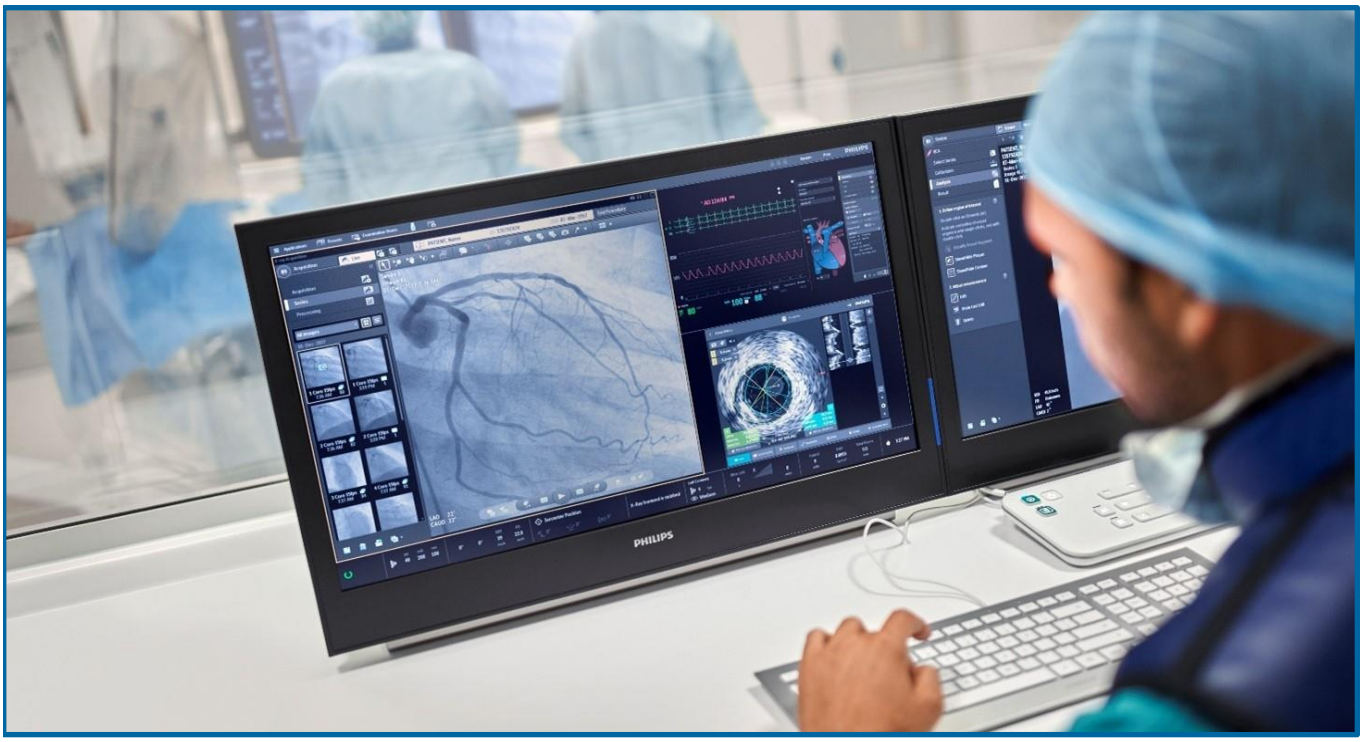
DICOM Conformance Statement

Interventional Workspace Hub R1.0, UniGuide R1.0



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1. DICOM Conformance Statement Overview

The Interventional Workspace Hub communicates with IGT Application via specific software interfaces to support their workflow including import and export of supported data e.g. pre-operative images and plannings.

As a platform, the Interventional Workspace Hub hosts UniGuide — a software medical device that supports endovascular procedures by importing pre operative 3D images and planning data, adding supplemental planning information, and presenting them alongside live Philips Interventional X ray images to aid anatomical visualization and device guidance.

