

IHE Change Proposal

Tracking information:

IHE Domain	PaLM
Change Proposal ID:	CP-LAB-281
Change Proposal Status:	Ballot
Date of last update:	2026/06/10
Person assigned:	David Clunie < dclunie@dclunie.com >

Change Proposal Summary information:

DPIA Acquisition Complete	
Submitter's Name(s) and e-mail address(es):	David Clunie < dclunie@dclunie.com >
Submission Date:	2025/12/05
Integration Profile(s) affected:	DPIA
Actor(s) affected:	Acquisition Modality, Image Manager/Archive, Image Display
IHE Technical Framework or Supplement modified:	PaLM TF
Volume(s) and Section(s) affected:	Trial Implementation V1.4
Rationale for Change: There is more than one WSI DICOM image created during a single acquisition (scan) of each slide, and it is difficult for recipients to know when an acquisition is complete and what images constitute a complete acquisition. Neither storage or storage commitment transactions provide information about what images constitute a complete acquisition. Modality Performed Procedure Step (MPPS) is commonly used to signal completeness in the Radiology world, but since DPIA does not use Modality Worklist (MWL), there is no explicit DICOM procedure step information. Also, it is desirable for some use cases (such as automated workflow, routing and/or algorithm invocation) for the completeness information to be persistent. Though HL7 messages related to status change could be used, it is desirable to have a DICOM message for the Image manager/Archive and downstream actors. Accordingly, it is proposed to use the existing DICOM Key Object Selection (KOS) mechanism used in the IHE RAD Key Image Note (KIN) profile, and an existing DCM code for the KOS Document Title to describe what stored images constitute a complete acquisition. The IWOS Status Change [LAB-82] is not updated to include a list of images acquired (scanned) and stored, since it is not expected that the Acquisition Manager and other upstream systems will need that information. In future, if needed, this could be communicated by additional OBX-3/5. TBD. Some of the changes illustrated overlap with those in CP-LAB-279 "Specialize Radiology Transactions in DPIA to add Options and Display Requirements" and need to be reconciled as the CPs are processed.	

Amend Vol 1 transactions:

X.1 DPIA Actors, Transactions, and Content Modules

...

Ed. Instruction; Replace figure X.1-1.

