IRWF.b)

630   Although IDEP is similar in concept to the IRWF.b Profile, the trigger events, the automation of the import, the relevancy determination, the expected actions after the import, report transport, and the requirement to display the study as "a local prior" differentiate IDEP from IRWF.b.

In the IDEP workflow, the local patient and new order is known, which triggers the Importer to actively seek external prior relevant studies throughout an enterprise. In IRWF.b, the external
635   patient and study is known because an imaging study has arrived by some means (e.g., patient brings in a DVD), and IRWF.b defines how to ingest that study into the local systems. In IRWF.b, the trigger is passive ("study arrives") and external relevancy is not described.

The IDEP Profile also focuses on reports by providing a method to actively seek and import external prior reports and provide them to the local report manager as an HL7 v2.5.1 ORU.

640   IDEP has additional focus on the display requirements of external priors such that side-by-side comparisons can be made during interpretation. Finally, IDEP has a specific option ("Purge Priors") for purchasers of systems to be able to determine life cycle management issues.

48.4.1.5 Access of External Prior Reports via MHD Document Responder

The IDEP Profile does not prescribe how a remote Report Manager, grouped with an MHD
645   Document Responder, is able to access reports. The two most common methods, however, are aggregating HL7 v2 ORU messages or accessing an EMR(s) or Report Manager(s) via a query.

The HL7 v2 query mechanism is not widely implemented and, therefore, reports and amendments (ORU messages) tend to be duplicated and sent to multiple destinations. To limit this proliferation of copies, reports for certain systems can be aggregated once and then the MHD
650   Profile can be used to perform a query to access reports.

Conversely, if an EMR or other Report Manager supports any query mechanism, the MHD Document Responder can act as a gateway and provide a standardized interface and query for the reports in the background.

48.4.1.6 Imaging Report Payload Formats and Transport

655   To provide clarity and reduce variability, this profile limits the report payload formats and transport protocols required for communication between sites (see Section 48.1.1.2).

Historically, radiology report payload formats and transport methods vary widely. The payload formats that exist include text, PDF, HL7 CDA wrapped objects, DICOM SR, or even DICOM Secondary Capture (SC). It is not practical to convert all report formats from one to another, such
660   as converting a DICOM SC into an HL7 CDA Level 3 report. The transport methods for reports may include HL7 v2 ORU messages, DICOM DIMSE C-STORE, XDS / XDS-I and MHD (based on HL7 FHIR).

In this profile, reports originating as DICOM objects are transferred as DICOM objects via DICOM DIMSE services (C-STORE). Reports originating as text or PDF are transported to the
665   local destination as an HL7 v2 ORU messages.

An Importer or a Report Manager may choose to implement other payload and transport conversions, such as creating MHD Document Reference Resources from DICOM SR.

48.4.1.6.1 DICOM Report Formats

DICOM report formats are not specifically addressed in the IDEP reporting workflow.

670   If all sites in an IDEP deployment are managing reports in a DICOM format – such as Structured Report or Encapsulated PDF – the DICOM Retrieval use case (see Section 48.4.2.3) will also cover the transportation of reports.

If some sites in an IDEP deployment do not support DICOM report formats, the standard IDEP report retrieval mechanisms should be used (see Section 48.4.2.4).

675   ### 48.4.1.7 Timing and Updates of Trigger Events

The baseline trigger event in IDEP is the generation of a new order at the local site (i.e., an HL7 v2 OMI message).

A new procedure may be ordered minutes, weeks or even months in advance. If an external prior study is retrieved too far in advance there is an increased risk that it will be unnecessarily
680   retrieved (e.g., study canceled), inconsistent or updated content (e.g., additional renderings or models created remotely), that a report may be amended, or that the study or report may be unintentionally purged locally prior to the interpretation of the new study.

A local order may also be updated, for example from "CT Abdomen" to "CT Chest/Abdomen/Pelvis" which may change the relevancy determination. In this case, the order is
685   not a new trigger event, but rather changing trigger parameters.

For these reasons, it is advantageous to retrieve relevant priors closer to the scheduled study date. Some DSS/OF systems are capable of withholding sending the order message until a specified time period, e.g., 24 or 48 hours prior to the scheduled start time or "day of" the scheduled start

time. In other cases, the Importer may consider retaining the order data and updates until within a specified time period.

48.4.1.8 Data Governance of Prior Studies and Reports

Data governance of external prior studies and reports includes well-defined enterprise-wide determination of patient consent to share, legal requirements, ownership and archiving responsibility, determining the recommendations for moving full or partial prior studies, maintaining consistency, and life cycle management.

The goal of this section is to give an overview of some of the topics of relevance to this profile.

48.4.1.8.1 Identification of External Priors

It is critical that local systems be capable of definitively identifying external studies. To that end, the IDEP Profile specifies a code to identify external priors.

The code (IRWF007, IHERADTF, "To be provided as prior") identifies an external prior when:

- Included by an IDEP Importer in an import notification (OMI) message sent to a local Image Manager or a local Report Manager

- Included by an IDEP Importer in the Scheduled Protocol Sequence (0040,0008) of an external prior study sent to a local Image Manager

Additional codes may also be provided for inform Image Lifecycle Management policies, such as:

- (IRWF001, IHERADTF, "Import")

- (IRWF003, IHERADTF, "To be archived")

- (IRWF012, IHERADTF, "Do not archive")

However, additional information which may be useful in identifying priors for DICOM applications may be configuration and site dependent, but could include:

- Use of a separate DICOM Application Entity (AE) title for the Storage SCP for the IDEP transactions.

- Use of the DICOM attributes Institution Name (0008,0080) in the DICOM object as an external institution.

- Use of the DICOM attribute Issuer of Accession Number Sequence (0008,0051) to identify that the study was ordered externally. (Note: There may be a list of local accession number assigning authorities, it may not be a single local system.)

- Use of Instance Origin Status (0400,0600) with a value of "IMPORTED"

Additional information which may be useful in identifying priors for HL7 v2 applications include:

- HL7 OMI and / or ORU messages received on a dedicated port

- HL7 MSH segment MSH-3 Sending Application and MSH-4 Sending Facility may also indicate external systems

48.4.1.8.2 Access Control of Prior Studies and Prior Reports

In some jurisdictions, patients must explicitly consent to sharing healthcare information. Automated external prior access may need to account for the requirement of the patient to "opt in" or "opt out". Patient consent for accessing external priors is outside of the scope of this profile. ITI profiles, including Basic Patient Privacy Consents (BPPC), define the content of the consent. The RadLex code system also provides several codes for consent status.

For XDS.b implementations, the Advanced Patient Privacy Consents (APPC) Profile, allows a patient privacy policy domain to have individualized and customized patient consent constraints.

48.4.1.8.3 Legal Requirements for Retention

Retention of prior external images and reports is typically a legal issue that will vary by jurisdiction. For example:

- pediatric studies may be subject to different rules than adult studies

- retention rules for images may differ from retention rules for reports

- retention rules for external studies may differ from retention rules for local studies

  o in some cases, retaining references to external studies may be sufficient

48.4.1.8.4 Image Lifecycle Management

Retention of external prior studies and reports should be part of a larger Image Lifecycle Management (ILM) plan for every institution. Capabilities of existing systems must be considered. Considerations also include architectural, storage capacities, and bandwidth between sites.

A method to identify studies as external priors is defined in Section 48.4.1.8.1.

48.4.1.8.5 Ability to purge priors

This profile provides explicit "Purge Prior Images" and "Purge Prior Reports" (Section 48.2) options to identify system capabilities. Although there are no specific transactions associated with these options, there are several methods which could be implemented.

For an Image Manager, if prior study data is to be purged, a separate DICOM Application Entity (AE) title could be created. The Importer could send all prior DICOM studies to this AE title. Any studies received on this AE title could be automatically deleted based on a first in-first out or other algorithm, or after a given time period after reception or date of last access, e.g., 3 months. Manual queues or automated algorithms could be created suggesting studies for deletion based on location of acquisition and last accessed date.

More automated methods of determining archiving intentions include the IRWF.b codes for Import, specifically Scheduled Protocol Sequence (0040,0008) which uses the IHERADTF coding scheme and provides a sequence of codes such as "Import", "To be archived", "Do not archive", etc.

760 A similar concept could be employed for a Report Manager of HL7 v2 ORU messages, although reports do not usually create the same storage capacity issues.

48.4.1.8.6 Data Integrity

DICOM Study Instance unique identifiers (SIUIDs) of external priors are intended to be globally unique and should not be modified, unless there is a clear error in UID generation. SIUIDs are

765 key to determining duplicative studies and maintaining consistency of data enterprise-wide.

The Accession Number has become the primary index for managing an imaging study in the electronic medical record. It also links images with associated reports and other documents. However, Accession Numbers are not unique unless combined with the Accession Number Assigning Authority. In this profile, the Importer is required to insert the remote Assigning

770 Authority of the issuer to identify external Accession Numbers, particularly on systems which do not provide the Issuer of Accession Number. This may include configuring a prefix or suffix string on the Accession Number value itself.

> Notes:
>
> 1. Modifications to the Accession Number must be done in a consistent manner, i.e., the same external Accession Number should always be transformed into the same local Accession Number. Otherwise it may create data and
775 reference integrity issues
>
> 2. The Importer is required to store the original Accession Number in the Original Attribute Sequence (see RAD TF-3: 4.61.4.1.2.1 in the IRWF.b Supplement)
>
> 3. Modifications to the Accession Number are constrained by the requirements for the DICOM VR of the attribute

780 It is possible that one report (one Accession Number) covers multiple imaging studies (multiple Study Instance UIDs), or vice versa. An existing Image Manager or Report Manager may not support these multiple references, and this should be investigated in advance of system installation.

48.4.1.8.7 Data Timeliness

785 Prior studies are only useful if they are available at the time of interpreting the new study, as part of the radiologist's normal interpretation workflow. Trigger events should be determined to provide priors in advance of the new study scheduled date and time. It may be desirable to withhold new orders until the day of the new study, as described in Section 48.4.1.7.

48.4.1.8.8 Data Transmission Verification

790 To ensure that a study is not transmitted multiple times, i.e., to check if it has already been stored locally, the existence of the study and each instance should be verified prior to retrieving / transmitting as shown in Section 48.4.2.2.2.

To ensure that the intended content of the study transfer is complete, the Importer can create a DICOM Modality Performed Procedure Step (MPPS) based on the set of instances being imported. This can be used to determine that the complete set of DICOM information has been transmitted as shown in Section 48.4.2.2.2.

48.4.1.8.9 Primary Archiving Responsibility and Retention Policies

IDEP addresses the problem of recognizing, accessing, and retrieving priors. However, in doing so, secondary issues are created with data duplication and data synchronization.

Primary archiving responsibility and ownership (also known as "the gold standard") may be the site where the data was created, a centralized system such as a vendor neutral archive (VNA), EMR, or other options. Various models are functional, so long as these are defined in advance. Provisions for transitioning primary archiving responsibility are beyond the scope of the IDEP Profile.

The IDEP Profile does not suggest that the Importer or the Local Image Manager become the primary archive. The Local Image Manager may choose to archive the study and create additional evidence. Furthermore, legal requirements may dictate that the images or reports used as reference for interpretation be retained for a period of time. However, those studies could become "stale" if additional evidence is created or study metadata is updated. Conversely, the original source may have different retention policies and may not be able to provide the study again at some point in the future.

For these reasons, uniform retention policies should be implemented across all systems when possible.

If a study is transferred as an external prior, a data governance plan should define:

1. whether the study will be deleted locally and re-retrieved if necessary

2. whether the study will just be retained "as is" as a local archived copy

3. whether additional objects for a prior study created locally will be returned to the original site

4. whether additional objects for a prior study created remotely/externally will be sent to the new site and studies re-interpreted

5. whether study content consistency will be actively maintained across systems (for example, using Image Object Change Management (IOCM))

48.4.1.8.10 Defining prior study content

The requirements for the portion / completeness of the prior study content to be transferred must be consistent with the plan for long term archiving. To allow for bandwidth and system loading considerations, however, it may be that entire studies should not be transferred. For example, for a MR study that contains 10,000 instances, it may be problematic to transfer the entire study. It may be only selected series, such as the derived or processed series, or key images be

transferred. This would be part of the internal relevancy logic for priors and requires more sophisticated clinical knowledge and knowledge of local procedure terminology.

48.4.1.8.11 IDEP Deployment Examples

IDEP does not prescribe a deployment model. Physical deployment of the IDEP actors will vary by site. The IDEP Importer could be deployed:

- with each local Image Manager and local Report Manager as decentralized edge devices.
- with the Importer as a centralized system for the entire enterprise.
- as a hybrid model of edge systems as well as some components centralized.

Refer to Appendix K for illustrations and advantages of the various deployment models.

48.4.2 Use Cases

In all use cases, there will typically be many remote Image Managers and many remote Report Managers; however, only a single instance of each is shown in the diagrams below.

48.4.2.1 Use Case 1: External Priors Retrieval

This use case presents the basic triggers and overall data flow, independent of specific transactions. It is intended to describe the "big picture" prior to details described in later use cases.