Table 1: Network Services

SOP Class		User of Service (SCU)	Provider of Service (SCP)	Display
Name	**UID**			
Other				
Verification SOP Class	1.2.840.10008.1.1	Yes	Yes	N/A
Print Management				
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18	Yes	No	N/A
>Basic Color Image Box SOP Class	1.2.840.10008.5.1.1.4.1	Yes	No	N/A
>Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	Yes	No	N/A
>Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	Yes	No	N/A
>Printer SOP Class	1.2.840.10008.5.1.1.16	Yes	No	N/A
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Yes	No	N/A
>Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	Yes	No	N/A
>Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	Yes	No	N/A
>Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4	Yes	No	N/A
>Printer SOP Class	1.2.840.10008.5.1.1.16	Yes	No	N/A
Query/Retrieve				
Patient Root QR Information Model – FIND SOP Class	1.2.840.10008.5.1.4.1.2.1.1	Yes	No	N/A
Patient Root QR Information Model – MOVE SOP Class	1.2.840.10008.5.1.4.1.2.1.2	Yes	No	N/A
Study Root QR Information Model – FIND SOP Class	1.2.840.10008.5.1.4.1.2.2.1	Yes	No	N/A
Study Root QR Information Model – MOVE SOP Class	1.2.840.10008.5.1.4.1.2.2.2	Yes	No	N/A
Transfer				
CT Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.2	Yes	Yes	Yes

SOP Class		User of Service (SCU)	Provider of Service (SCP)	Display
Name	UID			
X-Ray Angiographic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.1	Yes	Yes	Yes
Enhanced CT Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.2.1	Yes	Yes	Yes
X-Ray 3D Angiographic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.13.1.1	Yes	Yes	Yes
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7	Yes	Yes	Yes
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Yes	Yes	Yes
Surface Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.5	Yes	Yes	Yes
Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.4	Yes	Yes	Yes

A table of Supported Media Storage Application Profiles (with roles) is provided.

Table 2: Media Services

Media Storage Application Profile	File-set Creator (FSC)	File-set Updater (FSU)	File-set Reader (FSR)
CD-R			
General Purpose CD-R Interchange	Yes	No	Yes
DVD			
General Purpose DVD Interchange with JPEG	Yes	No	Yes
USB			
General Purpose USB Media Interchange with JPEG	Yes	Yes	Yes

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3. Introduction

3.1. Revision History

The revision history provides dates and differences of the different releases.

Table 3: Revision History

Document Version	Date of Issue	Description of change
01	16-Sept-2025	First release for Interventional Workspace Hub R1.0
02	17-Mar-2026	First release of the Interventional Workspace Hub R1.0 platform, featuring the UniGuide R1.0 application hosted on it

3.2. Audience

This Conformance Statement is intended for:

- (Potential) customers
- System integrators of medical equipment
- Marketing staff interested in system functionality
- Software designers implementing DICOM interfaces

It is assumed that the reader is familiar with the DICOM standard.

3.3. Remarks

The DICOM Conformance Statement is contained in chapter 4 through 8 and follows the contents and structuring requirements of DICOM PS 3.2.
This DICOM Conformance Statement by itself does not guarantee successful interoperability of Philips equipment with non-Philips equipment. The user (or user's agent) should be aware of the following issues:

- **Interoperability**
  Interoperability refers to the ability of application functions, distributed over two or more systems, to work successfully together. The integration of medical devices into an IT environment may require application functions that are not specified within the scope of DICOM. Consequently, using only the information provided by this Conformance Statement does not guarantee interoperability of Philips equipment with non-Philips equipment.
  It is the user's responsibility to analyze thoroughly the application requirements and to specify a solution that integrates Philips equipment with non-Philips equipment.

- **Validation**
  Philips equipment has been carefully tested to ensure that the actual implementation of the DICOM interface corresponds with this Conformance Statement.
  Where Philips equipment is linked to non-Philips equipment, the first step is to compare the relevant Conformance Statements. If the Conformance Statements indicate that successful information exchange should be possible, additional validation tests will be necessary to ensure the functionality, performance, accuracy and stability of image and image related data. It is the responsibility of the user (or user's agent) to specify the appropriate test suite and to carry out the additional validation tests.

- **New versions of the DICOM Standard**
  The DICOM Standard will evolve in future to meet the user's growing requirements and to incorporate new features and technologies. Philips is actively involved in this evolution and plans to adapt its equipment to future versions of the DICOM Standard. In order to do so, Philips reserves the right to

make changes to its products or to discontinue its delivery. The user should ensure that any non-Philips provider linking to Philips equipment also adapts to future versions of the DICOM Standard. If not, the incorporation of DICOM enhancements into Philips equipment may lead to loss of connectivity (in case of networking) and incompatibility (in case of media).