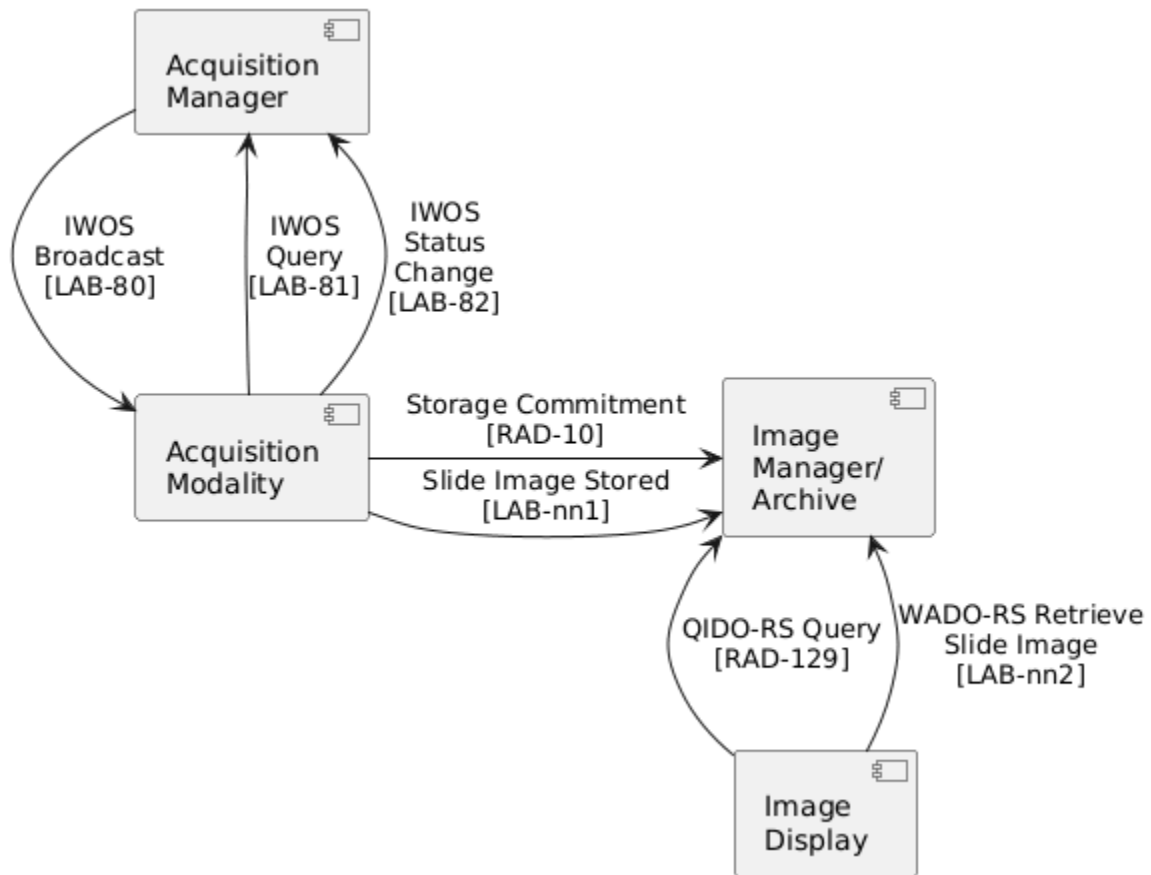


Figure X.1-1: DPIA Actor Diagram

With:

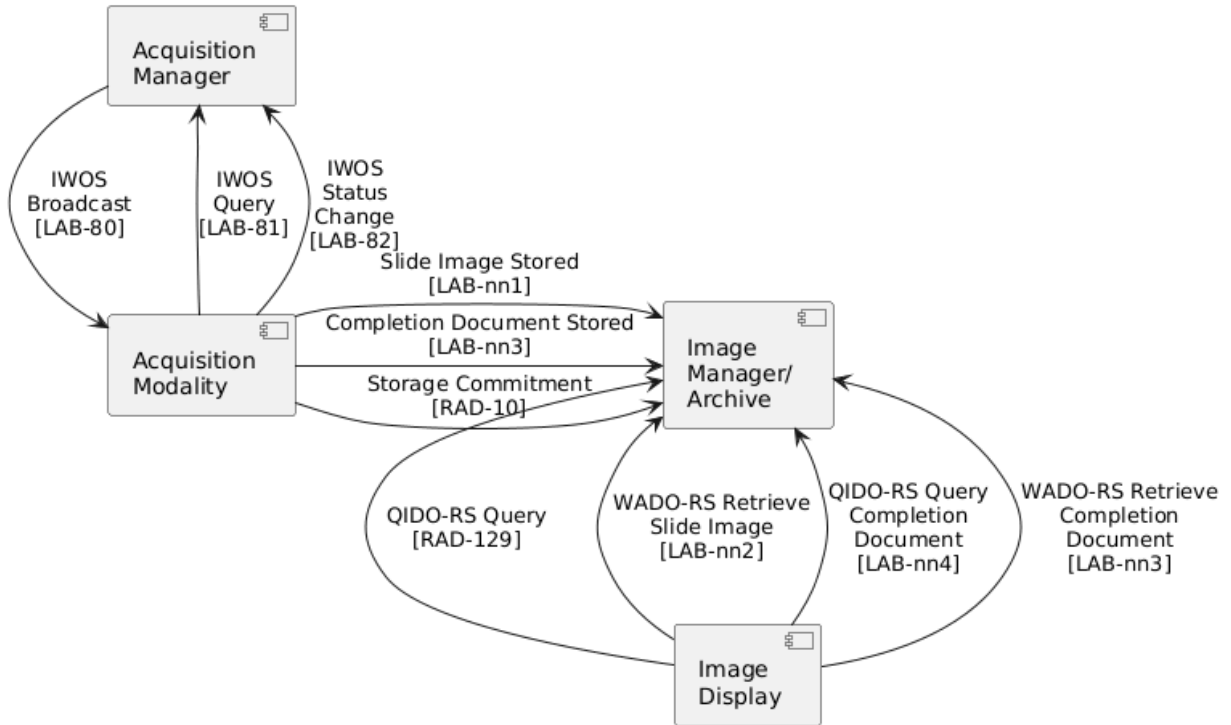


Figure source to render at <https://www.plantuml.com/> :

@startuml

[Acquisition Manager] as "Acquisition\nManager"

[Acquisition Modality] as "Acquisition\nModality"

[Image Manager/Archive] as "Image\nManager/\nArchive"

[Image Display] as "Image\nDisplay"

[Acquisition Manager] -down-> [Acquisition Modality] : IWOS\nBroadcast\n[LAB-80]

[Acquisition Modality] -up-> [Acquisition Manager] : IWOS\nQuery\n[LAB-81]

[Acquisition Modality] -up-> [Acquisition Manager] : IWOS\nStatus\nChange\n[LAB-82]

[Acquisition Modality] -right-> [Image Manager/Archive] : Storage Commitment\n[RAD-10]

[Acquisition Modality] -right-> [Image Manager/Archive] : Slide Image Stored\n[LAB-nn1]

[Acquisition Modality] -right-> [Image Manager/Archive] : Completion Document
Stored\n[LAB-nn3]

[Image Display] -up-> [Image Manager/Archive] : QIDO-RS Query\n[RAD-129]

[Image Display] -up-> [Image Manager/Archive] : WADO-RS Retrieve\nSlide
Image\n[LAB-nn2]

[Image Display] -up-> [Image Manager/Archive] : QIDO-RS
Query\nCompletion\nDocument\n[LAB-nn4]

*[Image Display] -up-> [Image Manager/Archive] : WADO-RS
Retrieve\nCompletion\nDocument\n[LAB-nn3]
@enduml*

Table X.1-1 lists the transactions for each actor directly involved in the DPIA Profile. To claim compliance with this profile, an actor shall support all required transactions (labeled “R”) and may support the optional transactions (labeled “O”).

Table X.1-1: DPIA Profile - Actors and Transactions

Actors	Transactions	Optionality	Reference
...	...		
Acquisition Modality	...		
	Storage Commitment [RAD-10]	R	RAD TF-2: 4.10
	Completion Document Stored [LAB-nn3]	O	Section 3.nn3
Image Manager / Image Archive	QIDO-RS Query [RAD-129]	R	RAD TF-2: 4.129
	...		
	Storage Commitment [RAD-10]	R	RAD TF-2: 4.10
	Completion Document Stored [LAB-nn3]	O	Section 3.nn3
	QIDO-RS Query Completion Document [LAB-nn5]	O	Section 3.nn5
	WADO-RS Retrieve Completion Document [LAB-nn4]	O	Section 3.nn4
Image Display	QIDO-RS Query [RAD-129]	R	RAD TF-2: 4.129
	...		
	QIDO-RS Query Completion Document [LAB-nn5]	O	Section 3.nn5
	WADO-RS Retrieve Completion Document [LAB-nn4]	O	Section 3.nn4

X.1.1 Actor Descriptions and Actor Profile Requirements

...

X.1.1.1 Acquisition Manager

...