48.4.2.1.1 Retrieval Data Flow

A healthcare enterprise consists of seven hospitals and twenty outpatient clinics with imaging. This particular healthcare system has implemented IDEP and, for the purposes of illustration, includes the following centralized systems:

- An enterprise-wide PIX Manager
- One enterprise-wide Importer
- A secure network exists throughout the enterprise
- One PACS, one EMR, and one PID Assigning Authority shared by all twenty outpatient clinics

and the following distributed systems:

- Separate Patient Identification systems and PID Assigning Authorities at each hospital
- A separate PACS at each hospital
- A separate EMR at each hospital to store the radiology reports.

The clinical scenario is that a new "CT Abdomen" study has been ordered at the current local hospital. This patient has previously received care at one of the other hospitals in the enterprise ("remote hospital").

48.4.2.1.2 Simplified Retrieval Process Flow

In this diagram the Importer is a centralized system and is not part of either the local or remote hospital (denoted by the boxes below). See Appendix K for additional deployment models.
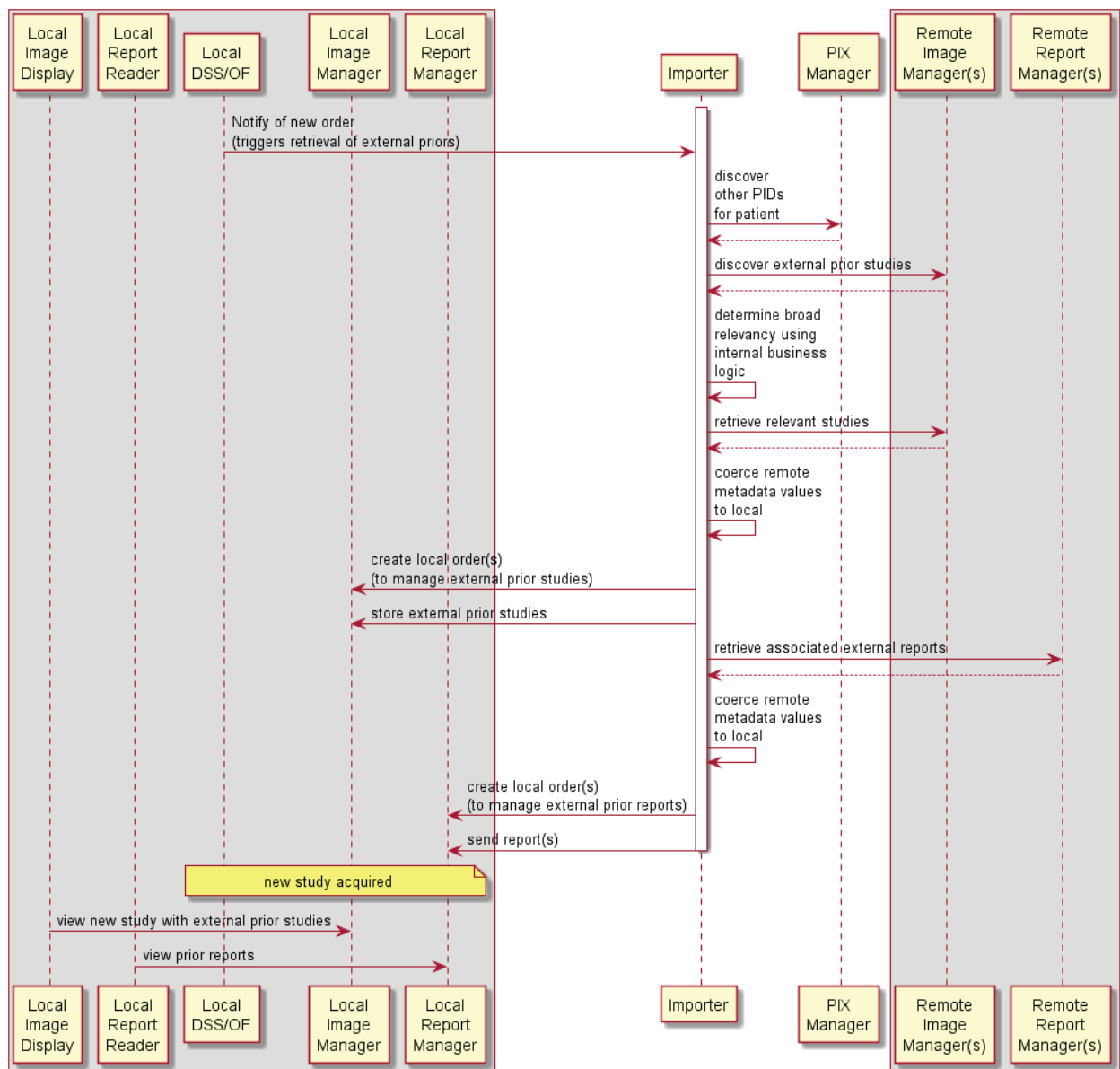
Figure 48.4.2.1.2-1: Simplified Retrieval Process Flow

The text in Figure 48.4.2.1.2-2 was used to generate the diagram in Figure 48.4.2.1.2-1. Readers will generally find the diagram more informative. The text is included here to facilitate editing.

```
box
        participant "Local\nImage\nDisplay" as LID
        participant "Local\nReport\nReader" as LRR
        participant "Local\nDSS/OF" as LDSS
        participant "Local\nImage\nManager" as LIM
        participant "Local\nReport\nManager" as LRM
end box
participant "Importer" as Importer
participant "PIX\nManager" as PM
box
        participant "Remote\nImage\nManager(s)" as RIM
        participant "Remote\nReport\nManager(s)" as RRM
end box

activate Importer
LDSS->Importer: Notify of new order\n(triggers retrieval of external priors)
Importer->PM: discover\nother PIDs\nfor patient
PM-->Importer
Importer->RIM: discover external prior studies
RIM-->Importer

Importer->Importer: determine broad\nrelevancy using\ninternal business\nlogic
Importer->RIM: retrieve relevant studies
RIM-->Importer
Importer->Importer: coerce remote\nmetadata values\nto local
Importer->LIM: create local order(s)\n(to manage external prior studies)
Importer->LIM: store external prior studies

Importer->RRM: retrieve associated external reports
RRM-->Importer
Importer->Importer: coerce remote\nmetadata values\nto local
Importer->LRM: create local order(s)\n(to manage external prior reports)
Importer->LRM: send report(s)
deactivate Importer

note over LDSS, LRM: new study acquired
LIM<-LID: view new study with external prior studies
LRM<-LRR: view prior reports
```

Figure 48.4.2.1.2-2: Diagram Pseudocode for Simplified Retrieval Process Flow

890   Because there are many Image Managers and Report Managers, the Importer will need to be able to direct the retrieved external images and reports to the appropriate Image Manager and Report Manager based on the source of the new order trigger message. If the DSS/OF has a one-to-one correspondence with an Image Manager and Report Manager, this is a straightforward process.

      If the DSS/OF is responsible for creating orders for multiple Image Manager/RMs, the Importer
895   will need to ascertain additional information from the order trigger message to determine the correct destination Image Manager or Report Manager. This is common when a centralized EMR is performing the role of the DSS/OF. Useful information to determine the correct destination

may include the fields from initial order (OMI), such as IPC-7 "Scheduled Station Name", IPC-8 "Scheduled Procedure Step Location", and IPC-9 "Scheduled AE Title".

48.4.2.2 Use Case 2: Trigger Events and Patient Identification

48.4.2.2.1 Trigger and Events Patient Identification Use Case Description

The process flow described in Section 48.4.2.2 is divided into several sections. This use case sets up the initial trigger events to query for priors across the enterprise and to determine other patient identifiers. It applies to all future use cases.

The following actors involved in this use case:

- Department System Scheduler/ Order Filler

- Importer

- Patient Identifier Cross-reference Manager

- Patient Demographics Supplier

- Image Manager (remote)

48.4.2.2.2 Trigger Events and Patient Identification Process Flow

48.4.2.2.2.1 Trigger events
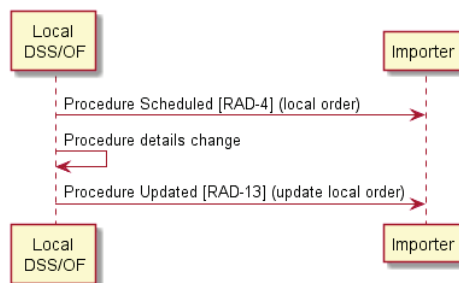
Figure 48.4.2.2.2.1-1: DICOM Use Case - Trigger Events

The text in Figure 48.4.2.2.2.1-2 was used to generate the diagram in Figure 48.4.2.2.2.1-1. Readers will generally find the diagram more informative. The text is included here to facilitate editing.

```
participant "Local\n DSS/OF" as LDSS
participant "Importer" as IR

LDSS -> IR: Procedure Scheduled [RAD-4] (local order)
LDSS -> LDSS: Procedure details change
LDSS -> IR: Procedure Updated [RAD-13] (update local order)
```

Figure 48.4.2.2.2.1-2: Diagram Pseudocode for DICOM Use Case - Trigger Events

48.4.2.2.2.2 Discovery of external patient identifiers

925   Using one of three methods, the Importer determines if additional external Patient Identifiers exist for this patient.
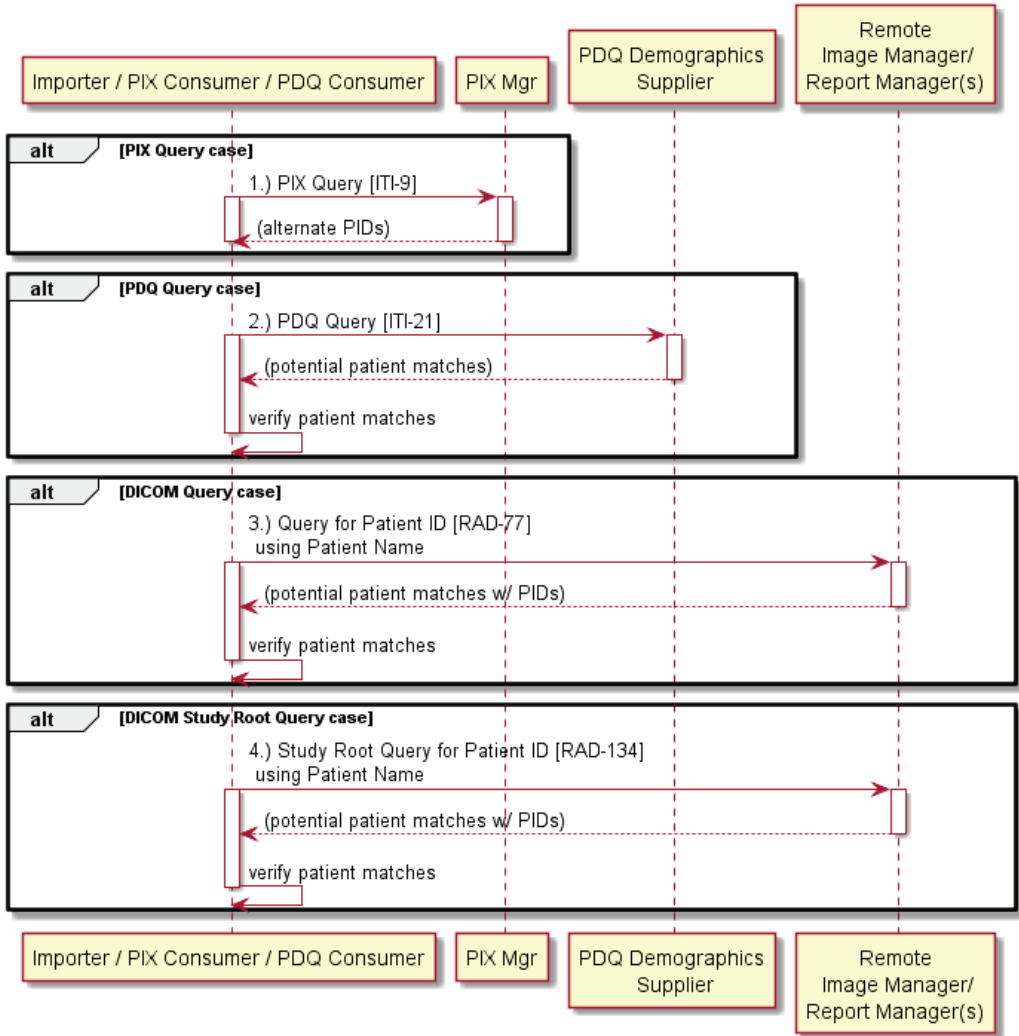
Figure 48.4.2.2.2.2-1: Discovery of External Patient Identifiers

The text in Figure 48.4.2.2.2.2-2 was used to generate the diagram in Figure 48.4.2.2.2.2-1. Readers will generally find the diagram more informative. The text is included here to facilitate
930   editing.