3.4. Definitions, Terms and Abbreviations

Table 4: Definitions, Terms and Abbreviations

Abbreviation/Term	Explanation
AE	Application Entity
ANSI	American National Standard Institute
AP	Application Profile
BOT	Basic Offset Table
CD	Compact Disc
CD-R	CD-Recordable
CD-M	CD-Medical
CR	Computed Radiography
CT	Computed Tomography
DCR	Dynamic Cardio Review
DICOM	Digital Imaging and Communications in Medicine
DIMSE	DICOM Message Service Element
DX	Digital X-Ray
EBE	DICOM Explicit VR Big Endian
ELE	DICOM Explicit VR Little Endian
FSC	File-set Creator
FSR	File-set Reader
FSU	File-set Updater
GUI	Graphic User Interface
HIS	Hospital Information System
HL7	Health Level Seven
ILE	DICOM Implicit VR Little Endian
IOD	Information Object Definition
ISIS	Information System – Imaging System
MPPS	Modality Performed Procedure Step
MR	Magnetic Resonance
PHI	Protected Health Information
NEMA	National Electrical Manufacturers Association
PDU	Protocol Data Unit
RF	X-Ray Radiofluoroscopic
RIS	Radiology Information System
RT	Radiotherapy
RWA	Real-World Activity

Abbreviation/Term	Explanation
SC	Secondary Capture
SCM	Study Component Management
SCP	Service Class Provider
SCU	Service Class User
SOP	Service Object Pair
TCP/IP	Transmission Control Protocol/Internet Protocol
UID	Unique Identifier
US	Ultrasound
USMF	Ultrasound Multi-frame
WLM	Worklist Management
XA	X-Ray Angiographic

3.5. References

[DICOM] Digital Imaging and Communications in Medicine, Parts 1 - 22 (NEMA PS 3.1- PS 3.22),
National Electrical Manufacturers Association
1300 North 17th Street
Suite 900
Arlington, Virginia 22209
Internet: https://www.dicomstandard.org/current

4. Implementation Model

This section contains the networking related services (vs. the media related ones).

4.1. Implementation model

The implementation model consists of three sections:

- The application data flow diagram, specifying the relationship between the Application Entities and the "external world" or Real-World Activities,
- A functional description of each Application Entity, and
- The sequencing constraints among them.

4.1.1. Application Data Flow

The Interventional Workspace Hub implements one network application entity: The Interventional Workspace Hub Network AE.

The following figure shows the networking application data flow as a functional overview of the application entity. On the left the local Real-World Activities are presented, whereas on the right the remote Real-World Activities are presented.

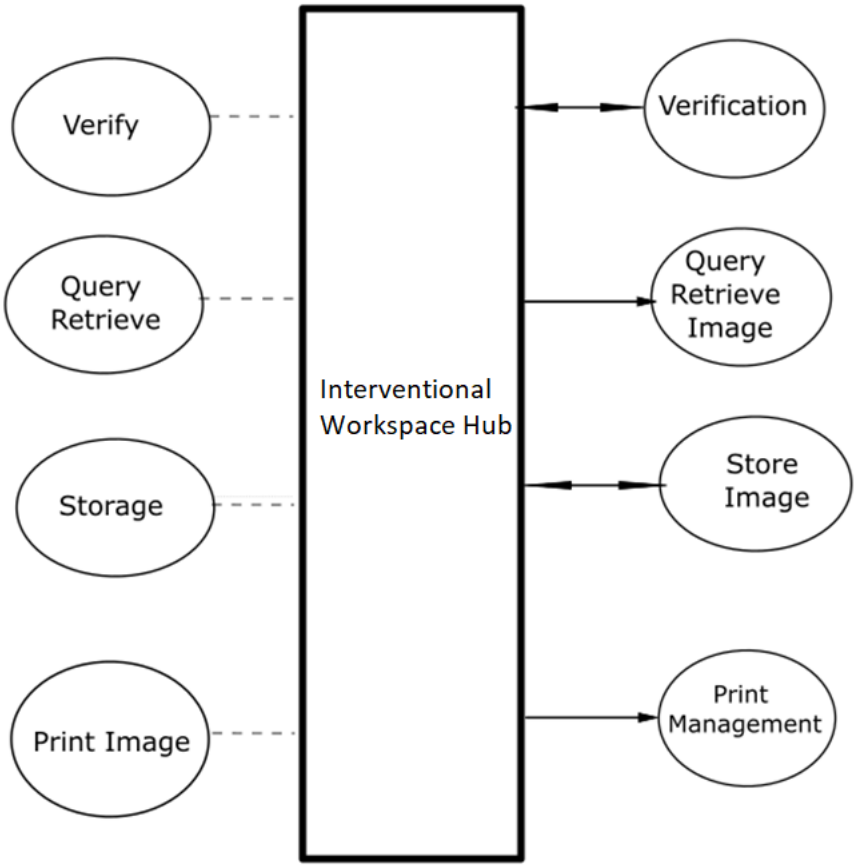


Figure 1: Application Data Flow Diagram

The Interventional Workspace Hub incorporates the following functionality:
- Import images to a Interventional Workspace Hub database.
- Export images from the local database to a network DICOM node.
- Query and retrieve images from a remote DICOM node.
- Query and retrieve images from the local database.