X.1.1.2 Acquisition Modality

An image acquisition device (e.g., digital camera or whole slide imaging scanner) that receives instructions (image work order steps, IWOS) from an acquisition manager about a physical asset to capture into one or more digital assets. **The captured images is are stored in the iImage**

Image Manager/Image Archive, optionally a document listing the complete set of images scanned and stored for a single acquisition of one slide, is stored on the Image Manager/Archive, and the Acquisition Manager is notified of the completion of the acquisition and storage.

X.1.1.3 Image Manager / Image Archive

These may represent two separate but coupled components that manage the storage of captured digital images in a manner that facilitates ready retrieval upon request by all other actors for display or analysis. An Image Manager may be queried for the presence of digital assets associated with a pathology case and, if present, returns **the count of or the actual** digital assets available to the requestor **with various configuration options, such as resolution, with or without annotations, with or without the label, with or without the thumbnail etc including the scanned images, and optionally a document listing the complete set of images scanned and stored for a single acquisition of one slide.**

X.1.1.4 Image Display

Queries and retrieves digital assets from the Image Manager/Image Archive, in order to display them to its user.

X.2 DPIA Actor Options

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

Table X.2-1: DPIA - Actors and Options

Actor	Option Name	Reference
Acquisition Manager	No options defined	
Acquisition Modality	...	
	Acquisition Complete	Section X.2.4
Image Manager / Image Archive	...	
	Acquisition Complete	Section X.2.4
Image Display	...	
	Acquisition Complete	Section X.2.4

...

X.2.4 Acquisition Complete Option

The Acquisition Modality creates, and stores to the Image Manager, a Key Object Selection (KOS) document that lists the complete set of images that will be stored for a single acquisition (scan) of a single slide.

Note: The Acquisition Modality is not required to wait until the complete set of images are actually successfully stored before storing the KOS document. Downstream actors should not assume any particular sequence of storage operations, or when stored instances may become available for query or retrieval.

The Acquisition Modality and Image Manager / Image Archive shall support the Completion Document Stored [LAB-nn3] transaction.

The Image Manager / Image Archive and Image Display shall support the WADO-RS Retrieve Completion Document [LAB-nn4] and OIDO-RS Query Completion Document [LAB-nn5] transactions.

Add new Vol 2 transactions:

3 IHE Transactions

...

Add new Section 3.nn3:

3.nn3 Completion Document Stored [LAB-nn3]

3.nn3.1 Scope

This transaction transmits a DICOM Key Object Selection (KOS) document that lists the complete set of images that were stored that constitute a scan of a single slide in a single acquisition.

Note: The LAB-nn3 transaction follows the pattern of, and specializes, the IHE RAD TF RAD-29 transaction.

3.nn3.2 Actor Roles

Actor: Acquisition Modality

Role: Itemizes complete set of images by creating KOS document and issues Completion Document Stored transactions to the Image Archive.

Actor: Image Archive

Role: Accepts and Stores KOS Instances received from the Acquisition Modality. This transaction describes the role related only to storage of the KOS.

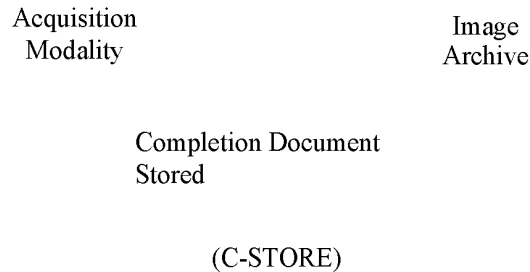
3.nn3.3 Referenced Standards

DICOM PS3.3 Section A.35.4: Key Object Selection Document IOD

DICOM PS3.4 Annex B: Storage Service Class

DICOM PS3.16 TID 2010: Key Object Selection

3.nn3.4 Interaction Diagram



3.nn3.4.1 Completion Document Stored Message

3.nn3.4.1.1 Trigger Events

When it has an understanding of what images constitute the complete acquisition of the scanned slide contents, the Acquisition Modality generates a KOS and sends it to the Image Archive for storage.

