Integrating the Healthcare Enterprise

IHE Radiology
Technical Framework Supplement

Import and Display of External Priors (IDEP)

Revision 1.0 – Draft for Public Comment

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Please verify you have the most recent version of this document. See here for Trial Implementation and Final Text versions and here for Public Comment versions.

Foreword

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

This supplement is published on February 20, 2019 for Public Comment. Comments are invited and may be submitted at https://www.ihe.net/Radiology_Public_Comments. In order to be considered in development of the Trial Implementation version of the supplement, comments must be received by March 22, 2019.

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.

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.

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.

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 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 display.

The figure below illustrates the flow of external prior images and reports between facilities.

185 ## Items To Do

- References to supplements in TI phase may need to be updated when this supplement goes to final text.
- CP needed to SOLE to add new codes

Open Issues and Questions

Issue:
1. 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.
2. 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.
3. 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?
4. Should Purge External Images capability be mandatory for Image Manager actors? Currently this is optional but it may be required by policy at most sites.
5. Should Purge External Reports capability be mandatory for Report Manager actors? Currently this is optional but it may be required by policy at most sites.
6. 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.
7. Should an Importer in an XDS environment require all of the DICOM®[1] operations? In an XDS environment DICOM query transactions are not likely to be used.

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

8. 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.

Closed Issues

Issue:	Status/Resolution:
HL7®[2] 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 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.
There is a potential IDEP use case that searches for priors 'on demand':	**Out of scope in this profile.**

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

Issue:	Status/Resolution:
1. User initiates search for priors 2. Importer initiates patient lookup and federated query 3. Importer filters search results based on relevancy rules 4. Importer returns localized search results 5. User chooses studies to retrieve 6. Importer retrieves / localizes selected studies and reports	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**
Should the Importer send orders to the Image Manager / Report Manager or the DSS?	**Image Manager / Report Manager.**

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

Issue:	Status/Resolution:
	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-73.** Explore whether RAD-73 needs to be adjusted to accommodate this. Also include RAD-73 in this supplement as a reference.
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 1UU)?	**No.** Mentioned in deployments (related issue – operational performance of IA/IM actors)
IDEP with DIMSE Q/R: Are there any gaps in existing transactions?	**No.**

Issue:	Status/Resolution:
	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**
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	**Yes** The purpose in this use case is to allow the Image Manager to know

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

Issue:	Status/Resolution:
used even for Scheduled Workflow and the IDEP Profile can function without it. Is the value sufficient to justify the higher implementation burden?	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.

General Introduction

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:

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-Y1	Query for Patient Studies	A query to find any studies associated with a particular patient.

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 performed at a different facility associated with an External Prior Study.

Volume 1 – Profiles

X Import and Display of External Priors (IDEP) Profile

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”.

IDEP is a workflow profile. The new requirements are concentrated in the Importer Actor 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.

X.1 IDEP Actors, Transactions, and Content Modules

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.

Figure X.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 dotted lines. Actors which have a required grouping are shown in conjoined boxes (see Section X.3).

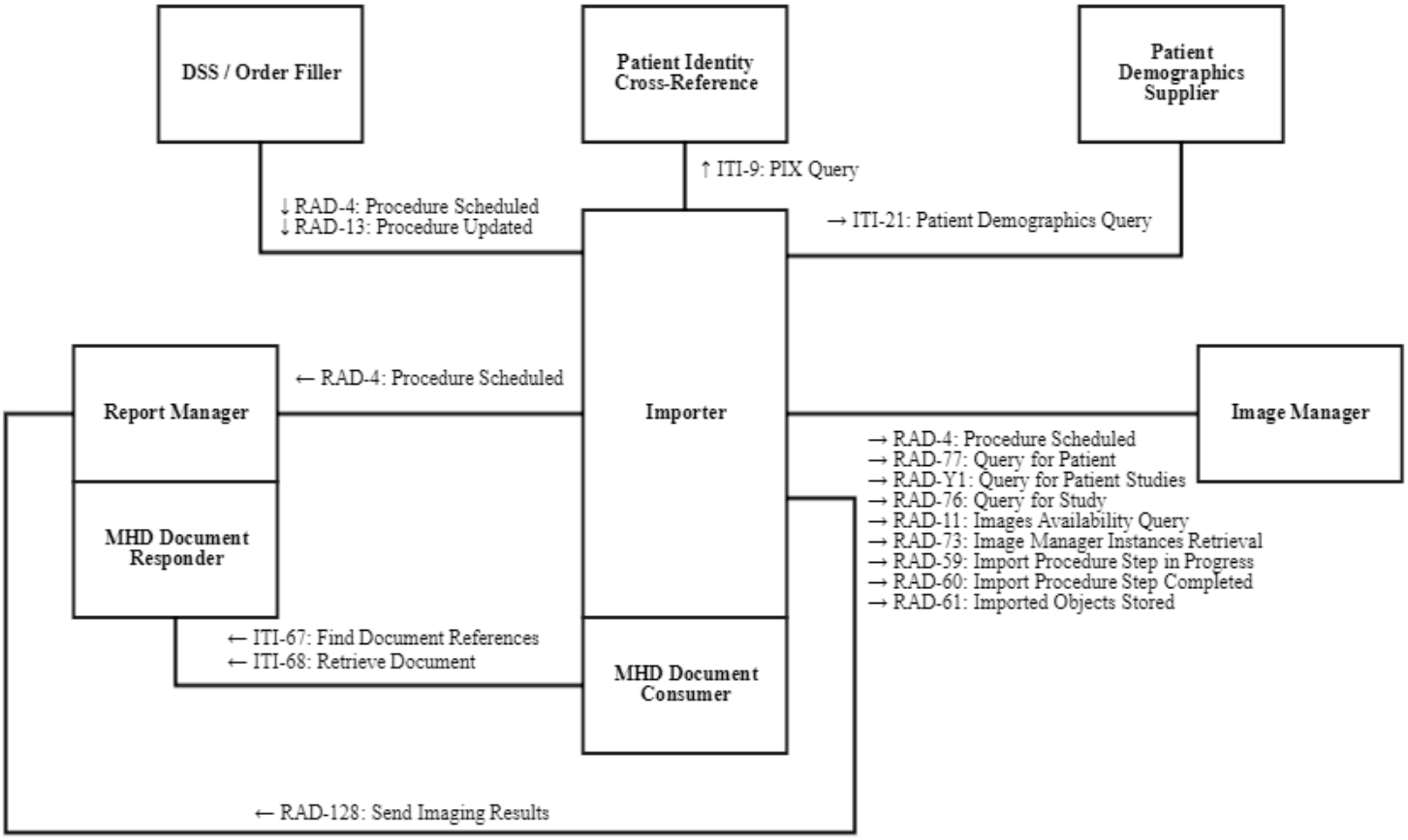


Figure X.1-1: IDEP Actor Diagram

Figure X.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.

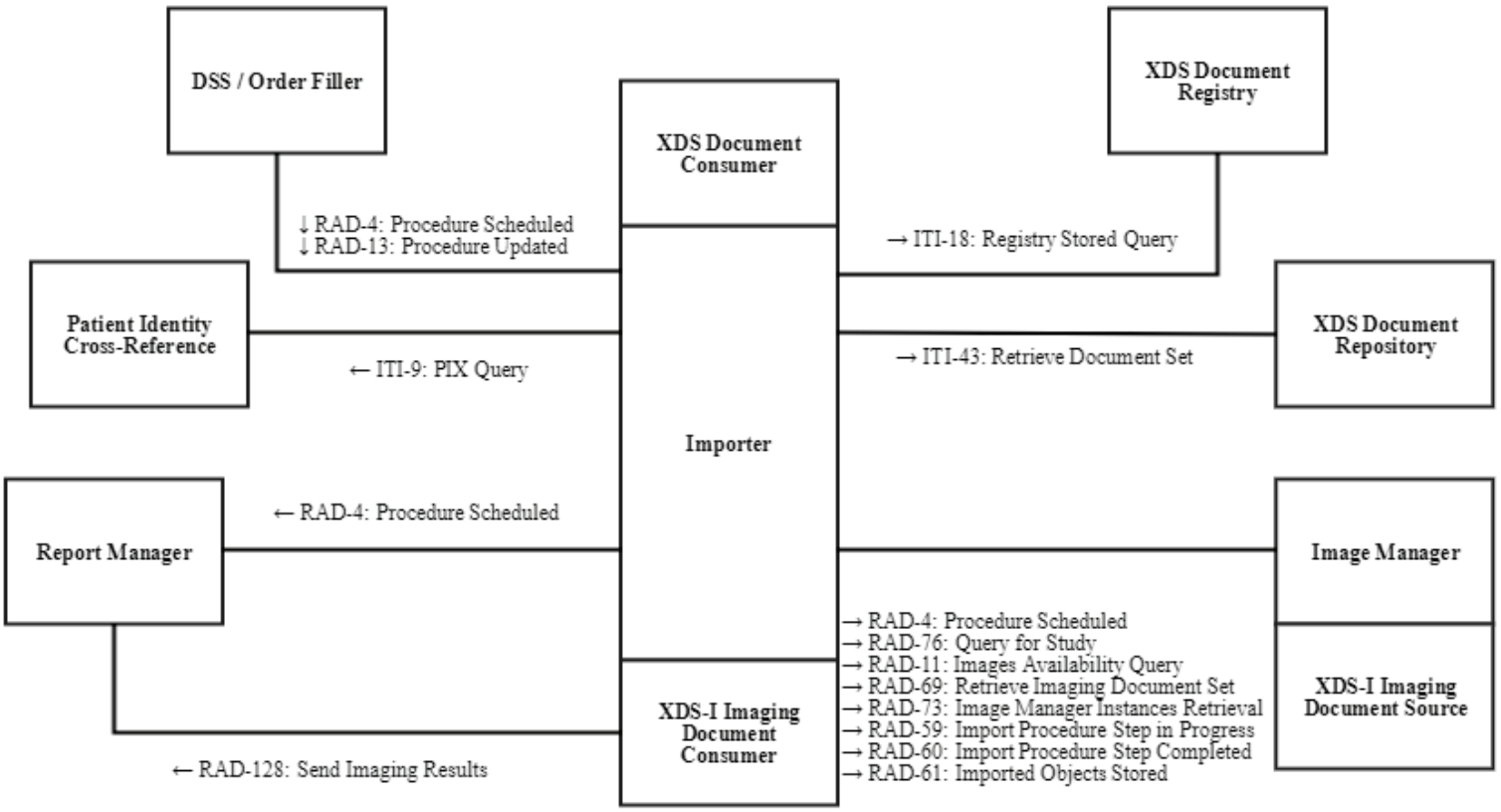


Figure X.1-2: IDEP XDS Options Actor Diagram

Table X.1-1 lists the transactions for each actor directly involved in the IDEP Profile. To claim compliance with this profile, an actor shall support all required transactions (labeled "R") and may support the optional transactions (labeled "O"). See Section X.3 IDEP Required Actor Grouping for additional required transactions.