- Print grayscale and color images from the local database on a DICOM printer.

4.1.2. Functional Definition of AE's

This section contains a functional definition for each individual local Application Entity.

4.1.2.1. Functional Definition of Interventional Workspace Hub Network AE

Interventional Workspace Hub incorporates the following functionality:

- The Interventional Workspace Hub Network AE can verify application level communication by using the Verification service both as SCU and SCP (Verify).
- The Interventional Workspace Hub Network AE can store images by using the Storage service both as SCU and SCP (Store Image).
- The Interventional Workspace Hub Network AE can find and move images by using the Query/Retrieve service as SCU (Query/Retrieve Image).
- The Interventional Workspace Hub Network AE can print images by using the Print Management service as SCU (Print Image).

4.1.3. Sequencing of Real World Activities

4.1.3.1. Sequencing of Query/Retrieve Activities

The Interventional Workspace Hub can Query DICOM archives and Receive images locally. An association is established when the user initiates a query from the graphical user interface. The Interventional Workspace Hub's Query/Retrieve SCU will establish an association to query a remote AE to obtain a list of relevant objects based on the user's inputs.
When the user retrieves the needed objects, the remote AE establishes a connection with the Interventional Workspace Hub's Storage SCP to store the images locally.

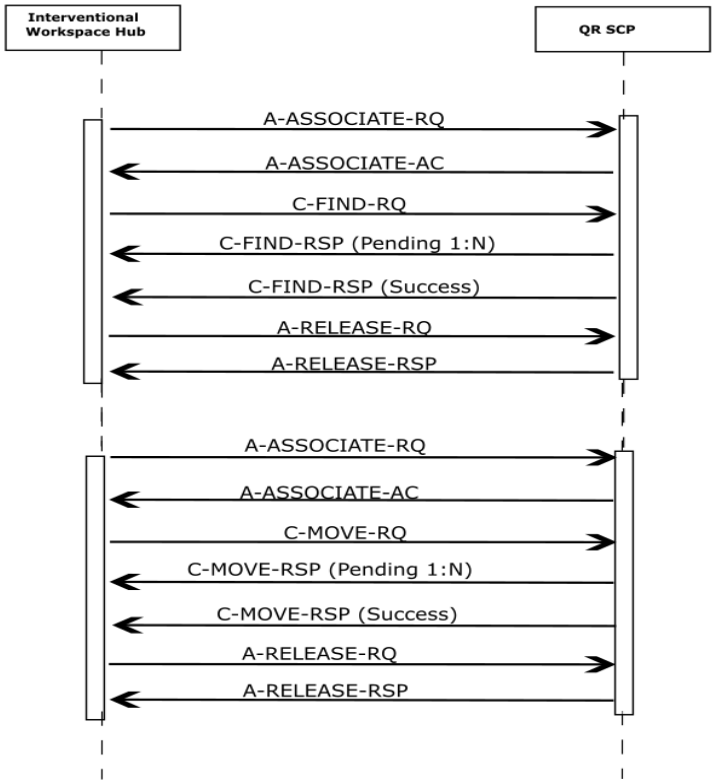


Figure 2: Sequencing of Query/Retrieve

5. Service and Interoperability Description

5.1. AE Specifications

This section in the DICOM Conformance Statement is a set of Application Entity specifications. There are as many of these subsections as there are different AE's in the implementation.

5.1.1. Interventional Workspace Hub Network AE

Detail of this specific Application Entity is specified in this section.

5.1.1.1. SOP Classes

This Application Entity provides Standard Conformance to the following SOP Classes.

Table 5: SOP Classes for Interventional Workspace Hub Network AE

SOP Class Name	SOP Class UID	SCU	SCP
Verification SOP Class	1.2.840.10008.1.1	Yes	Yes
CT Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.2	Yes	Yes
X-Ray Angiographic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.1	Yes	Yes
X-Ray 3D Angiographic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.13.1.1	Yes	Yes
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7	Yes	Yes
Multi-frame True Color Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7.4	Yes	Yes
Surface Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.5	Yes	Yes
Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.4	Yes	Yes
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	Yes	Yes
Study Root QR Information Model – FIND SOP Class	1.2.840.10008.5.1.4.1.2.2.1	Yes	No
Study Root QR Information Model – MOVE SOP Class	1.2.840.10008.5.1.4.1.2.2.2	Yes	No
Patient Root QR Information Model – FIND SOP Class	1.2.840.10008.5.1.4.1.2.1.1	Yes	No
Patient Root QR Information Model – MOVE SOP Class	1.2.840.10008.5.1.4.1.2.1.2	Yes	No
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18	Yes	No
>Basic Color Image Box SOP Class	1.2.840.10008.5.1.1.4.1	Yes	No
>Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	Yes	No
>Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	Yes	No
>Printer SOP Class	1.2.840.10008.5.1.1.16	Yes	No
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Yes	No
>Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	Yes	No
>Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	Yes	No
>Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4	Yes	No
>Printer SOP Class	1.2.840.10008.5.1.1.16	Yes	No