3.nn3.4.1.2 Message Semantics

The message is a DICOM C-STORE of a Key Object Selection instance. The Acquisition Modality is the SCU. The Image Archive is the SCP.

The Sender shall create a new Key Object Selection (KOS) Storage instance in a new Series of the referenced images' Study. The instance shall be constructed as defined in DICOM PS3.3 and PS3.4 using the required template [TID 2010](#) defined in PS3.16.

An Acquisition Modality that supports the DPIA Profile Acquisition Complete Option shall use the following Key Object Selection Document Title code:

- [\(113034, DCM, "Complete Acquisition Content"\)](#)

Note: This code is defined as "The list of objects that were generated in a single procedure step."

References to multi-frame images shall reference the entire image, and not selected frames, since the concept of completeness applies to all frames in the images.

The completion document is required to include the same Patient, Study and Specimen identifying and descriptive information that is present in the referenced images.

Note: This requirement allows the receiver to evaluate the information present in the reference images, without first having to retrieve them.

3.nn3.4.1.3 Expected Actions

The Image Archive will store the received KOS objects.

Add Section 3.nn.4:

3.nn4 WADO-RS Retrieve Completion Document [LAB-nn4]

3.nn34.1 Scope

The WADO-RS Retrieve Completion Document [LAB-nn4] transaction accesses DICOM Key Object Selection (KOS) SOP Instances via an HTTP interface, in order to support the retrieval of a document that lists the complete set of images that constitute an acquisition.

Note: The LAB-nn4 transaction follows the pattern of, and specializes, the IHE RAD TF RAD-31 and RAD-107 transactions.

3.nn34.2 Actor Roles

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

Table 3.nn34.2-1: Actor Roles

Role:	Requestor: Submit retrieve DICOM KOS requests
Actor(s):	The following actors may play the role of Requester: Image Display
Role:	Responder: Returns the requested DICOM KOS
Actor(s):	The following actors may play the role of Responder: Image Archive

Transaction text specifies behavior for each Role. The behavior of specific actors may also be specified when it goes beyond that of the general role.

3.nn34.3 Referenced Standards

RFC7231 Hypertext Transfer Protocol (HTTP/1.1): Semantics and Content,
<http://www.ietf.org/rfc/rfc7231.txt>

DICOM [PS3.18 Section 10.4](#): Web Services – Retrieve Transaction of the DICOM Studies Service

3.nn34.4 Messages

This transaction defines two request/response message pairs:

- Get Instances
- Get Metadata

A Requester shall support at least one of these request/response pairs.

A Responder shall support both pairs, as defined in DICOM.

Note: Since there is no bulk data or pixel data payload in a KOS instance, the metadata response may contain sufficient information such that a Get Instances request is not needed, unless there is a need to use a DICOM PS3.10 parser to process the retrieved object.

3.nn34.4.1 Get Instances Request Message

The Requester retrieves one or more DICOM instances from the Responder.

3.nn34.4.1.1 Trigger Events

The Requester wishes to retrieve DICOM instances.

3.nn34.4.1.2 Message Semantics

The Get Instances Request message is a Retrieve transaction of the DICOM Studies Service. See DICOM [PS3.18 Section 10.4](#).

The Requester is the User Agent, and the Responder is the Origin Server.

The message shall correspond to the Resources in Table 3.nn34.4.1.2-1.

Table 3.nn34.4.1.2-1: Retrieve Transaction Instance Resources

Resource	Reference
Instance	DICOM PS3.18 Section 10.4.1.1.1

3.nn34.4.1.3 Expected Actions

The Responder shall parse the request, prepare representation(s) of the Resource in the Selected Media Type (see DICOM [PS3.18 Section 10.4.2](#)), and return a response as described in Section 3.2.4.2.

3.nn34.4.2 Get Instances Response Message

The Responder reports the outcome of the Get Instances Request Message.