935

```
participant "Importer / PIX Consumer / PDQ Consumer" as IR
participant "PIX Mgr" as PIX
participant "PDQ Demographics\n Supplier" as DS
participant "Remote\n Image Manager/\nReport Manager(s)" as RIM

alt PIX Query case
IR->PIX: 1.) PIX Query [ITI-9]
activate PIX
activate IR
PIX-->IR: (alternate PIDs)
deactivate PIX
deactivate IR
end

alt PDQ Query case
IR->DS: 2.) PDQ Query [ITI-21]
activate DS
activate IR
DS-->IR:(potential patient matches)
deactivate DS
IR->IR: verify patient matches
deactivate IR
end

alt DICOM Query case
IR->RIM: 3.) Query for Patient ID [RAD-77]\n using Patient Name
activate RIM
activate IR
RIM-->IR: (potential patient matches w/ PIDs)
deactivate RIM
IR->IR: verify patient matches
deactivate IR
end

alt DICOM Study Root Query case
IR->RIM: 4.) Study Root Query for Patient ID [RAD-134]\n using Patient Name
activate RIM
activate IR
RIM-->IR: (potential patient matches w/ PIDs)
deactivate RIM
IR->IR: verify patient matches
deactivate IR
end
```

Figure 48.4.2.2.2.2-2: Diagram Pseudocode for Discovery of External Patient Identifiers

If a PIX Manager is not present, the Importer determines if any of the patient demographic matches returned in the PDQ or DICOM query is an exact patient match. That is, a PDQ request or DICOM query patient match may require additional patient matching intelligence on the Importer.

940

48.4.2.3 Use Case 3: DICOM Retrieval

The DICOM Retrieval Use Case describes the use of DICOM transactions to discover and retrieve the external prior instances as shown in Section 48.4.2.1.

The following actors involved in this use case:

945
- Importer

- Image Manager (remote)

- Image Manager (local)

- Image Display

- Report Reader

950 The following transport methods and payload formats are addressed:

- Importer retrieval of external prior studies from remote Image Manager:

    o Transport method: DICOM DIMSE services

    o Payload format: any mutually supported DICOM IOD

- Importer storage of external prior studies to local Image Manager:

955
    o Transport method: DICOM DIMSE services

    o Payload format: any mutually supported DICOM IOD

48.4.2.3.1 DICOM Retrieval Use Case Description

In this use case, all the images and reports are stored as DICOM objects, e.g., reports may be encoded as a DICOM Structured Report, Secondary Capture, or Encapsulated PDF. Because all
960 the transactions and payloads are DICOM-based in this use case, the Report Manager is combined with the Image Manager in each of the local and remote locations.

48.4.2.3.2 DICOM Retrieval Process Flow

The retrieval process described in Section 48.4.2.1 is divided into several sections.

48.4.2.3.2.1 Discovery of prior studies

965 The Importer uses the external Patient ID(s) when querying for external/remote studies.

Figure 48.4.2.3.2.1-1: DICOM Use Case – Discovery of External Prior Studies

The text in Figure 48.4.2.3.2.1-2 was used to generate the diagram in Figure 48.4.2.3.2.1-1.
970   Readers will generally find the diagram more informative. The text is included here to facilitate editing.

```
participant "Importer" as IR
participant "Remote\n Image Manager/\nReport Manager(s)" as RIM

IR -> RIM: Query for Patient Studies [RAD-133]
activate IR
activate RIM
RIM --> IR: (study metadata as Q/R return keys)\nInstances -- Images and reports
deactivate IR
deactivate RIM
```

Figure 48.4.2.3.2.1-2: Diagram Pseudocode for DICOM Use Case – Discovery of External Prior Studies

980   **48.4.2.3.2.2 Determine broad relevancy and existence of local instances**

The Importer applies its business logic to determine which external prior studies are relevant. If the Importer has discovered multiple copies of the same study in multiple remote Image Managers, it will filter out duplicates as part of this process.

After determining a study is relevant, the Importer optionally verifies if the study and its
985   instances are already present on the local Image Manager. This can improve system efficiency, especially for very large studies.
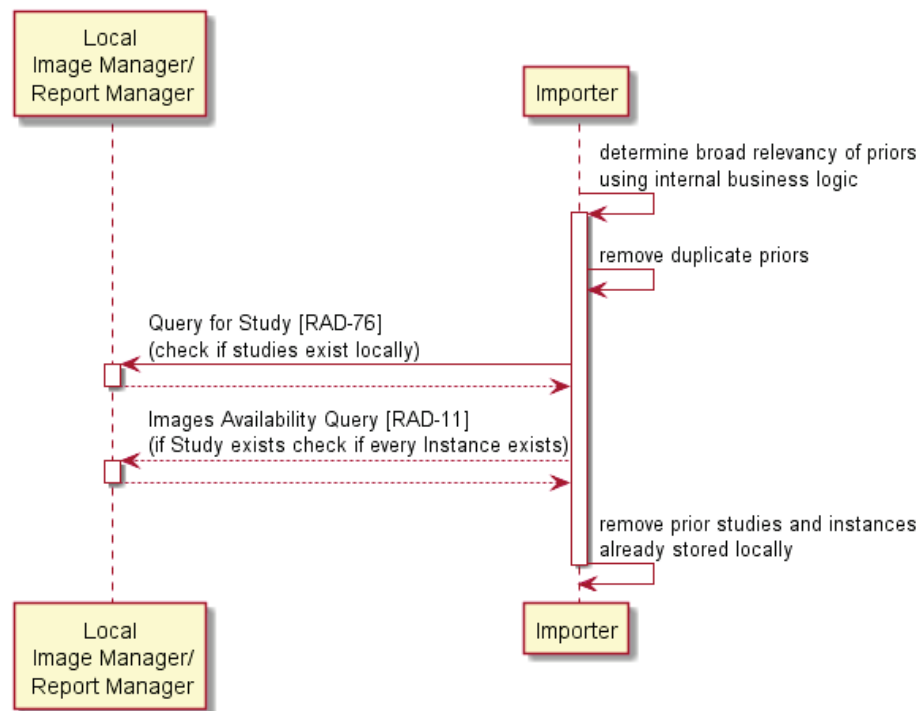
Figure 48.4.2.3.2.2-1: DICOM Use Case – Determine Broad Relevancy and Existence of Local Instances

The text in Figure 48.4.2.3.2.2-2 was used to generate the diagram in Figure 48.4.2.3.2.2-1. Readers will generally find the diagram more informative. The text is included here to facilitate editing.

```
participant "Local\n Image Manager/\n Report Manager" as LIM
participant "Importer" as IR

IR -> IR: determine broad relevancy of priors\nusing internal business logic
activate IR
IR -> IR: remove duplicate priors

IR -> LIM: Query for Study [RAD-76]\n(check if studies exist locally)
activate LIM
LIM --> IR
deactivate LIM

IR --> LIM: Images Availability Query [RAD-11]\n(if Study exists check if every Instance exists)
activate LIM
LIM --> IR
deactivate LIM

IR -> IR: remove prior studies and instances\nalready stored locally
deactivate IR
```

Figure 48.4.2.3.2.2-2: Diagram Pseudocode for DICOM Use Case – Determine Broad Relevancy and Existence of Local Instances

48.4.2.3.2.3 Retrieve external prior studies

All relevant DICOM instances, including both images and reports (e.g., SR, SC or Encapsulated objects) are retrieved for a given Study Instance UID. If there are multiple external relevant prior studies, there will be multiple study retrievals.

1000   If a portion of the study is already present on the local Image Manager, the Importer may choose to retrieve only the missing instances if they are deemed relevant.
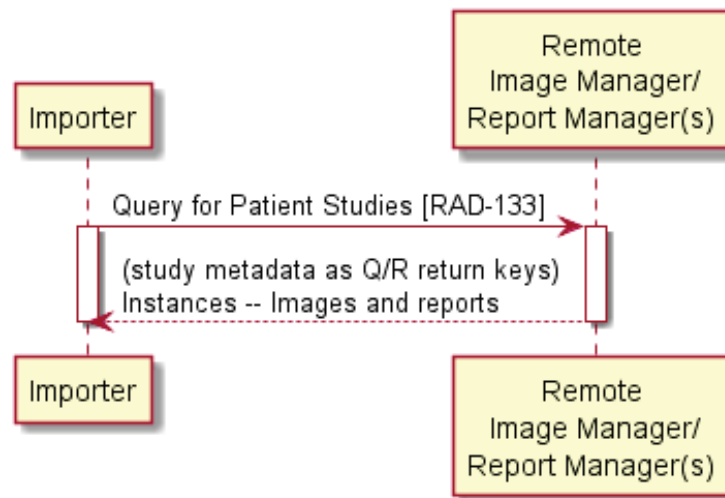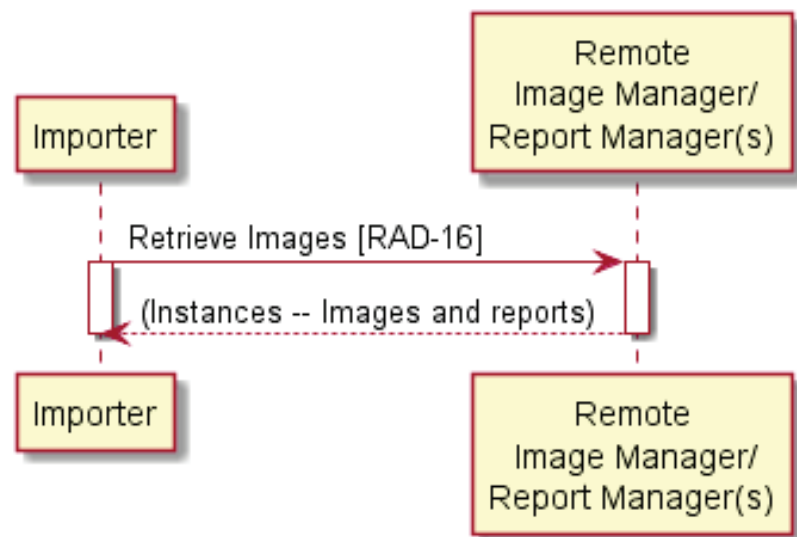

Figure 48.4.2.3.2.3-1: DICOM Use Case – Retrieve External Prior Studies

1005   The text in Figure 48.4.2.3.2.3-2 was used to generate the diagram in Figure 48.4.2.3.2.3-1. Readers will generally find the diagram more informative. The text is included here to facilitate editing.

```
participant "Importer" as IR
participant "Remote\n Image Manager/\nReport Manager(s)" as RIM

IR -> RIM: Retrieve Images [RAD-16]
activate IR
activate RIM
RIM --> IR: (Instances -- Images and reports)
deactivate IR
deactivate RIM
```

Figure 48.4.2.3.2.3-2: Diagram Pseudocode for DICOM Use Case – Retrieve External Prior Studies
1010

48.4.2.3.2.4 Prepare and store external prior studies

If the study does not exist on the local Image Manager, the Importer creates a new order and notifies the local Image Manager. The order uses the local patient identifier and should use local procedure codes. This new order contains a code that differentiates these images and reports as priors.

The Importer coerces the DICOM attributes of the external prior studies as described in Section 48.1.1.2.

The Importer notifies the local Image Manager that external prior studies are being sent via Send Import Notification [RAD-135].

The Importer sends the study and notifies the local Image Manager of completion of the import.

The Image Manager can use the Modality Performed Procedure Step from [RAD-60] to verify that it has all of the expected instances.
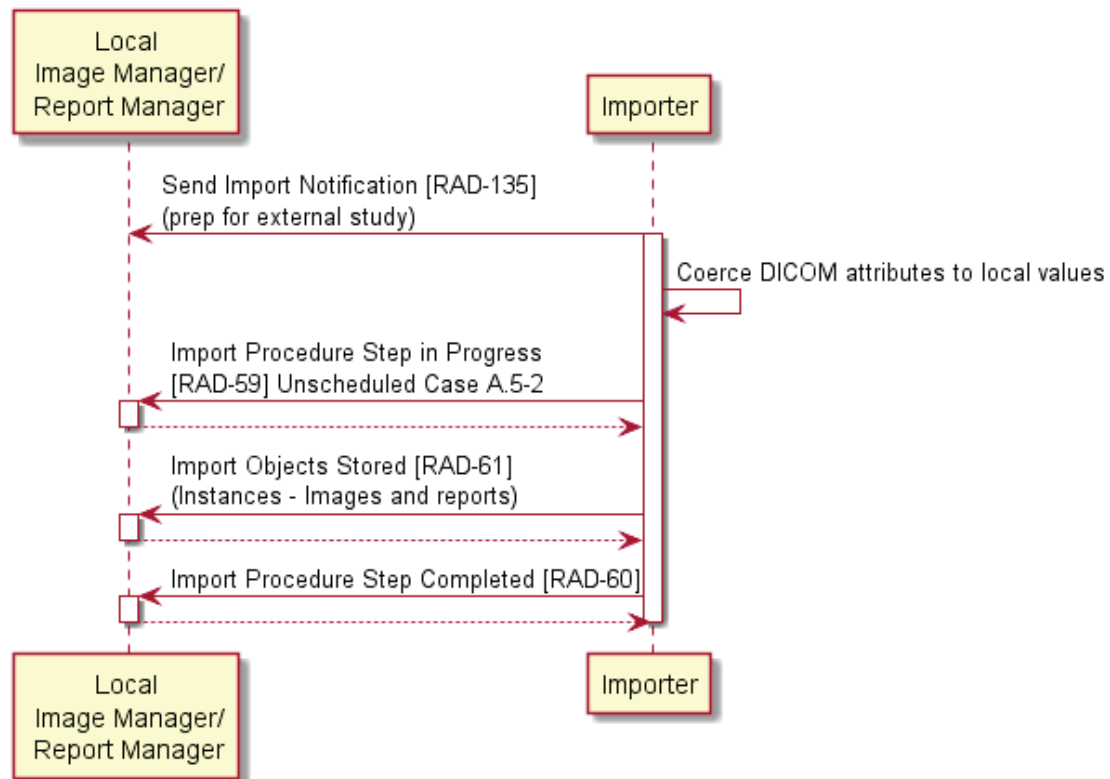
Figure 48.4.2.3.2.4-1: DICOM Use Case - Coerce Attributes and Store