Note: Any SOP specific behavior is documented later in the conformance statement in the applicable SOP specific conformance section.

5.1.1.2. Association Policies

Each AE specification contains a description of the general association establishment and acceptance policies of the AE.

5.1.1.2.1 General

The DICOM standard application context is specified below.

Table 6: DICOM Application Context

Description	Value
Application Context Name	1.2.840.10008.3.1.1.1

5.1.1.2.2 Number of Associations

The number of simultaneous associations that an Application Entity may support as an Initiator or Acceptor is specified here.

Table 7: Number of associations as an Association Initiator for this AE

Description	Value
Maximum number of simultaneous associations	50

Table 8: Number of associations as an Association Acceptor for this AE

Description	Value
Maximum number of simultaneous associations	10

5.1.1.2.3 Asynchronous Nature

The implementation supports negotiation of multiple outstanding transactions, along with the maximum number of outstanding transactions supported.

The Interventional Workspace Hub Network AE does not support asynchronous operations and will not perform asynchronous window negotiation. The only exceptions are for reports from Print Management operations.

Table 9: Asynchronous nature as an Association Initiator for this AE

Description	Value
Maximum number of outstanding asynchronous transactions	Not Applicable

5.1.1.2.4 Implementation Identifying Information

The value supplied for Implementation Class UID and version name are documented here.

Table 10: DICOM Implementation Class and Version for Interventional Workspace Hub Network AE

Implementation Class UID	1.3.46.670589.7.100.1.0
Implementation Version Name	1.0

5.1.1.2.5 Communication Failure Handling

The behavior of the AE during communication failure is summarized in the below table.

Table 11: Communication Failure Behavior

Exception	Behavior
ARTIM Timeout	The association setup fails; the reason is logged and reported to the user.

5.1.1.3. Association Initiation Policy

The Application Entity will respond to a received Association rejection as shown in the below table:

Table 12: Association Rejection response

Result	Source	Reason/Diagnosis	Behavior
1 – rejected-permanent	1 – DICOM UL service-user	1 – no-reason-given	Association is not established. The following error is logged. Association rejected by peer (1: REJECT_RESULT_permanent,1: REJECT_SOURCE_dul_user,1: REJECT_REASON_no_reason_given)
		2 – application-context-name-not supported	Association is not established. The following error is logged. Association rejected by peer (1: REJECT_RESULT_permanent, 1: REJECT_SOURCE_dul_user, 2: REJECT_REASON_application_context_not_support)
		3 – calling-AE-title-not-recognized	Association is not established. The following error is logged. Association rejected by peer (1: REJECT_RESULT_permanent, 1: REJECT_SOURCE_dul_user, 3: REJECT_REASON_calling_aetitle_not_recognized)
		7 – called-AE-title-not-recognized	Association is not established. The following error is logged. Association rejected by peer (1: REJECT_RESULT_permanent, 1: REJECT_SOURCE_dul_user, 7: REJECT_REASON_called_aetitle_not_recognized)
	2 – DICOM UL service-provider (ACSE related function)	1 – no-reason-given	Association is not established. The following error is logged. Error: UserRecoverable: impl.dicom.access.PEER: Associationrejected by peer (1: REJECT_RESULT_permanent, 2: REJECT_SOURCE_dul_provider (acse), 1: REJECT_REASON_no_reason_given)
		2 – protocol-version-not-supported	Association is not established. The following error is logged. Association rejected by peer (1: REJECT_RESULT_permanent, 2: REJECT_SOURCE_dul_provider (acse), 2: REJECT_REASON_ protocol-version-not-supported)
	3 – DICOM UL service-provider (Presentation related function)	1 – temporary-congestion	Association is not established. The following error is logged. Association rejected by peer (1: REJECT_RESULT_permanent, 3: REJECT_SOURCE_dul_provider (presentation), 1: REJECT_REASON_ temporary-congestion)
		2 – local-limit-exceeded	Association is not established. The following error is logged. Association rejected by peer (1: REJECT_RESULT_permanent, 3: REJECT_SOURCE_dul_provider (presentation), 2: REJECT_REASON_ local-limit-exceeded)