3.nn34.4.2.1 Trigger Events

The Responder completes processing of the Get Instances Request Message.

3.nn34.4.2.2 Message Semantics

The message is a Response to a Retrieve Transaction as specified in DICOM [PS3.18 Section 10.4.3](#).

The Requester is the User Agent, and the Responder is the Origin Server.

The Responder shall provide a response as described in Table 3.nn34.4.2.2-1.

Table 3.nn34.4.2.2-1: Response Message Semantics

Resource	Reference
Instance	DICOM PS3.18 Section 10.4.3.3.1

The Responder shall provide a response message header containing the appropriate status code indicating success, warning, or failure as described in DICOM [PS3.18 Section 10.4.3.1](#).

3.nn34.4.2.3 Expected Actions

The Requester shall accept the response.

The Requester shall follow redirects (responses with values of 301, 302, 303 or 307. See <https://tools.ietf.org/html/rfc7231#section-6.4> for details) unless a loop or security policy violation is detected.

3.nn34.4.3 Get Metadata Request Message

The Requester retrieves metadata regarding one or more DICOM instances from the Responder.

3.nn34.4.3.1 Trigger Events

The Requester wishes to retrieve metadata of DICOM instances.

3.nn34.4.3.2 Message Semantics

The Get Metadata Request message is a Retrieve transaction of the DICOM Studies Service. See DICOM [PS3.18 Section 10.4](#).

The Requester is the User Agent, and the Responder is the Origin Server.

The message shall correspond to one of the Metadata Resources in Table 3.nn34.4.3.2-1.

Table 3.nn34.4.3.2-1: Retrieve Transaction Metadata Resources

Resource	Reference
Study Metadata	DICOM PS3.18 Section 10.4.1.1.2
Series Metadata	
Instance Metadata	

3.nn34.4.3.3 Expected Actions

The Responder shall parse the request, prepare representation of the Metadata Resource in the Selected Media Type (see DICOM [PS3.18 Section 10.4.2](#)), and return response described in Section 3.2.4.4.

3.nn34.4.4 Get Metadata Response Message

The Responder reports the outcome of the Get Metadata Request Message.

3.nn34.4.4.1 Trigger Events

The Responder completes processing of the Get Metadata Request Message.

3.nn34.4.4.2 Message Semantics

The message is a Response to a Retrieve Transaction as specified in DICOM [PS3.18 Section 10.4.3](#).

The Requester is the User Agent, and the Responder is the Origin Server.

The Responder shall provide a response as described in Table 3.nn34.4.4.2-1.

Table 3.nn34.4.4.2-1: Response Message Semantics

Resource	Reference
Study Metadata	DICOM PS3.18 Section 10.4.3.3.2
Series Metadata	
Instance Metadata	

The Responder shall provide a response message header containing the appropriate status code indicating success, warning, or failure as described in DICOM [PS3.18 Section 10.4.3.1](#).

3.nn34.4.4.3 Expected Actions

The Requester shall accept the response.

The Requester shall follow redirects (responses with values of 301, 302, 303 or 307. See <https://tools.ietf.org/html/rfc7231#section-6.4> for details) unless a loop or security policy violation is detected.

3.nn34.5 Security Considerations

Additional security considerations that may apply are discussed in RAD TF-1: 42.5 – WIA Security Considerations.

3.nn34.5.1 Security Audit Considerations

The [Radiology Audit Trail Option](#) in the ITI Audit Trail and Node Authentication (ATNA) Profile ([ITI TF-1: 9](#)) defines audit requirements for IHE Radiology transactions **that are also applicable to the LAB transactions**. See RAD TF3:5.1.

3.nn34.6 View Images in DIPA Profile with Acquisition Complete Option

3.nn34.6.1 Trigger Events

The Image Display that supports the Acquisition Complete Option is requested to display the whole slide images.

3.nn34.6.2 Invocation Semantics

This is a local invocation of functions at the Image Display.

