Integrating the Healthcare Enterprise

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CONTENTS

Appendix A: Attribute Consistency between Modality Worklist, Composite IODs, Evidence Documents and Modality Performed Procedure Step

This appendix reflects IHE's adoption of DICOM-defined attribute consistency (DICOM PS3.17 Annex J). The Message Semantics section in several transactions in the Radiology Technical Framework reference this appendix to incorporate these requirements.

- Section A.1 contains IHE clarifications, additions and a summary of DICOM PS3.17 Annex J that relate to *image acquisition*. Some IHE profiles require that Acquisition Modality Actors support the Attribute mapping defined in tables in this section in transactions for Modality Worklist and Storage and MPPS. IHE restates or extends some of the DICOM requirements and selects some of the choices offered or enforce some of the recommendations of DICOM. A few additional IHE recommendations are also specified.
- Section A.2 defines attribute mappings for consistency in DICOM SR-based *evidence objects* generated by the Evidence Creator and Acquisition Modality. The DICOM SR objects are created based on existing images that provide values to be filled into the new evidence documents.
- Section A.3 defines additional mapping requirements for *consistency of DICOM C-FIND Return Key* Attributes.
- Section A.4 introduces a *real-world data model* of the entities and their Attributes related to consistency. Readers are advised to use this data model along with the information presented in Scheduled Workflow and Scheduled Workflow.b (RAD TF-1: 3.4 and 3.34). This data model is provided only for ease of understanding and does not introduce any additional IHE requirements.

A.1: Image Acquisition Integration-critical Attributes

The tables below describe requirements, recommendations or explanations on integration-critical attributes for image acquisition cases. They define which integration-critical attributes need to be equal (copied or generated locally), in order to correctly relate scheduled and performed procedure steps for the PPS cases described in RAD TF-2: 4.6.4.1.2.3.

General table structure:

- The 1st column denotes the DICOM attributes whose values shall be mapped between the DICOM objects (equal values in the same table row). The DICOM attribute tag is indicated for clarity.
- The 2nd to 4th columns define where attribute values come from: all defined attribute values of one table row are equal.

  These columns read left to right: MWL return values (2nd column), if existing, shall be used as the source for copies to Image/ Standalone or MPPS IODs.

- The MWL column is omitted if the described case does not include any MWL return values, or to simplify the table (as in the Append Case in Table A.1-3 or the PGP with Group Case in Table A.1-5).

Cell content conventions:

- "**Source**" in a table cell means that the DICOM object defined in the table column (e.g., MWL) and created by one actor shall be the source of this value for the DICOM attribute for *another* actor to fill in this value for their own objects (e.g., Image or MPPS).
- "**Copy**" in a table cell means that the value shall be copied from a corresponding source attribute of another DICOM object, as defined by the table column.
- "**Copy from: <DICOM attribute>**" means that, instead of using the DICOM attribute of the same row as the source, the source as specified in the referenced DICOM attribute shall be used.
- "**Equal**" in a table cell means that an actor already knows the value, e.g., from some previously performed action. Thus, the circumstances of value generation do not matter.
- "**Equal (internally generated)**" in a table cell means that an actor has internally generated a value that may be used in more than one DICOM object, without having obtained this value from another actor (i.e., no copy).
- "**Equal (copied from MWL)**" in a table cell means that the actor shall use a value that it already knows from an MWL query result obtained for the same SPS in the append case.
- "**Source-1**", "**Copy-1**" or "**Equal-1**" etc. are corresponding mapping attribute values, if several sources appear in one table row.
- "**See (IHE-X)**" in a table cell denotes additional requirements, recommendations or explanations for the attribute value, as described in the table's note "(IHE-X)". Otherwise, brief text that fits into a table cell is presented in the cell.
- "**n.a.**" in a table cell means that such an attribute or value shall not exist. Either the attribute is not defined by the DICOM standard for this object, or the particular sequence attribute is a DICOM type 3 attribute, and DICOM requires at least one sequence item to be present.

Actor behavior:

- An attribute from the column "Modality Worklist" shall be requested by a MWL SCU (Acquisition Modality) as a return key in its C-FIND Requests. The Department System Scheduler shall return attribute values in the Modality Worklist C-FIND response (for a complete description, see RAD TF-2: Table 4.5-3).
- The MWL return attribute values, if available as a source, shall be used by the Acquisition Modality in filling the attribute shown on the corresponding rows both for Composite Instances and MPPS Instances.

- If the MWL value is not existing ("n.a."), then the Modality shall generate certain values internally.
- The PPS Manager, Image Manager and Department System Scheduler roles shall be capable of handling the attributes shown in the corresponding row of the column titled "MPPS IOD" as defined by the SCP Type and the additional notes.
- The Department System Scheduler shall copy the value of the Study Instance UID from the Procedure Scheduled Message (RAD TF-2: 4.4.4.1) ZDS-1 (HL7 v2.3.1 Message Semantics) or IPC-3 (HL7 v2.5.1 Message Semantics) into the SOP Instance UID (0008,1155) attribute of the single Item of the Referenced Study Sequence (0008,1110). The SOP Class UID of such an Item shall be "1.2.840.10008.3.1.2.3.2".
- An empty Referenced Study Sequence (0008,1110) in a MPPS Instance indicates an unscheduled case (no Scheduled Procedure Step involved).

Note: The values of an Item of the Referenced Study Sequence (0008,1110) shall not be used to query/retrieve a SOP Instance of the Detached Study Management (retired) as is the intention of this sequence in the DICOM Standard. The use of the Detached Study Management SOP Class UID (1.2.840.10008.3.1.2.3.1) is only intended as a placeholder indicating the SOP Instance UID being the Study Instance UID.

Table A.1-1: Simple Case - required mapping of corresponding attributes

In the simple normal case, a Procedure Step is performed

- exactly as scheduled, or
- different than scheduled, but without being rescheduled, e.g., due to a patient's allergic reaction to contrast media.

DICOM attribute	Modality Worklist (return attribute values)	Filling values for: Image/ Standalone IOD		Filling values for: MPPS IOD	
Study Instance UID (0020,000D)	Source	Copy		Scheduled Step Attributes Sequence (0040,0270)	Copy
Referenced Study Sequence (0008,1110)	Source	Copy			Copy
Accession Number (0008,0050)	Source	Copy See (IHE-A.1.1)			Copy See (IHE-A.1.1)
Issuer of Accession Number Sequence (0008,0051)	Source	Copy See (IHE-A.1.6)			Copy See (IHE-A.1.6)
>Local Namespace Entity ID (0040,0031)	Source	Copy			Copy
>Universal Entity ID (0040,0032)	Source	Copy			Copy
>Universal Entity ID Type (0040,0033)	Source	Copy			Copy
Requested Procedure ID (0040,1001)	Source	Request Attributes Sequence (0040,0275)	Copy		Copy
Requested Procedure Description (0032,1060)	Source		Copy		Copy
Reason for the Requested Procedure (0040,1002)	Source		Copy or from user input		Copy or from user input
Reason for Requested Procedure Code Sequence (0040,100A)	Source		Copy or leave absent unless coded value is present		Copy or leave absent unless coded value is present
Scheduled Procedure Step ID (0040,0009)	Source		Copy		Copy
Scheduled Procedure Step Description (0040,0007)	Source		Copy		Copy
Scheduled Protocol Code Sequence (0040,0008)	Source		Copy		Copy
Institution Name (0008,0080)	Source	Copy See (IHE-A.1.6)			

DICOM attribute	Modality Worklist (return attribute values)	Filling values for: Image/ Standalone IOD	Filling values for: MPPS IOD
Institution Address (0008,0081)	Source	Copy See (IHE-A.1.6)	
Institution Code Sequence (0008,0082)	Source	Copy See (IHE-A.1.6)	
>Code Value (0008,0100)	Source	Copy See (IHE-A.1.6)	
>Coding Scheme Designator (0008,0102)	Source	Copy See (IHE-A.1.6)	
>Code Meaning (0008,0104)	Source	Copy See (IHE-A.1.6)	
Performed Protocol Code Sequence (0040,0260)	n.a.	Equal (internally generated). Recommendation: Absent if the value is not known. Is non-empty if the Assisted Acquisition Protocol Setting Option is supported (see RAD TF-2: 4.6.4.1.2.4).	Equal (internally generated). Shall be zero length if the value is not known, e.g., Assisted Acquisition Protocol Setting Option is not supported.
Study ID (0020,0010)	n.a.	Equal (internally generated). Recommendation: use Requested Procedure ID.	Equal (internally generated). Recommendation: use Requested Procedure ID.
Performed Procedure Step ID (0040,0253)	n.a.	Equal (internally generated). See (IHE-A.1.2)	Equal (internally generated).
Performed Procedure Step Start Date (0040,0244)	n.a.	Equal (internally generated). Recommendation: use the same value for Study Date.	Equal (internally generated).
Performed Procedure Step Start Time (0040,0245)	n.a.	Equal (internally generated). Recommendation: use the same value for Study Time.	Equal (internally generated).
Performed Procedure Step Description (0040,0254)	n.a.	Equal (internally generated). Recommendation: use the same value for Study Description.	Equal (internally generated).
Requested Procedure Code Sequence (0032,1064)	Value shall be used for Procedure Code Sequence as specified below.	n.a.	n.a.
Procedure Code Sequence (0008,1032)	n.a.	Copy from: Requested Procedure Code Sequence (0032,1064). Recommendation: Copy if the system is able to ensure that what is acquired is what was scheduled; otherwise absent, e.g.: • if empty in MWL, or	Copy from: Requested Procedure Code Sequence (0032,1064). Recommendation: Copy if the system is able to ensure that what is acquired is what was scheduled; otherwise empty, e.g.: • if empty in MWL, or • the Assisted Acquisition Protocol

DICOM attribute	Modality Worklist (return attribute values)	Filling values for: Image/ Standalone IOD		MPPS IOD	
		• the Assisted Acquisition Protocol Setting Option is not supported, or • performed acquisition is different from what was scheduled.		Setting Option is not supported, or • performed acquisition is different from what was scheduled.	
Referenced SOP Class UID (0008,1150)	n.a.	**Referenced PPS Sequence** (IHE-A.1.3)	1.2.840.10008.3.1.2.3.3	Equal (internally generated). See (IHE-A.1.4)	
Referenced SOP Instance UID (0008,1155)	n.a.		Equal to SOP Instance of the associated MPPS (IHE-A.1.5).	Equal (internally generated). See (IHE-A.1.5)	
Protocol Name (0018,1030)	n.a.	Recommendation: equal (internally generated)		**Performed Series Sequence** (0040,0340)	Equal (internally generated)

- (IHE-A.1.1) A Zero Length Accession Number (one of the options proposed by DICOM PS3.17 Annex J) shall be created when no reliable value for this attribute is available. Reliable values are those that can be conveyed by means other than manual data entry such as a value received from the Order Filler via a Modality Worklist including an Accession Number or received through a bar code reader.
- (IHE-A.1.2) Performed Procedure Step ID is generated by the modality arbitrarily and is not necessarily unique: Two different Performed Procedure Steps may share the same ID (e.g., may have been generated by different modalities). This ID may not enable a receiving system to reliably relate the PPS to the associated Requested Procedure and SPS. It is not reliable to assume that two PPSs with the same PPS ID value fulfill the same SPS/Requested Procedure, without checking the content of Scheduled Attributes Step Sequence.
- (IHE-A.1.3) The Referenced Performed Procedure Step Sequence (0008,1111) that contains the PPS SOP Instance UID shall be included (per DICOM PS3.3 Section C.7.3

strong recommendation, General Series Module Table, Note 1) when Acquisition Modality Actors support MPPS.

- (IHE-A.1.4) In MPPS, SOP Class UID is sent in the Affected SOP Class UID (0000,0002) for the PPS N-Create message and in Requested SOP Class UID (0000,0003) for the PPS N-Set message. SOP Class UID (0008,0016) shall not be used.
- (IHE-A.1.5) In MPPS, SOP Instance UID is sent in the Affected SOP Instance UID (0000,1000) of the PPS N-Create message and in Requested SOP Instance UID (0000,1001) for the PPS N-Set message. SOP Instance UID (0008,0018) shall not be used.
- (IHE-A.1.6) For Acquisition Modalities that support the Enterprise Identity Option. See RAD TF-2: 4.6.4.1.2.5 and RAD TF-2: 4.8.4.1.2.5. For Evidence Creators that support the Enterprise Identity Option, see RAD TF-2: 4.18.4.1.2.6 and RAD TF-2: 4.20.4.1.2.4.

215 **Table A.1-2: Unscheduled Case - required mapping of corresponding attributes**

DICOM attribute	Filling values for:	
	Image/ Standalone IOD	MPPS IOD
Study Instance UID (0020,000D)	Equal (internally generated).	Scheduled Step Attributes Sequence (0040,0270): Equal (internally generated).
Referenced Study Sequence (0008,1110)	n.a.	Scheduled Step Attributes Sequence (0040,0270): Shall be empty.
Accession Number (0008,0050)	Shall be empty (zero length).	Scheduled Step Attributes Sequence (0040,0270): Shall be empty.
Issuer of Accession Number Sequence (0008,0051)	Source	Scheduled Step Attributes Sequence (0040,0270): Copy See (IHE-A.1.6)
>Local Namespace Entity ID (0040,0031)	Source	Scheduled Step Attributes Sequence (0040,0270): Copy
>Universal Entity ID (0040,0032)	Source	Scheduled Step Attributes Sequence (0040,0270): Copy
>Universal Entity ID Type (0040,0033)	Source	Scheduled Step Attributes Sequence (0040,0270): Copy
Requested Procedure ID (0040,1001)	Request Attributes Sequence (0040,0275): n.a.	Scheduled Step Attributes Sequence (0040,0270): Shall be empty.
Requested Procedure Description (0032,1060)	Request Attributes Sequence (0040,0275): n.a.	Scheduled Step Attributes Sequence (0040,0270): Shall be empty.
Scheduled Procedure Step ID (0040,0009)	Request Attributes Sequence (0040,0275): n.a.	Scheduled Step Attributes Sequence (0040,0270): Shall be empty.
Reason for the Requested Procedure (0040,1002)	Request Attributes Sequence (0040,0275): n.a.	Scheduled Step Attributes Sequence (0040,0270): Shall be empty.
Reason for Requested Procedure Code Sequence (0040,100A)	Request Attributes Sequence (0040,0275): n.a.	Scheduled Step Attributes Sequence (0040,0270): Shall be empty.
Scheduled Procedure Step Description (0040,0007)	Request Attributes Sequence (0040,0275): n.a.	Scheduled Step Attributes Sequence (0040,0270): Shall be empty.
Scheduled Protocol Code Sequence (0040,0008)	Request Attributes Sequence (0040,0275): n.a.	Scheduled Step Attributes Sequence (0040,0270): Shall be empty.
Institution Name (0008,0080)	See (IHE-A.2.5)	
Institution Address (0008,0081)	See (IHE-A.2.5)	
Institution Code Sequence (0008,0082)	See (IHE-A.2.5)	
>Code Value (0008,0100)	See (IHE-A.2.5)	
>Coding Scheme Designator (0008,0102)	See (IHE-A.2.5)	
>Code Meaning (0008,0104)	See (IHE-A.2.5)	

DICOM attribute	Filling values for:	
	Image/ Standalone IOD	MPPS IOD
Performed Protocol Code Sequence (0040,0260)	Equal (internally generated). Recommendation: Absent if the value is not known. Is non-empty if the Assisted Acquisition Protocol Setting Option is supported (see RAD TF-2: 4.6.4.1.2.4).	Equal (internally generated). Shall be zero length if the value is not known, e.g., Assisted Acquisition Protocol Setting Option is not supported.
Study ID (0020,0010)	Equal (internally generated)	Equal (internally generated)
Performed Procedure Step ID (0040,0253)	Equal (internally generated). See (IHE-A.2.1)	Equal (internally generated).
Performed Procedure Step Start Date (0040,0244)	Equal (internally generated). Recommendation: use the same value for Study Date.	Equal (internally generated).
Performed Procedure Step Start Time (0040,0245)	Equal (internally generated). Recommendation: use the same value for Study Time.	Equal (internally generated).
Performed Procedure Step Description (0040,0254)	Equal (internally generated). Recommendation: use the same value for Study Description.	Equal (internally generated).
Requested Procedure Code Sequence (0032,1064)	n.a.	n.a.
Procedure Code Sequence (0008,1032)	n.a.	Shall be empty.
Referenced SOP Class UID (0008,1150)	**Referenced PPS Sequence** (0008,1111) (IHE-A.2.2): 1.2.840.10008.3.1.2.3.3	Equal (internally generated). See (IHE-A.2.3)
Referenced SOP Instance UID (0008,1155)	**Referenced PPS Sequence** (0008,1111) (IHE-A.2.2): Equal to SOP Instance of the associated MPPS. See (IHE-A.2.4).	Equal (internally generated). See (IHE-A.2.4)
Protocol Name (0018,1030)	Recommendation: equal (internally generated).	**Performed Series Sequence** (0040,0340): Equal (internally generated)

- (IHE-A.2.1) Performed Procedure Step ID is generated by the modality arbitrarily and is not necessarily unique: Two different Performed Procedure Steps may share the same ID (e.g., may have been generated by different modalities).

- (IHE-A.2.2) The Referenced Performed Procedure Step Sequence (0008,1111) that contains the PPS SOP Instance UID shall be included (per DICOM PS3.3 Section C.7.3 strong recommendation, General Series Module Table, Note 1) when Acquisition Modality Actors support MPPS.
- (IHE-A.2.3) In MPPS, SOP Class UID is sent in the Affected SOP Class UID (0000,0002) for the PPS N-Create message and in Requested SOP Class UID (0000,0003) for the PPS N-Set message. SOP Class UID (0008,0016) shall not be used.
- (IHE-A.2.4) In MPPS, SOP Instance UID is sent in the Affected SOP Instance UID (0000,1000) of the PPS N-Create message and in Requested SOP Instance UID (0000,1001) for the PPS N-Set message. SOP Instance UID (0008,0018) shall not be used.
- (IHE-A.2.5) For Acquisition Modalities that support the Enterprise Identity Option, see RAD TF-2: 4.6.4.1.2.5 and RAD TF-2: 4.8.4.1.2.5.

235 **Table A.1-3: Append to a Simple/ Normal Case - required mapping of corresponding attributes**

Similar to the simple case, the first PPS is generated in response to an SPS. Other PPSs are added at a later time, for instance due to unacceptable quality of certain images.