1025   The text in Figure 48.4.2.3.2.4-2 was used to generate the diagram in Figure 48.4.2.3.2.4-1. Readers will generally find the diagram more informative. The text is included here to facilitate editing.
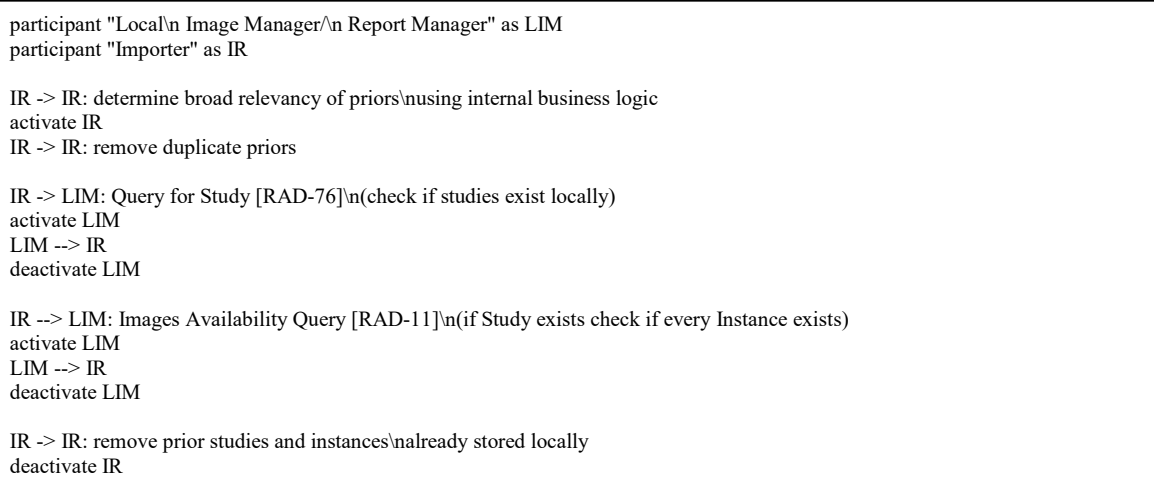
```
participant "Local\n Image Manager/\n Report Manager" as LIM
participant "Importer" as IR

IR  -> LIM: Send Import Notification [RAD-135]\n(prep for external study)
activate IR
IR -> IR: Coerce DICOM attributes to local values

IR -> LIM: Import Procedure Step in Progress\n[RAD-59] Unscheduled Case A.5-2
activate LIM
LIM --> IR
deactivate LIM

IR -> LIM: Import Objects Stored [RAD-61]\n(Instances - Images and reports)
activate LIM
LIM --> IR
deactivate LIM

IR -> LIM: Import Procedure Step Completed [RAD-60]
activate LIM
LIM --> IR
deactivate LIM
deactivate IR
```

Figure 48.4.2.3.2.4-2: Diagram Pseudocode for DICOM Use Case - Coerce Attributes and Store

1030   **48.4.2.3.2.5 Optional purge of external prior studies**

Based on local policies and some identified criteria, e.g., the "Do not archive" code in the order message, time period or storage capacity, the local Image Manager / Report Manager may purge external prior studies. See Sections 48.2.1 and 48.4.1.8 for a further description and concepts.

48.4.2.4 Use Case 4: Report Retrieval

1035   The Report Retrieval Use Case describes the retrieval of external prior reports as shown in Section 48.4.2.1.

The following actors involved in this use case:

- Importer grouped with MHD Document Consumer

- Report Manager (remote) grouped with MHD Document Responder

1040   - Report Manager (local)

The following transport methods and payload formats are addressed:

- Importer retrieval of external prior reports from remote Report Manager:

  o Transport method: ITI Mobile access to Health Documents (MHD)

1045

       o   Payload format: PDF Report, CDA Wrapped Text Report or CDA Imaging Report with Structured Headings

- Importer storage of external prior reports to local Report Manager:
  - o Transport method: HL7 v2.5.1 ORU
  - o Payload format: Text or PDF

48.4.2.4.1 Report Retrieval Use Case Description

1050 In this use case, all reports are stored as PDF or text reports, not as DICOM objects. The remote reports are accessed using the MHD Profile (FHIR-based). The report payload and/or transport method is modified as necessary to match the local system requirements and is sent using an HL7 v2.5.1 message.

48.4.2.4.2 Report Retrieval Process Flow

1055 **48.4.2.4.2.1 Trigger events**

The trigger events are the same as shown in Use Case 2, Section 48.4.2.2.2.

48.4.2.4.2.2 Discovery of external patient identifiers

The external patient identifier discovery method is the same as shown in Section 48.4.2.2 Use Case 2.

1060 **48.4.2.4.2.3 Discovery of prior studies**

The external relevant prior imaging studies discovery method is the same as shown in Section 48.4.2.3 Use Case 3.

48.4.2.4.2.4 Determine broad relevancy and existence of local instances

The determination of broad relevancy and existence of local image instances method is the same 1065 as shown in Use Case 3, Section 48.4.2.3.2.2.

48.4.2.4.2.5 Retrieve external prior reports

The Importer has already determined which studies are relevant and moved those DICOM image objects to the Local Image Manager as described in Use Case 2.

The Patient Resource may not need to be retrieved from the MHD Document Responder. The 1070 Patient-level attributes from the external prior study associated with the report may be used.

Note: If the Importer wants to retrieve the Patient Resource this may be hosted by a different system than the DocumentReference Resource

The MHD Document Responder is responsible for providing the reports. How the Document Responder obtained the reports from the remote Report Manager is not specified by this profile

1075   but is discussed in Section 48.4.1.5. The external Accession Numbers are identified from the relevant DICOM imaging study and used in the `related` parameter of the query.

Note that non-radiology documents may use the same Accession Number in a different context and the `format` parameter should be used to limit the results appropriately.

1080
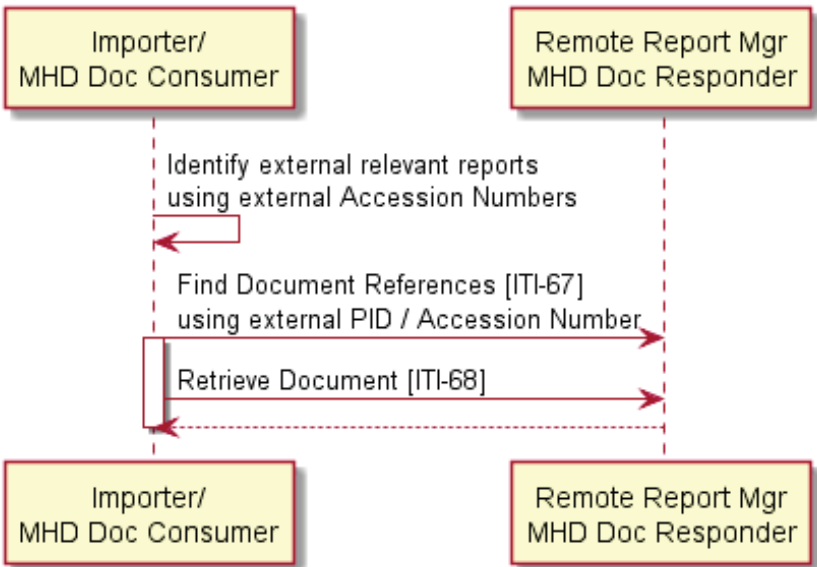
Figure 48.4.2.4.2.5-1: MHD Use Case - Report Retrieval

The text in Figure 48.4.2.4.2.5-2 was used to generate the diagram in Figure 48.4.2.4.2.5-1. Readers will generally find the diagram more informative. The text is included here to facilitate editing.

```
participant "Importer/\nMHD Doc Consumer" as Importer
participant "Remote Report Mgr\nMHD Doc Responder" as RemoteReport

Importer -> Importer: Identify external relevant reports\nusing external Accession Numbers
Importer -> RemoteReport: Find Document References [ITI-67]\nusing external PID / Accession Number
activate Importer
Importer -> RemoteReport: Retrieve Document [ITI-68]
RemoteReport --> Importer
deactivate Importer
```
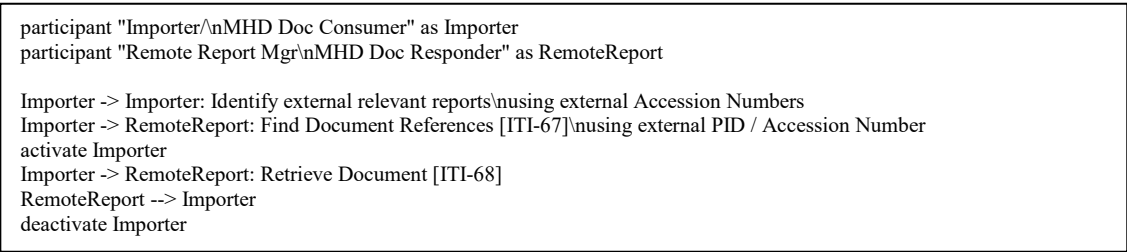
1085   **Figure 48.4.2.4.2.5-2: Diagram Pseudocode for MHD Use Case - Report Retrieval**

48.4.2.4.2.6 Prepare and store external prior reports

The Importer creates a new order and notifies the local Report Manager. The order uses the local patient identifier and should use local procedure codes. The new order contains a code that differentiates reports as priors.

1090   The Importer maps the DocumentReference Resource elements to an HL7 v2.5.1 ORU Send
       Imaging Result [RAD-128] message as described in RAD TF-3: Appendix P.
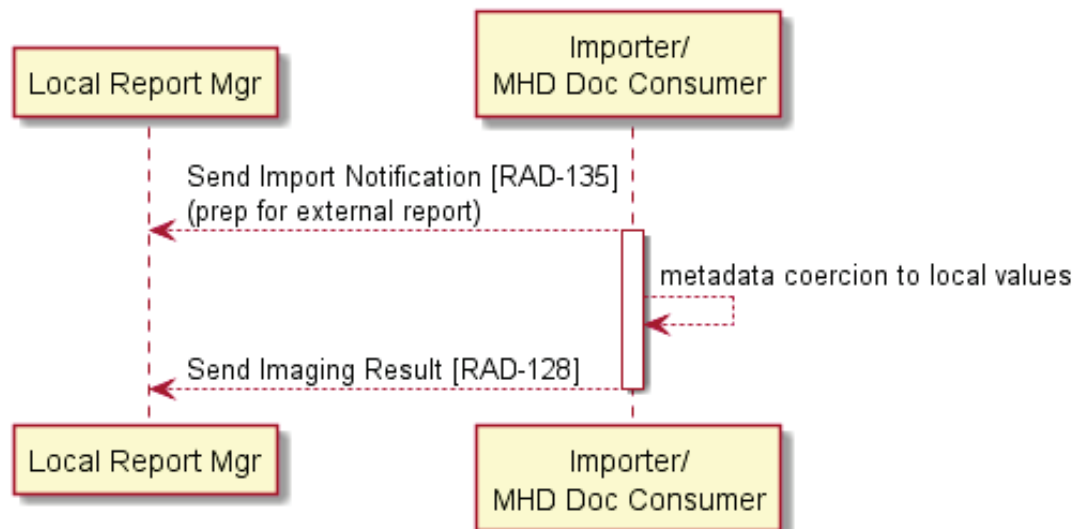
Figure 48.4.2.4.2.6-1: MHD Use Case - Convert Report and Store to Local System

1095   The text in Figure 48.4.2.4.2.6-2 was used to generate the diagram in Figure 48.4.2.4.2.6-1.
       Readers will generally find the diagram more informative. The text is included here to facilitate
       editing.

```
participant "Local Report Mgr" as LocalReport
participant "Importer/\nMHD Doc Consumer" as Importer

Importer-->LocalReport: Send Import Notification [RAD-135]\n(prep for external report)
activate Importer
Importer-->Importer: metadata coercion to local values
Importer-->LocalReport: Send Imaging Result [RAD-128]
deactivate Importer
```

**Figure 48.4.2.4.2.6-2: Diagram Pseudocode for MHD Use Case - Convert Report and Store
to Local System**

1100 48.4.2.4.2.7 Optional purge of prior reports

Based on local policies and some identified criteria, e.g., the "Do not archive" code in the order
message, time period or storage capacity, the local Report Manager may purge external prior
reports. See Sections 48.2.2, and 48.4.1.8 for a detailed description and concepts of the Purge
External Priors Option.