Result	Source	Reason/Diagnosis	Behavior
2 – rejected-transient	1 – DICOM UL service-user	1 – no-reason-given	Association is not established. The following error is logged. Association rejected by peer (2: REJECT_RESULT_transient, 1: REJECT_SOURCE_dul_user, 1: REJECT_REASON_no_reason_given)
		2 – application-context-name-not-supported	Association is not established. The following error is logged. Association rejected by peer (2: REJECT_RESULT_transient, 1: REJECT_SOURCE_dul_user, 2: REJECT_REASON_application_context_not_support)
		3 – calling-AE-title-not-recognized	Association is not established. The following error is logged. Association rejected by peer (2: REJECT_RESULT_transient, 1: REJECT_SOURCE_dul_user, 3: REJECT_REASON_calling_aetitle_not_recognized)
		7 – called-AE-title-not-recognized	Association is not established. The following error is logged. Association rejected by peer (2: REJECT_RESULT_transient, 1: REJECT_SOURCE_dul_user, 7: REJECT_REASON_called_aetitle_not_recognized)
	2 – DICOM UL service-provider (ACSE related function)	1 – no-reason-given	Association is not established. The following error is logged. Association rejected by peer (2: REJECT_RESULT_transient, 2: REJECT_SOURCE_dul_provider (acse), 1: REJECT_REASON_no_reason_given)
		2 – protocol-version-not-supported	Association is not established. The following error is logged. Association rejected by peer (2: REJECT_RESULT_transient, 2: REJECT_SOURCE_dul_provider (acse), 2: REJECT_REASON_ protocol-version-not-supported)
	3 – DICOM UL service-provider (Presentation related function)	1 – temporary-congestion	Association is not established. The following error is logged. Association rejected by peer (2: REJECT_RESULT_transient, 3: REJECT_SOURCE_dul_provider (presentation), 1: REJECT_REASON_ temporary-congestion)
		2 – local-limit-exceeded	Association is not established. The following error is logged. Association rejected by peer (2: REJECT_RESULT_transient, 3: REJECT_SOURCE_dul_provider (presentation), 2: REJECT_REASON_application_context_not_support)

The behavior of the AE on receiving an Association abort is summarized in the below table.

Table 13: Association Abort Handling

Source	Reason/Diagnosis	Behavior When Received	Behavior When Sent
0 – DICOM UL service-user (initiated abort)	0- reason-not-specified	When received, the Interventional Workspace Hub terminates the connection with the following log: Association ABORTED by peer (0: ABORT_SOURCE_dul_user, 0: ABORT_REASON_not_specified).	Abort is issued to an executing job that utilizes this network connection (ExportNetwork/ ArchiveNetwork/DICOMCopy/DICOMMove) Any other problem than ones specified for Interventional Workspace Hub Network AE SCU in the rows below. (Examples: Problem while decoding the DICOM stream, SCU was unable to send the Response to SCP, Error writing to SCU stream).
2 – DICOM UL service-provider (initiated abort)	0 – reason-not-specified	When received, the Interventional Workspace Hub Network AE terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 0: ABORT_REASON_not_specified)	There are problems in SCU/SCP role negotiation. Any other problem than ones specified for Interventional Workspace Hub Network AE SCU in the rows below. (Example: Problem while decoding the DICOM stream).
	1 – unrecognized-PDU	When received, the Interventional Workspace Hub Network AE terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 1: ABORT_REASON_unrecognized_pdu).	An unrecognized PDU type is received.
	2 – unexpected-PDU	When received, the Interventional Workspace Hub Network AE terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 2: ABORT_REASON_unexpected_pdu).	The received PDU type is not expected in the current state of connection.
	4 – unrecognized-PDU-parameter	When received, the Interventional Workspace Hub Network AE terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 4: ABORT_REASON_unrecognized_pdu_parameter).	An unrecognized Associate PDU item is received
	5 – unexpected-PDU-parameter	When received, the Interventional Workspace Hub Network AE terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 5: ABORT_REASON_unexpected_pdu_parameter).	One of the Associate PDU items is received more than once. One of the Associate PDU items is received unexpectedly.