Table X.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 (Note 1)	RAD TF-2: 4.4 (See both RAD TF-2 and the IRWF.b Supplement) RAD TF-3: Appendix 2MM

Actors	Transactions	Optionality	Reference
	Procedure Updated [RAD-13]	R (Note 1)	RAD TF-2: 4.13 (See both RAD TF-2 and the IRWF.b Supplement)
	PIX Query [ITI-9]	R	ITI TF-2a: 3.9
	Patient Demographics Query [ITI-21]	R	ITI TF-2a: 3.21
	Query for Patient ID [RAD-77]	R	RAD TF-3: 4.77 (See IRWF.b Supplement)
	Query for Patient Studies [RAD-Y1]	R	RAD TF-3: 4.Y1
	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)
	Image Manager Instances Retrieval [RAD-73]	R	RAD TF-3: 4.73 (See MIMA Supplement)
	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]	R	RAD TF-3: 4.77 (See IRWF.b Supplement)
	Query for Patient Studies [RAD-Y1]	R	RAD TF-3: 4.Y1
	Image Manager Instances Retrieval [RAD-73]	R	RAD TF-2: 4.73 (See MIMA Supplement)
	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)
	Procedure Scheduled [RAD-4]	R	RAD TF-2: 4.4
	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	Procedure Scheduled [RAD-4]	R	RAD TF-2: 4.4 (See IRWF.b Supplement)
	Send Imaging Result [RAD-128]	R	RAD TF-3: 4.128 (See RD Supplement)

Actors	Transactions	Optionality	Reference
Patient Identifier Cross-reference Manager	PIX Query [ITI-9]	R	ITI TF-2a: 3.9
Patient Demographics Supplier	Patient Demographics Query [ITI-21]	R	ITI TF-2a: 3.21

Note 1: This transaction shall be supported as both a Sender and Receiver.

X.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.

X.1.1.1 DSS/OF

The DSS/OF triggers the external priors workflow at the placement of a new local order.

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

X.1.1.2 Image Manager / Image Archive

While the list of transactions for the Image Manager is extensive, these transactions are widely implemented. The intent is that existing Image Manager implementations are minimally affected.

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

Table X.1.1.1-1 identifies the transactions related to the remote Image Manager role and Table X.1.1.2-2 identifies the transactions related to the local Image Manager role.

Table X.1.1.2-1: IDEP Profile – Remote Image Manager Transactions

Transactions	Optionality	Reference	Purpose
Query for Patient ID [RAD-77]	R	RAD TF-3: 4.77 (See IRWF.b Supplement)	Supporting discovery of remote patient identifiers by the Importer
Query for Patient Studies [RAD-Y1]	R	RAD TF-3: 4.Y1	Supporting discovery of external priors by the Importer
Image Manager Instances Retrieval [RAD-73]	R	RAD TF-3: 4.73 (See MIMA Supplement)	Supporting retrieval of external priors by the Importer

Table X.1.1.2-2: IDEP Profile – Local Image Manager Transactions

Transactions	Optionality	Reference	Purpose
Query for Study [RAD-76]	R	RAD TF-3: 4.76 (See IRWF.b Supplement)	Determining if external prior is already in local Image Manager
Images Availability Query [RAD-11]	R	RAD TF-2: 4.11 (See IRWF.b Supplement)	Determining if local copy of external prior is complete
Procedure Scheduled [RAD-4]	R	RAD TF-2: 4.4	Preparing Image Manager for receipt of external prior
Import Procedure Step in Progress [RAD-59]	R	RAD TF-3: 4.59 (See IRWF.b Supplement)	Providing status of external prior import
Imported Objects Stored [RAD-61]	R	RAD TF-3: 4.61 (See IRWF.b Supplement)	Storage of external prior
Import Procedure Step Completed [RAD-60]	R	RAD TF-3: 4.60 (See IRWF.b Supplement)	Providing content manifest and status of external prior import

Imported external prior studies shall be treated in a similar manner to non-imported (local) priors.

Imported external prior studies:

- 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"
- if possible, should not be included in a search from an external facility. For example, if Facility A imports a study from Facility B, Facility A does not return that study in a search from Facility B (or Facility C)

For local studies, an Image Manager / Image Archive that supports IOCM it shall not include rejected images in a search from an external facility (see Section X.6.1).

The Image Manager/Image Archive shall support [RAD-4] as defined in IRWF.b.

The Image Manager shall support the HL7 v2.5.1 Message Semantics for [RAD-4] described in RAD TF-2: 4.4.4.1.2.2, and the Expected Actions described in RAD TF-2: 4.4.4.2.

X.1.1.3 Image Display

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.

Note that the means of communication between the Image Display and the local Image Manager / Image Archive are not defined by this profile.

The Image Display shall display external prior studies in a similar manner to local priors.

The Image Display shall be capable of simultaneously displaying prior (both external and local) and current studies. The Image Display shall be capable of displaying the Accession Number and Study Date on each of the prior and current studies. It is strongly recommended that there is a visual indication that a prior study is an external prior study, for example, by displaying the Issuer of Accession Number or pre-pending a prefix to the Accession Number.

If an Image Display is capable of displaying Structured Report (SR) or Encapsulated PDF objects it shall display these when present in an external prior study in the same way it would when they are present in a local study.

See Section X.4.1.3 Proper Display and Interpretation using External Priors.

X.1.1.4 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 is required to support both roles.

Table X.1.1.4-1 identifies the transactions related to the remote Report Manager role and Table X.1.1.4-2 identifies the transactions related to the local Report Manager role.

Note: All remote Report Manager transactions are inherited from its grouping with an MHD Document Responder. See Section X.3

Table X.1.1.4-1: IDEP Profile – Remote Image Manager grouped with MHD Document Responder Transactions

Transactions	Optionality	Reference	Purpose
Find Document References [ITI-67]	R	ITI TF-2c: 3.67 (See ITI MHD Supplement)	Supporting discovery of external reports by the Importer
Retrieve Document [ITI-68]	R	ITI TF-2c: 3.68 (See ITI MHD Supplement)	Supporting retrieval of external reports by the Importer

Table X.1.1.4-2: IDEP Profile – Local Image Manager Transactions

Transactions	Optionality	Reference	Purpose
Procedure Scheduled [RAD-4]	R	RAD TF-2: 4.4 (See IRWF.b Supplement)	Preparing for receipt of external report
Send Imaging Result [RAD-128]	R	RAD TF-3: 4.128 (See RD Supplement)	Receiving external report

Imported external prior reports shall be treated in a similar manner to local prior reports, e.g., imported external prior reports shall be included in responses to local queries, etc.

Imported external prior report status shall not be modified by radiologists' interpretation worklist, e.g., a "final" report shall not be required to be re-interpreted.

The Report Manager shall support [RAD-4] as defined in the IRWF.b Profile.

The MHD Document Responder grouped with the Report Manager:

- shall respond to 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 X.4.2.4.
- shall support DocumentReference Resources that have the following `format` values:
  - `urn:ihe:rad:TEXT` (CDA Wrapped Text Report)
  - `urn:ihe:rad:PDF` (PDF Report)

  and, if the CDA Imaging Report with Structured Headings Option is supported
  - `urn:ihe:rad:CDA:ImagingReportStructuredHeadings:2013` (CDA Imaging Report with Structured Headings)
- shall respond to Retrieve Document [ITI-68] requests for the identified documents

Other DocumentReference Resource formats are not addressed as part of this profile.

The Report Manager shall support the HL7 v2.5.1 Message Semantics for [RAD-4] described in RAD TF-2: 4.4.4.1.2.2, and the Expected Actions described in RAD TF-2: 4.4.4.2. See Section X.4.1.6 Imaging Report Payload Formats and Transmission.

X.1.1.5 Report Reader

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

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

The Report Reader shall display external prior reports in a similar manner as local prior reports.

There shall be a clear visual indicator to differentiate external reports from local reports. It is strongly recommended that there is a visual indication that a prior report is an external prior report, for example, by pre-pending a prefix to the Accession Number.

X.1.1.6 Importer

The Importer is responsible for identifying external prior studies and reports, determining likely clinical relevancy of studies, retrieving these external data sets, coercing the metadata attributes to local values, and sending the information to the appropriate destinations.

During a single execution of the IDEP workflow the Importer will interact with a single local Image Manager and one or more remote Image Managers. The different transactions that apply to local vs. remote Image Managers are described in Section X.1.1.2.

During a single execution of the IDEP workflow the Importer will interact with a single local Report Manager and one or more remote Report Managers. The different transactions that apply to local vs. remote Report Managers are described in Section X.1.1.4.

The Importer shall support a method to filter the list of external studies returned by the Query for Patient Studies [RAD-Y1] to avoid retrieving irrelevant studies. Defining this business logic is beyond the scope of this profile but concepts are described in Section X.4.1.2.

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 Table MM-1 in place of the "Request Filling of Order ORI" column in RAD TF-2: Table A.5-3.
- The Importer Issuer of Patient ID (0010,0021) and Issuer of Accession Number (0008,0051) shall be populated.
  These values for these attributes may be come from system configuration.
- The Importer shall tag external prior studies as external by adding the code (IRWF007, IHERADTF, To be provided as prior) into the Scheduled Protocol Sequence (0040,0008) as an additional sequence item.
- The Importer shall ensure the Institution Name (0008,0080), Institution Address (0008,0081), and Institution Code Sequence (0008,0082) are populated. The institution information may be from system configuration based upon the Sending AE title or other information.

See Figure X.4.2.3-4 for context and timing of the coercion.

The Importer shall support the HL7 v2.5.1 Message Semantics for [RAD-4] and [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 mapping of the external prior study to an order is described in RAD TF-3: Appendix 2MM.

The MHD Document Consumer grouped with the Importer:

- 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 X.4.2.4.
- shall identify matching DocumentReference Resources that have the following `format` values:
  - `urn:ihe:rad:TEXT` (CDA Wrapped Text Report)
  - `urn:ihe:rad:PDF` (PDF Report)

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

    - `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 addressed as part of this profile.

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

- Text
- PDF

The Importer shall encode HL7 v2.5.1 ORU objects as described in Appendix 2PP.

X.2 IDEP Actor Options

Options that may be selected for each actor in this profile, if any, are listed in Table X.2-1. Dependencies between options when applicable are specified in notes.

Table X.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 X.2.1
Image Display	None	
Report Manager	Purge External Reports Option	Section X.2.2
Report Reader	None	
Importer	XDS-I.b Images Option	Section X.2.3
	XDS.b Reports Option	Section X.2.4
	CDA Imaging Report with Structured Headings	Section X.2.5

X.2.1 Purge External Images Option

Purging (deleting) external prior studies is important in enterprise data governance planning. See Section X.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:

- completed interpretation of the order (OMI) that initiated the execution of the IDEP workflow
- expiry of a retention period for external prior studies

There are no additional transactions associated with this option.