48.4.2.5 Use Case 5: Image and Report Access Using XDS-I

The Image and Report Access using XDS-I use case describes the retrieval of external prior images and reports as shown in Section 48.4.2.1 in an XDS environment. Associated options for the Importer are described in Sections 48.2.3 and 48.2.4.

The following actors involved in this use case:

- Importer grouped with XDS-I.b Imaging Document Consumer
- XDS.b Document Registry
- XDS.b Document Repository
- XDS-I.b Imaging Document Source

The following transport methods and payload formats are addressed:

- Importer retrieval of external prior studies from XDS-I Imaging Document Source:
  - Transport method: XDS-I
  - Payload format: any mutually supported DICOM IOD
- Importer storage of external prior studies to local Image Manager:
  - Transport method: DICOM DIMSE services
  - Payload format: any mutually supported DICOM IOD
- Importer retrieval of external prior reports from XDS Document Repository:
  - Transport method: XDS.b
  - Payload format: PDF Report, CDA Wrapped Text Report or CDA Imaging Report with Structured Headings (with CDA Imaging Report with Structured Headings Option)
- Importer storage of external prior reports to local Report Manager:
  - Transport method: HL7 v2.5.1 ORU
  - Payload format: Text or PDF

48.4.2.5.1 Image and Report Access Using XDS-I Use Case Description

The Importer is grouped with an XDS-I.b Imaging Document Consumer.

48.4.2.5.2 Image and Report Access Using XDS-I Process Flow

48.4.2.5.2.1 Trigger events

The trigger events are the same as shown in Use Case 2, Section 48.4.2.2.2.1.

48.4.2.5.2.2 Discovery of external patient identifiers

1135 XDS transactions depend on the use of the Affinity Domain Patient ID. The method of discovering the Affinity Domain Patient ID may follow the PIX or PDQ Query from Use Case 2, Section 48.4.2.2.2.2, or may involve other mechanisms not defined in this profile.

48.4.2.5.2.3 Discovery of external prior studies

As described in Section 48.2.3 and 48.2.4, the Importer is grouped with the XDS-I Imaging
1140 Document Consumer. The Importer queries the XDS Document Registry using the Affinity Domain Patient ID in the Registry Stored Query [ITI-18] transaction to discover imaging document manifests and reports.

The query response contains the external Accession Number and Assigning Authority in the referenceIdList of the XDS-I metadata.

1145

Figure 48.4.2.5.2.3-1: XDS Use Case – Discovery of External Prior Studies

The text in Figure 48.4.2.5.2.3-2 was used to generate the diagram in Figure 48.4.2.5.2.3-1. Readers will generally find the diagram more informative. The text is included here to facilitate
1150 editing.

```
participant "Importer /\nXDS Document Consumer /\nXDS Imaging Document Consumer" as Importer
participant "XDS Registry" as XDSReg

Importer -> XDSReg: Registry Stored Query [ITI-18]
activate Importer
activate XDSReg
XDSReg --> Importer: (study metadata as Q/R return keys)
deactivate Importer
deactivate XDSReg
```

Figure 48.4.2.5.2.3-2: Diagram Pseudocode for XDS Use Case – Discovery of External Prior Studies

48.4.2.5.2.4 Determine broad relevancy and existence of local instances

The Importer uses the XDS metadata to determine relevancy. The Importer determines existence
1155 of local DICOM image instances method is the same as shown in Use Case 3, Section 48.4.2.3.2.1.

48.4.2.5.2.5 Retrieve external prior studies and reports

As described in Section 48.2.3, the Importer retrieves the DICOM instances. As described in Section 48.2.4, the Importer uses the Retrieve Document Set [ITI-43] transaction to retrieve the associated report(s).

In Figure 48.4.2.5.2.5-1, the Importer uses Retrieve Imaging Document Set [RAD-69], but it is also valid to retrieve using WADO Retrieve [RAD-55], or Retrieve Images [RAD-16] (DICOM C-MOVE).
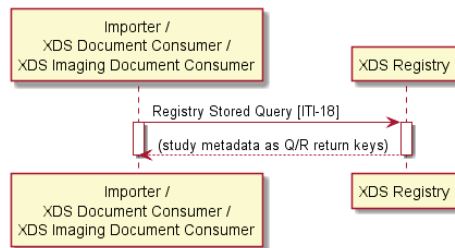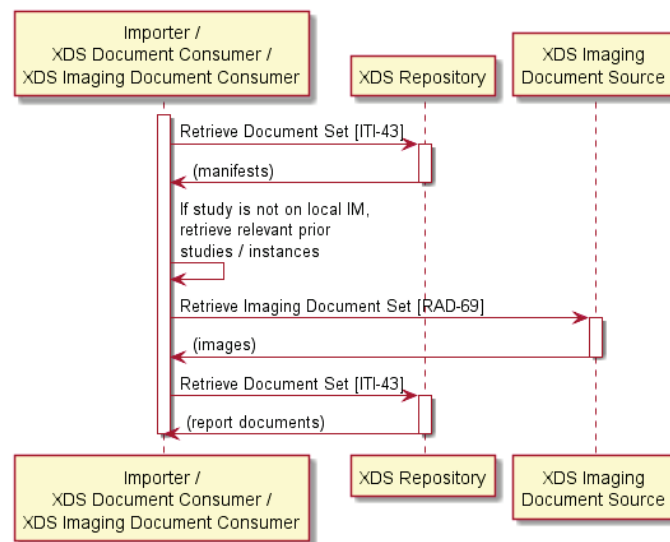

Figure 48.4.2.5.2.5-1: XDS Use Case– Retrieve External Prior Studies and Reports

The text in Figure 48.4.2.5.2.5-2 was used to generate the diagram in Figure 48.4.2.5.2.5-1. Readers will generally find the diagram more informative. The text is included here to facilitate editing.

```
participant "Importer /\nXDS Document Consumer /\nXDS Imaging Document Consumer" as Importer
participant "XDS.b Repository" as XDSRep
participant "XDS.b Imaging\nDocument Source" as XDSImg

activate Importer
Importer->XDSReg: Registry Stored Query [ITI-18]
Importer->XDSRep: Retrieve Document Set [ITI-43]
activate XDSRep
XDSRep->Importer: (manifests)
deactivate XDSRep

Importer->Importer: If study is not on local IM,\nretrieve relevant prior\nstudies / instances
Importer->XDSImg: Retrieve Imaging Document Set [RAD-69]
activate XDSImg
XDSImg->Importer: (images)
deactivate XDSImg

Importer->XDSRep: Retrieve Document Set [ITI-43]
activate XDSRep
XDSRep->Importer: (report documents)
deactivate XDSRep
deactivate Importer
```

1170 **Figure 48.4.2.5.2.5-2: Diagram Pseudocode for XDS Use Case– Retrieve External Prior Studies and Reports**

48.4.2.5.2.6 Prepare and store external prior studies

The Importer coerces and stores the external prior studies as shown in Use Case 3, Section 48.4.2.3.2.1.

1175 ### 48.4.2.5.2.7 Prepare and store external prior reports

If the report does not exist on the local Report Manager, the Importer creates a new order and notifies the local Report Manager. The order uses the local patient identifier and should use local procedure codes. The new order contains a code that differentiates reports as priors.

The Importer coerces the XDS Metadata elements to an HL7 v2.5.1 ORU Send Imaging Result
1180 [RAD-128] messages as described in RAD TF-3: Appendix P.

48.4.2.5.2.8 Optional purge of external prior studies and reports

External prior images may be purged as described in Use Case 3, Section 48.4.2.3.2.5. External prior reports may be purged as described in Use Case 4, Section 48.4.2.4.2.7.

48.5 IDEP Security Considerations

48.5.1 Security Considerations for Actors

Patient Health Information (PHI) is present in both the images as well as the reports. Arguably, the reports are more volatile than the images because the interpretation may contain information such as an oncology or cardiac diagnosis that should be relayed to a patient by a physician or even be "sold".

1. All actors in the IDEP Profile should be grouped with the ITI Audit Trail and Node Authentication (ATNA) Profile as a Secure Application (single application) or Secure Node (entire system).

2. This profile strongly recommends implementation of the ATNA Record Audit Event [ITI-20] transaction to record when and where imaging reports are distributed.

3. The ATNA Profile also recommends implementation of the Authenticate Node [ITI-19] transaction as a Secure Node or Secure Application by all IDEP actors to further ensure the integrity of transactions. Implementers are advised to take advantage of the authentication and communication encryption capabilities that Authenticate Node [ITI-19] provides between secure nodes and to take advantage of TLS when communicating over the Internet.

4. The Importer will contain PHI from orders, images, and reports that may or may not be transiently stored.

5. Any IDEP actor may be the target of malicious attacks given the content of the studies and reports that may be stored.

6. The Importer may store the imaging reports in an EMR or Patient Portal. These actors will need to implement access control mechanisms consistent with the organization's policies, e.g., when to make reports available to patients, which care team members and non-members are permitted to view reports, etc.

7. This profile recommends that Image Manager / Image Archive actors use distinct endpoints for internal and external DICOM queries. DICOM query endpoints used by the Importer may need additional restrictions on calling devices, breadth of queries, etc.

48.5.2 Security Considerations for Report Content

Imaging reports contain not only personal demographic information, but also clinical information and diagnosis. A result such as a cancer diagnosis may need to be kept entirely confidential if a patient has not chosen to disclose that information to an employer, for example. For this reason, access to imaging reports by unauthorized persons can be a significant concern. Facilities commonly have various forms of control limiting access to authorized personnel.

48.6 IDEP Cross Profile Considerations

1220 The IDEP actors would operate in a more integrated manner if grouped with actors in other IHE profiles. Table 48.6-1 contains some recommended groupings.

Table 48.6-1: IDEP – Optional Actor Groupings

IDEP Actor	Might group with	Potential Purpose
Department System Scheduler / Order Filler	Import Reconciliation Workflow (IRWF.b) / Importer	To enable explicit instructions for life cycle management of imported objects by implementing the Import Instruction Handling Option for new orders within the IDEP process flows.
	Scheduled Workflow (SWF.b) / DSS/Order Filler	To eliminate Patient ID collisions by implementing the Enterprise Identity Option.
Image Manager	ITI Consistent Time (CT) / Time Client	To ensure consistent time stamps for log events and workflow analysis. For example, provide consistent time in logs from the time that external prior reports were received to determine availability at the time of new study interpretation.
	Scheduled Workflow (SWF.b) / Image Manager / Enterprise Identity Option	To eliminate Patient ID collisions by implementing the SWF.b Enterprise Identity Option.
	Standardized Operational Log of Events (SOLE) / Event Reporter	To capture events such as the time that imaging reports are signed. Such events support measuring business processes. Suggested events for the Local Image Manager include: Order Filled (SOLE101) and Study Transferred (NO CODE). Local IMs supporting the Purge Options should include ExamRemoved (RID45856). Suggested events for the Remote Image Manager include: Study Transferred (SOLE113) and ExamArchiveCommit (RID4580). The "Role" may be PACS (SOLE63).
	Import Reconciliation Workflow (IRWF.b) / Importer	To ensure that studies imported from DICOM DVDs/CDs will contain consistent data mappings to studies accessed through IDEP. Additionally, the Import Instruction Handling Option could also be implemented within the IDEP process flows to enable explicit instructions for life cycle management of imported objects.
	Imaging Object Change Management (IOCM) / Image Manager	To ensure that rejected images are not sent to other facilities.
Importer	Standardized Operational Log of Events (SOLE) / Event Reporter	To capture events such as the time that imaging reports are signed. Such events support measuring business processes. Suggested events include: Order Filled (SOLE101), Exam requested, e.g., priors (SOLE 112), Exam transferred, e.g., priors (SOLE113), Exam Prefetch Completed (RadLex RID45907). The "Role" may be Importer (See Note)
	ITI Patient Identifier Cross-Reference HL7 V3 (PIX V3) /	To provide an alternate method to identify patient identifiers in other assigning authorities.