Source	Reason/Diagnosis	Behavior When Received	Behavior When Sent
	6 – invalid-PDU-parameter-value	When received, the Interventional Workspace Hub Network AE terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 6: ABORT_REASON_invalid_pdu_parameter).	One of the Associate PDU items is received more than once. One of the Associate PDU items is not received[3]. There is mismatch in the application context names between the SCU and the SCP. Illegal Asynchronous Operations Window invoke value is received. Illegal Asynchronous Operations Window perform value is received. Unknown presentation context id is received. Unknown abstract syntax is received. The length or the format of a received PDU item is invalid.

Table 14: DICOM Command Communication Failure Behavior

Exception	Behavior
Reply Timeout	The association is aborted using A-ABORT and command marked as failed. The reason is logged and reported to the user.

5.1.1.3.1 (Real-World) Activity – Verification as SCU

5.1.1.3.1.1 Description and Sequencing of Activities

The Interventional Workspace Hub Network AE implements the Verification service class / Verification SOP class to verify application level communication.

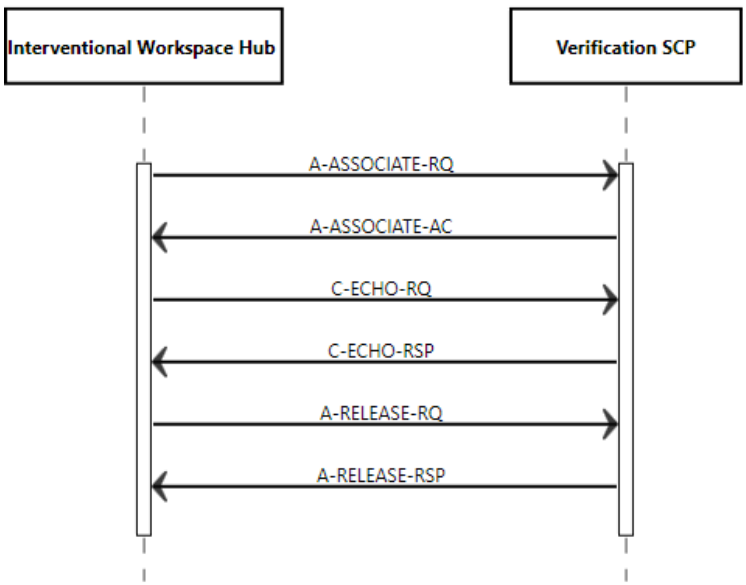


Figure 3: Data Flow Diagram – Verification as SCU

5.1.1.3.1.2 Proposed Presentation Contexts

The presentation contexts are defined in the below table.

Table 15: Proposed Presentation Contexts for (Real-World) Activity – Verification as SCU

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification SOP Class	1.2.840.10008.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		

5.1.1.3.1.3 SOP Specific Conformance for Verification SOP Class

The Interventional Workspace Hub Network AE provides standard conformance to the DICOM Verification service class.

5.1.1.3.1.3.1 Dataset Specific Conformance for Verification C-ECHO SCU

Table 16: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Confirmation	The SCP has successfully returned a verification response

5.1.1.3.2 (Real-World) Activity – FIND as SCU

5.1.1.3.2.1 Description and Sequencing of Activities

The Interventional Workspace Hub implements the Query/Retrieve service class to find selected images per Query/Retrieve SCP. When querying a remote database, the Interventional Workspace Hub AE initiates an association to the selected peer entity, sends a C-FIND request and receives the related C-FIND responses. The association is released after specific time-out.

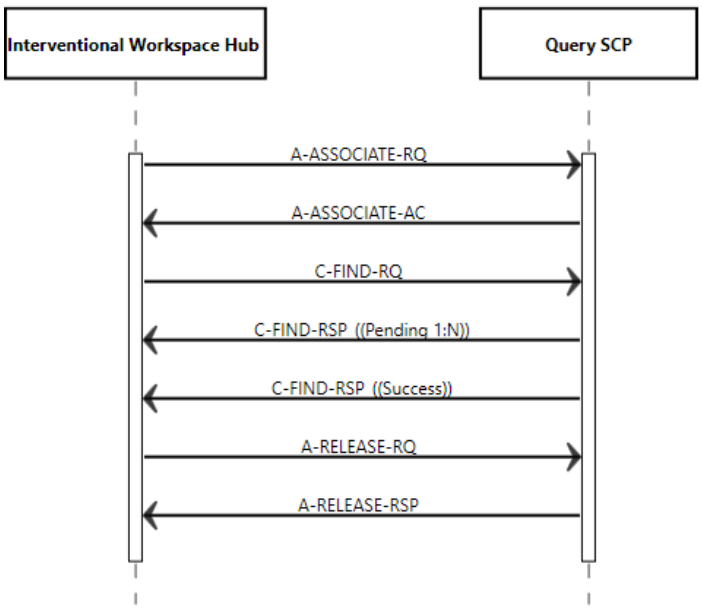


Figure 4: Data Flow Diagram – FIND as SCU

5.1.1.3.2.2 Proposed Presentation Contexts

The presentation contexts proposed by the system are defined in the below table.