3.nn34.6.3 Expected Actions

The Image Display actor makes use of the Completion Document KOS to assist in selecting, retrieving and displaying images

The Image Display actor may selectively retrieve the image metadata and frames for instances listed in the Completion Document KOS, without needing to retrieve the metadata for the entire Study or Series.

The content tree of the KOS will list all the images in IMAGE content items, which contains their SOP Instance UID (0008,0018) values, and the Current Requested Procedure Evidence Sequence (0040,A375) will contain a hierarchical description of all such referenced images, so

that the Series Instance UID (0020,000E) and Study Instance UID (0020,000D) are known. The Study Instance UID (0020,000D) of the referenced images is expected to be the same as the Study Instance UID (0020,000D) of the KOS itself, but the KOS will always be in a different Series than the referenced images, since the Modality (0008,0060) value is different (“KO” rather than “SM”).

If not all of the referenced images can be accessed (any of the instances are unavailable at the time of the user’s display request), then it may be preferable to warn the user that the set of displayed images are incomplete, rather than silently display an incomplete subset.

Add Section 3.nn.5:

3.nn5 QIDO-RS Query Completion Document [LAB-nn5]

3.nn35.1 Scope

The QIDO-RS Query Completion Document [LAB-nn5] transaction searches for DICOM Key Object Selection (KOS) SOP Instances that are Completion Documents via an HTTP interface.

Note: The LAB-nn4 transaction follows the pattern of, and specializes, the IHE RAD TF RAD-30 and RAD-129 transactions.

3.nn35.2 Actor Roles

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

Table 3.nn35.2-1: Actor Roles

Role:	Requestor: Queries for DICOM KOS
Actor(s):	The following actors may play the role of Requestor: Image Display
Role:	Responder: Returns metadata for matching query results
Actor(s):	The following actors may play the role of Responder: Image Archive

Transaction text specifies behavior for each Role. The behavior of specific actors may also be specified when it goes beyond that of the general role.

3.nn35.3 Referenced Standards

DICOM [PS3.18 Section 10.6](#): Web Services – Search Transaction of the DICOM Studies Service

3.nn35.4 Messages

3.nn35.4.1 Query Objects Request Message

The Requester queries the Responder for studies, series or instances based on some query keys.

The Requester shall support making requests to more than one Responder. The Responder shall support handling requests from more than one Requester.

3.nn35.4.1.1 Trigger Events

The Requester wishes to find DICOM instances that are Completion Documents encoded as DICOM Key Object Selection (KOS) SOP Instances.

3.nn35.4.1.2 Message Semantics

The Query Objects Request message is a Search transaction of the DICOM Studies Service. See DICOM [PS3.18 Section 10.6](#).

The Requester is the User Agent, and the Responder is the Origin Server.

The Requester shall issue the Query Objects Request using the QIDO-RS Query endpoint provided by the Responder

The message shall correspond to one of the Target Resources in Table 3.nn35.4.1.2-1. The only binding required for both the Requester and Responder is HTTP-GET.

The Requester shall support at least one Target Resource; a Responder shall support all Target Resources in Table 3.nn35.4.1.2-1.

Table 3.nn35.4.1.2-1: Retrieve Transaction Instance Resources

Resource	URI Template	Expected Response
Study's Series	<a href="http://<location>/studies/{study}/series/{?search*}">http://<location>/studies/{study}/series/{?search*}	Series that satisfy the query parameters
Study's Series' Instances	<a href="http://<location>/studies/{study}/series/{series}/instances/{?search*}">http://<location>/studies/{study}/series/{series}/instances/{?search*}	Instances that satisfy the query parameters
Study's Instances	<a href="http://<location>/studies/{study}/instances/{?search*}">http://<location>/studies/{study}/instances/{?search*}	Instances that satisfy the query parameters

Note: The All Studies, All Series and All Instances resources are not included in these requirements, because the use case is to find KOS instances for specific Studies or Series, not to find KOS for any Study or Series.