IDEP Actor	Might group with	Potential Purpose
	Patient Identifier Cross-reference Consumer	
	ITI Patient Identifier Cross-Reference for Mobile (PIXm) / Patient Identifier Cross-reference Consumer	To provide an alternate method to identify patient identifiers in other assigning authorities.
	ITI Patient Demographic Query HL7 V3 (PDQ V3) / Patient Demographics Consumer	To provide an alternate method to identify patient demographics in other assigning authorities.
	ITI Patient Demographic Query for Mobile (PDQm) / Patient Demographics Consumer	To provide an alternate method to identify patient demographics in other assigning authorities.
	Import Reconciliation Workflow (IRWF.b) / Importer	To ensure that studies imported from DICOM DVDs/CDs will contain consistent data mappings to studies accessed through IDEP. . Additionally, the Import Instruction Handling Option could also be implemented within the IDEP process flows to enable explicit instructions for life cycle management of imported objects.
	Web Image Access (WIA) / Imaging Document Consumer	To provide a web-based service for additional image repositories.
	Imaging Object Change Management (IOCM) / Importer	To ensure that rejected images are not imported to the local facility.
	ITI Cross-Community Access (XCA) / Initiating Gateway	To enable access to reports between healthcare enterprises.
	Cross-Community Access for Imaging (XCA-I) / Initiating Imaging Gateway	To enable access to imaging studies between healthcare enterprises.
	ITI Cross-Community Patient Discovery (XCPD) / Initiating Gateway	To enable patient identification between healthcare enterprises.
Report Manager	ITI Consistent Time (CT) / Time Client	To ensure consistent time stamps for log events and workflow analysis. For example, provide consistent time in logs from the time that reports were received from a Report Creator until the time that the reports were forwarded to a Report Consumer such as a critical follow-up management system.
	Standardized Operational Log of Events (SOLE) / Event Reporter	To capture events such as the time that imaging results are distributed throughout the enterprise. Suggested events for the Local Report Manager include: Import Image (See Note) The "Role" may be Reporting System (See Note)
	Simple Image and Numeric Report (SINR) / Report Manager	To make reports available to a Report Reader in a DICOM SR format.

Note: Additional SOLE codes will be added in CP-RAD-418

Appendices

1225 | *Add the following new appendix to RAD TF-1:*

Appendix J – DICOM Attributes and Relevancy

This appendix is informative.

Various actors, such as the Importer in the IDEP Profile, need to develop logic to determine whether DICOM studies are clinically relevant. Specific DICOM attributes that should be considered include:

1230

- Study Date (0008,0020)
- Modality (0008,0060)
- Procedure Code Sequence (0008,1032)
- Series Description (0008,103E)
- Series Description Code Sequence (0008,103F)

1235

- Anatomic Region Sequence (0008,2218)
- Primary Anatomic Structure Sequence (0008,2228)
- Body Part Examined (0018,0015)
- Protocol Name (0018,1030)
- Laterality (0020,0060)

1240

- Requesting Service (0032,1033)
- Requesting Service Code Sequence (0032,1034)
- Requested Procedure Description (0032,1060)
- Requested Procedure Code Sequence (0032,1064)
- Performed Protocol Code Sequence (0040,0260)

1245

- Reason for Requested Procedure (0040,1002)
- Reason for Requested Procedure Code Sequence (0040,100A)
- Reason for Performed Procedure Code Sequence (0040,1012)

The use of procedure codes and protocol names as relevancy criteria is more effective if sites use the same codes. The LOINC radiology procedures codes, previously known as the RadLex Playbook codes (see https://loinc.org/) are a recommended source of standard procedure codes, procedure names and protocol names. The Management of Acquisition Protocols (MAP) Profile provides a method for managing modality protocols to align with the standard code set.

1250

1255 The use of anatomical references including Body Part Examined, Anatomic Region Sequence, and Primary Anatomic Structure Sequence are also more effective if sites sharing priors use the same set of terms or codes. DICOM Part 16 Context Group Identifiers (CID) such as CID 4 Anatomic Region, CID 4031 Common Anatomic Regions, or more specific code sets such as CID 12236 Echo Anatomic Sites are recommended.

Appendix K – IDEP Deployment Models

1260 This appendix is informative.

The Import and Display of External Priors (IDEP) Profile allows flexibility for deployment of the Importer as an edge device, a centralized system or a hybrid of the two.

Factors affecting the deployment model decision include:

- Funding for product purchase "by site" versus portions of centralized projects

1265 - Scalability and capacity of the IDEP Importer

- Network performance, especially for sites with a low bandwidth connection

- Responsibility for installation and maintenance of configuration

- Availability and prioritization of centralized operational resources

- Volumes of studies, and probability for relevant external priors

1270 - The capabilities of existing Image Manager and Report Manager systems

- The ability to change / optimize relevancy rules on a per enterprise or per local site basis

Advantages of a decentralized edge device deployment model include:

- Clear ownership of device, funding, and maintenance

- May include better access to system optimization such local relevancy rules and report conversions

1275

- More detailed knowledge of local systems and intricacies

- Configuration may be easier for a smaller number of sites

Advantages of a fully centralized deployment model include:

- May be less expensive since there are fewer systems to purchase, install, and maintain

1280 - May be easier to implement consistent retrieval of priors across an enterprise including relevancy logic and report conversions

- Configuration and maintenance may be simpler since an n:m relationship of devices does not exist

- Enterprise-wide data governance and data sharing (patient consent) may be more easily implemented and consistency maintained

1285

Figure K-1 is a depiction of the IDEP Importer and the MHD Document Responder actors deployed centrally.
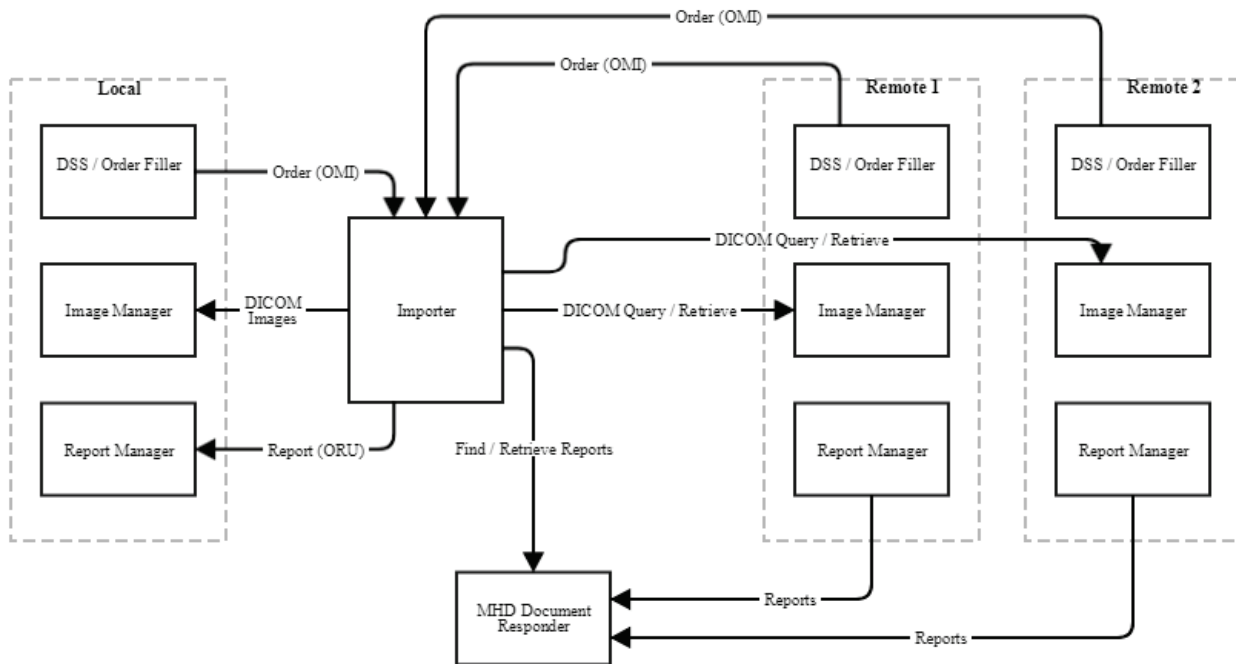
Figure K-1: IDEP Centralized Deployment Model

Figure K-2 is a depiction of all IDEP actors deployed as edge devices.

1290
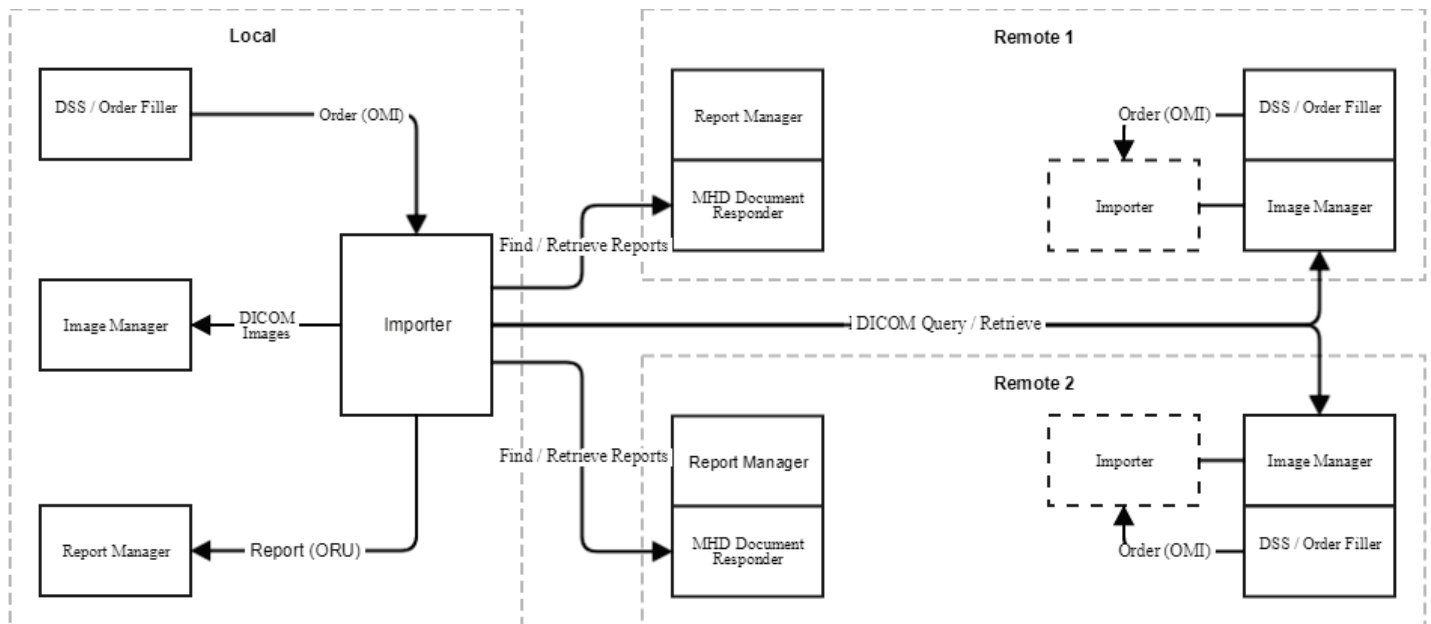
Figure K-2: IDEP Decentralized Deployment Model

Volume 3 – Transactions

1295   *Add Section 4.133*

4.133 Query For Patient Studies

4.133.1 Scope

Query for studies associated with a particular patient ID.

4.133.2 Actor Roles

1300   The roles in this transaction are defined in the following table and may be played by the actors shown here:

Table 4.133.2-1: Actor Roles

Role:	Requester: Queries for DICOM studies.
Actor(s):	The following actors may play the role of Requester: Importer
Role:	Responder: Responds to a DICOM query request for studies.
Actor(s):	The following actors may play the role of Responder: Image Manager

4.133.3 Referenced Standards

1305   DICOM PS3.4: Query/Retrieve Service Class

4.133.4 Messages
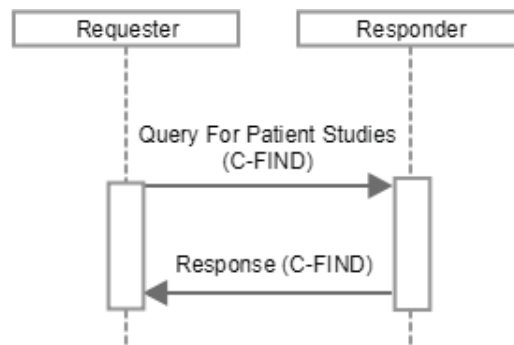
Figure 4.133.4-1: Interaction Diagram

4.133.4.1 Query For Patient Studies

1310 **4.133.4.1.1 Trigger Events**

The Requester needs to determine if studies exist on the Responder for a specific Patient ID. The Requester may also want to obtain additional information about the studies, for example to determine relevancy of the studies.

4.133.4.1.2 Message Semantics

1315 The message is a C-FIND Request from the DICOM Study Root Query/Retrieve Information Model – FIND SOP Class. The Requester is the SCU; the Responder is the SCP.

The Requester uses the Patient ID, and other patient demographics if desired, as the search criteria to determine if there are matching entries on the Responder at the Study level. Multiple matching studies may be returned.

1320 The Requester and the Responder shall support the matching keys and return keys as defined in Table 4.133.4.1.2-1. See RAD TF 2: 2.2 for more information on the notation.