DICOM attribute	Filling values for:		
	Original Image/ Standalone IOD	Append Image/ Standalone IOD	Append MPPS IOD
Study Instance UID (0020,000D)	Equal (copied from MWL)	Equal (copied from MWL)	Equal (copied from MWL)
Referenced Study Sequence (0008,1110)	Equal (copied from MWL)	Equal (copied from MWL)	Equal (copied from MWL)
Accession number (0008,0050)	Equal (copied from MWL). See (IHE-A.3.1).	Equal (copied from MWL). See (IHE-A.3.1)	Equal (copied from MWL). See (IHE-A.3.1).
Issuer of Accession Number Sequence (0008,0051)	Equal (copied from MWL)	Equal (copied from MWL). See (IHE-A.3.7)	Equal (copied from MWL)
>Local Namespace Entity ID (0040,0031)	Equal (copied from MWL)	Equal (copied from MWL). See (IHE-A.3.7)	Equal (copied from MWL)
>Universal Entity ID (0040,0032)	Equal (copied from MWL)	Equal (copied from MWL). See (IHE-A.3.7)	Equal (copied from MWL)
>Universal Entity ID Type (0040,0033)	Equal (copied from MWL)	Equal (copied from MWL). See (IHE-A.3.7)	Equal (copied from MWL)
Requested Procedure ID (0040,1001)	**Request Attributes Sequence** (0040,0275): Equal (copied from MWL)	**Request Attributes Sequence** (0040,0275): Equal (copied from MWL)	**Scheduled Step Attributes Sequence** (0040,0270): Equal (copied from MWL)
Requested Procedure Description (0032,1060)	Equal (copied from MWL)	Equal (copied from MWL)	Equal (copied from MWL)
Reason for the Requested Procedure (0040,1002)	Equal (copied from MWL) or from user input	Equal (copied from MWL) or from user input	Equal (copied from MWL) or from user input
Reason for Requested Procedure Code Sequence (0040,100A)	Equal (copied from MWL); absent unless coded	Equal (copied from MWL); absent unless coded	Equal (copied from MWL); absent unless coded
Scheduled Procedure Step ID (0040,0009)	Equal (copied from MWL)	Equal (copied from MWL)	Equal (copied from MWL)
Scheduled Procedure Step Description (0040,0007)	Equal (copied from MWL)	Equal (copied from MWL)	Equal (copied from MWL)
Scheduled Protocol Code Sequence (0040,0008)	Equal (copied from MWL)	Equal (copied from MWL)	Equal (copied from MWL)
Institution Name (0008,0080)	Equal (copied from MWL)	Equal (copied from MWL). See (IHE-A.3.7)	
Institution Address (0008,0081)	Equal (copied from MWL)	Equal (copied from MWL). See (IHE-A.3.7)	

DICOM attribute	Filling values for:		
	Original Image/ Standalone IOD	Append Image/ Standalone IOD	Append MPPS IOD
Institution Code Sequence (0008,0082)	Equal (copied from MWL)	Equal (copied from MWL). See (IHE-A.3.7)	
>Code Value (0008,0100)	Equal (copied from MWL)	Equal (copied from MWL). See (IHE-A.3.7)	
>Coding Scheme Designator (0008,0102)	Equal (copied from MWL)	Equal (copied from MWL). See (IHE-A.3.7)	
>Code Meaning (0008,0104)	Equal (copied from MWL)	Equal (copied from MWL). See (IHE-A.3.7)	
Performed Protocol Code Sequence (0040,0260)	Note: Values may not be relevant for the appended image and associated MPPS, e.g., due to adding images from an adjacent body region or from doing measurements.	Equal (internally generated). Recommendation: Absent if the value is not known. Is non-empty if the Assisted Acquisition Protocol Setting Option is supported (see RAD TF-2: 4.6.4.1.2.4).	Equal (internally generated). Shall be zero length if the value is not known, e.g., Assisted Acquisition Protocol Setting Option is not supported.
Study ID (0020,0010)	Equal (internally generated) Recommendation: use Requested Procedure ID.	Equal (internally generated) Recommendation: use Requested Procedure ID.	Equal (internally generated) Recommendation: use Requested Procedure ID.
Performed Procedure Step ID (0040,0253)	Note: Values not relevant for the appended image and associated MPPS.	Equal (internally generated). See (IHE-A.3.2)	Equal (internally generated).
Performed Procedure Step Start Date (0040,0244)	Note: Values not relevant for the appended image and associated MPPS.	Equal (internally generated). See (IHE-A.3.3)	Equal (internally generated).
Performed Procedure Step Start Time (0040,0245)	Note: Values not relevant for the appended image and associated MPPS.	Equal (internally generated). See (IHE-A.3.3)	Equal (internally generated).
Performed Procedure Step Description (0040,0254)	Note: Values not relevant for the appended image and associated MPPS.	Equal (internally generated). See (IHE-A.3.3)	Equal (internally generated).
Requested Procedure Code Sequence (0032,1064)	n.a.	n.a.	n.a.
Procedure Code Sequence (0008,1032)	Equal. Note: May be absent (see Table A.1-1)	Equal. If absent in original image, shall be absent here. Recommendation: absent, if performed acquisition is different from the original image's procedure.	Equal. If absent in original image, shall be empty. Recommendation: empty, if absent in the original/ appended image.

DICOM attribute	Filling values for:					
	Original Image/ Standalone IOD		Append Image/ Standalone IOD		Append MPPS IOD	
Referenced SOP Class UID (0008,1150)	**Referenced PPS Sequence** (0008,1111) (IHE-A.3.4)	Note: Values not relevant for the appended image and associated MPPS.	**Referenced PPS Sequence** (0008,1111) (IHE-A.3.4)	1.2.840.10008.3.1.2.3.3	Equal (internally generated). See (IHE-A.3.5).	
Referenced SOP Instance UID (0008,1155)				Equal to SOP Instance of the associated MPPS. See (IHE-A.3.6).	Equal (internally generated). See (IHE-A.3.6).	
Protocol Name (0018,1030)	Note: Values not relevant for the appended image and associated MPPS.		Recommendation: equal (internally generated).		**Performed Series Sequence** (0040,0340)	Equal (equally generated)

- (IHE-A.3.1) A Zero Length Accession Number (one of the options proposed by DICOM PS3.17 Annex J) needs to be created when no reliable value for this attribute is available. Reliable values are those that can be conveyed by means other than manual data entry such as a value received from the Order Filler via a Modality Worklist including an Accession Number or received through a bar code reader.
- (IHE-A.3.2) Performed Procedure Step ID is generated by the modality arbitrarily and is not necessarily unique: Two different Performed Procedure Steps may share the same ID (e.g., may have been generated by different modalities). This ID may not enable a receiving system to reliably relate the PPS to the associated Requested Procedure and SPS. It is not reliable to assume that two PPSs with the same PPS ID value fulfill the same SPS/Requested Procedure, without checking the content of Scheduled Attributes Step Sequence.
- (IHE-A.3.3) In the Image IODs created in Append Case, the Study Date, Study Time and Study Description shall re-use the corresponding values from the original images to which they are appended.

- (IHE-A.3.4) The Referenced Performed Procedure Step Sequence (0008,1111) that contains the PPS SOP Instance UID shall be included (per DICOM PS3.3 Section C.7.3 strong recommendation, General Series Module Table, Note 1) when Acquisition Modality Actors support MPPS.
- (IHE-A.3.5) In MPPS, SOP Class UID is sent in the Affected SOP Class UID (0000,0002) for the PPS N-Create message and in Requested SOP Class UID (0000,0003) for the PPS N-Set message. SOP Class UID (0008,0016) shall not be used.
- (IHE-A.3.6) In MPPS, SOP Instance UID is sent in the Affected SOP Instance UID (0000,1000) of the PPS N-Create message and in Requested SOP Instance UID (0000,1001) for the PPS N-Set message. SOP Instance UID (0008,0018) shall not be used.
- (IHE-A.3.7) For Acquisition Modality that supports the Enterprise Identity Option, see RAD TF-2: 4.6.4.1.2.5 and RAD TF-2: 4.8.4.1.2.5.

If a PPS and related images is appended to a group case (see RAD TF-2: 4.6.4.1.2.3.3), e.g., for adding 3D post-processing evidence to a grouped MR head and neck exam, then the following conditions need to be considered for the appended images and MPPS, especially as compared to appending to a simple case:

- The Study Instance UID (0020,000D) in appended images and PPS shall have the same value as the Study Instance UID generated for the original grouped images.
- The Accession Number (0008,0050) shall be empty if the grouped SPS do not have the same Accession Number.
- The Referenced Study Sequence (0008,1110) in appended images shall have as many sequence items as there are different grouped Requested Procedures.
- The Request Attributes Sequence (0040,0275) in appended images shall have as many sequence items as there are grouped SPSs.
- The Scheduled Step Attributes Sequence (0040,0270) associated with the appended images shall have as many sequence items as there are grouped SPSs.
- Performed Protocol Code Sequence (0040,0260) will probably have different values than for the original grouped images.
- The Procedure Code Sequence (0008,1032) in appended images and the associated MPPS is recommended to contain as many items as there are different Procedure Codes in Requested Procedures if the system is able to ensure that what is acquired is what has been scheduled. It is recommended to be absent if the Procedure Code Sequence is absent in MWL or the performed acquisition is different from what has been scheduled.

Table A.1-4: Group Case (3 SPSs belonging to 2 Requested Procedures) - required mapping of corresponding attributes

This scenario describes the case where the first Requested Procedure has 1 SPS, and the second Requested Procedure contains 2 SPSs (grouping as in the diagram in RAD TF-2: 4.6.4.1.2.3.6).

Note: For generating the append PPS to a group case, the Modality actor needs to fill in additional attributes currently not defined in DICOM, which relate to requested or scheduled information. A Correction Proposal to DICOM requests to resolve these issues by adding optional attributes to the Request Attributes Sequence in Image IODs and to the Scheduled Step Attribute Sequence in MPPS (for details see RAD TF-1x: B.2.2).

DICOM attribute	Modality Worklist (return attribute values)			Filling values for:						
	Item 1	Item 2	Item 3	Image IOD			MPPS IOD			
Study Instance UID (0020,000D)	Source-1	Source-2	Source-2	Equal (internally generated)				**Item 1**	**Item 2**	**Item 3**
								Equal	Equal	Equal
Accession Number (0008,0050)	Source-1	Source-2	Source-2	Copy (if same Accession Number in Source-1 and Source-2). Shall be empty if the grouped SPSs do not have the same Accession Number.			**Scheduled Step Attributes Sequence** (0040,0270)	Copy-1	Copy-2	Copy-2
Issuer of Accession Number Sequence (0008,0051)	Source-1	Source-2	Source-2	Copy (if same in Source-1 and Source-2). Shall not be included if the Accession Number is empty.				Copy-1	Copy-2	Copy-2
>Local Namespace Entity ID (0040,0031)	Source-1	Source-2	Source-2	Copy (if same in Source-1 and Source-2).				Copy-1	Copy-2	Copy-2
>Universal Entity ID (0040,0032)	Source-1	Source-2	Source-2	Copy (if same in Source-1 and Source-2).				Copy-1	Copy-2	Copy-2
>Universal Entity ID Type (0040,0033)	Source-1	Source-2	Source-2	Copy (if same in Source-1 and Source-2).				Copy-1	Copy-2	Copy-2
Referenced Study Sequence (0008,1110)	Source-1	Source-2	Source-2	**Item 1**	**Item 2**			Copy-1	Copy-2	Copy-2
				Copy-1	Copy-2					
Requested Procedure ID (0040,1001)	Source-1	Source-2	Source-2	**Request Attributes Sequence** (0040,0275)	**Item 1**	**Item 2**	**Item 3**	Copy-1	Copy-2	Copy-2
					Copy-1	Copy-2	Copy-2			
Requested Procedure Description (0032,1060)	Source-1	Source-2	Source-2		Copy-1	Copy-2	Copy-2	Copy-1	Copy-2	Copy-2
Reason for the Requested Procedure (0040,1002)	Source-1	Source-2	Source-2		Copy-1	Copy-2	Copy-2	Copy-1	Copy-2	Copy-2

DICOM attribute	Modality Worklist (return attribute values)			Filling values for:						
	Item 1	Item 2	Item 3	Image IOD			MPPS IOD			
Requested Procedure Code Sequence (0032,1064)	Source-1	Source-2	Source-2	Copy-1	Copy-2	Copy-2	Copy-1	Copy-2	Copy-2	
	Values shall be used for Procedure Code Sequence as specified below.									
Scheduled Procedure Step ID (0040,0009)	Source-1	Source-2	Source-3	Copy-1	Copy-2	Copy-3	Copy-1	Copy-2	Copy-3	
Reason for Requested Procedure Code Sequence (0040,100A)	Source-1	Source-2	Source-3	Copy-1	Copy-2	Copy-3	Copy-1	Copy-2	Copy-3	
Scheduled Procedure Step Description (0040,0007)	Source-1	Source-2	Source-3	Copy-1	Copy-2	Copy-3	Copy-1	Copy-2	Copy-3	
Scheduled Protocol Code Sequence (0040,0008)	Source-1	Source-2	Source-3	Copy-1	Copy-2	Copy-3	Copy-1	Copy-2	Copy-3	
Accession Number (0008,0050)	(documented above in this column)			Copy-1	Copy-2	Copy-2	n.a.			
Issuer of Accession Number Sequence (0008,0051)				Copy-1	Copy-2	Copy-2	n.a.			
>Local Namespace Entity ID (0040,0031)				Copy-1	Copy-2	Copy-2	n.a.			
>Universal Entity ID (0040,0032)				Copy-1	Copy-2	Copy-2	n.a.			
>Universal Entity ID Type (0040,0033)				Copy-1	Copy-2	Copy-2	n.a.			
Study Instance UID (0020,000D)				Equal (internally generated)	Equal (internally generated)	Equal (internally generated)	n.a.			
Referenced Study Sequence (0008,1110)				Copy-1	Copy-2	Copy-2	n.a.			
Institution Name (0008,0080)	Source-1	Source-2	Source-2	Copy (if same in Source-1 and Source-2).			n.a.			

DICOM attribute	Modality Worklist (return attribute values)			Filling values for:	
	Item 1	Item 2	Item 3	Image IOD	MPPS IOD
Institution Address (0008,0081)	Source-1	Source-2	Source-2	Copy (if same in Source-1 and Source-2).	n.a.
Institution Code Sequence (0008,0082)	Source-1	Source-2	Source-2	Copy (if same in Source-1 and Source-2).	n.a.
>Code Value (0008,0100)	Source-1	Source-2	Source-2	Copy (if same in Source-1 and Source-2).	n.a.
>Coding Scheme Designator (0008,0102)	Source-1	Source-2	Source-2	Copy (if same in Source-1 and Source-2).	n.a.
>Code Meaning (0008,0104)	Source-1	Source-2	Source-2	Copy (if same in Source-1 and Source-2).	n.a.
Performed Protocol Code Sequence (0040,0260)	n.a			Equal (internally generated). Recommendation: Absent if the value is not known. Is non-empty if the Assisted Acquisition Protocol Setting Option is supported (see RAD TF-2: 4.6.4.1.2.4).	Equal (internally generated). Shall be zero length if the value is not known, e.g., Assisted Acquisition Protocol Setting Option is not supported.
Study ID (0020,0010)	n.a			Equal (internally generated)	Equal (internally generated)
Performed Procedure Step ID (0040,0253)	n.a			Equal (internally generated). See (IHE-A.4.1).	Equal (internally generated). See (IHE-A.4.1).
Performed Procedure Step Start Date (0040,0244)	n.a			Equal (internally generated). Recommendation: Use the same value for Study Date	Equal (internally generated)
Performed Procedure Step Start Time (0040,0245)	n.a			Equal (internally generated). Recommendation: Use the same value for Study Time	Equal (internally generated)
Performed Procedure Step Description (0040,0254)	n.a			Equal (internally generated). Recommendation: Use the same value for Study Description	Equal (internally generated)
Procedure Code Sequence (0008,1032)	n.a			Equal (internally generated). Recommendation: Contains as many items as there are different Procedure Codes in Requested Procedures if the system is able	Equal (internally generated). Recommendation: Contains as many items as there are different Procedure Codes in Requested Procedures if the

DICOM attribute	Modality Worklist (return attribute values)			Filling values for:	
	Item 1	Item 2	Item 3	Image IOD	MPPS IOD
				to ensure that what is acquired is what has been scheduled. Otherwise absent in one of the following conditions (because it is Type 3 in the Image IOD): • if absent in MWL, or • the Assisted Acquisition Protocol Setting Option is not supported, or • performed acquisition is different from what has been scheduled.	system is able to ensure that what is acquired is what has been scheduled. Otherwise empty in one of the following conditions (because it is Type 2 in the MPPS IOD): • if absent in MWL, or • the Assisted Acquisition Protocol Setting Option is not supported, or • performed acquisition is different from what has been scheduled.
Referenced SOP Class UID (0008,1150)	n.a			**Referenced PPS Sequence** (0008,1111) (IHE-A.4.2): 1.2.840.10008.3.1.2.3.3	Equal (internally generated). See (IHE-A.4.3).
Referenced SOP Instance UID (0008,1155)	n.a			**Referenced PPS Sequence** (0008,1111) (IHE-A.4.2): Equal to SOP Instance UID of associated PPS. See (IHE-A.4.4).	Equal (internally generated). See (IHE-A.4.4).
Protocol Name (0018,1030)	n.a			Recommendation: Equal (internally generated)	**Performed Series Sequence** (0040,0340): Equal (internally generated)

- (IHE-A.4.1): Performed Procedure Step ID is generated by the modality arbitrarily and is not necessarily unique: Two different Performed Procedure Steps may share the same ID (e.g., may have been generated by different modalities). This ID may not enable a receiving system to reliably relate the PPS to the associated Requested Procedure and SPSs. It is not reliable to assume that two PPSs with the same PPS ID value fulfill the same set of SPSs/Requested Procedures, without checking the content of Scheduled Attributes Step Sequence.
- (IHE-A.4.2) The Referenced Performed Procedure Step Sequence (0008,1111) that contains the PPS SOP Instance UID shall be included (per DICOM PS3.3 Section C.7.3 strong recommendation, General Series Module Table, Note 1) when Acquisition Modality Actors support MPPS.

- (IHE-A.4.3) In MPPS, SOP Class UID is sent in the Affected SOP Class UID (0000,0002) for the PPS N-Create message and in Requested SOP Class UID (0000,0003) for the PPS N-Set message. SOP Class UID (0008,0016) shall not be used.
- (IHE-A.4.4) In MPPS, SOP Instance UID is sent in the Affected SOP Instance UID (0000,1000) of the PPS N-Create message and in Requested SOP Instance UID (0000,1001) for the PPS N-Set message. SOP Instance UID (0008,0018) shall not be used.

Table A.1-5: Group Case with PGP (3 SPS belonging to 2 Requested Procedures) - required mapping of corresponding attributes

As an extension to Table A.1-4, this scenario is based on the same grouping: the first Requested Procedure has 1 SPS, and the second Requested Procedure contains 2 SPSs (grouping as in the diagram in RAD TF-2: 4.6.4.1.2.3.6).

This table assumes that a Group Case acquisition has already been performed as part of the Modality Group Case Option in the Scheduled Workflow Profile. It describes the mapping on any actor (e.g., Acquisition Modality) that creates the GSPS and the PPS generated during the presentation step (i.e., split step) of the workflow. Therefore, the input of the mapping comes from Image IODs resulting from that previous Group Case acquisition (see Table A.1-4).

Note: For generating the append PPS to a group case, the Modality actor needs to fill in additional attributes currently not defined in DICOM, which relate to requested or scheduled information. A Correction Proposal to DICOM requests to resolve these issues by adding optional attributes to the Request Attributes Sequence in Image IODs and to the Scheduled Step Attribute Sequence in MPPS (for details see RAD TF-1x: B.2.2).