X.2.2 Purge External Reports Option

Purging (deleting) external prior studies is important in enterprise data governance planning. See Section X.4.1.8 for a discussion of considerations around purging external prior studies versus maintaining consistency of studies 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:

- completed interpretation of the order (OMI) that initiated the execution of the IDEP workflow
- expiry of a retention period for external prior reports

There are no additional transactions associated with this option.

X.2.3 XDS-I.b Images Option

The Importer that supports the XDS-I Images Option accesses external prior studies using the 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 X.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
- The Importer shall send retrieved external prior studies to the local Image Manager

X.2.4 XDS.b Reports Option

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

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

As described in Section X.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

The grouped Document Consumer shall support the FindDocuments and 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 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 with Structured Headings)

Other content formats may be supported.

X.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:

- `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 objects as described in RAD TF-3: Appendix 2PP.

X.3 IDEP Required Actor Groupings

An Actor from this profile (Column 1) shall implement all required transactions and/or content 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 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.

Section X.5 describes some optional groupings that may be of interest for security considerations and Section X.6 describes some optional groupings in other related profiles.

Table X.3-1: IDEP - Required Actor Groupings

IDEP Actor	Grouping Condition	Actor to be grouped with	Reference
DSS / Order Filler	n/a	None	
Image Manager / Image Archive	n/a	None	
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	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

X.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)

X.4.1 Concepts

X.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

X.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 X.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 1TT for specific DICOM attributes and contexts for determining relevancy.

X.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.

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 such 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 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.

X.4.1.4 IDEP v. Import Reconciliation Workflow (IRWF.b)

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 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.

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.

X.4.1.5 Access of External Prior Reports via MHD Responder

The IDEP Profile does not prescribe how a remote Report Manager, grouped with an MHD 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 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.

X.4.1.6 Imaging Report Payload Formats and Transport

To provide clarity and reduce variability, this profile limits the report payload formats and transport protocols required in Section X.1.1.6.

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 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 local destination as an HL7 v2 ORU message.

An Importer or a Report Manager may choose to implement other payload and transport conversions.

X.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 increased risk that it will be unnecessarily 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 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.

X.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.

X.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 the singular method of identifying external priors as the information in the preparatory order ("new order") OMI to define that the incoming study is a prior study. (See RAD TF-2: X.1.1.6) In the Procedure Scheduled [RAD-4] Scheduled Protocol Sequence for Import Option and Import Instruction Handling Option (see RAD TF-2: 4.5-4 in the IRWF.b Supplement), the code (IRWF007, IHERADTF, To be provided as prior) in the Scheduled Protocol Sequence of the OMI. Additional codes such as Import, To be archived, and Do not archive may also be provided for retention purposes.

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 Manager.
- 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

X.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.

X.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. Furthermore, retention rules for images may differ from retention rules for reports.

X.4.1.8.4 Life Cycle Management

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

A consistent method to identify studies as external priors should be defined. Study date is insufficient to determine that a study is a prior. The IRWF.b codes should be considered, specifically Scheduled Protocol Sequence (0040,0008) uses the IHERADTF coding scheme and provides a sequence of codes such as "Import", "To be archived", "Do not archive", "To be provided as prior", etc. See IHE RAD TF-2: 4.5.4.2.2.1 (in the IRWF.b Supplement). More than one code may be used simultaneously.

X.4.1.8.5 Ability to purge priors

This profile provides explicit "Purge Prior Images" and "Purge Prior Reports" (Section X.2) options to identify system capabilities. Although there are not 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.

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.

X.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 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 Authority as 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.

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.

X.4.1.8.7 Data Timeliness

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 X.4.1.7.

X.4.1.8.8 Data Transmission Verification

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 X.4.2.2.2.

To ensure that the intended content of the study transfer is complete, DICOM Modality Performed Procedure Step (MPPS) can be used to determine that the complete set of DICOM information has been transmitted as shown in Section X.4.2.2.2.

To ensure archiving, the DICOM Storage Commit SOP class could also be implemented by and Importer and Image Managers, although it is not specified in this profile since the external site may retain archiving responsibility.

If Image Object Change Management (IOCM) is not consistently deployed throughout an enterprise for prior studies, use of the DICOM services described above should reduce redundant transfers and improve consistency of data sets by verifying transmission.

X.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. if the study will be deleted locally and re-retrieved if necessary
2. if the study will just be retained "as is" as a local archived copy
3. if additional objects for a prior study created locally will be returned to the original site
4. if additional objects for a prior study created remotely/externally will be sent to the new site and studies re-interpreted
5. if study content consistency will be actively maintained across systems (see Section X.6.1)

X.4.1.8.10 Defining prior study content

The requirements for the portion/completeness of the prior study content to be transferred must be consist 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 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.

X.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 1UU for illustrations and advantages of the various deployment models.

X.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.

X.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.

X.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").

X.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 1UU for additional deployment models.

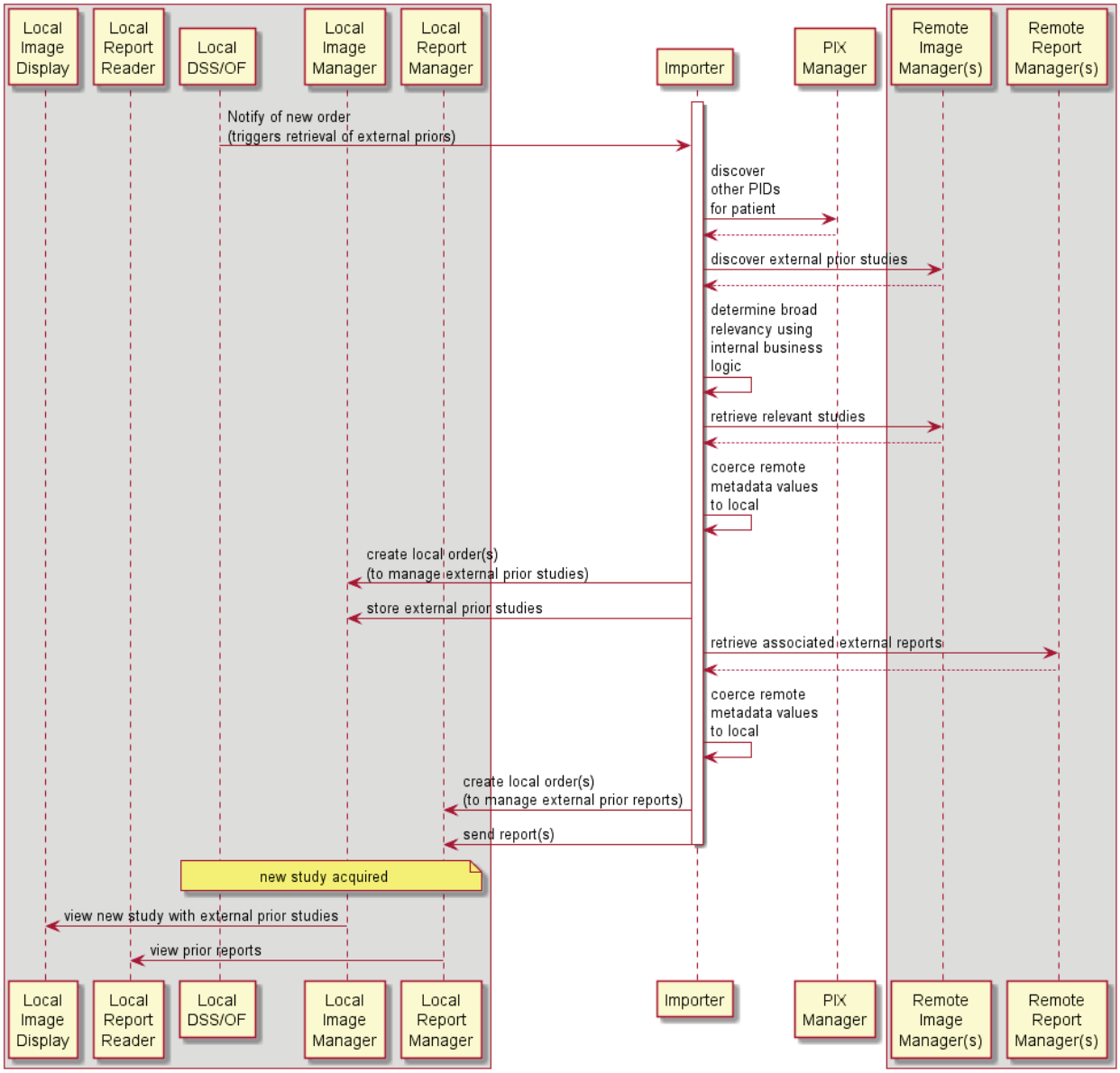


Figure X.4.2.1.2-1: Simplified Retrieval Process Flow

The text in Figure X.4.2.1.2-2 was used to generate the diagram in Figure X.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 X.4.2.1.2-2: Diagram Pseudocode for Simplified Retrieval Process Flow

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 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”.

X.4.2.2 Use Case 2: Trigger and Patient Identification

X.4.2.2.1 Trigger and Patient Identification Use Case Description

The process flow described in Section X.4.2.2 is divided into several sections. This use case sets up the initial trigger event 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)