Table 4.133.4.1.2-1: Query For Patient's Studies Matching and Return Keys

Attributes Name	Tag	Query Keys Matching		Query Keys Return		Notes
		SCU	SCP	SCU	SCP	
Study Level						
Study Date	(0008,0020)	O	R	O	R	
Study Time	(0008,0030)	O	R	O	R	
Accession Number	(0008,0050)	O	R	O	R	
Modalities in Study	(0008,0061)	O	R+	O	R+	
SOP Classes in Study	(0008, 0062)	O	O	O	O	

Attributes Name	Tag	Query Keys Matching		Query Keys Return		Notes
		SCU	SCP	SCU	SCP	
Referring Physician's Name	(0008,0090)	O	R+	O	R+	IHE-1, IHE-2
Study Description	(0008,1030)	O	O	O	R+	
Name of Physician(s) Reading Study	(0008,1060)	O	O	O	O	IHE-1, IHE-2
Patient Name	(0010,0010)	O	O	O	R	IHE-1, IHE-2
Patient ID	(0010,0020)	R+	R+	R+*	R	IHE-3, IHE-5
Issuer of Patient ID	(0010,0021)	O	O	O	O	IHE-5
Issuer of Patient ID Qualifiers Sequence	(0010,0024)					
>Universal Entity ID	(0040,0032)	O	O	O	O	
>Universal Entity ID Type	(0040,0033)	O	O	O	O	
>Identifier Type Code	(0040,0035)	O	O	O	O	
Patient's Birth Date	(0010,0030)	O	O	O	R+	
Patient's Birth Time	(0010,0032)	O	O	O	O	
Patient's Sex	(0010,0040)	O	O	O	R+	
Other Patient IDs	(0010,1000)	N/A	N/A	N/A	N/A	IHE-4
Other Patient IDs Sequence	(0010,1002)	O	O	O	O	IHE-4
Other Patient Names	(0010,1001)	O	O	O	O	IHE-1, IHE-2
Additional Patient History	(0010,21B0)	O	O	O	O	
Patient Comments	(0010,4000)	O	O	O	O	
Study ID	(0020,0010)	O	R	O	R	
Study Instance UID	(0020,000D)	O	R	R+*	R	IHE-5
Other Study Numbers	(0020,1070)	O	O	O	O	
Number of Patient Related Studies	(0020,1200)	N/A	N/A	O	O	
Number of Patient Related Series	(0020,1202)	N/A	N/A	O	O	
Number of Patient Related Instances	(0020,1204)	N/A	N/A	O	O	
Number of Study Related Series	(0020,1206)	N/A	N/A	O	R+	
Number of Study Related Instances	(0020,1208)	N/A	N/A	O	R+	

___

IHE-1:   Case insensitive matching is allowed for attributes of VR PN per DICOM PS 3.4.

IHE-2:   SCUs are recommended to append wildcard "*" at the end of each component of any structured name to facilitate matching (i.e., PN attributes).

IHE-3:   SCU shall include the Patient ID of the DICOM object(s) to be imported as the Matching Key in queries.

IHE-4:   Other Patient IDs (0010,1000) attribute shall not be used. It is redundant with Other Patient IDs Sequence (0010,1002) and insufficient, as it does not allow the Assigning Authority to be conveyed for each Patient ID.

IHE-5:   If the Issuer of Patient ID is not used as a Query Matching Key, the SCU shall perform additional verification to ensure that Patient ID collisions do not occur across multiple assigning authorities. This could include verification of Patient Name, Patient Date of Birth, etc., as well.

4.133.4.1.2.1 Enhanced Query Option

1325   A Requester or a Responder that supports the Enhanced Query Option shall support the matching keys and return keys as defined in Table 4.133.4.1.2.1-1 in addition to the matching and return keys as defined in Table 4.133.4.1.2-1. See RAD TF 2: 2.2 for more information on the notation.

**Table 4.133.4.1.2.1-1: Query For Patient's Studies Matching and Return Keys
(Enhanced Query Option)**

Attributes Name	Tag	Query Keys Matching		Query Keys Return		Notes
		SCU	SCP	SCU	SCP	
Study Level						
Issuer of Accession Number Sequence	(0008,0051)					IHE-3
>Local Namespace Entity ID	(0040,0031)	O	R+	O	R+	
>Universal Entity ID	(0040,0032)	O	R+	O	R+	
>Universal Entity ID Type	(0040,0033)	O	R+	O	R+	
Anatomic Regions in Study Code Sequence	(0008, 0063)					
>Code Value	(0008,0100)	O	O	O	R+	
>Coding Scheme Designator	(0008,0102)	O	O	O	R+	
>Coding Scheme Version	(0008,0103)	O	O	O	O	
>Code Meaning	(0008,0104)	O	O	O	R+	
Procedure Code Sequence	(0008,1032)					

___

Attributes Name	Tag	Query Keys Matching		Query Keys Return		Notes
		SCU	SCP	SCU	SCP	
>Code Value	(0008,0100)	O	O	O	R+	
>Coding Scheme Designator	(0008,0102)	O	O	O	R+	
>Coding Scheme Version	(0008,0103)	O	O	O	O	
>Code Meaning	(0008,0104)	O	O	O	R+	
Admitting Diagnoses Description	(0008,1080)	O	O	O	R+	
Referenced Study Sequence	(0008,1110)					
>Referenced SOP Class UID	(0008,1150)	O	O	O	O	
>Referenced SOP Instance UID	(0008,1155)	O	O	O	O	
Issuer of Patient ID	(0010,0021)	R+	R+	R+*	R+	
Requesting Service	(0032,1033)	O	O	O	O	
Requesting Service Code Sequence	(0032,1034)					
>Code Value	(0008,0100)	O	O	O	O	
>Coding Scheme Designator	(0008,0102)	O	O	O	O	
>Coding Scheme Version	(0008,0103)	O	O	O	O	
>Code Meaning	(0008,0104)	O	O	O	O	
Admission ID	(0038,0010)	O	O	O	O	
Issuer of Admission ID Sequence	(0038,0014)					
>Local Namespace Entity ID	(0040,0031)	O	O	O	O	
>Universal Entity ID	(0040,0032)	O	O	O	O	
>Universal Entity ID Type	(0040,0033)	O	O	O	O	
Reason for Performed Procedure Code Sequence	(0040,1012)					
>Code Value	(0008,0100)	O	O	O	R+	
>Coding Scheme Designator	(0008,0102)	O	O	O	R+	
>Coding Scheme Version	(0008,0103)	O	O	O	O	
>Code Meaning	(0008,0104)	O	O	O	R+	
Interpretation Author	(4008,010C)	O	O	O	O	IHE-1, IHE-2

IHE-1: Case insensitive matching is allowed for attributes of VR PN per DICOM PS 3.4.

IHE-2: SCUs are recommended to append wildcard "*" at the end of each component of any structured name to facilitate matching (i.e., PN attributes).

IHE-3: Universal Matching (selecting return keys) against an Attribute of VR SQ, may be requested by the Query SCU using a Zero Length Sequence Attribute. Query SCPs shall accept such Universal Match Requests. In addition, Query SCPs are required by the DICOM Standard to support requests for a Universal Match for an SQ attribute encoded as a zero-length item.

4.133.4.1.3 Expected Actions

The Responder receives the C-FIND request, performs the matching on the provided Query Matching Keys and sends the list of matching records with Return Keys back to the Requester via C-FIND responses.

1335 **4.133.5 Security Considerations**

4.133.5.1 Security Audit Considerations

The Radiology Audit Trail Option in the ITI Audit Trail and Node Authentication Profile (ITI TF-1: 9) defines audit requirements for IHE Radiology transactions. See RAD TF-3:5.

1340 | *Add Section 4.134*

4.134 Study Root Query for Patient ID

4.134.1 Scope

The Requester queries the Responder using patient demographics to find the identifier of the corresponding patient.

1345 **4.134.2 Actor Roles**

Table 4.134.2-1: Actor Roles

Role:	Requester: Queries for patients.
Actor(s):	The following actors may play the role of Requester: Importer
Role:	Responder: Responds to a DICOM query request for patients.
Actor(s):	The following actors may play the role of Responder: Image Manager

4.134.3 Referenced Standards

DICOM PS3.4: Query/Retrieve Service Class

1350

4.134.4 Messages
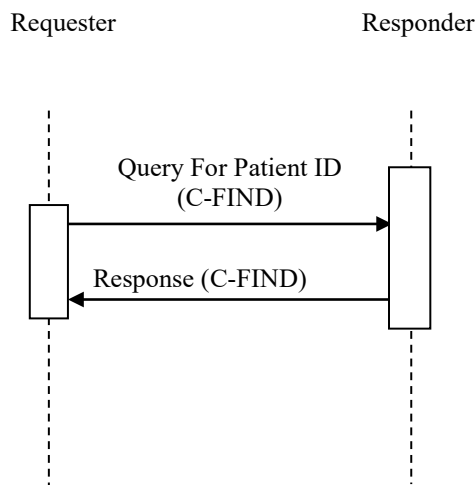
Figure 4.134.4-1: Interaction Diagram

4.134.4.1 Query For Patient ID

The Requester initiates a query using patient demographics.

4.134.4.1.1 Trigger Events

The Requester needs to find the patient ID corresponding to a set of patient demographics.

4.134.4.1.2 Message Semantics

The message is a DICOM C-FIND request of the DICOM Study Root Query/Retrieve Information Model – FIND SOP Class. The Requester is the SCU; the Responder is the SCP.

The Requester and the Responder shall support the Hierarchical Search Method.

Refer to DICOM PS3.4 for detailed semantics.

The Requester shall support the matching and return keys as defined in Table 4.134.4.1.2-1. See RAD-TF 2: 2.2 for more information.

If the request includes Patient ID (0010,0020) it shall also include Issuer of Patient ID (0010,0021) with the value corresponding to the Requester.

The request may include Study Date (0008,0020) to limit results to a relevant date range.

Table 4.134.4.1.2-1: Query For Patient ID Matching and Return Keys

Attributes Name	Tag	Query Keys Matching		Query Keys Return		Notes
		SCU	SCP	SCU	SCP	
Patient Level						
Patient Name	(0010,0010)	R+	R	R+*	R	IHE-1, IHE-2
Patient ID	(0010,0020)	O	R	R+*	R	
Issuer of Patient ID	(0010,0021)	O	R+	R+*	R+	
Issuer of Patient ID Qualifiers Sequence	(0010,0024)					
>Universal Entity ID	(0040,0032)	O	O	O	O	
>Universal Entity ID Type	(0040,0033)	O	O	O	O	
>Identifier Type Code	(0040,0035)	O	O	O	O	
Patient's Birth Date	(0010,0030)	O	O	R+*	R+	
Patient's Sex	(0010,0040)	O	O	R+*	R+	
Other Patient Names	(0010,1001)	O	O	O	O	IHE-1, IHE-2
Other Patient ID Sequence	(0010,1002)	O	O	O	O	IHE-3, IHE-4
Study Level						
Study Date	(0008,0020)	O	R	O	R	
Study Instance UID	(0020,000D)	N/A	N/A	R*	R	

IHE-1: Case insensitive matching is allowed for attributes of VR PN per DICOM PS3.4..

IHE-2: SCUs are recommended to append wildcard "*" at the end of each component of any structured name to facilitate matching (i.e., PN attributes).

IHE-3: Other Patient IDs (0010,1000) attribute shall not be used. It is redundant with Other Patient IDs Sequence (0010,1002) and insufficient as it does not allow the Assigning Authority to be conveyed for each Patient ID.

IHE-4: Responders that support the Enterprise Identity Option shall include Other Patient IDs Sequence and Issuer of Patient ID Qualifiers Sequence in the response. See RAD TF-2: 4.5.4.1.2.3.

4.134.4.1.3 Expected Actions

The Responder receives the C-FIND request, performs the matching on the provided keys and sends the list of matching studies back to the Requester via C-FIND responses.

If the request includes values for Patient ID (0010,0020) and Issuer of Patient ID (0010,0021), the responder may return studies that include these values in an item in the Other Patient IDs Sequence (0010,1002).

4.134.4.2 Response

The Responder returns a set of studies that match the query.

4.134.4.2.1 Trigger Events

The Responder receives a query from the Requester

4.134.4.2.2 Message Semantics

The message is a DICOM C-FIND response of the DICOM Study Root Query/Retrieve Information Model – FIND SOP Class. The Requester is the SCU; the Responder is the SCP.

Refer to DICOM PS3.4 for detailed semantics.

The Responder shall support the matching and return keys as defined in Table 4.134.4.1.2-1. See RAD-TF 2: 2.2 for more information.

4.134.4.2.3 Expected Actions

The Requester receives the set of C-FIND responses.

As the responses will be studies rather than patients, the response may include multiple studies for each matching patient.

If multiple studies are found for a single patient the Requester may need to decide which set of Patient attributes are appropriate to use for matching.

If multiple matching patients are returned then the Requester shall support mechanisms for resolving the correct patient (such as through a user interface, exception list, or other approach).

If the request included values for Patient ID (0010,0020) and Issuer of Patient ID (0010,0021) the responder may return studies that include these values in an item in the Other Patient IDs Sequence (0010,1002).

4.134.5 Security Considerations

4.134.5.1 Security Audit Considerations

The Radiology Audit Trail Option in the ITI Audit Trail and Node Authentication Profile (ITI TF-1: 9) defines audit requirements for IHE Radiology transactions. See RAD TF-3:5.

Add Section 4.135

1410 ## 4.135 Send Import Notification

4.135.1 Scope

This transaction specifies an import notification message from the Sender to the Receiver notifying them that an external prior study or report has been imported.

This order is intended to help these actors manage the imported images and reports (e.g., to avoid
1415 treating them as exceptions). This order is **not** intended to trigger reading / reporting workflow.