DICOM attribute	Filling values for:								
	Image IOD from Group Case Acquisition		Presentation Group 1			Presentation Group 2			
			GSPS IOD	MPPS IOD		GSPS IOD	MPPS IOD		
Study Instance UID (0020,000D)	Equal		Equal	Scheduled Step Attributes Sequence (0040,0270)	**Item 1** Equal	Equal	Scheduled Step Attributes Sequence (0040,0270)	**Item 1** Equal	**Item 2** Equal
Accession Number (0008,0050)	Equal. See (IHE-A.5.1)		Equal. See (IHE-A.5.1)		Equal. See (IHE-A.5.2)	Equal. See (IHE-A.5.1)		Equal See (IHE-A.5.2)	Equal See (IHE-A.5.2)
Issuer of Accession Number Sequence (0008,0051)	Equal. See (IHE-A.5.1) and (IHE A.5.10)		Equal. See (IHE-A.5.1) and (IHE-A.5.10)		Equal. See (IHE-A.5.2) and (IHE-A.5.10)	Equal. See (IHE-A.5.1) and (IHE-A.5.10)		Equal See (IHE-A.5.2) and (IHE-A.5.10)	Equal See (IHE-A.5.2) and (IHE-A.5.10)
>Local Namespace Entity ID (0040,0031)	Equal. See (IHE-A.5.1) and (IHE A.5.10)		Equal. See (IHE-A.5.1) and (IHE-A.5.10)		Equal. See (IHE-A.5.2) and (IHE-A.5.10)	Equal. See (IHE-A.5.1) and (IHE-A.5.10)		Equal See (IHE-A.5.2) and (IHE-A.5.10)	Equal See (IHE-A.5.2) and (IHE-A.5.10)
>Universal Entity ID (0040,0032)	Equal. See (IHE-A.5.1) and (IHE A.5.10)		Equal. See (IHE-A.5.1) and (IHE-A.5.10)		Equal. See (IHE-A.5.2) and (IHE-A.5.10)	Equal. See (IHE-A.5.1) and (IHE A.5.10)		Equal See (IHE-A.5.2) and (IHE-A.5.10)	Equal See (IHE-A.5.2) and (IHE-A.5.10)
>Universal Entity ID Type (0040,0033)	Equal. See (IHE-A.5.1) and (IHE A.5.10)		Equal. See (IHE-A.5.1) and (IHE-A.5.10)		Equal. See (IHE-A.5.2) and (IHE-A.5.10)	Equal. See (IHE-A.5.1) and (IHE-A.5.10)		Equal See (IHE-A.5.2) and (IHE-A.5.10)	Equal See (IHE-A.5.2) and (IHE-A.5.10)
Referenced Study Sequence (0008,1110)	**Item 1** Equal-1	**Item 2** Equal-2	Equal-1		Equal-1	Equal-2		Equal-2	Equal-2

DICOM attribute	Filling values for:													
	Image IOD from Group Case Acquisition				Presentation Group 1				Presentation Group 2					
					GSPS IOD		MPPS IOD		GSPS IOD				MPPS IOD	
	Request Attributes Sequence (0040,0275)	Item 1	Item 2	Item 3	Request Attributes Sequence (0040,0275)	Item 1			Request Attributes Sequence (0040,0275)	Item 1	Item 2			
Requested Procedure ID (0040,1001)		Equal-1	Equal-2	Equal-2		Equal-1		Equal-1		Equal-2	Equal-2		Equal-2	Equal-2
Requested Procedure Description (0032,1060)		Equal-1	Equal-2	Equal-2		Equal-1		Equal-1		Equal-2	Equal-2		Equal-2	Equal-2
Reason for the Requested Procedure (0040,1002)		Equal-1	Equal-2	Equal-2		Equal-1		Equal-1		Equal-2	Equal-2		Equal-2	Equal-2
Requested Procedure Code Sequence (0032,1064)		Equal-1	Equal-2	Equal-2		Equal-1		Equal-1		Equal-2	Equal-2		Equal-2	Equal-2
Reason for Requested Procedure Code Sequence (0040,100A)		Equal-1	Equal-2	Equal-2		Equal-1		Equal-1		Equal-2	Equal-2		Equal-2	Equal-2
Scheduled Procedure Step ID (0040,0009)		Equal-1	Equal-2	Equal-3		Equal-1		Equal-1		Equal-2	Equal-3		Equal-2	Equal-3
Scheduled Procedure Step Description (0040,0007)		Equal-1	Equal-2	Equal-3		Equal-1		Equal-1		Equal-2	Equal-3		Equal-2	Equal-3
Scheduled Protocol Code Sequence (0040,0008)		Equal-1	Equal-2	Equal-3		Equal-1		Equal-1		Equal-2	Equal-3		Equal-2	Equal-3
Accession number (0008,0050)		Equal-1	Equal-2	Equal-2		Equal-1	n.a.			Equal-2	Equal-2	n.a.		
Study Instance UID (0020,000D)		Equal-1	Equal-2	Equal-2		Equal-1	n.a.			Equal-2	Equal-2	n.a.		
Referenced Study Sequence (0008,1110)		Equal-1	Equal-2	Equal-2		Equal-1	n.a.			Equal-2	Equal-2	n.a.		
Institution Name (0008,0080)	Equal. See (IHE-A.5.1) and (IHE A.5.10)				Equal. See (IHE-A.5.1) and (IHE-A.5.10)		n.a.		Equal. See (IHE-A.5.1) and (IHE A.5.10)			n.a.		
Institution Address (0008,0081)	Equal. See (IHE-A.5.1) and (IHE A.5.10)				Equal. See (IHE-A.5.1) and (IHE-A.5.10)		n.a.		Equal. See (IHE-A.5.1) and (IHE-A.5.10)			n.a.		
Institution Code Sequence (0008,0082)	Equal. See (IHE-A.5.1) and (IHE A.5.10)				Equal. See (IHE-A.5.1) and (IHE-A.5.10)		n.a.		Equal. See (IHE-A.5.1) and (IHE-A.5.10)			n.a.		

DICOM attribute	Image IOD from Group Case Acquisition	Filling values for:			
		Presentation Group 1		Presentation Group 2	
		GSPS IOD	MPPS IOD	GSPS IOD	MPPS IOD
>Code Value (0008,0100)	Equal. See (IHE-A.5.1) and (IHE-A.5.10)	Equal. See (IHE-A.5.1) and (IHE-A.5.10)	n.a.	Equal. See (IHE-A.5.1) and (IHE-A.5.10)	n.a.
>Coding Scheme Designator (0008,0102)	Equal. See (IHE-A.5.1) and (IHE A.5.10)	Equal. See (IHE-A.5.1) and (IHE-A.5.10)	n.a.	Equal. See (IHE-A.5.1) and (IHE-A.5.10)	n.a.
>Code Meaning (0008,0104)	Equal. See (IHE-A.5.1) and (IHE A.5.10)	Equal. See (IHE-A.5.1) and (IHE-A.5.10)	n.a.	Equal. See (IHE-A.5.1) and (IHE-A.5.10)	n.a.
Performed Protocol Code Sequence (0040,0260)	Note: Values shall not be used for the GSPS and associated MPPS.	Equal-1 (internally generated). See (IHE-A.5.3)	Equal-1 (internally generated). See (IHE-A.5.4)	Equal-2 (internally generated). See (IHE-A.5.3)	Equal-2 (internally generated). See (IHE-A.5.4)
Study ID (0020,0010)	Equal	Equal	Equal	Equal	Equal
Performed Procedure Step ID (0040,0253)	Note: Value shall not be used for the GSPS and associated MPPS.	Equal-1 (internally generated). See (IHE-A.5.5)	Equal-1 (internally generated). See (IHE-A.5.5)	Equal-2 (internally generated). See (IHE-A.5.5)	Equal-2 (internally generated). See (IHE-A.5.5)
Performed Procedure Step Start Date (0040,0244)	Note: Value shall not be used for the GSPS and associated MPPS.	Equal-1 (internally generated). See (IHE-A.5.6)	Equal-1 (internally generated)	Equal-2 (internally generated). See (IHE-A.5.6)	Equal-2 (internally generated)
Performed Procedure Step Start Time (0040,0245)	Note: Value shall not be used for the GSPS and associated MPPS.	Equal-1 (internally generated). See (IHE-A.5.6)	Equal-1 (internally generated)	Equal-2 (internally generated). See (IHE-A.5.6)	Equal-2 (internally generated)
Performed Procedure Step Description (0040,0254)	Note: Value shall not be used for the GSPS and associated MPPS.	Equal-1 (internally generated). See (IHE-A.5.6)	Equal-1 (internally generated)	Equal-2 (internally generated). See (IHE-A.5.6)	Equal-2 (internally generated)
Procedure Code Sequence (0008,1032)	Equal. Note: This information is not always sufficient for linking each SPS to the proper Requested Procedure.	Equal. If present in images, then it shall contain a single item (code of the associated Requested Procedure).	Equal. If present in images, then it shall contain a single item (code of the associated Requested Procedure).	Equal. If present in images, then it shall contain a single item (code of the associated Requested Procedure).	Equal. If present in images, then it shall contain a single item (code of the associated Requested Procedure).

DICOM attribute	Filling values for:					
	Image IOD from Group Case Acquisition	Presentation Group 1		Presentation Group 2		
		GSPS IOD	MPPS IOD	GSPS IOD	MPPS IOD	
Referenced SOP Class UID (0008,1150)	**Referenced PPS Sequence** (0008,1111) Note: Value shall not be used for the GSPS and associated MPPS.	**Referenced PPS Sequence** (0008,1111) (IHE-A.5.8) 1.2.840.10008.3.1.2.3.3	Equal (internally generated). See (IHE-A.5.7)	**Referenced PPS Sequence** (0008,1111) (IHE-A.5.8) 1.2.840.10008.3.1.2.3.3	Equal (internally generated). See (IHE-A.5.7)	
Referenced SOP Instance UID (0008,1155)		Equal to SOP Instance UID of associated PPS	Equal (internally generated). See (IHE-A.5.8)	Equal to SOP Instance UID of associated PPS	Equal (internally generated). See (IHE-A.5.8)	
Protocol Name (0018,1030)	Note: Value shall not be used for the GSPS and associated MPPS.	Recommendation: Equal-1 (internally generated)	**Performed Series Sequence** (0040,0340) Equal-1 (internally generated)	Recommendation: Equal-2 (internally generated)	**Performed Series Sequence** (0040,0340) Equal-2 (internally generated)	

- (IHE-A.5.1) When several SPSs belonging to Requested Procedures attached to the same Imaging Service Request have been grouped together, the original value of Accession Number (0008,0050) and the associated Issuer of Accession Number Sequence (0008,0051) shall be copied in the Accession Number and the associated Issuer of Accession Number Sequence fields in GSPSs. When the grouped SPSs belong to Requested Procedures attached to different Imaging Service Request, the Accession Number (0008, 0050) in the original images is expected to be empty per the group case specified by IHE. Therefore, it shall also be empty in generated GSPS (as they belong to the same Study as the original images). For the same reason, the associated Issuer of

Accession Number Sequence in the original images is expected to be absent and it shall also be absent in the generated GSPS.

- (IHE-A.5.2) The Accession Number and the associated Issuer of the Accession Number Sequence in MPPS objects shall be equal to the MWL Accession Number and the associated Issuer of Accession Number Sequence return value, irrespective of the Accession Number value (including zero length) or the associated Issuer of Accession Number Sequence (if it exists) in Image and Standalone IODs and GSPSs.
- (IHE-A.5.3) Recommendation: Absent if the value is not known. If the Assisted Acquisition Protocol Setting Option is supported (see RAD TF-2: 4.6.4.1.2.4), the value is recommended to be non-empty and contain a specific code that indicates the splitting of grouped images.
- (IHE-A.5.4) Shall be zero length if the value is not known, e.g., Assisted Acquisition Protocol Setting is not supported. If the Assisted Acquisition Protocol Setting Option is supported (see RAD TF-2: 4.6.4.1.2.4), the value is recommended to be non-empty and contain a specific code that indicates the splitting of grouped images.
- (IHE-A.5.5) Performed Procedure Step ID is generated by the modality arbitrarily and is not necessarily unique: Two different Performed Procedure Steps may share the same ID (e.g., may have been generated by different modalities). This ID may not enable a receiving system to reliably relate the PPS to the associated Requested Procedure and SPSs. It is not reliable to assume that two PPSs with the same PPS ID value fulfill the same set of SPSs/Requested Procedures, without checking the content of Scheduled Attributes Step Sequence.
- (IHE-A.5.6) In the GSPS IODs created during the "splitting" step of PGP, the Study Date, Study Time and Study Description shall re-use the corresponding values from the source image to which they are appended.
- (IHE-A.5.7) In MPPS, SOP Class UID is sent in the Affected SOP Class UID (0000,0002) for the PPS N-Create message and in Requested SOP Class UID (0000,0003) for the PPS N-Set message. SOP Class UID (0008,0016) shall not be used.
- (IHE-A.5.8) In MPPS, SOP Instance UID is sent in the Affected SOP Instance UID (0000,1000) of the PPS N-Create message and in Requested SOP Instance UID (0000,1001) for the PPS N-Set message. SOP Instance UID (0008,0018) shall not be used.
- (IHE-A.5.9) The Referenced Performed Procedure Step Sequence (0008,1111) that contains the PPS SOP Instance UID shall be included (per DICOM PS3.3 Section C.7.3 strong recommendation, General Series Module Table, Note 1) when Acquisition Modality Actors support MPPS.
- (IHE-A.5.10) For an Acquisition Modality that supports the Enterprise Identity Option, see RAD TF-2: 4.6.4.1.2.5 and RAD TF-2: 4.8.4.1.2.5.

A.2: Evidence Documents Integration - Critical Attributes

The table in this section is analogous to the tables in the previous section, where the Acquisition Modality uses certain attributes from the Modality Worklist in order to fill in related image values in a consistent manner. Similarly, the Evidence Creator or Acquisition Modality in the Evidence Documents Integration Profile, which do not get a Modality Worklist, use relevant data from images that originate from a scheduled acquisition as input for consistently filling in corresponding values in DICOM SR Evidence Documents.

Note: In the Scheduled Workflow Integration Profile, the Evidence Creator creates images. This case can be considered an image acquisition append case (see Table A.1-2).

General table structure:

- The 1st column denotes the DICOM attributes whose values shall be mapped between the DICOM objects (equal values in the same table row). The DICOM attribute tag is indicated for clarity.
- The 2nd and 3rd columns define for each attribute how the attribute values are filled for the different IODs.
  These columns read left to right within the same row: Image/ Standalone IOD (2nd column) shall be used as the source for copies to Evidence Documents (DICOM SR IOD).

Cell content conventions:

- These are the same as defined in the corresponding paragraph of Section A.1.

Actor behavior:

- The values from the Image/ Standalone IOD, if available as a source, shall be used by the Evidence Creator or Acquisition Modality to fill in the attribute shown on the corresponding rows for Evidence Document instances.

Table A.2-1 defines how to use values from Image or Standalone IODs that were previously generated by a *different* actor in order to fill in values into newly generated Evidence Documents created by an Evidence Creator or Acquisition Modality in the Evidence Documents Integration Profile.

Note that this mapping table is most relevant for cases where evidence is created based on images that originate from a scheduled acquisition, otherwise most of the workflow integration-critical attributes will be absent or empty in the originating Image/ Standalone IODs. This table does not take into account cases where Evidence Documents are generated as a result of Post-Processing Workflow.

Table A.2-1: Evidence Document Attribute Mapping

DICOM attribute	Image/ Standalone IOD	Filling values for Evidence Documents
Study Instance UID (0020,000D)	Source	Copy See (IHE-A.2.1.1)
Referenced Study Sequence (0008,1110)	Source. See (IHE-A.2-1.2)	Copy, if not absent in Image/ Standalone IOD. See (IHE-A.2.1.1)
Accession Number (0008,0050)	Source	Copy See (IHE-A.2.1.1)
Issuer of Accession Number Sequence (0008,0051)	Source	Copy See (IHE-A.2.1.1) and (IHE-A.2.1.3)
>Local Namespace Entity ID (0040,0031)	Source	Copy See (IHE-A.2.1.1) and (IHE-A.2.1.3)
>Universal Entity ID (0040,0032)	Source	Copy See (IHE-A.2.1.1) and (IHE-A.2.1.3)
>Universal Entity ID Type (0040,0033)	Source	Copy See (IHE-A.2.1.1) and (IHE-A.2.1.3)
Institution Name (0008,0080)	Source	Copy See (IHE-A.2.1.3)
Institution Address (0008,0081)	Source	Copy See (IHE-A.2.1.3)
Institution Code Sequence (0008,0082)	Source	Copy See (IHE-A.2.1.3)
>Code Value (0008,0100)	Source	Copy See (IHE-A.2.1.3)
>Coding Scheme Designator (0008,0102)	Source	Copy See (IHE-A.2.1.3)
>Code Meaning (0008,0104)	Source	Copy See (IHE-A.2.1.3)
Requested Procedure ID (0040,1001)	**Request Attributes Sequence** (0040,0275): Source See (IHE-A.2.1.2)	**Referenced Request Sequence** (0040,A370): Copy, if not absent in Image/ Standalone IOD.
Requested Procedure Description (0032,1060)	**Request Attributes Sequence** (0040,0275): Source See (IHE-A.2-1.2)	**Referenced Request Sequence** (0040,A370): Copy, if not absent in Image/ Standalone IOD.
Reason for the Requested Procedure (0040,1002)	**Request Attributes Sequence** (0040,0275): Source See (IHE-A.2.1.2)	**Referenced Request Sequence** (0040,A370): Copy, if not absent in Image/ Standalone IOD.
Requested Procedure Code Sequence (0032,1064)	**Request Attributes Sequence** (0040,0275): Source See (IHE-A.2.1.2)	**Referenced Request Sequence** (0040,A370): Copy, if not absent in Image/ Standalone IOD.
Reason for Requested Procedure Code Sequence (0040,100A)	**Request Attributes Sequence** (0040,0275): Source See (IHE-A.2.1.2)	**Referenced Request Sequence** (0040,A370): Copy, if not absent in Image/ Standalone IOD.

DICOM attribute	Image/ Standalone IOD	Filling values for Evidence Documents
Procedure Code Sequence (0008,1032)	Source. Note: May be absent.	Recommendation: Copy, if not absent in Image/ Standalone IOD.

- (IHE-A.2.1.1) If the creation of evidence relates to a Requested Procedure, it is required per DICOM to also fill this information in the Referenced Request Sequence (0040,A370).
- (IHE-A.2.1.2) May be absent in case of an unscheduled image acquisition.
- (IHE-A.2.1.3) For Evidence Creators that support the Enterprise Identity Option, see RAD TF-2: 4.18.4.1.2.6.

A.3: Context-critical Attributes

This section extends the above table with additional IHE Requirements based on a number of context-critical attributes (Type 2 in DICOM) common to most images and standalone IODs when provided in response to a C-FIND Request in Return Key Attributes. The content of this table is strictly consistent with DICOM PS3.17 Annex J:.

Modality Worklist	Images and Standalone IOD	MPPS IOD
Patient Name	Patient Name (Note 1)	Patient Name (Note 1)
Patient ID	Patient ID (Note 1)	Patient ID (Note 1)
Issuer of Patient ID	Issuer of Patient ID (Note 3)	Issuer of Patient ID (Note 3)
Issuer of Patient ID Qualifiers Sequence	Issuer of Patient ID Qualifiers Sequence (Note 3)	Issuer of Patient ID Qualifiers Sequence (Note 3)
Patient's Birth Date	Patient's Birth Date (Note 2)	Patient's Birth Date (Note 2)
Patient's Sex	Patient's Sex (Note 2)	Patient's Sex (Note 2)
Other Patient IDs Sequence	Other Patient IDs Sequence (Note 4)	----
Referring Physician's Name	Referring Physician's Name (Note 2)	----

Note 1: This Attribute may be zero length when the Department System Scheduler/Order Filler providing the Modality Worklist service is not accessible. Pre-registered values for Patient ID and Patient Name will be used in the Unidentified Patient cases defined in the IHE Radiology Technical Framework.

Note 2: Attribute may be zero length when the Department System Scheduler/Order Filler providing Modality Worklist service is not accessible or the Attributes returned by MWL are zero length.

Note 3: For the Enterprise Identity Option see:

- RAD TF-2: 4.6.4.1.2.5 and RAD TF-2: 4.8.4.1.2.5 for the Acquisition Modality
- RAD TF-2: 4.18.4.1.2.6 and RAD TF-2: 4.20.4.1.2.4 for the Evidence Creator

Note 4: For the Enterprise Identity Option, Other Patient IDs Sequence shall be copied in Images and Standalone IODs if the information is available in the Modality Worklist item.

A.4: Consistency Data Model

The section introduces a data model of the entities and their Attributes related to Consistency. Readers are advised to use this data model along with the table presented in Section 1 of this appendix. This data model is provided only for ease of understanding and does not introduce any additional IHE requirements than those specified in Section C.2.

Entities are shown by solid line rectangular boxes.

A relationship between two entities is shown by an arrow or a straight line. In the case of straight lines, the Attributes used to define this relationship are not described by this model (they are generally well understood). In the case an arrow is used:

- The attribute in the referencing entity used to define this relationship is shown within the entity in a box next to the origin of the arrow (e.g., Ref. St. Seq. in the Requested Procedure Entity is used to link this entity with the Conceptual Study Management entity).
- The referenced attribute is shown at the tip of the arrow also in a rectangular box but with curly brackets (e.g., {Study Instance UID}). In some cases, the referencing Attribute has a different name than this referenced Attribute. This reflects the way DICOM has elected to name and or encode those Attributes. The number shown between square brackets is the Data Type as defined by DICOM.

The cardinality of relationship is defined both along straight lines and arrows:

- Cardinality of the relationship between the entities is shown along the arrow/lines. The direction of the arrow has no influence on the cardinality definition. This cardinality reflects the cardinality between entities in a real-world data model (used as defined by DICOM). This cardinality may be slightly different in the DICOM Information Object Definition data models as this data-model reflects entity relationship supported in the context of information communication. For example, “I-Series to I-Composite” has a 1 to 0-n relationship to reflect that a PPS may contain a series with no Composite Instances (e.g., images, GSPS). However, in the context of the DICOM Storage Service Class, a Series must contain at least one Composite Instance (e.g., image, GSPS). In other terms series with no images cannot be stored but can be defined by DICOM Performed Procedure Steps.

Arrows with thick lines reflect the fact that the referencing Attributes are UID (broad uniqueness), as opposed to simple IDs, which are shown by thin line arrows.

In this Data Model, two dotted-line boxes are shown:

- The first one groups 4 entities: I-Patient, I-Study, I-Series, and I-Composite. This is intended to reflect the fact that Composite Instances are transferred (Storage Service Class) by grouping these four entities. These 4 entities are those defined by DICOM Composite Image Information Model (see DICOM PS3.3 Section A.1.2).