The parameters of the message are defined in Table 3.nn35.4.1.2-2.

Table 3.nn35.4.1.2-2: Search Query Parameters

Parameter	Description	Notes
<location>	The host name, an optional port address, and may be followed by an optional path	See the discussion about location in ITI TF-2: 3.11.4.1.2 Message Semantics .
{study}	Study Instance UID of the study from which series or instances are to be returned.	
{series}	Series Instance UID of the series from which instances are to be returned.	
{?search*}	A set of attribute/value pairs for matching keys, or a set of 'includefield' attributes for return keys, or 'all' for all available attributes. This parameter may include 'limit' and 'offset' attributes to paginate a search response.	See DICOM PS3.18 Section 8.3.4 for syntax details.

The message shall include the header parameters defined in Table 3.nn35.4.1.2-3 to indicate the media type of the response.

Table 3.nn35.4.1.2-3: Search transaction Header Parameters

Header Name	REQ	Description
Accept	R	The representation scheme being requested from the RESTful service. Refer to DICOM PS3.18 Section 8.3.3.1 .

The Requester uses one or more matching keys as search criteria to obtain the list of matching entries in the Responder using a selected Resource (Table 3.nn35.4.1.2-1).

The Requester shall support all keys required for the SCU as defined in Table 3.nn35.4.1.3-1.

3.nn35.4.1.3 Expected Actions

The Responder shall parse the request, perform the search indicated using the matching rules in DICOM [PS3.18 Section 8.3.4](#), and return a response.

For requests sent to the QIDO-RS endpoint, the response shall be a Query Objects Response message (Section 3.nn35.4.2).

The Responder shall support all query matching and return keys required for the SCP as defined in Table 3.nn35.4.1.3-1:

Table 3.nn35.4.1.3-1: Specific SCP Query Matching and Return Keys

Attribute Name	Tag	Query Keys Matching		Query Keys Return	
		SCU	SCP	SCU	SCP
Concept Name Code Sequence (Note 1)	(0040,A043)	R+	R+	R+	R+
>Code Value	(0008,0100)	R+	R+	R+	R+
>Coding Scheme Designator	(0008,0102)	R+	R+	R+	R+
>Code Meaning	(0008,0104)	O	O	R+	R+

Note 1: The Concept Name Code Sequence of the root content item conveys the Key Image Note Title. For DPIA Completion Documents, the code used is (113034, DCM, "Complete Acquisition Content").

Note 2: The keys specified in Table 3.nn35.4.1.3-1 are the relevant subset of those in RAD TF-2: Table.4.30-1 for Key Image Notes.

3.nn35.4.2 Query Objects Response Message

The Responder returns the information about matching DICOM series or instances.

3.nn35.4.2.1 Trigger Events

The Responder completes processing of the Query Objects Request message.

3.nn35.4.2.2 Message Semantics

The message is a response to a Search transaction as specified in DICOM [PS3.18 Section 10.6.3](#).

The Requester is the User Agent, and the Responder is the Origin Server.

The Responder shall support the return keys as specified in Table 3.nn35.4.1.3-1.

3.nn35.4.2.3 Expected Actions

The Requester shall accept the response.

The Requester shall follow redirects (responses with values of 301, 302, 303 or 307. See <https://tools.ietf.org/html/rfc7231#section-6.4> for details) unless a loop or security policy violation is detected.

3.nn34.5 Security Considerations

Additional security considerations that may apply are discussed in RAD TF-1: 42.5 – WIA Security Considerations.

3.nn34.5.1 Security Audit Considerations

The [Radiology Audit Trail Option](#) in the ITI Audit Trail and Node Authentication (ATNA) Profile ([ITI TF-1: 9](#)) defines audit requirements for IHE Radiology transactions **that are also applicable to the LAB transactions**. See RAD TF3:5.1.