X.4.2.2.2 Trigger and Patient Identification Process Flow

X.4.2.2.2.1 Trigger events

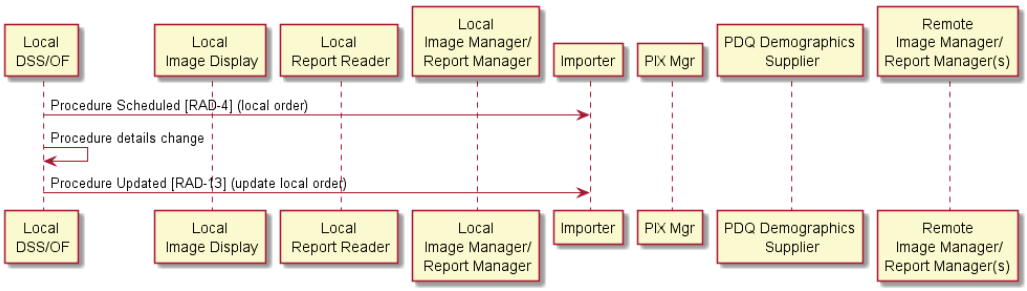


Figure X.4.2.2.2.1-1: DICOM Use Case - Trigger Event

The text in Figure X.4.2.2.2.1-2 was used to generate the diagram in Figure X.4.2.2.2.1-1. Readers will generally find the diagram more informative. The text is included here to facilitate editing.

```
Flowtitle DICOM Use Case - Trigger Event

participant "Local\n DSS/OF" as LDSS
participant "Local\n Image Display" as LID
participant "Local\n Report Reader" as LRR
participant "Local\n Image Manager/\n Report Manager" as LIM
participant "Importer" as IR
participant "PIX Mgr" as PIX
participant "PDQ Demographics\n Supplier" as DS
participant "Remote\n Image Manager/\nReport Manager(s)" as RIM

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

Figure X.4.2.2.2.1-2: Diagram Pseudocode for DICOM Use Case - Trigger Event

X.4.2.2.2.2 Discovery of external patient identifiers

Using one of three methods, the Importer determines if additional external Patient Identifiers exist for this patient.

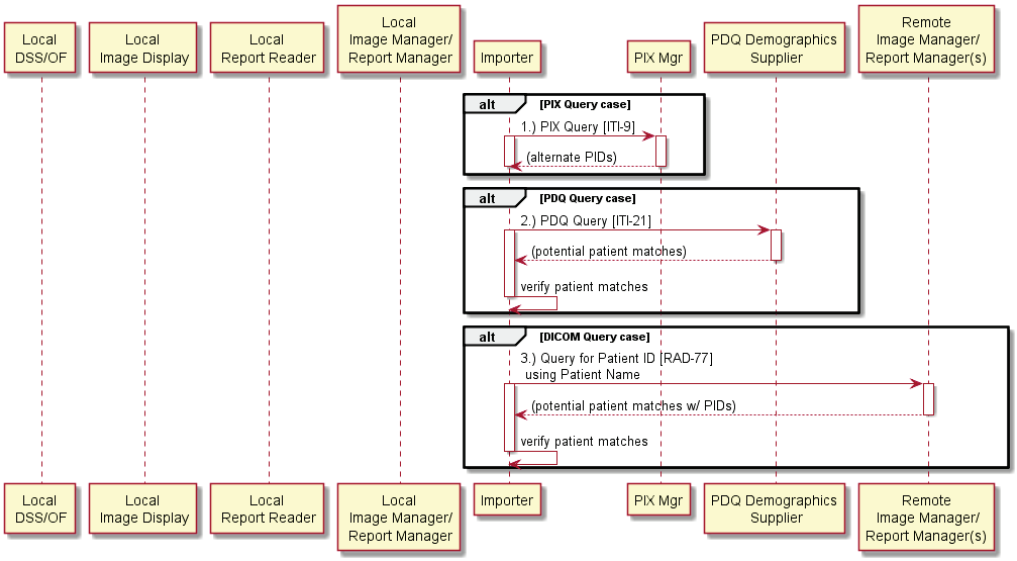


Figure X.4.2.2.2.2-1: Discovery of External Patient Identifiers

The text in Figure X.4.2.2.2.2-2 was used to generate the diagram in Figure X.4.2.2.2-1. Readers will generally find the diagram more informative. The text is included here to facilitate editing.

```
participant "Local\n DSS/OF" as LDSS
participant "Local\n Image Display" as LID
participant "Local\n Report Reader" as LRR
participant "Local\n Image Manager/\n Report Manager" as LIM
participant "Importer" 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
```

Figure X.4.2.2.2-2: 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.

X.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 X.4.2.1.

The following actors involved in this use case:

- Importer
- Image Manager (remote)
- Image Manager (local)
- Image Display
- Report Reader

The following transport methods and payload formats are addressed:

- Importer retrieval of external prior studies from remote Image Manager:
  - Transport method: DICOM DIMSE services
  - 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

X.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 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.

X.4.2.3.2 DICOM Retrieval Process Flow

The retrieval process described in Section X.4.2.1 is divided into several sections.

X.4.2.3.2.1 Discovery of prior studies

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

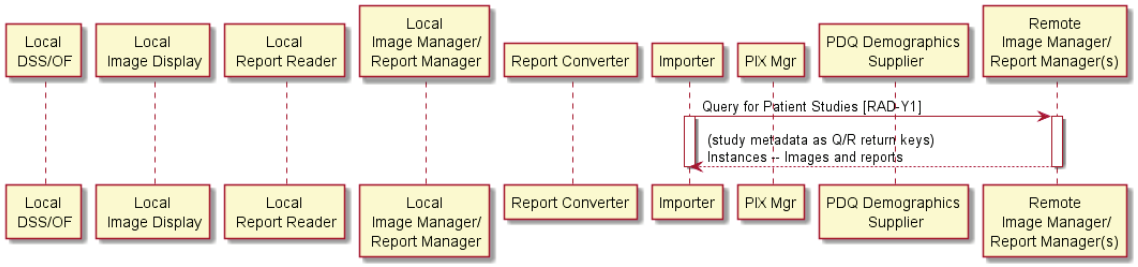


Figure X.4.2.3.2.1-1: DICOM Use Case – Discovery of External Prior Studies

The text in Figure X.4.2.3.2.1-2 was used to generate the diagram in Figure X.4.2.3.2.1-1. Readers will generally find the diagram more informative. The text is included here to facilitate editing.

```
Flowtitle DICOM Use Case – Discovery of External Prior Studies

participant "Local\n DSS/OF" as LDSS
participant "Local\n Image Display" as LID
participant "Local\n Report Reader" as LRR
participant "Local\n Image Manager/\n Report Manager" as LIM
participant "Importer" as IR
participant "PIX Mgr" as PIX
participant "PDQ Demographics\n Supplier" as DS
participant "Remote\n Image Manager/\nReport Manager(s)" as RIM

IR -> RIM: Query for Patient Studies [RAD-Y1]
activate IR
activate RIM
RIM --> IR: (study metadata as Q/R return keys)\nInstances -- Images and reports
deactivate IR
deactivate RIM
```

Figure X.4.2.3.2.1-2: Diagram Pseudocode for DICOM Use Case – Discovery of External Prior Studies

X.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 instances are already present on the local Image Manager. This can improve system efficiency, especially for very large studies.

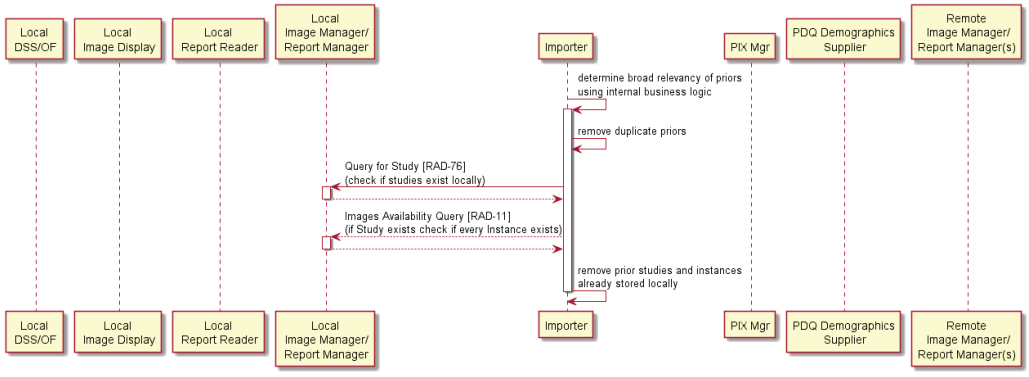


Figure X.4.2.3.2.2-1: DICOM Use Case – Determine Broad Relevancy and Existence of Local Instances

The text in Figure X.4.2.3.2.2-2 was used to generate the diagram in Figure X.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 DSS/OF" as LDSS
participant "Local\n Image Display" as LID
participant "Local\n Report Reader" as LRR
participant "Local\n Image Manager/\n Report Manager" as LIM
participant "Importer" as IR
participant "PIX Mgr" as PIX
participant "PDQ Demographics\n Supplier" as DS
participant "Remote\n Image Manager/\nReport Manager(s)" as RIM

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 X.4.2.3.2.2-2: Diagram Pseudocode for DICOM Use Case – Determine Broad Relevancy and Existence of Local Instances

X.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.

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.

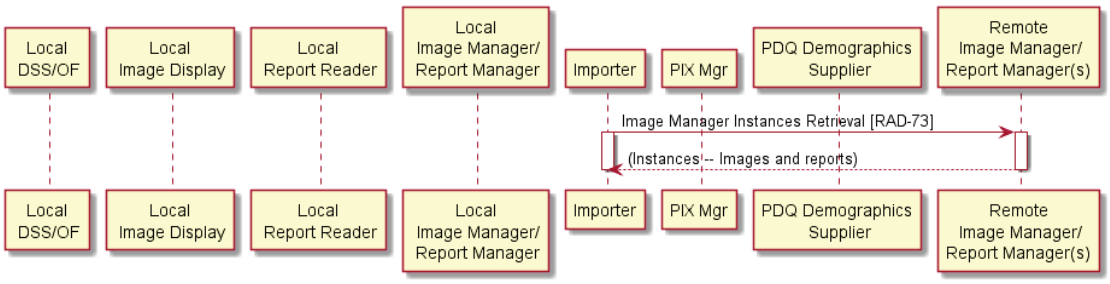


Figure X.4.2.3.2.3-1: DICOM Use Case – Retrieve External Prior Studies

The text in Figure X.4.2.3.2.3-2 was used to generate the diagram in Figure X.4.2.3.2.3-1. Readers will generally find the diagram more informative. The text is included here to facilitate editing.

```
Flowtitle DICOM Use Case – Discovery of External Prior Studies

participant "Local\n DSS/OF" as LDSS
participant "Local\n Image Display" as LID
participant "Local\n Report Reader" as LRR
participant "Local\n Image Manager/\n Report Manager" as LIM
participant "Importer" as IR
participant "PIX Mgr" as PIX
participant "PDQ Demographics\n Supplier" as DS
participant "Remote\n Image Manager/\nReport Manager(s)" as RIM

IR -> RIM: Image Manager Instances Retrieval [RAD-73]
activate IR
activate RIM
RIM --> IR: (Instances -- Images and reports)
deactivate IR
deactivate RIM
```

Figure X.4.2.3.2.3-2: Diagram Pseudocode for DICOM Use Case – Retrieve External Prior Studies

X.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 RAD TF-2: Table A.5-3 (in the IRWF.b supplement).

The Importer notifies the local Image Manager that external prior studies are being sent. This corresponds to the IRWF.b “Unscheduled Case.”

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

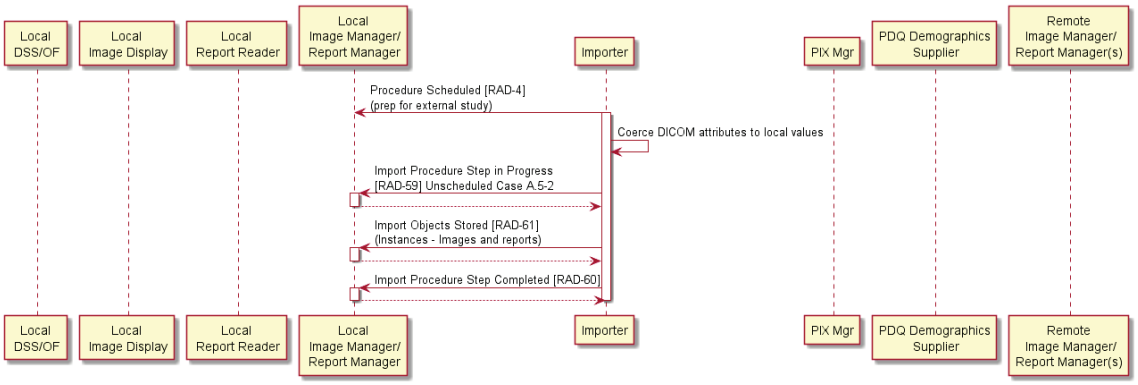


Figure X.4.2.3.2.4-1: DICOM Use Case - Coerce Attributes and Store

The text in Figure X.4.2.3.2.4-2 was used to generate the diagram in Figure X.4.2.3.2.4-1. Readers will generally find the diagram more informative. The text is included here to facilitate editing.