- The second one groups 2 entities: Requested Procedure and Conceptual Study Management. This reflects that those two entities are always in a one-to-one relationship. The Requested Procedure entity as well as those associated with it (Patient, Imaging Service Request, Schedule Procedure Step and Performed Procedure Step) are defined by the DICOM Model of the Real World for the purpose of the Modality-IS Interface (see DICOM PS3.3 Section 7.3). The "Conceptual Study Management" entity is special in that its only attribute in the context of this version of the IHE Technical Framework is the Referenced SOP Instance UID (found in Reference Study Sequence). This Conceptual Study Detached Study entity (without the Detached Management Study SOP Class being used) is defined in DICOM PS3.17 Annex J.

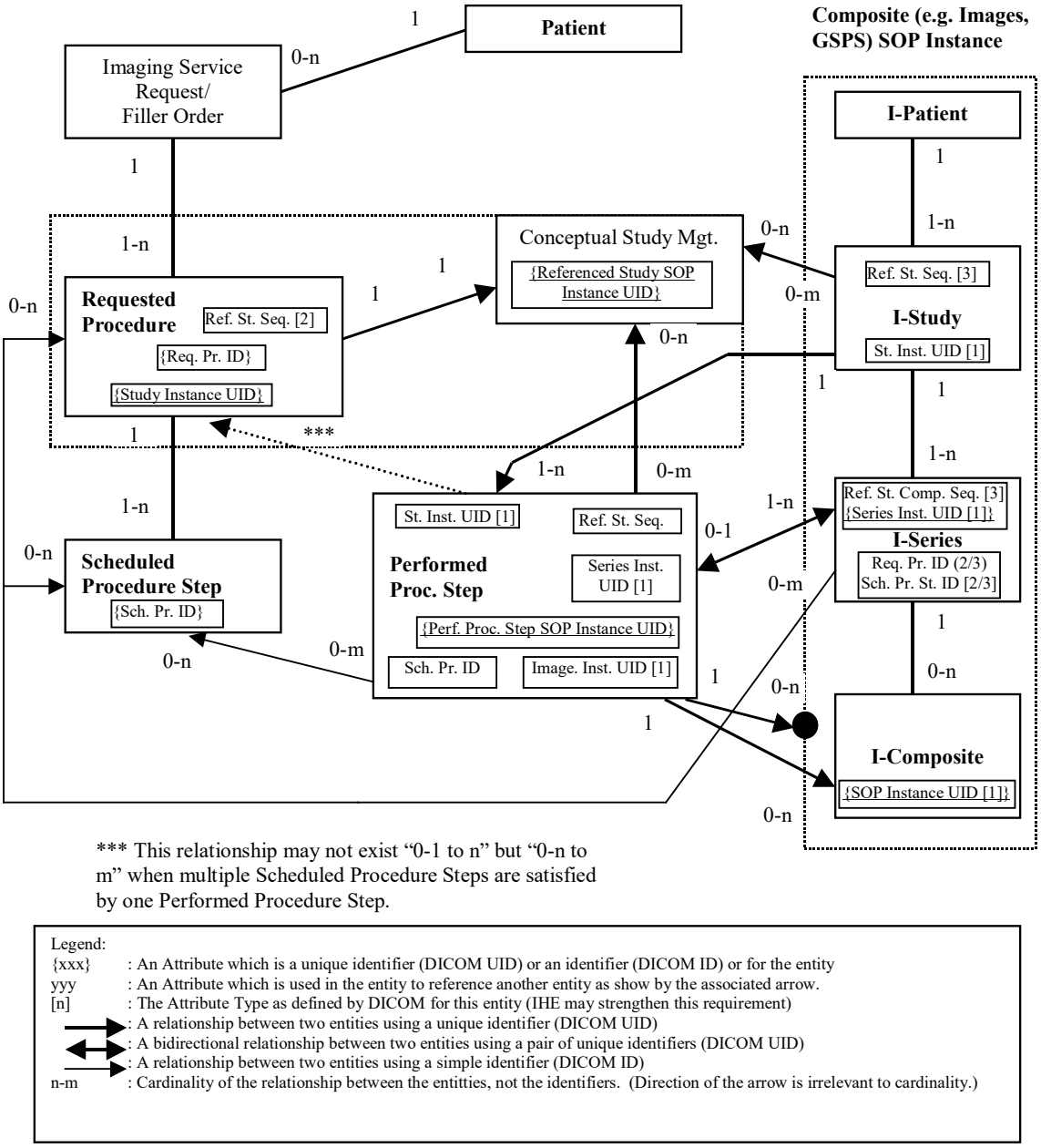

Figure A.4-1: Data Consistency Model: Modality Worklist Information Model, Composite IODs and Modality Performed Procedure Step IOD

A.5: Imported Object Integration – Critical Attributes

The Importer shall modify each DICOM object to ensure that critical attributes from the local Enterprise are incorporated.

The tables below describe requirements, recommendations or explanations on integration-critical attributes for cases covering import of digital media and creation of digitized objects into the local environment.

Until such time that Code Sets are consistent among Enterprises, the Protocol Code Sets used within one Enterprise will most likely not be valid in another Enterprise. Coercion rules or mechanisms for Code Sets are out of scope for the Radiology Technical Framework.

General table structure:

- The 1st column denotes the DICOM attributes whose values shall be mapped between the DICOM objects (equal values in the same table row). The DICOM attribute tag is indicated for clarity.
- The 2nd to 5th columns define where attribute values come from: all defined attribute values of one table row are equal. These columns read left to right.
- The column labeled 'Objects for Import' refers to attributes and values included in, or "extracted" from the objects to be imported. In the case of hardcopy import (i.e., digitization), this extraction can be done via OCR or manual entry, extracted from the paperwork accompanying the media, or via some other mechanism. It is likely that values will not be available for some of the attributes in that column.
- The column labeled 'Resultant IOD' signifies the attributes and values included in the objects resulting from the Import action (regardless of the source of the import).
- The MWL column is replaced by a column entitled 'Demographic Query Information' for unscheduled cases where the Importer receives information via an HL7 query message rather than via a DICOM MWL response.

Cell content conventions:

- "Source" in a table cell means that the DICOM object defined in the table column (e.g., MWL) and created by one actor shall be the source of this value for the DICOM attribute for another actor to fill in this value for their own objects (e.g., Image or MPPS).
- "Copy" in a table cell means that the value shall be copied from a corresponding source attribute of another DICOM object, as defined by the table column.
- "Copy from: <DICOM attribute>" means that, instead of using the DICOM attribute of the same row as the source, the source as specified in the referenced DICOM attribute shall be used.
- "Equal" in a table cell means that an actor already knows the value, e.g., from some previously performed action. Thus, the circumstances of value generation do not matter.
- "Equal (internally generated)" in a table cell means that an actor has internally generated a value that may be used in more than one DICOM object, without having obtained this value from another actor (i.e., no copy).

- ”Source-1”, “Copy-1” or “Equal-1” etc. are corresponding mapping attribute values, if several sources appear in one table row.
- “Copy-2 [Copy-1]” in a table cell means Copy the value from Source-2 (Copy-2) if present, otherwise Copy from Source-1 (Copy-1).
- “Merge Copy-1, Copy-2” in a table cell means that the values copied from multiple sources are all to be included in the resulting attribute. Note: this is done only for some multi-valued or sequence attributes.
- “See (IHE-X)” in a table cell denotes additional requirements, recommendations or explanations for the attribute value, as described in the table’s note “(IHE-X)”. Otherwise, brief text that fits into a table cell is presented in the cell.
- “n.a.” in a table cell means that such an attribute or value shall not exist. Either the attribute is not defined by the DICOM standard for this object, or the particular sequence attribute is a DICOM Type 3 attribute, and DICOM requires at least one sequence item to be present.

Actor behavior:

- The general goal for the ‘importing’ actor (Importer) is to minimally change the original Objects. Only attributes that are critical to ensure identification consistency in the receiving environment are coerced.
- The ‘importing’ actor (Importer) shall use the values in the second and third columns (‘Objects for Import’ and ‘MWL return values’ or ‘Demographic Query Information’) as the source for copying into the Image/ Standalone or MPPS IODs according to the rules defined within the tables.
- The ‘importing’ actor (Importer) shall not assume that instances on the media are from the same Series, Study, Patient, etc. There are cases where the media may contain multiple patients.
- Any attribute value in the original Objects for Import that is replaced by the importing actor shall be recorded in the ‘Original Attributes Sequence’ contained in the Objects resulting from the import activity.
- Attributes from the column “Modality Worklist” shall be requested by a MWL SCU (Importer) as a return key in its C-FIND Requests. The Department System Scheduler shall return attribute values in the Modality Worklist C-FIND response (for a complete description, see RAD TF-2: Table 4.5-3).
- The PPS Manager, Image Manager and Department System Scheduler Actors shall be capable of handling the attributes shown in the column titled “MPPS IOD” as defined by the SCP Type and the additional notes. The general goal is to use the PPS information presenting for the imported instances for use in the resulting PPS.

Table A.5-1: Scheduled Import - Required Mapping of Corresponding Attributes

DICOM attribute	Objects for Import	Modality Worklist (return attribute values)	Filling values for:	
			Resultant IOD	MPPS IOD
Patient Name (0010,0010)	Source-1	Source-2	Copy-2 [Copy-1]	Copy-2 [Copy-1]
Patient ID (0010,0020)	Source-1	Source-2	Copy-2 [Copy-1]	Copy-2 [Copy-1]
Other Patient IDs (0010,1000)	Source-1	Source-2	Merge Copy-1,Copy-2	n.a
Patient's Birth Date (0010,0030)	Source-1	Source-2	Copy-2 [Copy-1]	Copy-2 [Copy-1]
Patient's Sex (0010,0040)	Source-1	Source-2	Copy-2 [Copy-1]	Copy-2 [Copy-1]
Study Instance UID (0020,000D)	Source-1 (See IHE-A.5.1.2)	Source-2	Copy-1 [Copy-2] (See IHE-A.5.1.2)	Copy-1 [Copy-2] (See IHE-A.5.1.2)
Referenced Study Sequence (0008,1110)	Source-1 See (IHE-A.5.1.8)	Source-2 See (IHE-A.5.1.6)	Copy-1 [Copy-2]	Copy-1 [Copy-2]
Accession Number (0008,0050)	Source-1	Source-2	Copy-2 See (IHE-A.5.1.3)	Copy-2 See (IHE-A.5.1.3)
Requested Procedure ID (0040,1001)	Source-1	Source-2	Copy-2 [Copy-1]	Copy-2 [Copy-1]
Requested Procedure Description (0032,1060)	Source-1	Source-2	Copy-2 [Copy-1] See (IHE-A.5.1.7)	Copy-2 [Copy-1] See (IHE-A.5.1.7)
Reason for the Requested Procedure (0040,1002)	Source-1	Source-2	Copy-2 [Copy-1] See (IHE-A.5.1.7)	Copy-2 [Copy-1] See (IHE-A.5.1.7)
Reason for Requested Procedure Code Sequence (0040,100A)	Source-1	Source-2	Copy-2 [Copy-1] See (IHE-A.5.1.7)	Copy-2 [Copy-1] See (IHE-A.5.1.7)
Scheduled Procedure Step ID (0040,0009)	Source-1	Source-2	Copy-2 [Copy-1]	Copy-2 [Copy-1]

Request Attributes Sequence (0040,0275)

Scheduled Step Attributes Sequence (0040,0270)

DICOM attribute	Objects for Import	Modality Worklist (return attribute values)	Filling values for:	
			Resultant IOD	MPPS IOD
Scheduled Procedure Step Description (0040,0007)	Source-1	Source-2	Copy-1	Copy-2
Scheduled Protocol Code Sequence (0040,0008)	Source-1	Source-2	Copy-1 See (IHE-A.5.1.7)	Copy-2
Performed Protocol Code Sequence (0040,0260)	Source-1	n.a.	Copy-1 See (IHE-A.5.1.9)	See (IHE-A.5.1.10)
Study ID (0020,0010)	Source	n.a.	Copy [Equal (Internally Generated Recommendation: Use Requested Procedure ID from MWL)]	Copy [Equal (Internally Generated Recommendation: Use Requested Procedure ID from MWL)]
Performed Procedure Step ID (0040,0253)	Source See (IHE-A.5.1.1)	n.a.	Copy See (IHE-A.5.1.1)	Copy [Equal (Internally Generated)] See (IHE-A.5.1.1)
Performed Procedure Step Description (0040,0254)	Source	n.a.	Copy See (IHE-A.5.1.7)	Copy See (IHE-A.5.1.7)
Performed Procedure Step Start Date (0040,0244)	Source	n.a	Copy	Equal (internally generated).
Performed Procedure Step Start Time (0040,0245)	Source	n.a	Copy	Equal (internally generated).
Requested Procedure Code Sequence (0032,1064)	n.a	Value shall be used for Procedure Code Sequence as specified below.	n.a	n.a.
Procedure Code Sequence (0008,1032)	n.a	n.a.	Copy from: Requested Procedure Code Sequence (0032,1064). See (IHE-A.5.1.7)	Copy from: Requested Procedure Code Sequence (0032,1064) See (IHE-A.5.1.7)

DICOM attribute	Objects for Import	Modality Worklist (return attribute values)	Filling values for:		
			Resultant IOD		MPPS IOD
Referenced SOP Class UID (0008,1150)	n.a.	n.a.	**Referenced PPS Sequence** (IHE-A.1.3)	1.2.840.10008.3.1.2.3.3 See (IHE-A.5.1.4)	1.2.840.10008.3.1.2.3.3 See (IHE-A.5.1.4)
Referenced SOP Instance UID (0008,1155)	n.a.	n.a.		Equal to SOP Instance UID of the associated MPPS See (IHE-A.5.1.5)	Equal (internally generated) See (IHE-A.5.1.5)

- (IHE-A.5.1.1) Performed Procedure Step ID may be generated by the Importer arbitrarily and is not necessarily unique: Two different Performed Procedure Steps may share the same ID (e.g., may have been generated by different Importers). The Performed Procedure Step ID (0040,0253) will not be available when data is imported from non-digital media (e.g., digitized hardcopy objects)
- (IHE-A.5.1.2) Valid DICOM UIDs are universally unique, so there should be no risk of collision with local UIDs. When a valid set of DICOM UIDs is present the Importer shall use this set and not change them. If the Importer detects incorrect UIDs or an inconsistent set of UIDs, then it may correct or re-generate UIDs. The UIDs are used as references between objects, and if they are altered, the Importer shall maintain referential integrity.
- (IHE-A.5.1.3) A Zero Length Accession Number shall be created when no reliable value for this attribute is available. Reliable values are those that can be conveyed by means other than manual data entry such as a value received from the Order Filler via a Modality Worklist including an Accession Number or received through a bar code reader.
- (IHE-A.5.1.4) In MPPS, SOP Class UID is sent in the Affected SOP Class UID (0000,0002) for the PPS N-Create message and in Requested SOP Class UID (0000,0003) for the PPS N-Set message. SOP Class UID (0008,0016) shall not be used.
- (IHE-A.5.1.5) In MPPS, SOP Instance UID is sent in the Affected SOP Instance UID (0000,1000) of the PPS N-Create message and in Requested SOP Instance UID (0000,1001) for the PPS N-Set message. SOP Instance UID (0008,0018) shall not be used.
- (IHE-A.5.1.6) According to the Query Modality Worklist transaction (RAD TF-2: 4.5.4.1.2.2), the DSS/Order Filler is required to replicate the Study Instance UID value in both the Study Instance UID attribute (0020,000D) and within the Referenced Study Sequence (0008,1110).

- (IHE-A.5.1.7) Descriptions and Codes used in the Enterprise may not match those used in the Evidence Objects. The method used to coerce the Descriptions or Codes is out of scope of the Technical Framework. Note that the Descriptions and Codes from the Evidence Objects may be useful.
- (IHE-A.5.1.8) The Referenced Study Sequence (0008,1110) will not be available when data is imported from non-digital media (e.g., digitized hardcopy objects)
- (IHE-A.5.1.9) Performed Protocol Codes used in the Enterprise may not match those used in the Evidence Objects. Determination of whether to copy, coerce or remove the Codes is out of scope of the Technical Framework. Note that the Codes from the Evidence Objects may be useful.
- (IHE-A.5.1.10) See RAD TF-2: 4.59.4.1.2.3. If no information about the Scheduled Import exists, this shall be internally generated and included as one of the items in the Performed Protocol Sequence. The Performed Protocol Codes present in the Objects for Import may not match those used in the Evidence Objects. Determination of whether to merge, coerce and merge or discard the Codes is out of scope of the Radiology Technical Framework. Note that the Codes from the Evidence Objects may be useful.

Table A.5-2: Unscheduled Import - required mapping of corresponding attributes

DICOM attribute	Objects for Import	Demographic Query Information (return attribute values)	Filling values for:	
			Resultant IOD	MPPS IOD
Patient Name (0010,0010)	Source-1	Source-2 PID:5	Copy-2 [Copy-1]	Copy-2 [Copy-1]
Patient ID (0010,0020)	Source-1	Source-2 PID:3	Copy-2 [Copy-1]	Copy-2 [Copy-1]
Other Patient IDs (0010,1000)	Source-1	Source-2 PID:4	Merge Copy-1,Copy-2	n.a
Patient's Birth Date (0010,0030)	Source-1	Source-2 PID:7	Copy-2 [Copy-1]	Copy-2 [Copy-1]
Patient's Sex (0010,0040)	Source-1	Source-2 PID:8	Copy-2 [Copy-1]	Copy-2 [Copy-1]

DICOM attribute	Objects for Import	Demographic Query Information (return attribute values)	Filling values for:	
			Resultant IOD	MPPS IOD
Study Instance UID (0020,000D)	Source (See IHE-A.5.2.6)	n.a	Copy or Equal (internally generated) See (IHE-A.5.2.6)	Scheduled Step Attributes Sequence (0040,0270): Copy or Equal (internally generated) (See IHE-A.5.2.6)
Accession Number (0008,0050)	Source	n.a	Shall be empty (zero length).	Scheduled Step Attributes Sequence (0040,0270): Shall be empty.
Requested Procedure ID (0040,1001)	Source	n.a	Request Attributes Sequence (0040,0275): Equal (internally generated)	Scheduled Step Attributes Sequence (0040,0270): Equal (internally generated)
Scheduled Procedure Step ID (0040,0009)	Source	n.a	Request Attributes Sequence (0040,0275): Copy	Scheduled Step Attributes Sequence (0040,0270): Copy [Equal (internally generated)]
Reason for the Requested Procedure (0040,1002)	Source	n.a.	Request Attributes Sequence (0040,0275): Copy See (IHE-A.5.2.5)	Scheduled Step Attributes Sequence (0040,0270): Copy See (IHE-A.5.2.5)
Reason for Requested Procedure Code Sequence (0040,100A)	Source	n.a.	Request Attributes Sequence (0040,0275): Copy See (IHE-A.5.2.5)	Scheduled Step Attributes Sequence (0040,0270): Copy See (IHE-A.5.2.5)
Scheduled Protocol Code Sequence (0040,0008)	Source	n.a	Request Attributes Sequence (0040,0275): Copy	Scheduled Step Attributes Sequence (0040,0270): Copy
Performed Protocol Code Sequence (0040,0260)	Source	n.a	Copy See (IHE-A.5.2.7)	Merge Copy (internally generated). Shall contain a code indicating that an import was performed See (IHE-A.5.2.8)
Study ID (0020,0010)	Source	n.a.	Copy [Equal (Internally Generated)]	Copy [Equal (Internally Generated)]
Performed Procedure Step ID (0040,0253)	Source	n.a.	Copy See (IHE-A.5.2.1)	Copy [Equal (Internally Generated)] See (IHE-A.5.2.1)

DICOM attribute	Objects for Import	Demographic Query Information (return attribute values)	Filling values for:	
			Resultant IOD	MPPS IOD
Performed Procedure Step Description (0040,0254)	Source	n.a.	Copy See (IHE-A.5.2.5)	Copy See (IHE-A.5.2.5)
Performed Procedure Step Start Date (0040,0244)	Source	n.a	Copy	Equal (internally generated).
Performed Procedure Step Start Time (0040,0245)	Source	n.a	Copy	Equal (internally generated).
Requested Procedure Code Sequence (0032,1064)	n.a	Value shall be used for Procedure Code Sequence as specified below.	n.a	n.a.
Procedure Code Sequence (0008,1032)	n.a	n.a.	Copy from: Requested Procedure Code Sequence (0032,1064). See (IHE-A.5.2.5)	Copy from: Requested Procedure Code Sequence (0032,1064) See (IHE-A.5.2.5)
Referenced SOP Class UID (0008,1150)	n.a.	n.a.	**Referenced PPS Sequence** (IHE-A.2.2.2) 1.2.840.10008.3.1.2.3.3	1.2.840.10008.3.1.2.3.3 See (IHE-A.5.2.3)
Referenced SOP Instance UID (0008,1155)	n.a.	n.a.	Equal to SOP Instance UID of the associated MPPS See (IHE-A.5.2.4)	Equal (internally generated) See (IHE-A.5.2.4)

- (IHE-A.5.2.1) Performed Procedure Step ID is generated by the importer arbitrarily and is not necessarily unique: Two different Performed Procedure Steps may share the same ID (e.g., may have been generated by different importers).
- (IHE-A..2.2) The Referenced Performed Procedure Step Sequence (0008,1111) that contains the PPS SOP Instance UID shall be included (per DICOM PS3.3 Section C.7.3 strong recommendation, General Series Module Table, Note 1).
- (IHE-A.5.2.3) In MPPS, SOP Class UID is sent in the Affected SOP Class UID (0000,0002) for the PPS N-Create message and in Requested SOP Class UID (0000,0003) for the PPS N-Set message. SOP Class UID (0008,0016) shall not be used.