4.135.2 Actor Roles

Table 4.135.2-1: Actor Roles

Role:	Sender:
	Sends import notifications for imported external studies and reports to assist in image and report management.
Actor(s):	The following actors may play the role of Requester:
	Importer
Role:	Receiver:
	Receives import notifications and uses this information to assist in image / report management.
Actor(s):	The following actors may play the role of Responder:
	Image Manager
	Report Manager

4.135.3 Referenced Standards

HL7 v2.5.1 Chapters 2-4

1420 **4.135.4 Messages**

Figure 4.135.4-1: Interaction Diagram

4.135.4.1 Send Import Notification

4.135.4.1.1 Trigger Events

1425 The Sender imports an external prior study or external prior report.

If multiple external prior studies or external prior reports are imported each one will trigger its own import notification.

The import may be initiated by a "Trigger Order" – a Procedure Scheduled [RAD-4] message from the DSS/OF for a new local study with which the external prior studies and reports are 1430 associated.

4.135.4.1.2 Message Semantics

The import notification is an HL7 v2.5.1 Imaging Order (OMI) message. The Sender is the Sending Application and the Receiver is the Receiving Application.

This OMI message is effectively a "proxy order". Unlike typical OMI messages, this is not 1435 intended to trigger reading workflow.

The Sender shall send one "Proxy Order" OMI message for each external prior study being imported.

The Sender shall send one "Proxy Order" OMI message for each external prior report being imported.

1440 These OMI messages are sparsely populated. Most Patient Visit (PV1) and Observation request (OBR) optional fields (R2 or O) are not included because they refer to information that is not relevant in this context.

The Sender shall map metadata from the **Trigger Order** (if present) and the **Subject of Proxy Order** into the **Proxy Order OMI** as defined in Table 4.135.4.1.2-1. In Table 4.135.4.1.2-1:

1445   1. **"Trigger Order"** (if present) is the Procedure Scheduled [RAD-4] OMI sent from the DSS/OF to the Sender.

2. **"Subject of Proxy Order"** is one of:

- an external prior DICOM study

- an external MHD Report

1450   - an external XDS-I.b Report

3. **"Proxy Order"** is the OMI sent from the Sender to the Receiver.

- **OMI Field:** Fields not listed are Optional

- **OPT:** The coded values are defined in RAD TF-2: 2.3.

- **Requirements:** Defines how the field shall be populated.

1455

Table 4.135.4.1.2-1: Source of Proxy Order (OMI) Values

Sources of values for Sender to map into Proxy Order:						
Trigger Order	**Subject of Proxy Order. One of:**			**Proxy Order (Note 1)**		
	External Prior DICOM Study	**External MHD Report**	**External XDS-I.b Report**	**OMI Field**	**Opt**	**Requirements**
PID-3 Patient Identifier	Patient Identifier (0010,0020)	Patient.identfier in the Patient Resource referenced in DocumentReference.subject	DocumentEntry.patientId	PID-3 Patient Identifier	R	Shall include the Trigger Order PID-3 if present. Shall include the patient identifier from Subject of Proxy Order as an additional PID-3 value. Shall populate Assigning Authority (PID-3.4) using system configuration if it is not present in any of the PID-3 values.
PID-5 Patient Name	Patient Name (0010, 0010)	Patient.name in the Patient Resource referenced in DocumentReference.subject	PID-5 in DocumentEntry.sourcePatientInfo	PID-5 Patient Name	R2	Shall be Trigger Order PID-5 if present; otherwise map from Subject of Proxy Order if value is present.
PID-7 Patient Date of Birth	Patient Date of Birth (0010, 0030)	Patient.birthDate in the Patient Resource referenced in DocumentReference.subject	PID-7 in DocumesntEntry.sourcePatientInfo	PID-7 Patient Date of Birth	O	Shall be Trigger Order PID-7 if present; otherwise map from Subject of Proxy Order if value is present.

Sources of values for Sender to map into Proxy Order:						
Trigger Order	**Subject of Proxy Order. One of:**			**Proxy Order (Note 1)**		
	External Prior DICOM Study	**External MHD Report**	**External XDS-I.b Report**	**OMI Field**	**Opt**	**Requirements**
PID-8 Patient Sex	Patient Sex (0010, 0040)	Patient.gender in the Patient Resource referenced in DocumentReference.subject	PID-8 in DocumentEntry.sourcePatientInfo	PID-8 Administrative Sex	R2	Shall be Trigger Order PID-8 if present; otherwise map from Subject of Proxy Order if value is present.
-	-	-	-	PV1-2 Patient Class	R	Shall be "N" (Not Applicable)
-	-	-	-	ORC-1 Order Control	R	Shall be "NW" (New) Note that the order is New, but the status, ORC-5, is Completed.
-	-	-	-	ORC-3 Filler Order Number	R	Shall generate locally. Shall match OBR-3. The third component, Assigning Authority, shall be populated as the system creating the number. The same Filler Order Number may appear in multiple OMI messages if they relate to the same external prior study.
-	-	-	-	ORC-5 Order Status	R	Shall be "CM" (Order is completed)
-	Study Date (0008,0020) and Study Time (0008,0030).	context.period	DocumentEntry.serviceStartTime	TQ1-7 Start Date/Time	R	Shall be the date and time of the Subject of Proxy Order.
-	-	-	-	TQ1-9 Priority	R	Shall contain "R^Routine^HL70078" in the first three components. (All priors are routine and not urgent.)
-	-	-	-	OBR-3 Filler Order Number	R	Shall match ORC-3
-	Procedure Code Sequence (0008,1032) if present, otherwise Requested Procedure Code Sequence (0032,1064)	DocumentReference.type	DocumentEntry.typeCode	OBR-4 Universal Service ID	R	Shall be value from Subject of Proxy Order converted into an equivalent local Performed Procedure Code or a generalized local code. Shall match OBR-44.
-	-	-	-	OBR-44 Procedure Code	R	Shall match OBR-4.

Sources of values for Sender to map into Proxy Order:						
Trigger Order	Subject of Proxy Order. One of:			Proxy Order (Note 1)		
	External Prior DICOM Study	External MHD Report	External XDS-I.b Report	OMI Field	Opt	Requirements
-	Accession Number (0008, 0050) and Issuer of Accession Number Sequence (0008,0051) (if present)	context.related .identifier with a type value of 'ACSN'	DocumentEntry.re ferenceIdList	IPC-1 Accession Number	R	Shall populate Assigning Authority (IPC-1.2 through IPC-1.4) using system configuration if it is not present in any of the Subject of Proxy Order values.
-	Study Instance UID (0020, 000D)	context.related	DocumentEntry,re ferenceIdList	IPC-3 Study Instance UID	R	Shall be value from Subject of Proxy Order.
-	Modality (0008, 0060)	context.event	DocumentEntry.e ventCodeList	IPC-5 Modality	R2	Shall be value from Subject of Proxy Order.
IPC-6 Schedule d Protocol Code Sequence	-	-	-	IPC-6 Scheduled Protocol Code Sequence	R	Shall include (IRWF007, IHERADTF, "To be provided as prior") Other values from IRWF.b Table 4.5-4 Import Instruction Codes may also be included.

4.135.4.1.3 Expected Actions

The Responder will receive and process the ORM message according to the requirements of its application. This processing is not defined or constrained by IHE.

1460

> *Add the new transactions to RAD TF Vol 3, Table 5.1-1 IHE Radiology transactions and resulting ATNA trigger events*

1465

Table 5.1-2: IHE Radiology transactions and resulting ATNA trigger events

IHE Radiology Transaction	ATNA Trigger Event(s)	Actor(s) that shall be able to record audit event
…		
Retrieve Images [RAD-16]	Instances-Stored	Image Manager/Image Archive
	Study-used	… **Importer**
Query for Patient Studies [RAD-133]	**Query Information**	**Image Manager/Image Archive** **Importer**
Study Root Query for Patient Studies [RAD-134]	**Query Information**	**Image Manager/Image Archive** **Importer**
Send Import Notification [RAD-135]	**Procedure-record-event**	**Image Manager/Image Archive** **Report Manager** **Importer**

Appendices

Add the following new appendix to Volume 3.

1470

Appendix P – HL7 v2 ORU for External Prior Reports Mapping

This appendix is normative and applies to the following use cases in the Import and Display of External Priors (IDEP) Profile:

- Report Retrieval (RAD TF-1: 48.4.2.4)

1475
- Image and Report Access Using XDS-I (RAD TF-1: 48.4.2.5)

In these use cases the IDEP Importer retrieves an external prior report as either:

- an HL7 FHIR DocumentReference Resource, imported using MHD Retrieve Document [ITI-68]

- a report with DocumentEntry metadata, imported using XDS-I Retrieve Document Set

1480   [ITI-43]

- The Importer then sends the external report to the local Report Manager using the HL7 v2.5.1 Observation Results (ORU) Message defined in RAD TF-3: 4.128 Send Imaging Result [RAD-128] (currently in the Results Distribution (RD) TI Supplement).

The Importer shall localize and map the values from the external report into the ORU Message as

1485 specified in Table P-1. The Importer may retrieve multiple external prior reports, and, as defined in [RAD-128], the Importer shall send one ORU message per report.

These ORU messages are sparsely populated. Many of the Patient Visit (PV1) and Observation Request (OBR) optional fields (R2 or O) should not be included because they refer to information that is no longer relevant in this context.

1490 The coded values used in the **OPT** column are defined in RAD TF-2: 2-3.

Table P-1: MHD DocumentReference Resource / XDS Document to HL7 v2.5.1 ORU mapping

External Report. One of:		ORU Message		
External MHD Report	**External XDS.b Report**	**ORU Field**	**OPT**	**Requirements**
Patient.identifier in the Patient Resource referenced in DocumentReference.subject	DocumentEntry.patientId	PID-3 Patient Identifier	R	Shall include the Local patient identifier. Shall include External report patient identifier(s) as additional PID-3 values. Shall populate Assigning Authority (PID-3.4) using system configuration if it is not present in any of the PID-3 values.
Patient.name in the Patient Resource referenced in DocumentReference.subject	PID-5 in DocumentEntry.sourcePatientInfo	PID-5 Patient Name	R2	
Patient.birthDate in the Patient Resource referenced in DocumentReference.subject	PID-7 in DocumentEntry.sourcePatientInfo	PID-7 Patient Date of Birth	R2	
Patient.gender in the Patient Resource referenced in DocumentReference.subject	PID-8 in DocumentEntry.sourcePatientInfo	PID-8 Administrative Sex	R2	
N/A	N/A	PV1-2 Patient Class	R	Shall be "N" (Not Applicable)
DocumentReference.type	DocumentEntry.typeCode	OBR-4 Universal Service ID	R	Shall be value from Subject of Proxy Order converted into an equivalent local Performed Procedure Code or a generalized local code.
context.related.identifier with a type value of 'ACSN'	DocumentEntry.referenceIdList	OBR-18 Placer Field 1	R	Shall contain the Accession Number, including Assigning Authority
DocumentReference.date	DocumentEntry.creationTime	OBR-22 Report Date	R2	
-	-	OBR-25 Result Status	R	Shall be "F" (Final)
Name and identifier in the Practitioner Resource referenced in DocumentReference.author	DocumentEntry.author	OBR-32 Principal Result Interpreter	R2	
-	-	OBR-44 Procedure Code	R	Shall match OBR-4
-	-	TQ1-9 Priority	R	Shall contain "R^Routine^HL70078" in the first three components. (All priors are routine and not urgent.)

External Report. One of:		ORU Message		
External MHD Report	**External XDS.b Report**	**ORU Field**	**OPT**	**Requirements**
Shall include the following OBX segments: • an OBX segment identifying the imaging study used to produce the result (see RAD-TF: 3-4.128.4.1.2.8 in RD supplement) • for CDA Imaging Report with Structured Headings documents, one additional OBX segment per Section element • for CDA Wrapped Text Report documents, one additional OBX segment per paragraph in the nonXMLBody attribute • for PDF report formats, one additional OBX segment for the report content See RAD TF-3: 4.128.4.1.2.13 (currently in the RAD Results Distribution TI supplement) for details on OBX segment encoding.				
DocumentReference.content.format	DocumentEntry.formatCode	OBX-2 Value Type	R	Shall be: • "ED" for PDF reports • "TX" for Text reports • "TX" for CDA Structured Heading Segments
-	-	OBX-3 Observation Identifier	R	For Text and PDF reports shall be "18748-4^Diagnostic Imaging Report^LN". For CDA Imaging Reports with Structured Headings shall contain the code value for the corresponding section.
The document associated with the DocumentReference	The document associated with the DocumentEntry metadata	OBX-5 Observation Value	R	For PDF reports, shall contain the encapsulated PDF encoded as base64. For Text reports, shall contain a paragraph from the nonXMLBody attribute value converted to plain text. For CDA Imaging Reports with Structured Headings, shall contain the text element value from the corresponding section. OBX-5.2 through OBX-5.4 shall be mapped according to the mime type provided in: • content.attachment.contentType for MHD Report • mimeType for XDS.b Report and the type of document (e.g., Radiology Report) described in: • content.format for MHD Report • formatCode for XDS.b Report