```
Flowtitle DICOM Use Case - Coerce Attributes and Store

participant "Local\n DSS/OF" as LDSS
participant "Local\n Image Display" as LID
participant "Local\n Report Reader" as LRR
participant "Local\n Image Manager/\n Report Manager" as LIM
participant "Importer" as IR
participant "PIX Mgr" as PIX
participant "PDQ Demographics\n Supplier" as DS
participant "Remote\n Image Manager/\nReport Manager(s)" as RIM

IR -> RIM: Image Manager Instances Retrieval [RAD-73]
activate IR
activate RIM
RIM --> IR: (Instances -- Images and reports)
deactivate IR
deactivate RIM
```

Figure X.4.2.3.4-2: Diagram Pseudocode for DICOM Use Case - Coerce Attributes and Store

X.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 X.2.1 and X.4.1.8 for a further description and concepts.

X.4.2.4 Use Case 4: Report Retrieval

The Report Retrieval Use Case describes the retrieval of external prior reports as shown in Section X.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
- Report Manager (local)

The following transport methods and payload formats are addressed:

- Importer retrieval of external prior reports from remote Report Manager:
  - Transport method: ITI Mobile access to Health Documents (MHD)
  - 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:
  - Transport method: HL7 v2.5.1 ORU
  - Payload format: Text or PDF

X.4.2.4.1 Report Retrieval Use Case Description

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 (FHIR-based) Profile. 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.

X.4.2.4.2 Report Retrieval Process Flow

X.4.2.4.2.1 Trigger events

The trigger events are the same as shown in Use Case 2, Section X.4.2.2.2.

X.4.2.4.2.2 Discovery of external patient identifiers

The external patient identifier discovery method is the same as shown in Section X.4.2.2 Use Case 2.

X.4.2.4.2.3 Discovery of prior studies

The external relevant prior imaging studies discovery method is the same as shown in Section X.4.2.3 Use Case 3.

X.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 as shown in Use Case 3, Section X.4.2.4.2.3.

X.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 does not need to be retrieved from the MHD Document Responder.

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 but is discussed in Section X.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 field should be used to limit the results appropriately.

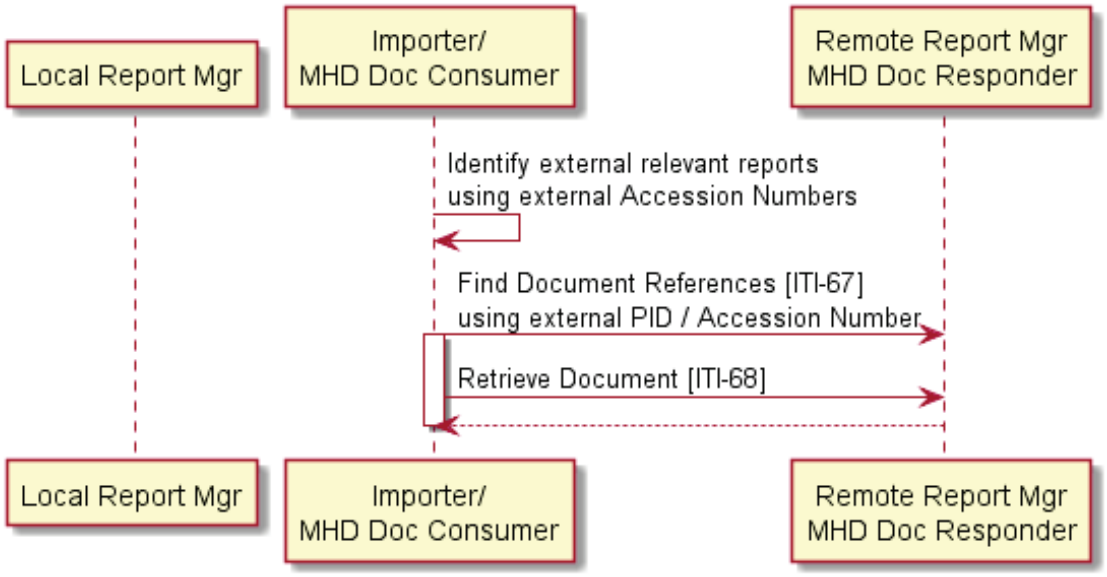


Figure X.4.2.4.2.5-1: MHD Use Case - Report Retrieval

The text in Figure X.4.2.4.2.5-2 was used to generate the diagram in Figure X.4.2.4.2.5-1. 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
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
```

Figure X.4.2.4.2.5-2: Diagram Pseudocode for MHD Use Case - Report Retrieval

X.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.

The Importer coerces the DocumentReference Resource elements to an HL7 v2 ORU message as described in RAD TF-3: Appendix 2PP.

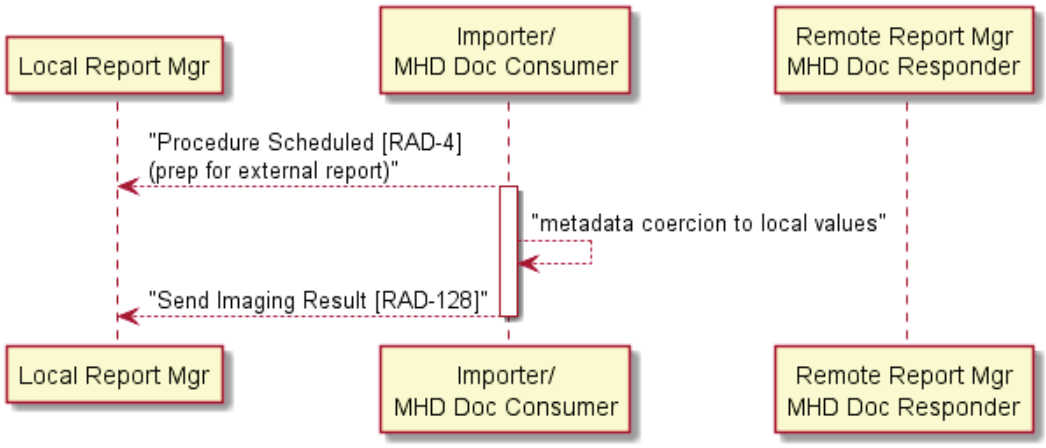


Figure X.4.2.4.2.6-1: MHD Use Case - Convert Report and Store to Local System

The text in Figure X.4.2.4.2.6-2 was used to generate the diagram in Figure X.4.2.4.2.6-1. Readers will generally find the diagram more informative. The text is included here to facilitate editing.

```
Flowtitle MHD Use Case - Convert Report and Store to Local System

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

Importer-->LocalReport: "Procedure Scheduled [RAD-4]\n(prep for external report)"
activate Importer
Importer-->Importer: "metadata coercion to local values"
Importer-->LocalReport: "Send Imaging Result [RAD-128]"
deactivate Importer
```

Figure X.4.2.4.2.6-2: Diagram Pseudocode for MHD Use Case - Convert Report and Store to Local System

X.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 X.2.2, and X.4.1.8 for a detailed description and concepts of the Purge External Priors Option.

X.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 X.4.2.1 in an XDS environment. Associated options for the Importer are described in Sections X.2.3 and X.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

X.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.

X.4.2.5.2 Image and Report Access Using XDS-I Process Flow

X.4.2.5.2.1 Trigger events

The trigger events are the same as shown in Use Case 2, Section X.4.2.2.2.1.

X.4.2.5.2.2 Discovery of external patient identifiers

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 X.4.2.2.2.2, or may involve other mechanisms not defined in this profile.

X.4.2.5.2.3 Discovery of external prior studies

As described in Section X.2.3 and X.2.4, the Importer is grouped with the XDS-I Imaging 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.