- (IHE-A.5.2.4) In MPPS, SOP Instance UID is sent in the Affected SOP Instance UID (0000,1000) of the PPS N-Create message and in Requested SOP Instance UID (0000,1001) for the PPS N-Set message. SOP Instance UID (0008,0018) shall not be used.
- (IHE-A.5.2.5) Descriptions and Codes used in the Enterprise may not match those used in the Evidence Objects for Import. The method used to coerce the Descriptions or Codes is out of scope of the Radiology Technical Framework. Note that the Descriptions and Codes from the Evidence Objects may be useful.
- (IHE-A.5.2.6) Ideally, UIDs are universally unique, so there should be no risk of collision with local UIDs, and hence there should be no reason to change them. However, since the integrity of externally generated data cannot be ensured, it may be necessary to correct or re-generate UIDs. The UIDs are used as references between objects, and if they are altered, the Importer shall maintain referential integrity.
- (IHE-A.5.2.7) Performed Protocol Codes used in the Enterprise may not match those used in the Evidence Objects. Determination of whether to copy, coerce or remove the Codes is out of scope of the Radiology Technical Framework. Note that the Codes from the Evidence Objects may be useful.
- (IHE-A.5.2.8) See RAD TF-2: 4.59.4.1.2.3. The Performed Protocol Codes present in the Objects for Import may not match those used in the Evidence Objects. Determination of whether to merge, coerce and merge or discard the Codes is out of scope of the Technical Framework. Note that the Codes from the Evidence Objects may be useful.

Appendix B: HL7 Order Mapping to DICOM MWL

This appendix defines the mapping of the HL7 ADT, OMG and ORM messages to the DICOM Modality Worklist. Note that the HL7 messages address information regarding the order in the Placer Order Management [RAD-2] transaction, not scheduling or resource management information. The scheduling and resource management is internal to the Department System Scheduler.

Note that this mapping does not apply to the Procedure Scheduled [RAD-4] transaction (message from Department System Scheduler to Image Manager, see RAD TF-2: 4.4). Also see the IHE ER Model (RAD TF-1: 3.4) and the HL7 Implementation Notes in RAD TF-2: 2.5 for a more thorough definition of field lengths, value representations, and attribute types. Mappings between HL7 and DICOM are illustrated in the following manner:

- Element Name (HL7 item_number.component #/ DICOM (group, element))
- The component value is not listed if the HL7 element does not contain multiple components

Table B-1: HL7 Order Mapping to DICOM MWL

DICOM Description /Module	DICOM Tag	DICOM SCP Matching Key Type	DICOM SCP Return Key Type	HL7 Description	HL7 Item #	HL7 v2.3.1 Segment	HL7 v2.5.1 Segment	Notes
SOP Common								
Specific Character Set	(0008,0005)	O	1C	Character Set	00692	ORM MSH:18	OMG MSH:18	
Scheduled Procedure Step								
Scheduled Procedure Step Sequence	(0040,0100)	R	1					
>Scheduled station AE title	(0040,0001)	R	1					Generated by the department system scheduler
>Scheduled Procedure Step Start Date	(0040,0002)	R	1					Generated by the department system scheduler
>Scheduled Procedure Step Start Time	(0040,0003)	R	1					Generated by the department system scheduler

DICOM Description /Module	DICOM Tag	DICOM SCP Matching Key Type	DICOM SCP Return Key Type	HL7 Description	HL7 Item #	HL7 v2.3.1 Segment	HL7 v2.5.1 Segment	Notes
>Modality	(0008,0060)	R	1					Generated by the department system scheduler (Note 3)
>Scheduled Performing Physician's Name	(0040,0006)	R	2	Technician	00266	ORM OBR:34	OMG OBR:34	See Note 9
>Scheduled Procedure Step Description	(0040,0007)	O	1C					Generated by the department system scheduler
>Scheduled Station Name	(0040,0010)	O	2					Generated by the department system scheduler
>Scheduled Procedure Step Location	(0040,0011)	O	2					Generated by the department system scheduler
>Scheduled Protocol Code Sequence	(0040,0008)	O	1C					
>>Code Value	(0008,0100)	O	1C					Generated by the department system scheduler
>>Coding Scheme Designator	(0008,0102)	O	1C					Generated by the department system scheduler
>>Code Meaning	(0008,0104)	O	3					Generated by the department system scheduler
>Pre-Medication	(0040,0012)	O	2C					

DICOM Description /Module	DICOM Tag	DICOM SCP Matching Key Type	DICOM SCP Return Key Type	HL7 Description	HL7 Item #	HL7 v2.3.1 Segment	HL7 v2.5.1 Segment	Notes
>Scheduled Procedure Step ID	(0040,0009)	O	1	N/A				Generated by the department system scheduler
>Requested Contrast Agent	(0032,1070)	O	2C	N/A				Generated by the department system scheduler
>Scheduled Procedure Step Status	(0040,0020)	O	3	N/A				Generated by the department system scheduler
>All other Attributes from the Scheduled Procedure Step Module		O	3					
Requested Procedure								
Requested Procedure ID	(0040,1001)	O	1					Generated by the department system scheduler
Reason for the Requested Procedure	(0040,1002)	O	3	Reason for Study	00263	ORM OBR:31	OMG OBR:31	OBR:31 may be either a code or text value; if a code, then the code meaning (display name) should be used; see also (0040,100A)

DICOM Description /Module	DICOM Tag	DICOM SCP Matching Key Type	DICOM SCP Return Key Type	HL7 Description	HL7 Item #	HL7 v2.3.1 Segment	HL7 v2.5.1 Segment	Notes
Reason for Requested Procedure Code Sequence	(0040,100A)	O	3	Reason for Study	00263	ORM OBR:31	OMG OBR:31	OBR:31 may be either a code or text value; see also (0040,1002)
>Code Value	(0008,0100)	O	1C					OBR:31 Component 1
>Coding Scheme Designator	(0008,0102)	O	1C					OBR-31 Component 3
>Coding Scheme Version	(0008,0103)	O	1C					Only sent if code scheme defines versions
>Code Meaning	(0008,0104)	O	3					OBR-31 Component 2
Requested Procedure Description	(0032,1060)	O	1C					Generated by the department system scheduler. See Note 1
Requested Procedure Code Sequence	(0032,1064)	O	1C					
>Code Value	(0008,0100)	O	1C					Generated by the department system scheduler. See Note 1
>Coding Scheme Designator	(0008,0102)	O	1C					Generated by the department system scheduler. See Note 1

DICOM Description /Module	DICOM Tag	DICOM SCP Matching Key Type	DICOM SCP Return Key Type	HL7 Description	HL7 Item #	HL7 v2.3.1 Segment	HL7 v2.5.1 Segment	Notes
>Code Meaning	(0008,0104)	O	3					Generated by the department system scheduler. See Note 1
Study Instance UID	(0020,000D)	O	1					Generated by the department system scheduler
Referenced Study Sequence	(0008,1110)	O	2					
>Referenced SOP Class UID	(0008,1150)	O	1C					
>Referenced SOP Instance UID	(0008,1155)	O	1C					
Requested Procedure Priority	(0040,1003)	O	2	Quantity/ Timing	00221.6	ORM ORC:7	OMG TQ1:9	See Note 2
Patient Transport Arrangements	(0040,1004)	O	2	Transport Arrangement Response.	01031.1-3	ORM OBR:30	OMG OBR:30	
All other Attributes from the Requested Procedure Module		O	3					
Imaging Service Request								
Accession Number	(0008,0050)	O	2					Generated by the department system scheduler
Issuer of Accession Number Sequence	(0008,0051)	O	3					Assigned by the department system scheduler

DICOM Description /Module	DICOM Tag	DICOM SCP Matching Key Type	DICOM SCP Return Key Type	HL7 Description	HL7 Item #	HL7 v2.3.1 Segment	HL7 v2.5.1 Segment	Notes
Requesting Physician	(0032,1032)	O	2	Ordering Provider	00226.1-7	ORM OBR:16	OMG OBR:16	
Referring Physician's Name	(0008,0090)	O	2	Referring Doctor	00138.1-7	ORM PV1:8	OMG PV1:8	
Placer Issuer and Number	(0040,2016)	O	2	Placer Order #	00216.1-2	ORM ORC:2	OMG ORC:2	See Note 4
Filler Issuer and Number	(0040,2017)	O	2	Filler Order #	00217.1-2	ORM ORC:3	OMG ORC:3	See Note 4
Reason for Imaging Service Request	(0040,2001)	O	2	Reason for Study	00263	ORM OBR:31	OMG OBR:31	The attribute (0040,2001) was retired by DICOM in 2004 in favor of (0040,1002) and (0040,100A). Accordingly, the DICOM return key may be empty, or a duplicate of (0040,1002) and/or the code meaning of (0040,100A).
Entered by….	(0040,2008)	O	3	Entered by….	00224.2-6	ORM ORC:10	OMG ORC:10	
Order Entering Location	(0040,2009)	O	3	Entering Organization	00231.2	ORM ORC:17	OMG ORC:17	
Order Callback Phone Number	(0040,2010)	O	3	Order Callback Phone Number	00228	ORM ORC:14	OMG ORC:14	
All other Attributes		O	3					

DICOM Description /Module	DICOM Tag	DICOM SCP Matching Key Type	DICOM SCP Return Key Type	HL7 Description	HL7 Item #	HL7 v2.3.1 Segment	HL7 v2.5.1 Segment	Notes
from the Scheduled Procedure Step Module								
Requested Procedure								
Requested Procedure Code Sequence	(0032,1064)							
>Code Value	(0008,0100)	O	1	Identifier	00393.1	ORM OBR:44	OMG OBR:44	
>Code Meaning	(0008,0104)	O	1	Text	00393.2	ORM OBR:44	OMG OBR:44	
>Coding Scheme Designator	(0008,0102)	O	1	Name of Coding System	00393.3	ORM OBR:44	OMG OBR:44	
Visit Identification								
Admission ID	(0038,0010)	O	2	Patient Account Number or Visit Number	00121.1 or 00149.1	ORM PID: 18 or PV1:19	OMG PID: 18 or PV1:19	See Note 6
Issuer of Admission ID Sequence	(0038,0014)	O	3	Patient Account Number or Visit Number	00121.4 or 00149.4	ORM PID:18 or PV1-19	OMG PID:18 or PV1-19	See Note 6
All other Attributes from the Visit Identification Module		O	3					
Visit Status								
Current Patient Location	(0038,0300)	O	2	Assigned Pat. Loc.	00133	ORM PV1:3	OMG PV1:3	
All other Attributes from the Visit Status Module		O	3					

DICOM Description /Module	DICOM Tag	DICOM SCP Matching Key Type	DICOM SCP Return Key Type	HL7 Description	HL7 Item #	HL7 v2.3.1 Segment	HL7 v2.5.1 Segment	Notes
Visit Relationship								
Referenced Patient Sequence	(0008,1120)	O	2					
>Referenced SOP Class UID	(0008,1150)	O	2					
>Referenced SOP Instance UID	(0008,1155)	O	2					
All other Attributes from the Visit Relationship Module		O	3					
Visit Admission								
All Attributes from the Visit Admission Module		O	3					
Patient Relationship								
All Attributes from the Patient Relationship Module		O	3					
Patient Identification								
Patient's Name	(0010,0010)	R	1	Patient Name	00108	ORM PID:5	OMG PID:5	See Note 10
Patient ID	(0010,0020)	R	1	External Patient ID	00105.1	ORM PID:3.1	OMG PID:3.1	See Note 5
Issuer of Patient ID	(0010,0021)	O	3	External Patient ID	00105.4	ORM PID:3.4	OMG PID:3.4	See Note 5
Ethnic Group	(0010,2160)	O	3	Ethnic Group	00125	ORM PID:22	OMG PID:22	
All other Attributes from the Patient		O	3					

DICOM Description /Module	DICOM Tag	DICOM SCP Matching Key Type	DICOM SCP Return Key Type	HL7 Description	HL7 Item #	HL7 v2.3.1 Segment	HL7 v2.5.1 Segment	Notes
Identification Module								
Patient Demographic								
Patients Birth Date	(0010,0030)	O	2	Date/ Time of Birth	00110.1	ORM PID:7	OMG PID:7	
Patient's Sex	(0010,0040)	O	2	Sex	00111	ORM PID:8	OMG PID:8	See Note 11
Patient's Weight	(0010,1030)	O	2	Observation Value	00573 when 00571.2 = "Body Weight" and 00574.1 = "kg"	ADT OBX:5	ADT OBX:5	See Note 7
Patient's Size	(0010,1020)	O	2	Observation Value	00573 when 00571.2 = "Body Height" and 00574.1 = "m"	ADT OBX:5	ADT OBX:5	See Note 7
Confidentiality constraint on patient data	(0040,3001)	O	2	VIP Indicator	146	ORM PV1:16	OMG PV1:16	
Region of Residence	(0010,2152)	O	3	Citizenship	00129	ORM PID:26	OMG PID:26	
Military Rank	(0010,1080)	O	3	Veterans Military Status	00130	ORM PID:27	OMG PID:27	
All other Attributes from the Patient Demographic Module		O	3					
Patient Medical								
Patient State	(0038,0500)	O	2	Danger Code	00246	ORM OBR:12	OMG OBR:12	

DICOM Description /Module	DICOM Tag	DICOM SCP Matching Key Type	DICOM SCP Return Key Type	HL7 Description	HL7 Item #	HL7 v2.3.1 Segment	HL7 v2.5.1 Segment	Notes
Pregnancy Status	(0010,21C0)	O	2	Ambulatory Status	00145	ORM PV1:15	OMG PV1:15	"B6" must be mapped to DICOM enumerated value "3" (definitely pregnant).
Medical Alerts	(0010,2000)	O	2	Relevant Clinical Info	00247	ORM OBR:13	OMG OBR:13	
Contrast Allergies	(0010,2110)	O	2	Allergy Code	00205	ADT AL1:3	ADT AL1:3	
Special Needs	(0038,0050)	O	2					
All other Attributes from the Patient Medical Module		O	3					

Adapted from DICOM PS3.4

- **Note 1**: Universal Service ID, Placer Supplemental Service Information and Specimen Source decoding:
  - In order to fulfill an accepted order, the Department System Scheduler generates one or more Requested procedures, to which it assigns IDs and proper codes, taken from either local or universal coding scheme (such as CPT-4 or LOINC).
  - If laterality is not specified in the Universal Service ID, then it is recommended to use HL7 v2.5.1 Placer Supplemental Information (01474) or HL7 v2.3.1 Specimen Source (00249) to further clarify the free format text descriptions of the Order.
- **Note 2**: Only the suggested values of the HL7 Priority component of Quantity/Timing shall be used for IHE. These values shall be mapped to the DICOM enumerated fields for Priority as:

HL7 Status	DICOM Status
S - STAT	STAT
A - ASAP	HIGH
R - Routine	ROUTINE
P - Pre-op	HIGH
C - Callback	HIGH

HL7 Status	DICOM Status
T - Timing	MEDIUM

- **Note 3**: Department System Scheduler/Order Filler shall determine the value of DICOM Modality (0008,0060) attribute based on the content of the order. The DICOM defined terms must be used for the MWL response as listed in DICOM PS3.3.
- **Note 4**: Attributes (0040,2016) and (0040,2017) are designed to incorporate the HL7 components of Placer Issuer and Number, and Filler Issuer and Number. In a healthcare enterprise with multiple issuers of patient identifiers, both the issuer name and number are required to guarantee uniqueness.
- **Note 5**: Refer to Appendix D for a more thorough discussion on the mapping of Patient ID and Issuer of Patient ID for different use cases.
- **Note 6**: As discussed in RAD TF-2: 4.1.4.1.2.4, either field PID-18 Patient Account Number or field PV1-19 Visit Number or both may be valued depending on the specific national requirements. Whenever field PV1-19 Visit Number in an order message is valued, its components shall be used to populate Admission ID (0038,0010) and Issuer of Admission ID Sequence (0038,0014) attributes in the MWL responses. In the case where field PV1-19 Visit Number is not valued, these attributes shall be valued from components of field PID-18 Patient Account Number. This requires that Visit Numbers be unique across all account numbers. Issuer of Admission ID (0038,0011), formerly identified in this note, has been retired by DICOM.
- **Note 7**: Patient's Weight and Patient's Size are two observations from multiple OBX segments. A coding scheme is not specified by IHE, but rather, the text values of "Body Weight" and "Body Height", respectively, are required to differentiate the two measurements. Note that DICOM specifies the use of "kg" and "m", respectively, for these measurements. An example of this HL7 encoding is:
  - OBX||ST|^BODY WEIGHT||62|kg|||||F
  - OBX||ST|^BODY HEIGHT||1.90|m|||||F
- **Note 8**: The DICOM attribute (0038, 0050) Special Needs is listed in Table D-1 with no specific mapping from an HL7 message. In the IHE demonstration, this value is to be provided by the DSS/Order Filler. The prospect of mapping this attribute to an HL7 value will be examined in the future.
- **Note 9**: Field OBR-34 *Technician* in ORM or OMG message is repeatable. Its data type is CM, with the following components: <name (CN)> ^ <start date/time (TS)> ^ <end date/time (TS)> ^ <point of care (IS)> ^ <room (IS)> ^ <bed (IS)> ^ <facility (HD)> ^ <location status (IS)> ^ <patient location type (IS)> ^ <building (IS)> ^ <floor (IS)>

- Thus, in mapping value to the DICOM attribute Scheduled Performing Physician (0040,0006), only sub-components of the first component of the first repetition of that field shall be used.

- **Note 10**: The encoding of the patient's name in the HL7 ORM or OMG PID:5 components is mapped without changes into the DICOM components in the Patient's Name (0010,0010) attribute as follows:

HL7	DICOM
<family_name&last_name_prefix>	=> <family_name_complex>
<given_name>	=> <given_name_complex>
<middle_initial_or_name>	=> <middle_name>
<suffix><degree> (See Note)	=> <name_suffix>
<prefix>	=> <name_prefix>

Note: The HL7 "degree" component is absorbed as a second element in the "name_suffix" component in DICOM.

- **Note 11**: The DICOM Patient's Sex (0010,0040) attribute can have only the values M, F or O (for other), or be zero length if unknown. These are enumerated values and hence any other values would be illegal. The HL7 v2 description also uses M, F and O, but suggests a value of U for unknown, which needs to be mapped to zero length. In HL7 these are only suggested values however, and care should be taken to map any other values encountered to valid DICOM values. Also note that in HL7 v2.5.1, the additional suggested values of A meaning Ambiguous and N meaning Not applicable, are present, and again, these would be illegal in DICOM and need to be mapped to O.

- **Note 12:** National requirements for character set values are defined below (see RAD TF-4 for further national extensions):

National Extension	DICOM attribute: Specific Character Set (0008,0005)	HL7 field: Character Set MSH 18
France	ISO_IR 100	8859/1
Germany	ISO_IR 100	8859/1
United States	ISO_IR 100	8859/1
Italy	ISO_IR 100	8859/1
UK	ISO_IR 100	8859/1
Canada	ISO_IR 100	8859/1
Spain	ISO_IR 100	8859/1
Japan	\ISO 2022 IR 87	ASCII~ISO IR87

Appendix C: Departmental Access to Non-Radiology Information

C.1: Scope

The access to non-radiology reports external to the imaging department is supported in the IHE Technical Framework by leveraging the Query Reports and Retrieve Reports Transactions also used to access imaging department Structured Reports (see RAD TF-2: 4.26 and 4.27). The External Report Repository Access provides a method to retrieve from the other department's reports (e.g., Laboratory).

The IHE Radiology Technical Framework does not restrict the manner in which this External Report Repository Access is implemented. It may, for example:

- Be a Laboratory Repository System that directly supports this actor and the associated Query Reports and Retrieve Reports Transactions;
- Accept the Query Reports and Retrieve Reports Transactions on one side and translate them into another query transaction supported by a specific laboratory report repository.

This appendix discusses the constraints that this External Report Repository Access needs to support for its proper integration.

C.2: Query Protocol

The assumptions under which the External Report Repository Access operates are:

1. The External Report Repository Access is responsible for formatting other department reports (e.g., laboratory report) into a DICOM Structured Report object (for content constraints see Section C.3). The primary focus for the Radiology Technical Framework will be laboratory reports, although other department's reports may be supported.
2. Consistent Patient IDs will be used in the laboratory (or other) department reports and in the imaging department. This will ensure that a Patient ID of an image displayed by an Image Display can be used as a key to retrieve recent laboratory reports for the same patient. This implies that the laboratory information system is integrated with the same ADT Patient Registration (although this integration is not within the scope of the IHE Radiology Technical Framework).
3. The Study and Series groupings are not specified by the IHE Radiology Technical Framework and may be arbitrarily used by the External Report Repository Access. For example, a DICOM Study may be created for each order (Accession Number) that contains one or more laboratory reports, a Series may be created for each laboratory request and so may contain mostly one report, unless amended. Alternatively, a single Series may be created and contain multiple reports if different laboratory exams were requested in the same order.
4. Study Instance UIDs, Series Instance UIDs and SOP Instance UIDs may be created by the External Report Repository Access to group one or more of its Reports. Those UIDs need to be properly formed DICOM UIDs, i.e., use a registered root.

5. If the same Report is being queried and retrieved several times, the same set of Study, Series and SOP Instance UIDs shall be provided by the External Report Repository Access. This ensures that two separate queries selecting the same report will identify the same instance and retrieve an identical copy. This is important to avoid multiple copies with the same content confusing the clinician.

6. Table C.2-1 shows the minimal set of matching and return keys that shall be supported by the External Report Repository Access as an SCP at the different DICOM Hierarchical Levels. It is a reduced set from the radiology department keys (see RAD TF-2: 4.14.4.1.2). Additional SR Instance specific keys that shall be supported by the External Report Repository Access as an SCP are defined in RAD TF-2: 4.26.4.1.2 and Table 4.26-1. Minimum DICOM conformance is still required. Conventions for Table C.2-1 may be found in RAD TF-2: 2.2.

Note: The use of N/A (Not Applicable) in the SCU columns is because the External Report Repository Access is only an SCP of the query request.

Table C.2-1: Query Matching and Return Keys

Attributes Name	Tag	Query Keys Matching		Query Keys Return		Notes
		SCU	SCP	SCU	SCP	
Study Level						
Study Date	(0008,0020)	N/A	R	N/A	R	
Study Time	(0008,0030)	N/A	R	N/A	R	
Accession Number	(0008,0050)	N/A	R	N/A	R	
Patient Name	(0010,0010)	N/A	R	N/A	R	IHE-1, IHE-2
Patient ID	(0010,0020)	N/A	R	N/A	R	
Study ID	(0020,0010)	N/A	R	N/A	R	
Study Instance UID	(0020,000D)	N/A	R	N/A	R	
Referring Physician's Name	(0008,0090)	N/A	R+	N/A	R+	IHE-1, IHE-2
Study Description	(0008,1030)	N/A	O	N/A	O	
Procedure Code Sequence	(0008,1032)	N/A	O	N/A	O	IHE-3
Patient's Birth Date	(0010,0030)	N/A	O	N/A	R+	
Patient's Sex	(0010,0040)	N/A	O	N/A	R+	
Series Level						
Modality	(0008,0060)	N/A	R	N/A	R	IHE-5
Series Number	(0020,0011)	N/A	R	N/A	R	
Series Instance UID	(0020,000E)	N/A	R	N/A	R	
Composite Object Instance Level						
Instance Number	(0020,0013)	N/A	R	N/A	R	
SOP Instance UID	(0008,0018)	N/A	R	N/A	R	
SOP Class UID	(0008,0016)	N/A	R+	N/A	R+	IHE-4

- **IHE-1:** Case insensitive matching is allowed in the IHE Radiology Technical Framework, for attributes of VR PN. A DICOM Change Proposal (CP 190) to allow case insensitivity on PN attributes was balloted in DICOM 2001.
- **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:** A SOP Class UID is a non-ambiguous key to identify a specific type of image (Modality is not).
- **IHE-5:** The Modality Matching Key will always be set to "SR".

C.3: External Report Content

The requirements for coded entries and report structure for reports handled by the External Report Repository via the Query Reports and Retrieve Reports transactions shall be similar to the Report Creator (see RAD TF-2: 4.24.4.1.2.1):

- The types of reports generated by the External Report Repository are defined in RAD TF-1: 9.4. The External Report Repository shall be able to generate reports based on the Simple Image Report (RAD TF-1: 9.4.1) with optional image references. If the External Report Repository supports the Enhanced SR Information Object Definition, then it shall also support the generation of Simple Image and Numeric Reports (RAD TF-1: 9.4.2).
- A specialized set of Report Titles, Report Section Headings, Concept Name Codes, Observation Context Codes, Measurement Codes and Disposition or Conclusion Codes will be defined for each type of department repository accessed (e.g., laboratory codes for laboratory departments)

Appendix D: Clarification of Patient Identifiers for Merge Cases

D.1: Introduction

IHE Technical Framework has adopted the changes in HL7 v2.3.1 and HL7 v2.5.1 Patient Identifiers. This includes:

- External Patient ID (PID–2) has been retained for backward compatibility.
- Alternate Patient ID (PID-4) has been retained for backward compatibility.
- Internal Patient ID (PID-3) has been renamed "Patient Identifier List" and is now allowed to repeat.

Due to the adoption of these HL7 changes, IHE mandates the use of assigning authority (issuer) in PID-3 component 4 and identifier in PID-3 component 1.

Since the DICOM Patient ID attribute (0010,0020) does not convey assigning authority and the Issuer of Patient ID (0010,0021) is an optional attribute in DICOM, both the Image Manager and the Department System Scheduler/Order Filler shall be prepared to make assumptions regarding the assigning authority for Patient IDs transmitted from a Modality via DICOM Modality PPS. It is assumed that it is possible to recognize a valid range of patient identifiers assigned by a single ADT or a single issuer of identifiers within an enterprise.

It is required that the healthcare institution configure the issuer of temporary patient identifiers to be either the ADT Issuer or the Departmental Issuer in both the Image Manager and the DSS/Order Filler. This will ensure that Patient ID in DICOM (0010,0020) is associated with the same assigning authority when mapped into a PID-3 in HL7 messages.

Although, an organization may operate with temporary patient identifiers issued by the ADT and used primarily in Cases 1, 2 and 3, Case 5 may occur. This may happen due to Modality operator errors when manually entering patient identifier in Case 3. In this situation, DSS/Order Filler and Image Manager shall recognize the error and associate the erroneous identifier to the same issuer. The reconciliation will happen on the DSS/Order Filler and it will send the Patient Merge message to the Image Manager where both "new" and "old" patient identifiers are associated with the same issuer.

The use of PID-3 is illustrated in the following sections using the use cases from RAD TF-1: 3.3, 4.3. In the examples given below time flows from the top row of the table to the bottom.

Table Acronyms	Description
IM	Image Manager
OF	Departmental System Scheduler/Order Filler
OP	Order Placer
PPSM	Performed Procedure Step Manager

D.2: Administrative Process Flow (RAD TF-1: 3.3.1)

The illustration includes A01, A04, A05, A11, and A30 although only an A01 is included in this example. The ADT identifier number used in the example below is "123", the assigning authority is "ADT_Issuer", Universal ID is "1.2.3.4" and Universal ID Type is "ISO".

Transaction	PID-3 (Patient Identifier List)	DICOM (0010, 0020)	DICOM (0010, 0021)	DICOM (0010, 0024) (0040, 0032)	DICOM (0010, 0024) (0040 ,0033)	MRG-1 (Prior Patient Identifier List)
A01 (ADT -> OF)	123^^^ADT_Issuer &1.2.3.4&ISO	N/A	N/A	N/A	N/A	N/A
A01 (ADT -> OP)	123^^^ADT_Issuer &1.2.3.4&ISO	N/A	N/A	N/A	N/A	N/A
ORM (OP->OF) (HL7 v.2.3.1) OMG (OP->OF) (HL7 v2.5.1)	123^^^ADT_Issuer &1.2.3.4&ISO	N/A	N/A	N/A	N/A	N/A
ORM (OF->IM) (HL7 v2.3.1) OMG (OF->IM) (HL7 v2.5.1)	123^^^ADT_Issuer &1.2.3.4&ISO	N/A	N/A	N/A	N/A	N/A
DICOM MWL (OF -> Modality)	N/A	123	ADT_Issuer	1.2.3.4	ISO	N/A
PPS (Modality -> PPSM)	N/A	123	ADT_Issuer	1.2.3.4	ISO	N/A
PPS (PPSM -> IM)	N/A	123	ADT_Issuer	1.2.3.4	ISO	N/A
PPS (PPSM -> OF)	N/A	123	ADT_Issuer	1.2.3.4	ISO	N/A

D.3: Patient Merge (RAD TF-1: 3.3.2)

This specifically looks at the Patient merge scenario in RAD TF-1: 3.3.2.2. The "old" ADT identifier number used in the example below is "123", the assigning authority is "ADT_Issuer", Universal ID is "1.2.3.4" and Universal ID Type is "ISO". The "new" ADT identifier number used in the example below is "456", the assigning authority is "ADT_Issuer", Universal ID is "1.2.3.4" and Universal ID Type is "ISO".

Transaction	PID-3 (Patient Identifier List)	DICOM (0010, 0020)	DICOM (0010, 0021)	DICOM (0010, 0024) (0040, 0032)	DICOM (0010, 0024) (0040, 0033)	MRG-1 (Prior Patient Identifier List)
A01 (ADT -> OF)	123^^^ADT_Issuer&1.2.3.4&ISO	N/A	N/A	N/A	N/A	N/A

Transaction	PID-3 (Patient Identifier List)	DICOM (0010, 0020)	DICOM (0010, 0021)	DICOM (0010, 0024) (0040, 0032)	DICOM (0010, 0024) (0040, 0033)	MRG-1 (Prior Patient Identifier List)
A01 (ADT -> OP)	123^^^ADT_Issuer&1.2.3.4&ISO	N/A	N/A	N/A	N/A	N/A
ORM (OP->OF) (HL7 v.2.3.1) OMG (OP->OF) (HL7 v2.5.1)	123^^^ADT_Issuer&1.2.3.4&ISO	N/A	N/A	N/A	N/A	N/A
ORM (OF->IM) (HL7 v2.3.1) OMG (OF->IM) (HL7 v2.5.1)	123^^^ADT_Issuer&1.2.3.4&ISO	N/A	N/A	N/A	N/A	N/A
DICOM MWL (OF -> Modality)	N/A	123	ADT_Issuer	1.2.3.4	ISO	N/A
A40 (ADT -> OF)	456^^^ADT_Issuer&1.2.3.4&ISO	N/A	N/A	N/A	N/A	123^^^ADT_Issuer&1.2.3.4&ISO
A40 (OF->IM)	456^^^ADT_Issuer&1.2.3.4&ISO	N/A	N/A	N/A	N/A	123^^^ADT_Issuer&1.2.3.4&ISO
A40 (ADT -> OP)	456^^^ADT_Issuer&1.2.3.4&ISO	N/A	N/A	N/A	N/A	123^^^ADT_Issuer&1.2.3.4&ISO

D.4: Trauma Cases 1 and 2 (RAD TF-1: 4.3)

The ADT temporary identifier for "John Doe" used in the example below is "Temp_123", the assigning authority is "ADT_Issuer", Universal ID is "1.2.3.4" and Universal ID Type is "ISO".

Transaction	PID-3 (Patient Identifier List)	DICOM (0010, 0020)	DICOM (0010, 0021)	DICOM (0010, 0024) (0040, 0032)	DICOM (0010, 0024) (0040, 0033)	MRG-1 (Prior Patient Identifier List)
A01 (ADT -> OF)	Temp_123^^^ADT_Issuer&1.2.3.4&ISO	N/A	N/A	N/A	N/A	N/A
A01 (ADT -> OP)	Temp_123^^^ADT_Issuer&1.2.3.4&ISO	N/A	N/A	N/A	N/A	N/A
ORM (OP->OF) (HL7 v.2.3.1) OMG (OP->OF) (HL7 v2.5.1)	Temp_123^^^ADT_Issuer&1.2.3.4&ISO	N/A	N/A	N/A	N/A	N/A

Transaction	PID-3 (Patient Identifier List)	DICOM (0010, 0020)	DICOM (0010, 0021)	DICOM (0010, 0024) (0040, 0032)	DICOM (0010, 0024) (0040, 0033)	MRG-1 (Prior Patient Identifier List)
ORM (OF->IM) (HL7 v2.3.1) OMG (OF->IM) (HL7 v2.5.1)	Temp_123^^^ADT_Issuer&1.2.3.4&ISO	N/A	N/A	N/A	N/A	N/A
DICOM MWL (OF -> Modality)	N/A	Temp_123	ADT_Issuer	1.2.3.4	ISO	N/A
PPS (Modality -> PPSM)	N/A	Temp_123	ADT_Issuer	1.2.3.4	ISO	N/A
PPS (PPSM -> IM)	N/A	Temp_123	ADT_Issuer	1.2.3.4	ISO	N/A
PPS (PPSM -> OF)	N/A	Temp_123	ADT_Issuer	1.2.3.4	ISO	N/A
A40 (ADT -> OF)	456^^^ADT_Issuer&1.2.3.4&ISO	N/A	N/A	N/A	N/A	Temp_123^^^ADT_Issuer&1.2.3.4&ISO
A40 (OF->IM)	456^^^ADT_Issuer&1.2.3.4&ISO	N/A	N/A	N/A	N/A	Temp_123^^^ADT_Issuer&1.2.3.4&ISO
A40 (ADT -> OP)	456^^^ADT_Issuer&1.2.3.4&ISO	N/A	N/A	N/A	N/A	Temp_123^^^ADT_Issuer&1.2.3.4&ISO

D.5: Trauma Case 3 (RAD TF-1: 4.3)

The ADT temporary identifier number for "John Doe" used in the example below is "Temp_123". The patient will later be assigned a permanent identifier of "Real_456", the assigning authority is "ADT_Issuer", Universal ID is "1.2.3.4" and Universal ID Type is "ISO".

Transaction	PID-3 (Patient Identifier List)	DICOM (0010, 0020)	DICOM (0010, 0021)	DICOM (0010, 0024) (0040, 0032)	DICOM (0010, 0024) (0040, 0033)	MRG-1 (Prior Patient Identifier List)
A01 (ADT -> OF)	Temp_123^^^ADT_Issuer&1.2.3.4&ISO	N/A	N/A	N/A	N/A	N/A
A01 (ADT -> OP)	Temp_123^^^ADT_Issuer&1.2.3.4&ISO	N/A	N/A	N/A	N/A	N/A
(Note: Temporary Patient ID "Temp_123" is manually entered at the modality.)	N/A	N/A	N/A	N/A	N/A	N/A

Transaction	PID-3 (Patient Identifier List)	DICOM (0010, 0020)	DICOM (0010, 0021)	DICOM (0010, 0024) (0040, 0032)	DICOM (0010, 0024) (0040, 0033)	MRG-1 (Prior Patient Identifier List)
PPS (Modality -> PPSM)	N/A	Temp_123	ADT_Issuer	1.2.3.4	ISO	N/A
PPS (PPSM -> IM)	N/A	Temp_123	ADT_Issuer	1.2.3.4	ISO	N/A
(Note: The IM recognizes an unscheduled PPS and assumes a site configured assigning authority of "ADT_Issuer".)	N/A	N/A	ADT_Issuer	1.2.3.4	ISO	N/A
PPS (PPSM -> OF)	N/A	Temp_123	N/A	N/A	N/A	N/A
(Note: The OF recognizes an unscheduled PPS with a valid ADT Patient ID – with a site configured assigning authority of "ADT_Issuer".)	N/A	N/A	N/A	N/A	N/A	N/A
ORM (OF-> OP) (HL7 v2.3.1) OMG (OP->OF) (HL7 v2.5.1)	Temp_123^^^ ADT_Issuer& 1.2.3.4&ISO	N/A	N/A	N/A	N/A	N/A
ORR (OP->OF) (HL7 v2.3.1) ORG (OP->OF) (HL7 v2.5.1)	Temp_123^^^ ADT_Issuer& 1.2.3.4&ISO	N/A	N/A	N/A	N/A	N/A
ORM (OF-> IM) (HL7 v2.3.1) OMI (OF->IM) (HL7 v2.5.1)	Temp_123^^^ ADT_Issuer& 1.2.3.4&ISO	N/A	N/A	N/A	N/A	N/A
(Note: Patient Reconciliation occurs on the ADT system.)	N/A	N/A	N/A	N/A	N/A	N/A
A40 (ADT -> OF)	Real_456^^^A DT_Issuer&1. 2.3.4&ISO	N/A	N/A	N/A	N/A	Temp_123^^^ADT _Issuer&1.2.3.4&I SO
A40 (ADT -> OP)	Real_456^^^A DT_Issuer&1. 2.3.4&ISO	N/A	N/A	N/A	N/A	Temp_123^^^ADT _Issuer&1.2.3.4&I SO

Transaction	PID-3 (Patient Identifier List)	DICOM (0010, 0020)	DICOM (0010, 0021)	DICOM (0010, 0024) (0040, 0032)	DICOM (0010, 0024) (0040, 0033)	MRG-1 (Prior Patient Identifier List)
A40 (OF-> IM)	Real_456^^^ADT_Issuer&1.2.3.4&ISO	N/A	N/A	N/A	N/A	Temp_123^^^ADT_Issuer&1.2.3.4&ISO

D.6: Trauma Case 4 (RAD TF-1: 4.3)

The OF temporary identifier number for "John Doe" used in the example below is "Dept_789" the assigning authority is "OF_Issuer", Universal ID is "1.2.3.5" and Universal ID Type is "ISO". The Patient will later be assigned a permanent identifier of "123", the assigning authority is "ADT_Issuer", Universal ID is "1.2.3.4" and Universal ID Type is "ISO".