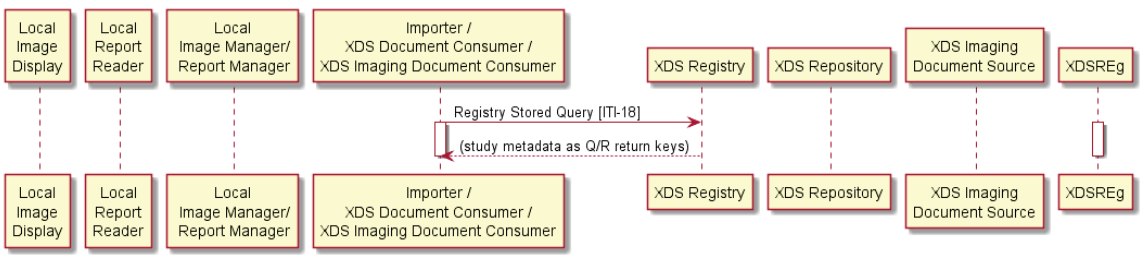


Figure X.4.2.5.2.3-1: XDS Use Case – Discovery of External Prior Studies

The text in Figure X.4.2.5.2.3-2 was used to generate the diagram in Figure X.4.2.5.2.3-1. Readers will generally find the diagram more informative. The text is included here to facilitate editing.

```
Flowtitle XDS Use Case – Discovery of External Prior Studies

participant "Local\nImage\nDisplay" as LID
participant "Local\nReport\nReader" as LRR
participant "Local\n Image Manager/\n Report Manager" as LIM
participant "Importer /\nXDS Document Consumer /\nXDS Imaging Document Consumer" as Importer
participant "XDS Registry" as XDSReg
participant "XDS Repository" as XDSRep
participant "XDS Imaging\nDocument Source" as XDSImg

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 X.4.2.5.2.3-2: Diagram Pseudocode for XDS Use Case – Discovery of External Prior Studies

X.4.2.5.2.4 Determine broad relevancy and existence of local instances

The Importer determines uses the XDS metadata to determine relevancy. The Importer determines existence of local DICOM image instances method is the same as shown in Use Case 3, Section X.4.2.3.2.1.

X.4.2.5.2.5 Retrieve external prior studies and reports

As described in Section X.2.3, the Importer retrieves the DICOM instances. As described in Section X.2.4, the Importer uses the Retrieve Document Set [ITI-43] transaction to retrieve the associated report(s).

In Figure X.4.2.5.2.5-1, the Importer uses [RAD-69], but it is also valid to retrieve using WADO [RAD-55] or DICOM C-MOVE [RAD-16].

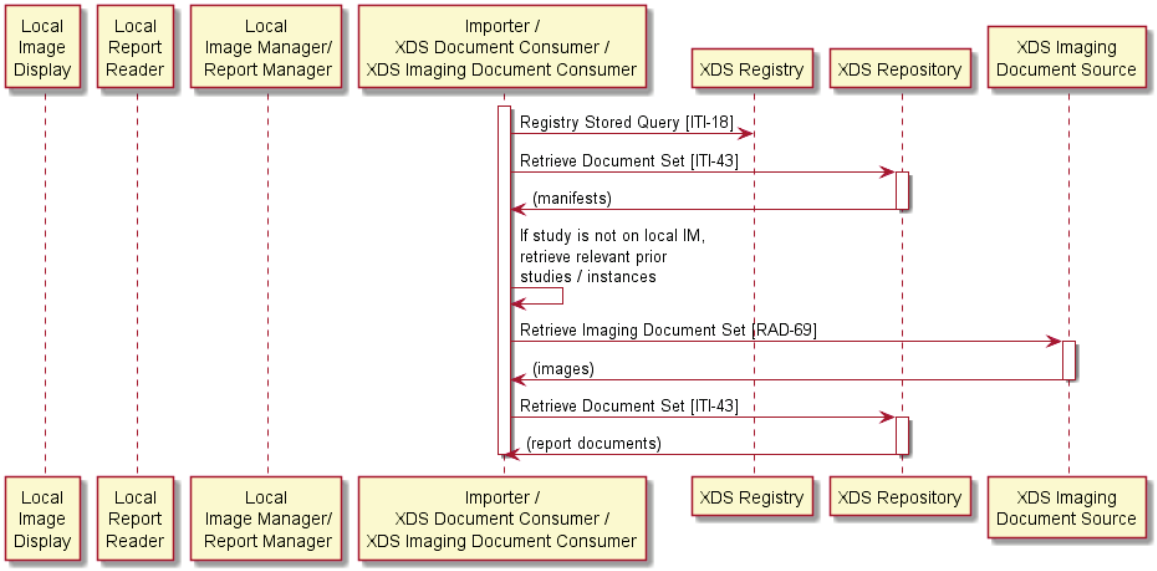


Figure X.4.2.5.2.5-1: XDS Use Case– Retrieve External Prior Studies and Reports

The text in Figure X.4.2.5.2.5-2 was used to generate the diagram in Figure X.4.2.5.2.5-1. Readers will generally find the diagram more informative. The text is included here to facilitate editing.