Transaction	PID-3 (Patient Identifier List)	DICOM (0010, 0020)	DICOM (0010, 0021)	DICOM (0010, 0024) (0040, 0032)	DICOM (0010, 0024) (0040, 0033)	MRG-1 (Prior Patient Identifier List)
ORM (OF->IM)	Dept_789^^^OF_Issuer&1.2.3.5&ISO	N/A	N/A	N/A	N/A	N/A
DICOM MWL (OF->Modality)	N/A	Dept_789	OF_Issuer	1.2.3.5	ISO	N/A
PPS (Modality -> PPSM)	N/A	Dept_789	OF_Issuer	1.2.3.5	ISO	N/A
PPS (PPSM -> IM)	N/A	Dept_789	OF_Issuer	1.2.3.5	ISO	N/A
(Note: The IM recognizes a scheduled PPS with a Patient ID - with a site configured assigning authority of "OF_Issuer".)	N/A	N/A	OF_Issuer	1.2.3.5	ISO	N/A
PPS (PPSM -> OF)	N/A	Dept_789	N/A	N/A	N/A	N/A
(Note: The OF recognizes a scheduled PPS with a Patient ID issued by the OF.)	N/A	N/A	N/A	N/A	N/A	N/A
A01 (ADT -> OP)	123^^^ADT_Issuer&1.2.3.4&ISO	N/A	N/A	N/A	N/A	N/A

Transaction	PID-3 (Patient Identifier List)	DICOM (0010, 0020)	DICOM (0010, 0021)	DICOM (0010, 0024) (0040, 0032)	DICOM (0010, 0024) (0040, 0033)	MRG-1 (Prior Patient Identifier List)
A01 (ADT -> OF)	123^^^ADT_Issuer&1.2.3.4&ISO	N/A	N/A	N/A	N/A	N/A
(Note: The patient Dept_789^^^OF_Issuer&1.2.3.5&ISO is manually reconciled with 123^^^ADT_Issuer&1.2.3.4&ISO)	N/A	N/A	N/A	N/A	N/A	N/A
A40 (OF-> IM)	123^^^ADT_Issuer&1.2.3.4&ISO	N/A	N/A	N/A	N/A	Dept_789^^^OF_Issuer&1.2.3.5&ISO
ORM (OF-> IM) (HL7 v2.3.1) OMI (OF->IM) (HL7 v2.5.1)	123^^^ADT_Issuer&1.2.3.4&ISO	N/A	N/A	N/A	N/A	N/A
ORM (OF-> OP)) (HL7 v2.3.1) OMG (OP->OF) (HL7 v2.5.1)	123^^^ADT_Issuer&1.2.3.4&ISO	N/A	N/A	N/A	N/A	N/A
ORR (OP->OF) (HL7 v2.3.1) ORG (OP->OF) (HL7 v2.5.1)	123^^^ADT_Issuer&1.2.3.4&ISO	N/A	N/A	N/A	N/A	N/A

D.7: Trauma Case 5 (RAD TF-1: 4.3)

865 The temporary identifier number for "John Doe" used in the example below is "Dept_123" and is manually entered on the Modality, with assigning authority of "Configured_Issuer", Universal ID is "1.2.3.6" and Universal ID Type is "ISO". The patient will later be assigned a permanent identifier of "Real_456", the assigning authority is "ADT_Issuer", Universal ID is "1.2.3.4" and Universal ID Type is "ISO".

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Transaction	PID-3 (Patient Identifier List)	DICOM (0010, 0020)	DICOM (0010, 0021)	DICOM (0010, 0024) (0040, 0032)	DICOM (0010, 0024) (0040, 0033)	MRG-1 (Prior Patient Identifier List)
PPS (Modality -> PPSM)	N/A	Dept_123	Configured_Issuer	1.2.3.6	ISO	

Transaction	PID-3 (Patient Identifier List)	DICOM (0010, 0020)	DICOM (0010, 0021)	DICOM (0010, 0024) (0040, 0032)	DICOM (0010, 0024) (0040, 0033)	MRG-1 (Prior Patient Identifier List)
PPS (PPSM->IM)	N/A	Dept_123	Configured_Issuer	1.2.3.6	ISO	N/A
(Note: The IM recognizes an unscheduled PPS and assumes a site configured assigning authority)	N/A	N/A	N/A	N/A	N/A	N/A
PPS (PPSM->OF)	N/A	Dept_123	Configured_Issuer	1.2.3.6	ISO	N/A
(Note: The OF recognizes an unscheduled PPS and assumes a site configured assigning authority; recognizes that Patient ID is invalid.)	N/A	N/A	N/A	N/A	N/A	N/A
A01 (ADT->OF)	Real_456^^^ADT_Issuer&1.2.3.4&ISO	N/A	N/A	N/A	N/A	N/A
A01 (ADT->OP)	Real_456^^^ADT_Issuer&1.2.3.4&ISO	N/A	N/A	N/A	N/A	N/A
(Note: Manual patient reconciliation occurs on the OF system.)	N/A	N/A	N/A	N/A	N/A	N/A
A40 (OF-> IM)	Real_456^^^ADT_Issuer&1.2.3.4&ISO	N/A	N/A	N/A	N/A	Dept_123^^^Configured_Issuer&1.2.3.6&ISO
ORM (OF-> OP) (HL7 v2.3.1) OMG (OP->OF) (HL7 v2.5.1)	Real_456^^^ADT_Issuer&1.2.3.4&ISO	N/A	N/A	N/A	N/A	N/A

Transaction	PID-3 (Patient Identifier List)	DICOM (0010, 0020)	DICOM (0010, 0021)	DICOM (0010, 0024) (0040, 0032)	DICOM (0010, 0024) (0040, 0033)	MRG-1 (Prior Patient Identifier List)
ORR (OP->OF) (HL7 v2.3.1) ORG (OP->OF) (HL7 v2.5.1)	Real_456^^^^ADT_Issuer&1.2.3.4&ISO	N/A	N/A	N/A	N/A	N/A
ORM (OF->IM) (HL7 v2.3.1) OMI (OF->IM) (HL7 v2.5.1)	Real_456^^^^ADT_Issuer&1.2.3.4&ISO	N/A	N/A	N/A	N/A	N/A

Appendix E: DICOM Media Interchange – Critical DICOM Compatibility Tips

This appendix presents a number of compatibility issues that result from not following the DICOM Media Interchange standard (DICOM PS3.10, PS3.11 and PS3.12). This appendix is simply intended to be a reminder for the most common DICOM issues that have resulted in the past in incompatibilities between file set creators and readers.

This list shall not be interpreted, as being the only DICOM requirements that implementers should pay attention to. DICOM has proven to be a very effective and thorough specification that implementers of the IHE PDI Profile shall be familiar with.

1. If CD Media is used, the CD Media shall be formatted according to ISO 9660 Level 1. Extensions such as Joliet or Rock Ridge are not forbidden by DICOM and hence are permitted by the PDI Profile. A UDF file system is not allowed for CD Media, unless an ISO 9660 Level 1 Filesystem is also present. Such extensions may be necessary to encode non-DICOM content on the media, such as long filenames for viewing software. Such extensions may result in ISO 9660 Level 1 uppercase filenames being presented to application software as lowercase or mixed case depending on the operating system's mount behavior; accordingly, all Portable Media Displays and Portable Media Importers shall be case insensitive in this respect, whether the media is CD, DVD or USB.
2. The DICOMDIR file shall be at the root directory of the Interchange Media
3. All DICOM file names shall contain only uppercase letters, numeric digits and the underscore character, and the file name size without extensions shall not exceed 8 characters.
4. All Directory names in DICOM paths shall contain only uppercase characters, numeric digits and the underscore character. Directory names shall not contain extensions.
5. Non-DICOM files may have extensions with more than 3 characters.
6. DICOM files shall have no extension.
7. DICOM files shall have an ISO 9660 version of 1, which may be displayed by some operating systems as a ".;1" at the end. However, the ".;1" should not be included in the name of the file itself. Some authoring software fails to include the required "." prior to the ";1", or omits the required ".;1" entirely, violating the ISO 9660 Level 1 standard; this common error has no interoperability impact, and may safely be ignored by a reader.
8. The version number of the file name shall not be included in the reference data element in the DICOMDIR.
9. Only 8 levels of Directories are allowed, including the root directory (i.e., there may be up to 7 levels of sub-directories below the root).
10. Objects in DICOM files shall be stored in Explicit VR Little Endian (not Implicit), or the appropriate compressed Transfer Syntax for the DVD and USB Options.
11. DICOM File Meta-Information shall be in Explicit VR Little Endian (not Implicit)

12. File Meta Information Version (0002,0001) shall contain a two byte OB value consisting of a 0x00 byte, followed by 0x01 byte, and not the value 0x0001 encoded as a little endian 16 bit short value, which would be the other way around.
13. The file meta information shall include the Media Storage SOP Class UID (0002,0002) data element, and its value shall be equal to the SOP Class UID data element in the data set.
14. The file meta information shall include the Media Storage SOP Instance UID (0002,0003) data element, and its value shall be equal to the SOP Instance UID data element in the data set.
15. No private elements shall be included in the file meta information.
16. The file meta information header shall contain an attribute (0002,0000) Group Length with a correct value as specified in DICOM PS3.10.
17. The physical format of the DICOM DVD discs or USB media is specified in DICOM PS3.12. The physical format of the DICOM CD-R discs shall comply with the application definitions within ISO/IEC 10149 Part II as specified in DICOM PS3.12. This allows discs to be written with:
    - Mode 1 sectors or
    - Mode 2, Form 1 sectors with CD-ROM-XA File Number = 0, Channel Number = 0 and Coding Information Byte = 0.

Appendix F: Example Created Media Instance Content

Example F-1. Media containing a DICOM CT imaging study, a DICOM Presentation States and a DICOM Structured Report. The creator supports the Web Content Option and includes web-viewable data derived from DICOM data on the media. Also, a DICOM Viewer is included on the media.

Content element(s)	Description
Identification Marking	Marker with content per RAD TF-2: 4.47.4.1.2.2: patient name creation date name of the institution that created the media
/README.TXT	File with content per RAD TF-2: 4.47.4.1.2.2
/INDEX.HTM	File with content per RAD TF-2: 4.47.4.1.2.2: media type: "DICOM PLUS WEB" links to XHTML report and to another page (THUMBS.HTM) with thumbnails that link the full resolution JPEG images link to a launch point for the DICOM viewer in the VIEWERS directory link to the list of importable data
/DICOMDIR	DICOM Directory file referencing all DICOM instances: all DICOM images the PS object the SR object
/ DICOM/ /DICOM /12296 /DICOM /12297 /DICOM /NNNNN /DICOM /98732 /DICOM /12312 /IHE_PDI /REPORT.HTM /IHE_PDI /THUMBS.HTM /IHE_PDI /T_12296.JPG /IHE_PDI /T_12297.JPG /IHE_PDI /I_12296.JPG /IHE_PDI /I_12297.JPG	Directory with content per RAD TF-2: 4.47.4.1.2.2: Image object 1 Image object 2 Image object N DICOM Presentation State object Basic Text DICOM Structured Report object XHTML report navigation page derived from DICOM data that displays T_12296.JPG and T_12297.JPG thumbnail of Image object 1 thumbnail of Image object 2 full resolution JPEG image for view within browser full resolution JPEG image for view within browser
/VIEWERS/ /VIEWERS/VIEWER.EXE	Optional directory: executable viewer

Example F-2. Media containing a DICOM US imaging study and a DICOM SR diagnostic report. The creator does not support the Web Content Option but chose to optionally include the README.TXT file. No web-viewable data derived from DICOM data is included on the media.

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Content element(s)	Description
Identification Marking	**Marker with content per RAD TF-2: 4.47.4.1.2.2:** **patient name** **creation date** name of the institution that created the media **media type: "DICOM ONLY"**
/README.TXT	**File with content per RAD TF-2: 4.47.4.1.2.2**
/DICOMDIR	DICOM Directory file referencing all DICOM instances: all DICOM images the SR object
/DICOM/ **/DICOM**/78567856 **/DICOM**/78567857 . . . **/DICOM**/NNNNNNN **/DICOM**/12343412	**Directory with content per RAD TF-2: 4.47.4.1.2.2:** **Image object 1** **Image object 2** . . . **Image object N** **Basic Text DICOM Structured Report object**

Appendix G: Configuration for Accessing DICOM, WADO and Web Services Retrieve Services

G.1: Mapping DICOM AE Title to DICOM AE Network Address

When an Imaging Document Consumer wants to retrieve DICOM instances that are referenced within a shared manifest Document using DICOM C-MOVE/C-STORE, the following configuration is necessary.

The Key Object Selection Document Instance includes an AE Title but does not include any IP address or any port number. As AE Title alone is not sufficient to retrieve DICOM objects, the Imaging Document Consumer needs to get the IP address and the port number of the Imaging Document Source from its local configuration file.

Similarly, the Imaging Document Source needs to know the AE Title, the IP address and the port number of the Imaging Document Consumer in order to store the DICOM objects. The Imaging Document Source needs to get the IP address, the AE Title, the port number of the Imaging Document Consumer from its local configuration file.

In this profile, it is assumed that mapping of AE Titles of Imaging Document Source and Imaging Document Source to their network presentation addresses (IP and port) is supported by exchanging configuration files of the related actors, under the guidance of affinity domain policies and processes. The method of configuration file exchange is out of the scope of this profile. Configuration Management in DICOM PS3.15 Section 7, and its proper extension in cross-enterprise use, can be employed to automate this mapping.

As IP addresses and port numbers need to be resolved from AE titles, a special attention is required to ensure that AE titles of actors that are involved in this profile are uniquely allocated in an affinity domain.

G.2: Mapping DICOM AE Title to WADO Service Network Address

In order for an Imaging Document Consumer to retrieve DICOM instances referenced within a shared Manifest Document using the WADO Retrieve [RAD-55] transaction, it needs to build a WADO HTTP Request-URI for the SOP instance. Though SOP instance identification information is fully specified in the Manifest, the Imaging Document Consumer needs an auxiliary method to map the Retrieve AE Title specified for a referenced SOP Instance in the Manifest to the server network address, which supports the WADO retrieve service.

The Imaging Document Consumer needs to maintain a mapping configuration of the server network addresses of all Imaging Document Source in the Affinity Domain, and their Retrieve AE Titles. Using this mapping, the Retrieve AE Title of a referenced SOP instance in the Manifest can be translated to WADO service server address, which is then used to build the WADO HTTP Request-URI together with SOP instance identification information, and optionally other standard WADO HTTP parameters.

To achieve an unambiguous, automated mapping of Retrieve AE Title and WADO access service server network address, some policy needs to be in place to ensure unique Retrieve AE Titles of Imaging Document Source in the entire Affinity Domain.

G.3: Mapping DICOM AE Title to Web Services Address

To use the Retrieve Imaging Document Set [RAD-69] transaction to retrieve DICOM instances referenced within a manifest document, an Imaging Document Consumer must pass a repositoryUniqueId attribute in the Retrieve Imaging Document Set Request.

The Imaging Document Consumer needs to maintain a list that associates the web service addresses of all Imaging Document Sources in the XDS Affinity Domain and their Retrieve AE Titles and/or Retrieve Location UIDs. Using this mapping, the Retrieve AE Title of a referenced SOP instance in the manifest can be translated to a repositoryUniqueId, which is then passed in the Retrieve Imaging Document Set Request together with a documentUniqueId (SOP instance identification information). Alternatively, a Retrieve Location UID can be used directly as the repositoryUniqueId in the Retrieve Imaging Document Set Request.

To achieve an unambiguous, automated mapping from Retrieve AE Title to a web service address, some policy needs to be in place to ensure unique Retrieve AE Titles of Imaging Document Sources within the entire XDS Affinity Domain.

Appendix H: Example Template for Teaching File Structured Report Manifests

Included here is a DICOM PS3.16 style template containing:

- section headings (container concept names) for plain text blocks to mirror the MIRC concepts of history, findings, discussion, plus coded alternatives where likely (e.g., history and findings)
- section headings (container concept names) and code concept names for differential diagnosis, diagnosis, pathology, anatomy and organ system, etc.
- context groups for coded values for differential diagnosis, diagnosis, pathology, anatomy and organ system (likely from SNOMED +/- ICD9CM, +/- ACR Index)
- diagnosis confirmation flag

The idea is to provide for the partial or complete authoring of teaching files on the Image Display. The concepts are derived from those in the RSNA MIRC Document Schema Version 16.

Note that this template will not replicate the function of the Key Object Selection document in its role as a manifest; hence neither a listing of the referenced instances to be included, nor the person observer context for the receiver of the manifest to route it to the correct user will be required.

Table H-1: Example Additional Teaching File Information Template

	NL	Rel with parent	Value Type	Concept Name	VM	Req Type	Cond	Value Set Constraint
1			CONTAINER	EV (TCE006, IHERADTF, “Additional Teaching File Information”)	1	M		Root node
2	>	CONTAINS	TEXT	EV (TCE101, IHERADTF, “Author”)	1	M		
3	>>	HAS PROPERTIES	TEXT	EV (TCE102, IHERADTF, “Affiliation”)	1	U		
4	>>	HAS PROPERTIES	TEXT	EV (TCE103, IHERADTF, “Contact”)	1	U		
5	>	CONTAINS	TEXT	EV (TCE104, IHERADTF, “Abstract”)	1	M		
6	>	CONTAINS	TEXT	EV (TCE105, IHERADTF, “Keywords”)	1-n	MC	XOR row 7	
7	>	CONTAINS	CODE	EV (TCE105, IHERADTF, “Keywords”)	1-n	MC	XOR row 6	ACR or MESH or ICD9CM Diagnosis Codes
8	>	CONTAINS	TEXT	EV (121060, DCM, "History")	1-n	U		
9	>	CONTAINS	CODE	EV (121060, DCM, "History")	1-n	U		
10	>	CONTAINS	TEXT	EV (121071, DCM, "Finding")	1-n	U		

	NL	Rel with parent	Value Type	Concept Name	VM	Req Type	Cond	Value Set Constraint
11	>	CONTAINS	CODE	EV (121071, DCM, "Finding")	1-n	U		
12	>	CONTAINS	TEXT	EV (TCE106, IHERADTF, “Discussion”)	1-n	U		
13	>	CONTAINS	TEXT	(111023, DCM, “Differential Diagnosis/ Impression”)	1-n	U		
14	>	CONTAINS	CODE	(111023, DCM, “Differential Diagnosis/ Impression”)	1-n	U		
15	>	CONTAINS	TEXT	EV (TCE107, IHERADTF, “Diagnosis”)	1-n	U		
16	>	CONTAINS	CODE	EV (TCE107, IHERADTF, “Diagnosis”)	1-n	U		
17	>	CONTAINS	TEXT	(112005, DCM, “Radiographic anatomy”)	1-n	U		
18	>	CONTAINS	CODE	(112005, DCM, “Radiographic anatomy”)	1-n	U		
19	>	CONTAINS	TEXT	(111042, DCM, “Pathology”)	1-n	U		
20	>	CONTAINS	CODE	(111042, DCM, “Pathology”)	1-n	U		
21	>	CONTAINS	TEXT	EV (TCE108, IHERADTF, “Organ system”)	1-n	U		
22	>	CONTAINS	CODE	EV (TCE108, IHERADTF, “Organ system”)	1-n	U		
23	>	CONTAINS	CODE	(121139, DCM, “Modality”)	1-n	U		DCID (29) Acquisition Modality
24	>	CONTAINS	CODE	EV (TCE109, IHERADTF, “Category”)	1	M		BCID Table Q-2 categories of teaching files
25	>	CONTAINS	CODE	EV (TCE110, IHERADTF, “Level”)	1	U		BCID Table Q-3 levels of teaching files
27	>	CONTAINS	CODE	EV (TCE111, IHERADTF, “Diagnoses confirmed”)	1	U		DCID (230) Yes-No

Table H-2: Categories of Teaching Files (American Board of Radiology categories)

Coding Scheme Designator	Code Value	Code Meaning
IHERADTF	TCE301	Musculoskeletal
IHERADTF	TCE302	Pulmonary
IHERADTF	TCE303	Cardiovascular
IHERADTF	TCE304	Gastrointestinal
IHERADTF	TCE305	Genitourinary
IHERADTF	TCE306	Neuro
IHERADTF	TCE307	Vascular and Interventional
IHERADTF	TCE308	Nuclear
IHERADTF	TCE309	Ultrasound

Coding Scheme Designator	Code Value	Code Meaning
IHERADTF	TCE310	Pediatric
IHERADTF	TCE311	Breast

Table H-3: Levels of Teaching Files

Coding Scheme Designator	Code Value	Code Meaning
IHERADTF	TCE201	Primary
IHERADTF	TCE202	Intermediate
IHERADTF	TCE203	Advanced

Appendix I: De-identification, Re-identification, Pseudonymization, Persistence of Identification and Clinical Trial Attributes (Informative)

I.1: De-identification

Complete de-identification of a DICOM instance to remove all PHI contained within attributes without a priori knowledge of how the instance was created requires removal of the values all attributes containing text as well as all private attributes. This is often impractical, since useful information required for subsequent applications may be contained in some of the text values.

For example, Study Description and Series Description typically contain useful information that it is often undesirable to remove. De-identification of a report would not typically remove the text values that are the payload of the report. In some cases, it may be useful to provide a mechanism for replacement of Study Description and Series Description that are more meaningful or more correct for a particular teaching file or clinical trial application, e.g., to state that a series is “T1 axial post-contrast” or similar, when this information is otherwise absent.

Dates and times may or may not be appropriate to remove. For example, it may be desirable to remove any evidence of a particular visit date (e.g., Study Date), though the times may need to be preserved in order to maintain the temporal relationship between images. In other scenarios, dates may need to be preserved exactly, in order to correlate with real-world events, such as therapy.

Ages and dates of birth are particularly problematic, since they are also a form of PHI, but may be required for the statistical purpose of a clinical trial or the meaningful interpretation of a teaching file case where age affects diagnostic possibilities. A typical technique is to remap ages into exemplars of an age range, or to make dates the first of the same month, etc. The validity of such techniques requires review by an expert.

In addition, site policy and local regulations may impose specific requirements on removal of PHI for specific purposes, and these requirements may differ. It is not possible or desirable to standardize for every use case which attributes must be removed.

One can go to extraordinary lengths to attempt to ensure de-identification by such means as adding noise to pixel data to confound binary or hash matching, removal of facial features and other such mechanisms. This is rarely, if ever, required in practice and is beyond the scope of IHE to define.

I.2: Consistency of Identifiers on Repeated Export

Whilst it is entirely possible to devise reversible and irreversible algorithms to consistently map identifiers into new values, even if those algorithms are based on cryptographic one-way hash functions, anyone with access to a list of all possible inputs (e.g., all patient names and IDs in the institution) could identify the subject by a relatively short exhaustive search. Thus, while such mechanisms may be effective for de-identification for distribution outside an institution, they may not be sufficient within an institution.

An alternative means to provide deterministic mapping would be to maintain a persistent record of the mapping (such as a database), and to consult that record on the next occasion. Such a record would need to be well protected.

For the same reason, if auditing export actions, care should be taken not to include both the original and replacement identities in the audit trail.

Reversible mapping might be desirable in some scenarios in which authorized individuals were permitted to recover the original identity. Means of achieving this are not defined by IHE, though either a persistent record of mapping as described, or embedded encrypted original attributes as described in DICOM PS3.15 Annex E Basic Application Level Confidentiality Profile, could be used.

An irreversible, but repeatable, mapping may also be useful for later updates of teaching files, as additional information becomes available. For example, follow-up studies and reports or pathology information could automatically be re-mapped to the same teaching file identifiers and hence automatically become part of the same teaching file, since the same "pseudonymous" identifiers would be used.

I.3: Addition of Clinical Trial Attributes

DICOM defines additional optional attributes that may be added to any composite SOP instance for the purpose of clinical trials. These are defined in the Clinical Trial Subject, Clinical Trial Study and Clinical Trial Series Modules in DICOM PS3.3.

These attributes provide:

- Subject identification information that may be used to augment the patient identification, e.g., the combination of Clinical Trial Protocol ID, Clinical Trial Site ID and Clinical Trial Subject ID
- Other trial-specific identifiers useful for the trial workflow, not specifically related to identification of the subject, e.g., Clinical Trial Timepoint ID

To the extent that this information is known at the time of the Export Instances transaction, it is desirable to populate these fields.

Since many downstream systems will not be aware of these attributes, however, it is common practice to also replace the normal DICOM patient and other identification fields with values corresponding to the clinical trial identifiers. For example, not only might one insert Clinical Trial Protocol ID, Clinical Trial Site ID and Clinical Trial Subject ID, but also replace Patient ID with Clinical Trial Subject ID, Patient Name with a concatenation of Clinical Trial Protocol ID, Clinical Trial Site ID and Clinical Trial Subject ID, and Institution Name with Clinical Trial Site ID, etc.

The Remap Identifiers Option provides a mechanism to automatically populate these values.

Appendix J: Clinical Decision Support (CDS) and Appropriate Use Criteria (AUC) Data Explanation

This appendix is currently in the Clinical Decisions Support – Order Appropriateness Tracking (CDS-OAT) Trial Implementation Supplement.

Appendix K: Import Reconciliation Workflow Import Instruction Handling Option

This appendix is currently in the Import Reconciliation Workflow.b (IRWF.b) Trial Implementation Supplement.

Appendix L: Attribute Consistency between General Purpose Worklist, SPS, PPS and Resulting Composite IODs in Post-Processing Workflow (previously Vol 3 Appx C)

This appendix provides requirements for the use of attributes in the objects generated by the different participants of the Post-Processing Workflow. In particular, it specifies which attributes provided by the Post-Processing Manager shall be used unaltered to populate the attributes in the GP-PPS objects, objects that may be produced as a result of post-processing operations, and also the N-ACTION command that is used to claim and complete workitems.

L.1 Integration-critical Attributes

The table below shall be interpreted as follows:

- An Attribute shown in the first column shall be requested by a GPWL SCU (for example, image processing workstation or CAD device) as a return key in its C-FIND Requests. The Post-Processing Manager shall return attribute Values in the C-FIND response.
- The return Attribute Values shall be used by the performing station in filling the Attribute shown on the corresponding line of Table L.1-1 both for Composite Instances (second column) and GP-PPS Instances.
- The Post-Processing Manager shall be capable of handling the Attributes shown in the corresponding line of the third column as defined by the SCP Type and the additional notes.

Table L.1-1: Comparison of Corresponding Attributes of General Purpose Worklist, SPS, PPS, Images, GSPS and other IODs

General Purpose Worklist	General Purpose SPS N-ACTION	General Purpose PPS	Images and GSPS IOD	SR Based Evidence Documents	KIN
--	--	Referenced General Purpose Scheduled Procedure Step Sequence [1C]	--	--	--
SOP Class UID [1]	SOP Class UID [1]	>SOP Class UID [1]	--	--	--
SOP Instance UID [1]	SOP Instance UID [1]	>SOP Instance UID [1]	--	-	--
--	Transaction UID [1]	> Referenced General Purpose Scheduled Procedure Step Transaction UID [1]	--		
General Purpose Scheduled Procedure Step Status [1]	General Purpose Scheduled Procedure Step Status[1]	--	--	--	--
Input Information Sequence [2]	--	--	--	Current Requested Procedure Evidence Sequence [1C]	--
Relevant Information Sequence [2]	--	--	--	Pertinent Other Evidence Sequence [1C]	--
Referenced Study Component Sequence [2]					
Resulting General Purpose Performed Procedure Step Sequence [2]			Referenced Study Component Sequence [3]	Referenced Study Component Sequence [2]	Referenced Study Component Sequence [2]
>Referenced SOP Class UID [1]	--	SOP Class UID [1]	>SOP Class UID [1]	>SOP Class UID [1]	>SOP Class UID [1]
>Referenced SOP Instance UID [1]	--	SOP Instance UID [1]	>SOP Instance UID [1]	>SOP Instance UID [1]	>SOP Instance UID [1]
Actual Human Performers Sequence [2]	Actual Human Performers Sequence [3]	Actual Human Performers Sequence [2]	--	--	--
Study Instance UID [1]	--	--	Study Instance UID [1]	Study Instance UID [1]	Study Instance UID [1]

General Purpose Worklist	General Purpose SPS N-ACTION	General Purpose PPS	Images and GSPS IOD	SR Based Evidence Documents	KIN
--	--	--	Request Attributes Sequence [3]	--	--
Scheduled Procedure Step ID [1]			>Scheduled Procedure Step ID [1C]		
Referenced Request Sequence [1]		Referenced Request Sequence [2]		Referenced Request Sequence[1C]	Referenced Request Sequence [1C]
>Study Instance UID [1]		>Study Instance UID [1]		>Study Instance UID [1]	>Study Instance UID [1]
>Requested Procedure ID [1]		>Requested Procedure ID [2]	>Requested Procedure ID [1C]	>Requested Procedure ID [2]	>Requested Procedure ID [2]
>Requested Procedure Description [1C]		>Requested Procedure Description [2]		>Requested Procedure Description [2]	>Requested Procedure Description [2]
>Requested Procedure Code Sequence [1C]		>Requested Procedure Code Sequence [2]		>Requested Procedure Code Sequence [2]	>Requested Procedure Code Sequence [2]
>Referenced Study Sequence [2]		>Referenced Study Sequence [2]	Referenced Study Sequence [3]	>Referenced Study Sequence [2]	>Referenced Study Sequence [2]
>Accession Number [2]		>Accession Number [2]	Accession Number [2]	>Accession Number [2]	>Accession Number [2]
>Placer Order Number/Imaging Service Request [3]		>Placer Order Number/Imaging Service Request [3]		>Placer Order Number/Imaging Service Request [2]	>Placer Order Number/Imaging Service Request [2]
>Filler Order Number/Imaging Service Request [3]		>Filler Order Number/Imaging Service Request [3]		>Filler Order Number/Imaging Service Request [2]	>Filler Order Number/Imaging Service Request [2]
>Requesting Physician [2]		>Requesting Physician [2]		>Requesting Physician [2]	>Requesting Physician [2]
		Performed Procedure Step ID [1]	Performed Procedure Step ID [3]		
		Performed Procedure Step Start Date [1]	Performed Procedure Step Start Date [3]		
		Performed Procedure Step Start Time [1]	Performed Procedure Step Start Time [3]		
		Performed Procedure Step Description [1]	Performed Procedure Step Description [3]		

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Appendix M: Attribute Consistency between General Purpose Worklist, SPS, PPS and Resulting Composite IODs In Reporting Workflow (previously Vol 3 Appx D)

This appendix provides requirements for the use of attributes in the diagnostic reports generated by the Report Creator as a participant of Reporting Workflow. These reports are encoded as DICOM SR objects. In particular, it specifies which attributes provided by the Report Manager shall be used unaltered to populate the attributes in the GP-PPS objects, resulting DICOM SR objects, and also the N-ACTION command that is used to claim and complete workitems.

M.1: Integration-critical Attributes

The table below shall be interpreted as follows:

- An Attribute shown in the first column shall be requested by a GPWL SCU (Report Creator) as a return key in its C-FIND Requests. The Report Manager shall return attribute Values in the C-FIND response.
- The return Attribute Values shall be used by the Report Creator in filling the Attribute shown on the corresponding line of Table M.1-1 both for Composite Instances (fourth column) and GP-PPS Instances.
- The Report Manager shall be capable of handling the Attributes shown in the corresponding line of the third column as defined by the SCP Type and the additional notes.

Table M.1-1: Comparison of Corresponding Attributes of General Purpose Worklist, SPS, PPS, Images, GSPS and other IODs

General Purpose Worklist	General Purpose SPS N-ACTION	General Purpose PPS	SR Based Report Documents
--	--	Referenced General Purpose Scheduled Procedure Step Sequence [1C]	--
SOP Class UID [1]	SOP Class UID [1]	>SOP Class UID [1]	--
SOP Instance UID [1]	SOP Instance UID [1]	>SOP Instance UID [1]	-
--	Transaction UID [1]	> Referenced General Purpose Scheduled Procedure Step Transaction UID [1]	
General Purpose Scheduled Procedure Step Status [1]	General Purpose Scheduled Procedure Step Status[1]	--	--
Input Information Sequence [2]	--	--	Current Requested Procedure Evidence Sequence [1C]

General Purpose Worklist	General Purpose SPS N-ACTION	General Purpose PPS	SR Based Report Documents
Relevant Information Sequence [2]	--	--	Pertinent Other Evidence Sequence [1C]
Referenced Study Component Sequence [2]			
Resulting General Purpose Performed Procedure Step Sequence [2]			Referenced Study Component Sequence [2]
>Referenced SOP Class UID [1]	--	SOP Class UID [1]	>SOP Class UID [1]
>Referenced SOP Instance UID [1]	--	SOP Instance UID [1]	>SOP Instance UID [1]
--	Actual Human Performers Sequence [3]	Actual Human Performers Sequence [2]	Actual Human Performers Sequence [2]
Study Instance UID [1]	--	--	Study Instance UID [1]
--	--	--	--
Scheduled Procedure Step ID [1]			
Referenced Request Sequence [1]		Referenced Request Sequence [2]	Referenced Request Sequence[1C]
>Study Instance UID [1]		>Study Instance UID [1]	>Study Instance UID [1]
>Requested Procedure ID [1]		>Requested Procedure ID [2]	>Requested Procedure ID [2]
>Requested Procedure Description [1C]		>Requested Procedure Description [2]	>Requested Procedure Description [2]
>Requested Procedure Code Sequence [1C]		>Requested Procedure Code Sequence [2]	>Requested Procedure Code Sequence [2]
>Referenced Study Sequence [2]		>Referenced Study Sequence [2]	>Referenced Study Sequence [2]
>Accession Number [2]		>Accession Number [2]	>Accession Number [2]
>Placer Order Number/Imaging Service Request [3]		>Placer Order Number/Imaging Service Request [3]	>Placer Order Number/Imaging Service Request [2]
>Filler Order Number/Imaging Service Request [3]		>Filler Order Number/Imaging Service Request [3]	>Filler Order Number/Imaging Service Request [2]
>Requesting Physician [2]		>Requesting Physician [2]	>Requesting Physician [2]
		Performed Procedure Step ID [1]	
		Performed Procedure Step Start Date [1]	

General Purpose Worklist	General Purpose SPS N-ACTION	General Purpose PPS	SR Based Report Documents
		Performed Procedure Step Start Time [1]	
		Performed Procedure Step Description [1]	

Appendix N: HL7 Version 2.3.1 Message Field Replaced with HL7 Version 2.5.1 Summary (previously Vol 2 Appx E)

This appendix provides for a summary of the overloaded and/or obsolete message fields profiled in the HL7 v2.3.1 message semantics in this Radiology Technical Framework and the replacement message fields profiled in the HL7 v2.5.1 Message Semantics. Refer to the transaction description in the Technical Framework for the detailed description. This table is provided for your reference.

N.1: Patient Registration [RAD-1]/Patient Update [RAD-12]

ADT Version 2.3.1			ADT Version 2.5.1		
Segment	**SEQ**	**Element Name**	**Segment**	**SEQ**	**Element Name**
PV1	9	Consulting Doctor	ROL	4	ROLE-Person

N.2: Place Order Management [RAD-2]/Filler Order Management [RAD-13]

ORM/ORR Version 2.3.1			OMG/ORG Version 2.5.1		
Segment	**SEQ**	**Element Name**	**Segment**	**SEQ**	**Element Name**
PV1	9	Consulting Doctor	ROL	4	ROLE-Person
ORC	7	Timing/Quantity	TQ1	7	Start Time Date

N.3: Procedure Scheduled [RAD-4]/Procedure Update [RAD-13]

ORM Version 2.3.1			OMI Version 2.5.1		
Segment	**SEQ:<comp>**	**Element Name**	**Segment**	**SEQ**	**Element Name**
PV1	9	Consulting Doctor	ROL	4	ROLE-Person
ORC	7	Timing/Quantity	TQ1	7	Start Time Date
ZDS	1	Study Instance UID	IPC	3	Study Instance UID
OBR	4:4-6	Universal Service ID	IPC	6	Protocol Code
OBR	15	Specimen Source	OBR	46	Placer Supplemental Service Information
OBR	18	Placer Field 1	IPC	1	Accession Identifier
OBR	19	Placer Field 2	IPC	2	Requested Procedure ID
OBR	20	Filler Field 1	IPC	4	Scheduled Procedure Step ID
OBR	24	Diagnostic Service ID	IPC	5	Modality

Appendix O: Reason for Procedure Codesets (Informative)

This appendix is currently in the Encounter-based Imaging Workflow (EBIW) Trial Implementation Supplement.

Appendix P: HL7 v2 ORU for External Prior Reports Mapping

This appendix is currently in the Import and Display of External Priors (IDEP) Trial Implementation Supplement.

Appendix Q: Organization of series and images into framesets

RAD TF-2: 4.16.4.2.2.6.2 defines the concept of a FrameSet that combines Series and Multi-frame images to provide a consistent mechanism for navigation, in order to provide the same user experience regardless of whether the same information is encoded as separate single frame images or a single multi-frame image.

The simple case that results in one FrameSet per Series occurs when:

- each Series contains multiple single frame images, or
- each Series contains only a single multi-frame image.

More than one FrameSet is required per Series when that Series contains a mixture of single frame and multi-frame images.

The following example applies the rules of RAD TF-2: 4.16.4.2.2.6.2 to define FrameSets, and shows:

- what navigation elements (from RAD TF-2: Table 4.16.4.2.2.6.13-1) would be used to step forward and backward,
- whether or not cine tools are available for that FrameSet.

A hypothetical FrameSet Identifier and Frame # within FrameSet is used to illustrate the grouping.

Note: As per RAD TF-2: Table 4.16.4.2.2.5.13-1, the Right and Down arrow keys have the same effect as the ">" (Next Frame) button, and the Page Down key has the same effect as the ">>" (Next FrameSet) button, etc.

1185 **Table Q-1: Mixed Single and Multi-Frame Images Within Series Example – Ultrasound**

Series # & Description	Image # & Comment	# of Frames	SOP Class	FrameSet Identifier	Frame #	Next	Prior	Cine
Series 1 – Echo	Image 1 – Cine Loop	54	US MF	FrameSet 1.1	1	>	None	Yes
					…	>	<	
					54	>>	<	
	Image 2 – Measurement	1	US SF	FrameSet 1.2	1	>>	<<	No
	Image 3 – Measurement	1	US SF	FrameSet 1.3	1	>>	<<	No
	Image 4 – Cine Loop	60	US MF	FrameSet 1.4	1	>	<<	Yes
					…	>	<	
					60	>>	<	
	Image 5 – Measurement	1	US SF	FrameSet 1.5	1	>>	<<	No
Series 2 – Contrast	Image 1 – Recording	700	US MF	FrameSet 2.1	1	>	<<	Yes
					…	>	<	
					700	>>	<	
Series 3 – Analysis	Image 1 – Color Perfusion	60	US MF	FrameSet 3.1	1	>	<<	Yes
					…	>	<	
					60	>>	<	
	Image 2 – Perfusion Curves	2	SC MF	FrameSet 3.2	1	>	<<	Yes
					2	None	<	

Table Q-2: Simple Case of all Single Frame Images Within Series Example – CT

Series # & Description	Image # & Comment	# of Frames	SOP Class	FrameSet Identifier	Frame #	Next	Prior	Cine
Series 1 – Localizer	Image 1 – AP	1	CT SF	FrameSet 1.1	1	>	None	No
Series 2 – Lung	Image 1	1	CT SF	FrameSet 2.1	1	>	<<	Yes
	…	1	CT SF		…	>	<	
	Image 140	1	CT SF		140	>>	<	
Series 3 – Bone	Image 1	1	CT SF	FrameSet 3.1	1	>	<<	Yes
	…	1	CT SF		…	>	<	
	Image 140	1	CT SF		140	>>	<	

Table Q-3: Simple Case of all Multi-Frame Images Within Separate Series Example – Enhanced CT

Series # & Description	Image # & Comment	# of Frames	SOP Class	FrameSet Identifier	Frame #	Next	Prior	Cine
Series 1 – Localizer	Image 1 – AP	1	CT MF	FrameSet 1.1	1	>	None	No
Series 2 – Lung	Image 1 – Lung	140	CT MF	FrameSet 2.1	1	>	<<	Yes
					…	>	<	
					140	>>	<	
Series 3 – Bone	Image 1 – Bone	140	CT MF	FrameSet 3.1	1	>	<<	Yes
					…	>	<	
					140	>>	<	

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Table Q-4: Simple Case of all Multi-Frame Images Within Single Series Example – Enhanced CT

Series # & Description		Image # & Comment	# of Frames	SOP Class	FrameSet Identifier	Frame #	Next	Prior	Cine
Series 1		Image 1 – AP	1	CT MF	FrameSet 1.1	1	>	None	No
		Image 2 – Lung	140	CT MF	FrameSet 1.2	1	>	<<	Yes
						…	>	<	
						140	>>	<	
		Image 3 – Bone	140	CT MF	FrameSet 1.3	1	>	<<	Yes
						…	>	<	
						140	>>	<	

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Appendix R: Multiple Identity Resolution Option

This appendix is currently in the Multiple Image Manager/Archive (MIMA) Trial Implementation Supplement.

Appendix S: Intentionally left blank

Appendix T: Intentionally left blank

Appendix U: HL7 ADT Mapping to DICOM MWL for POCUS

This appendix is currently in the Encounter-Based Imaging Workflow (EBIW) Trial Implementation Supplement.

Appendix V: Attribute Consistency between UPS and Resulting Composite IODs

This appendix is currently in the AI Workflow for Imaging (AIW-I) Trial Implementation Supplement (previously PAWF).

Appendix W: Populating UPS Workitem Attributes during Creation

This appendix is currently in the AI Workflow for Imaging (AIW-I) Trial Implementation Supplement (previously PAWF).

Appendix X: Intentionally left blank

Appendix Y: Intentionally left blank

Appendix Z: Reject Analysis Coding

This appendix is currently in the Reject Analysis and Monitoring (RAM) Trial Implementation Supplement.