```
Flowtitle XDS Use Case– Retrieve External Priors

participant "Local\nImage\nDisplay" as LID
participant "Local\nReport\nReader" as LRR
participant "Local\n Image Manager/\n Report Manager" as LIM
participant "Importer /\nXDS Document Consumer /\nXDS Imaging Document Consumer" as Importer
participant "XDS.b Registry" as XDSReg
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
```

Figure X.4.2.5.2.5-2: Diagram Pseudocode for XDS Use Case– Retrieve External Prior Studies and Reports

X.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 X.4.2.3.2.1.

X.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 ORU message as described in RAD TF-3: Appendix 2PP.

X.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 X.4.2.3.2.5. External prior reports may be purged as described in Use Case 4, Section X.4.2.4.2.7.

X.5 IDEP Security Considerations

X.5.1 Security Considerations for Actors

Patient Healthcare information 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.

X.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.

X.6 IDEP Cross Profile Considerations

The IDEP actors would operate in a more integrated manner if grouped with actors in other IHE profiles. Table X.6-1 contains some recommended groupings.

Table X.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 SWF.b 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 images rejected for quality reasons are not sent to other facilities. See Section X.6.1 for detailed IOCM description.
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 (SOLEXX1)**

	ITI Patient Identifier Cross-Reference HL7 V3 (PIX V3) / Patient Identifier Cross-reference Consumer	To provide an alternate method to identify patient identifiers in other assigning authorities.
	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 images rejected for quality reasons are not sent to other facilities. See Section X.6.1 for detailed IOCM description.
	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 (SOLEXX2)** The "Role" may be **Reporting System (SOLEXX1)**
	Simple Image and Numeric Report (SINR) / Report Manager	To make reports available to a Report Reader in a DICOM SR format.

X.6.1 IOCM

Image Manager and Importer Actors in the IDEP Profile should consider using the Imaging Object Change Management (IOCM) Profile to maintain study consistency between various systems as studies are shared between Image Managers.

An Image Manager that supports IOCM will follow the "hide rejected instances" behavior defined in RAD TF-3: 4.66.4.1.3 while acting as the remote Image Manager.

An Importer that supports IOCM will follow the "hide rejected instances" behavior defined for an Image Manager in RAD TF-3: 4.66.4.1.3 and not include any rejected instances in the Imported Objects Stored [RAD-61] transaction.

Appendices

Appendix 1TT – 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:

- Study Date (0008,0020)
- Modality (0008,0060)
- Procedure Code Sequence (0008,1032)
- Series Description (0008,103E)
- Series Description Code Sequence (0008,103F)
- Anatomic Region Sequence (0008,2218)
- Primary Anatomic Structure Sequence (0008,2228)
- Body Part Examined (0018,0015)
- Protocol Name (0018,1030)
- Laterality (0020,0060)
- 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)
- 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.

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 1UU – IDEP Deployment Models

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
- 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
- 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
- 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
- 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

Figure 1UU-1 is a depiction of the IDEP Importer and the MHD Document Responder actors deployed centrally.

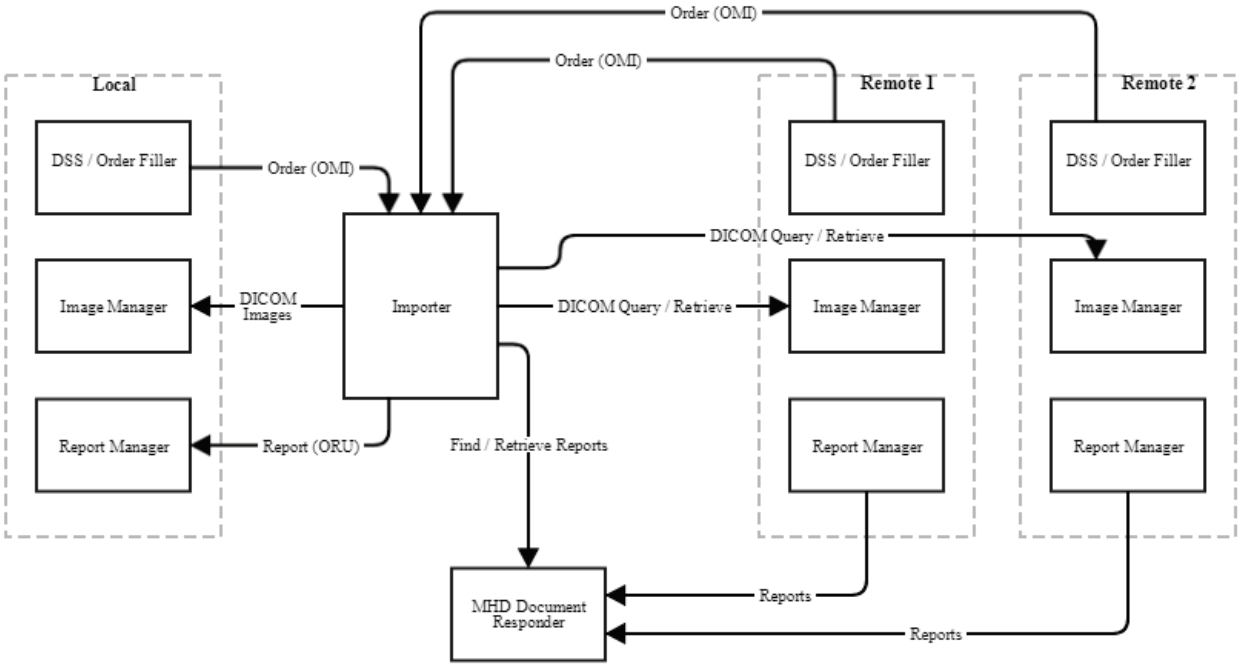


Figure 1UU-1: IDEP Centralized Deployment Model

Figure 1UU-2 is a depiction of all IDEP actors deployed as edge devices.

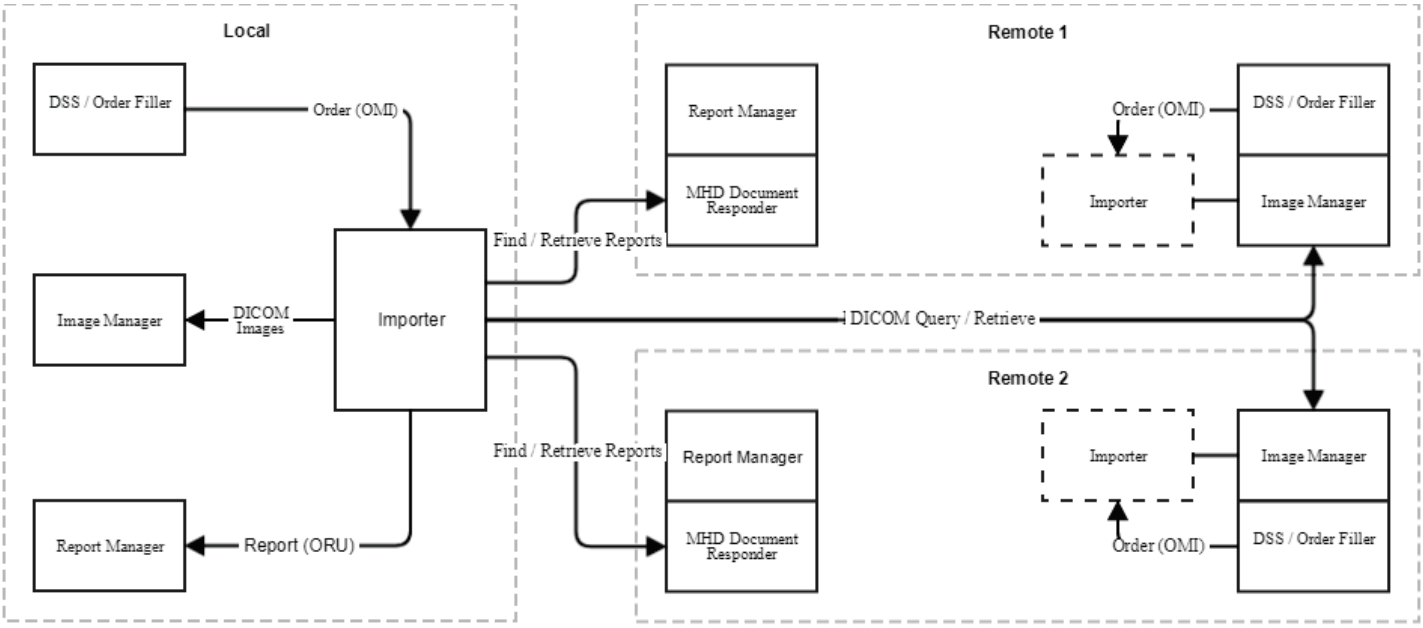


Figure 1UU-2: IDEP Decentralized Deployment Model

Volume 2 – Transactions

Update 4.73 from IHE RAD Suppl MIMA Rev1.2 as follows

4.73 Image Manager Instances Retrieval

~~**This section corresponds to Transaction RAD-73 of the IHE Technical Framework. Transaction RAD-73 is used by the Image Manager actor supporting the Multiple Identity Resolution option.**~~

4.73.1 Scope

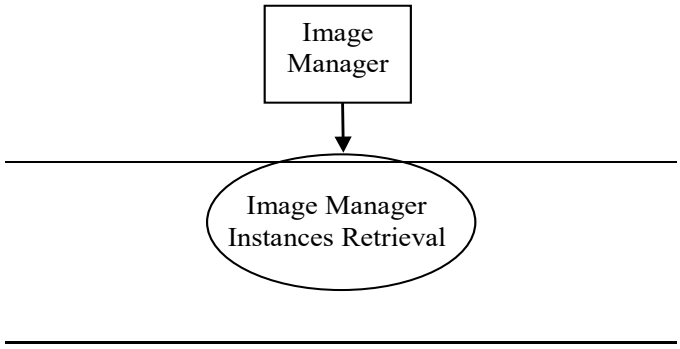
After a ~~**retrieving Image Manager actor**~~ **Requester** requests image retrieval, the requested DICOM Composite SOP Instances are transferred from the ~~**receiving Image Manager**~~ **Responder** to the **Requester** ~~**retrieving Image Manager**~~.

4.73.2 ~~Use Case~~ Actor Roles

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

Table 4.73.2-1: Actor Roles

Role:	**Requester:** **Requests retrieval of Studies, Series, and Instances.**
Actor(s):	**The following actors may play the role of Requester:** **Image Manager** **Importer**
Role:	**Responder:** **Responds to retrieval requests for Studies, Series, and Instances and returns the requested SOP Instances.**
Actor(s):	**The following actors may play the role of Responder:** **Image Manager**



~~Actor: Image Manager~~

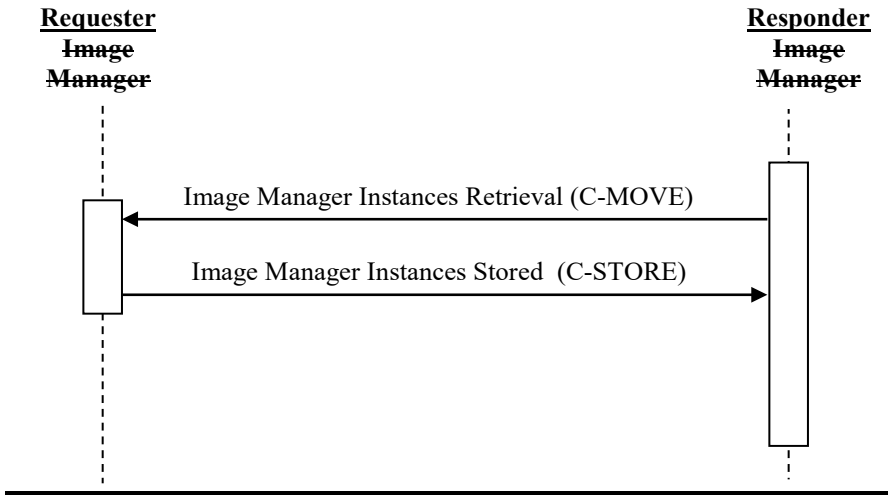
~~Role: When acting as a retrieving Image Manager, requests retrieval of Studies, Series, and Instances from a receiving Image Manager, and receives the requested Composite SOP Instances. When acting as a receiving Image Manager, responds to retrieval requests for Studies, Series, and Instances, and sends the requested SOP Instances to the retrieving Image Manager.~~

4.73.3 Referenced Standards

DICOM ~~**2009**~~ PS3.4: Storage Service Class

DICOM ~~**2009**~~ PS3.4: Query/Retrieve Service Class

4.73.4 Interaction Diagram



4.73.4.1 Retrieve Instances

The Retrieve (Study Root – MOVE) SOP Class shall be supported. The DICOM Image Storage SOP Classes will be supported by the **Requester** ~~**receiving Image Manager**~~ as an SCU. Refer to DICOM PS3.4, Annex C, for detailed descriptive semantics.

4.73.4.1.1 Trigger Events

The user of a **Requester** ~~**retrieving Image Manage**~~r wishes to view selected images, or a **Requester** ~~**retrieving Image Manage**~~r automatically triggers the retrieval of Composite SOP Instances due to internal behavior (such as in the case where pre-fetch rules internal to a **Requester** ~~**retrieving Image Manage**~~r trigger the retrieval of relevant prior SOP Instances from a **Responder** ~~**receiving Image Manager**~~).

4.73.4.1.2 Message Semantics

The message semantics are defined by the DICOM Query/Retrieve SOP Classes and the DICOM Image Storage SOP Classes.

A C-MOVE Request from the DICOM Study Root Query/Retrieve Information Model – MOVE SOP Class shall be sent from the **Requester** ~~**retrieving Image Manage**~~r to a **Responder** ~~**receiving Image Manager**~~ .

The **Requester** ~~**retrieving Image Manage**~~r shall meet the **Image Manager** requirements defined in Appendix J: Multiple Identity Resolution Option. Specific**ally** ~~**to this transaction, it shall support**~~:

- Cross-Referencing of Patient Identifiers (Section J.2.1)
- Configurable Mapping to Default Assigning Authorities (Section J.2.2)
- Expected Actions when Receiving SOP Instances (Section J.2.4.2)

4.73.4.1.3 Expected Actions

In response to a C-MOVE request, the **Responder** ~~**receiving Image Manager**~~ establishes a DICOM association with the **Requester** ~~**retrieving Image Manage**~~r specified using the C-MOVE Destination AE Title and uses the appropriate DICOM Storage SOP Classes to transfer the requested Composite SOP Instances. It is expected that the C-MOVE Destination **Requester** ~~**retrieving Image Manage**~~r will support multiple storage SOP Classes.

The **Responder** ~~**receiving Image Manager**~~ shall meet the **Image Manager** requirements defined in Appendix J: Multiple Identity Resolution Option. Specific**ally** ~~**to this transaction, it shall support**~~:

- Cross-Referencing of Patient Identifiers (Section J.2.1)
- Configurable Mapping to Default Assigning Authorities (Section J.2.2)
- Message Semantics when Sending SOP Instances (Section J.2.4.2)
- Handling of Assigning Authorities in Retrieval Requests (Section J.2.7)

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

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
…		
Image Manager Instances Stored [RAD-70]	Begin-storing-instances	Image Manager/Image Archive (~~**sender**~~ **requester**) **Importer**
	Instances-Stored	Image Manager/Image Archive (receiver)
Image Manager Storage Commitment [RAD-71]	None	
Image Manager Instances Query [RAD-72]	Query Information	Image Manager/Image Archive (receiver of query request)
Image Manager Instances Retrieval [RAD-73]	Instances-Stored	Image Manager/Image Archive (receiver of retrieval request)
	Study-used	Image Manager/Image Archive (sender of retrieval request) **Importer**

Add Section 4.Y1

4.Y1 Query For Patient Studies

This section corresponds to Transaction [RAD-Y1] for the IHE RAD Technical Framework.

4.Y1.1 Scope

Query for studies associated with a particular patient ID.

4.Y1.2 Actor Roles

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

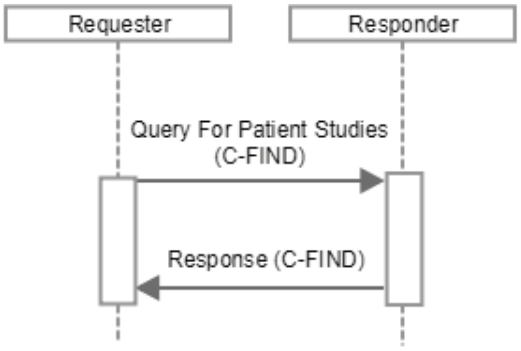
Table 4.Y1.2-1: Actor Roles

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.Y1.3 Referenced Standards

DICOM PS3.4: Query/Retrieve Service Class

4.Y1.4 Interaction Diagram



4.Y1.4.1 Query For Patient Studies

4.Y1.4.1.1 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.Y1.4.1.2 Message Semantics

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.

The Requester and the Responder shall support the matching keys and return keys as defined in Table 4.Y1.4.1.2-1. See RAD TF 2: 2.2 for more information on the notation.

Table 4.Y1.4.1.2-1: Query For Patient's Studies Matching and Return Keys

(Highlighted entries are beyond what is specified in [RAD-14] and have been added to facilitate determination of relevancy)

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**	

Attributes Name	Tag	Query Keys Matching		Query Keys Return		Notes
		SCU	SCP	SCU	SCP	
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+	
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	
Patient Name	(0010,0010)	O	O	O	R	IHE-1, IHE-2
Patient ID	(0010,0020)	R+	R+	R+	R	IHE-4
Issuer of Patient ID	(0010,0021)	R+	R+	R+	R+	IHE-7
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	
Study ID	(0020,0010)	O	R	O	R	
Study Instance UID	(0020,000D)	O	R	R+	R	IHE-6
Modalities in Study	(0008,0061)	O	R+	O	R+	
SOP Classes in Study	(0008, 0062)	O	O	O	O	
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+	
Referring Physician's Name	(0008,0090)	O	R+	O	R+	IHE-1, IHE-2
Study Description	(0008,1030)	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+	
Name of Physician(s) Reading Study	(0008,1060)	O	O	O	O	IHE-1, IHE-2
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	
Referenced Patient Sequence	(0008,1120)					
>Referenced SOP Class UID	(0008,1150)	O	O	O	O	
>Referenced SOP Instance UID	(0008,1155)	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-5
Other Patient IDs Sequence	(0010,1002)					
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	
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+	

Attributes Name	Tag	Query Keys Matching		Query Keys Return		Notes
		SCU	SCP	SCU	SCP	
Number of Study Related Instances	(0020,1208)	N/A	N/A	O	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

Note: For a description of the notation/ modifiers used in the above table, see RAD TF-2: 2.2.

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.

IHE-4: SCU shall include the Patient ID of the DICOM object(s) to be imported as the Matching Key in queries.

IHE-5: 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-6: SCU shall include the Study Instance UID of the DICOM object(s) to be imported as a Return Key in queries.

IHE-7: 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.Y1.4.1.3 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.

4.Y1.5 Security Considerations

4.Y1.5.1 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.

Appendices

Add the following appendices to Volume 3.

Appendix 2MM – Populating HL7 v2 OMI for Prior Studies and reports

This appendix is normative.

This appendix applies to the following IDEP Profile use cases:

- DICOM Retrieval (RAD TF-1: X.4.2.3)
- Report Retrieval (RAD TF-1: X.4.2.4)
- Image and Report Access Using XDS-I (RAD TF-1: X.4.2.5)

The Importer generates a "proxy order" representing the completed external prior study or report. The Image Manager and / or Report Manager is notified about the proxy order using the HL7 v2.5.1 Order (OMI) Message defined in RAD TF-2: 4.4.4.1.2.2 Procedure Scheduled [RAD-4]. The [RAD-4] message is populated as specified in Table 2MM-1 below.

The proxy order informs the Image Managers and Report Managers of the patient and study identification of external prior DICOM images and reports (after localization).

This order is intended to facilitate management of the imported images by the Image Manager and Report Manager (e.g., to avoid being treated as exceptions).

This order is **not** intended to trigger reading / reporting workflow. The EMR is not explicitly informed of these orders.

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

The Importer shall send one OMI message for each external prior study being sent to the Image Manager (RAD TF-1: X.1.2).

The Importer shall send one OMI message for each external prior report being sent to the Report Manager (RAD TF-1: X.1.4).

In this appendix for the IDEP Profile, the "Destination" is the local system where the new study is to be performed and these values are found in the new order trigger [RAD-4/RAD-13]. The "Source" is the facility where the prior external study originated, i.e., the remote system. For each order these will be found in a combination of the "trigger order" – the order that initiated the search for priors – and a subject, which is one of:

- The external prior DICOM header for prior studies
- The DocumentReference metadata for reports retrieved using MHD

- The DocumentEntry metadata for reports retrieved using XDS-I

1445 **Table 2MM-1: Source of Proxy Order (OMI) Values**

Trigger Order (OMI)	Subject of Proxy Order			Proxy Order		
	External Prior DICOM Study	External MHD Report	External XDS-I Report	OMI Field	Opt	Requirements
PID-3	Patient Identifier (0010,0020)	subject.Patient .identifier	patientId	PID-3 (Patient Identifier)	R	Shall use Triger Order PID-3 as the first value. Shall include subject of proxy order patient identifiers as additional PID-3 values. For all values of PID-3, the source of the Assigning Authority (PID-3-4) may be system configuration.
PID-5	Patient Name (0010, 0010)	subject.Patient .name	sourcePatientInfo. PID-5	PID-5 (Patient Name)	R	Shall use Triger Order PID-5 if present.
PID-7	Patient Date of Birth (0010, 0030)	subject.Patient .birthDate	sourcePatientInfo. PID-7	PID-7 (Patient Date of Birth)	O	Shall use Triger Order PID-7 if present.
PID-8	Patient Sex (0010, 0040)	subject.Patient .gender	sourcePatientInfo. PID-8	PID-8 (Patient Sex)	R	Shall use Triger Order PID-8 if present.
N/A	N/A	N/A	N/A	PV-1 (Patient Class)	R	Shall use “N” for Not Applicable
N/A	N/A	N/A	N/A	ORC-1 (Order Control)	R	Shall use “NW” for New Note that the order is New, but the status, ORC-5, is Completed.
N/A	N/A	N/A	N/A	ORC-2 (Placer Order Number)	C	Should be omitted or locally generated. If locally generated, the third component, Assigning Authority, shall be populated as the system creating the number. If locally generated, shall match OBR-2. Condition: For backward compatibility with older systems, may need to include and assign a number such that collisions are avoided with local systems.

Trigger Order (OMI)	Subject of Proxy Order			Proxy Order		
	External Prior DICOM Study	External MHD Report	External XDS-I Report	OMI Field	Opt	Requirements
N/A	N/A	N/A	N/A	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. For backward compatibility with older systems, may need to include and assign a number such that collisions are avoided with local systems. This Order Filler number may be duplicated if there are multiple Requested Procedures (multiple OMI messages).
N/A	N/A	N/A	N/A	ORC-5 (Order Status)	R	"CM" Order is completed
N/A	N/A	N/A	N/A	OBR-2 (Placer Order Number)	C	Shall match ORC-2
N/A	N/A	N/A	N/A	OBR-3 (Filler Order Number)	R	Shall match ORC-3
N/A	Procedure Code Sequence (0008,1032) or, if necessary, Requested Procedure Code Sequence (0032,1064)	type	typeCode	OBR-4 (Universal Service ID)	R	Convert source value into Destination's Performed Procedure Code set or into Destination's generalized local code set. Shall match OBR-44.
N/A	Medical Alerts (0010, 2000), Allergies (0010, 2110), or Admitting Diagnoses Description (0008, 1080)	N/A	N/A	OBR-13 (Relevant Clinical Info)	O	Deployment specific mapping
N/A	Reason for Study (0032, 1030)	type	typeCode	OBR-31 (Reason for Study)	O	Shall use source value unless a direct mapping to the Destination value set exists.

Trigger Order (OMI)	Subject of Proxy Order			Proxy Order		
	External Prior DICOM Study	External MHD Report	External XDS-I Report	OMI Field	Opt	Requirements
N/A	Procedure Code Sequence (0008,1032) or, if necessary, Requested Procedure Code Sequence (0032,1064)	type	typeCode	OBR-44 (Procedure Code)	R2	Shall match OBR-4.
N/A	Laterality (0020,0060)	N/A (included in "type" if relevant)	N/A (included in "eventCodeList" if relevant)	OBR-46 (Placer Supplemental Service Information)	C	Condition: If Laterality is unambiguous in image header.
N/A	Study Date (0008,0020) and Study Time (0008,0030).	context.period	serviceStartTime	TQ1-7 (Start Date/Time)	R	Shall be the date and time of the prior study.
N/A	N/A	N/A	N/A	TQ1-9 (Priority)	R	Shall contain "R^Routine^HL70078" in the first three components. (All priors are routine and not urgent.)
N/A	Accession Number (0008, 0050)	context.related	referenceIdList	IPC-1 (Accession Number)	R	Pre-pend or otherwise alter is acceptable. Alteration may be required to avoid data collisions on receiver. The 4th component, Assigning Authority, shall be included and may be set from configuration.
N/A	Study Instance UID (0020, 000D)	context.related	referenceIdList	IPC-3 (Study Instance UID)	R	Shall not alter unless Source contains an invalid UID.
N/A	Modality (0008, 0060)	context.event	eventCodeList	IPC-5 (Modality)	R2	If this OMI message is sent to the Image Manager, Modality shall be included from the prior study. If this OMI message is sent to Report Manager, this value should be included if known.
N/A	N/A	N/A	N/A	IPC-6 (Scheduled Protocol Code Sequence)	R2	If sent, should be valued from IRWF.b Table 4.5-4 Import Instruction Codes. This may be a multi-valued field. Note that the trigger OMI order message may have contained Import Instructions which should be followed if provided.

The coded values used in the **OPT** column are:

- R: Required
- R2: Required but may be empty.
- O: Optional.
- C: Conditional. This usage has an associated condition predicate.

See RAD TF-2: 2-3.

Appendix 2PP – HL7 v2 ORU for External Prior Reports Mapping

This appendix is normative.

This appendix applies to the following IDEP Profile use cases:

- Report Retrieval (RAD TF-1: X.4.2.4)
- Image and Report Access Using XDS-I (RAD TF-1: X.4.2.5)

As part of the above use cases the Importer:

- Retrieves one of:
  - an MHD DocumentReference Resource defined in Retrieve Document [ITI-68] transaction
  - an XDS Document defined in Retrieve Document Set [ITI-43] transaction
- Generates a HL7 v2.5.1 ORU message containing the external prior report
- Sends the 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].

The Importer shall map the values from the Remote Report into the Local Report ORU Message as specified in Table 2PP-1. As defined in [RAD-128], there is one ORU message per report, although multiple reports may be retrieved into the MHD / XDS transaction.

These ORU messages may be sparsely populated; most other optional (R2 or O) elements in this message should not be included because many of the Patient Visit (PV1) and Observation request (OBR) fields refer to information that is no longer relevant in this context.

Table 2PP-1: MHD DocumentReference Resource / XDS Document to HL7 v2.5.1 ORU mapping

Remote Report (one of)		Local Report ORU Message		
MHD DocumentReference Resource	**XDS DocumentEntry Metadata**	**ORU Field**	**OPT**	**Requirements**
subject.Patient.identifier	patientId	PID-3 Patient Identifier	R	Shall use Destination patient identifier as the first value. Shall include remote report patient identifiers as additional PID-3 values. For all values of PID-3, the source of Assigning Authority (PID-3-4) may be system configuration.
subject.Patient.name	sourcePatientInfo.PID-5	PID-5 Patient Name	R	
subject.Patient.birthDate	sourcePatientInfo.PID-7	PID-7 Patient Date of Birth	R2	
subject.Patient.gender	sourcePatientInfo.PID-8	PID-8 Administrative Sex	R2	May need mapping based on local value set
N/A	N/A	PV-1 Patient Class	R	Value shall be "N" for Not Applicable
type	typeCode	OBR-4.1-3 Procedure Code	R	Convert Procedure Code into local procedure code set or group set. Should be the same Procedure Code as was copied into DICOM instances after conversion.
context.related.identifier	referenceIdList	OBR-18 Placer Field 1	R	Shall contain the Accession Number, including Assigning Authority
Attachment.creation	creationTime	OBR-22 Report Date	R2	
N/A	N/A	OBR-25 Result Status	R	Value shall be HL7 v2 value "F" Final
author.name and author.identifier	authorPerson	OBR-32 Principal Result Interpreter	R2	The author might not be contained in the metadata, but rather might be contained within the report content.
N/A	N/A	OBR-44 Procedure Code	R	Shall match OBR-4
N/A	N/A	TQ1-9 Priority	R	Value shall be HL7 v2 value: R-routine (All prior reports are Routine.)
For CDA Imaging Report with Structured Headings documents there shall be one OBX segment per Section element. For CDA Wrapped Text Report documents there shall be one OBX segment per paragraph in the nonXMLBody attribute. For PDF report formats there shall be only one OBX segment.				

Remote Report (one of)		Local Report ORU Message		
MHD DocumentReference Resource	**XDS DocumentEntry Metadata**	**ORU Field**	**OPT**	**Requirements**
content.format	formatCode	OBX-2 Value Type	R	Value shall be: • "ED" for PDF reports • "TX" for Text reports • "TX" for CDA Structured Heading Segments
See Nodes / Description	See Nodes / Description	OBX-3 Observation Identifier	R	• For Text and PDF reports shall correspond to the format / formatCode • For CDA Imaging Reports with Structured Headings shall contain the code value for the corresponding section
See Nodes / Description	See Nodes / Description	OBX-5 Observation Value	R	• For PDF reports shall contain the encapsulated PDF • 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 See Results Distribution RAD TF-3: 4.128.4.1.2.13. OBX-5.2 through OBX-5.4 shall be mapped according to the mime type provided in contentType and the content.format which describes the type of document (e.g., Radiology Report). OBX-5.5 contains the report data. Note that the report(s) may be contained Resources or may need to be accessed via a URL prior to creating the HL7 ORU message.
N/A	N/A	OBX-23 Performing Organization Name	R2	If the DICOM Study Instance UID OBX segment is included, the Performing Organization Name should be included.
N/A	N/A	OBX-24 Performing Organization Address	R2	If the DICOM Study Instance UID OBX segment is included, the Performing Organization Address should be included.

1475 The coded values used in the **OPT** column are:

- R: Required

- R2: Required but may be empty.
- O: Optional.
- C: Conditional. This usage has an associated condition predicate.

See RAD TF-2: 2-3.