Table 17: Proposed Presentation Contexts for (Real-World) Activity – FIND as SCU

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Patient Root QR Information Model – FIND SOP Class	1.2.840.10008.5.1.4.1.2.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
Study Root QR Information Model – FIND SOP Class	1.2.840.10008.5.1.4.1.2.2.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		

5.1.1.3.2.3 SOP Specific Conformance for Patient Root QR Information Model – FIND SOP Class

The Interventional Workspace Hub Network AE provides standard conformance to the DICOM Query Retrieve service class. The system issues a C-FIND-RQ to a configured remote DIOCM node for matching studies. The responses received are displayed to the user.

In the below table the supported query keys for each query level are described. Universal matching is supported as default.

The user may retrieve the images from the remote node.

5.1.1.3.2.3.1 Dataset Specific Conformance for Patient Root QR Information Model – FIND SOP Class C-FIND-SCU

Table 18: Supported Query Keys for Patient Root Information Model

Patient Root Information Model				
Attribute Name	Tag	VR	Type of Matching	Comment
Query/Retrieve Level	0008,0052	CS	Patient, Study and Series	
Specific Character Set	0008,0005	CS		
Q/R Patient level				
Patient ID	0010,0020	LO	Single Value	
Patient's Name	0010,0010	PN	Single Value, Wild card	
Patient's Birth Date	0010,0030	DA	Universal	
Patient Sex	0010,0040	CS	Universal	
Q/R Study level				
Study Date	00080020	DA	Single Value, Range, Universal	
Study Time	0010,0010	TM	Universal	
Accession Number	0008,0050	SH	Universal	
Modalities in Study	0008,0061	CS	Universal	

Patient Root Information Model				
Attribute Name	**Tag**	**VR**	**Type of Matching**	**Comment**
Referring Physician's Name	0008,0090	PN	Universal	
Patient ID	0010,0020	LO	Single Value, Wild card	
Study Instance UID	0020,000D	UI	Universal	
Study ID	0020,0010	SH	Single Value, Universal	
Q/R Series level				
Series Date	0008,0021	DA	Universal	
Series Time	0008,0031	TM	Universal	
Modality	0008,0060	CS	Single Value, Universal	
Series Instance UID	0020,000E	UI	Universal	
Series Number	0020,0011	IS	Universal	
Frame of Reference UID	0020,0052	UI	Universal	

NOTE: A configuration template is available without private attributes.

Table 19: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Matching is complete – No final identifier is supplied	Successful completion of the query.
Failure	A700	Refused – Out of resources	Error code is logged; no query results are displayed in UI
	A900	Failed- Identifier does not match SOP Class	Error code is logged; no query results are displayed in UI
	C000	Failed – Unable to process	Error code is logged; no query results are displayed in UI
Cancel	FE00	Matching terminated due to Cancel request	No Results Displayed
Pending	FF00	Matches are continuing – Current match is supplied, and any optional keys were supported in the same manner as required keys	Query continues
	FF01	Matches are continuing – Warning that one or more optional keys were not supported for existence and/or matching for this identifier	Optional keys not supported.

5.1.1.3.2.4 SOP Specific Conformance for Study Root QR Information Model – FIND SOP Class

The Interventional Workspace Hub Network AE provides standard conformance to the DICOM Query Retrieve service class. The system issues a C-FIND-RQ to a configured remote DIOCM node for matching studies. The responses received are displayed to the user.

In the below table the supported query keys for each query level are described. Universal matching is supported as default.

The user may retrieve the images from the remote node.

5.1.1.3.2.4.1 Dataset Specific Conformance for Study Root QR Information Model – FIND SOP Class C-FIND-SCU

Table 20: Supported Query Keys for Study Root Information Model

Study Root Information Model				
Attribute Name	**Tag**	**VR**	**Type of Matching**	**Comment**
Query/Retrieve Level	0008,0052	CS	Study, Series	
Q/R Study level				
Study Date	00080020	DA	Single Value, Range, Universal	
Study Time	0010,0010	TM	Universal	
Accession Number	0008,0050	SH	Single Value, Universal, Wild card	"Accession Number" is displayed on UI.
Modalities in Study	0008,0061	CS	Single Value, Universal	
Referring Physician's Name	0008,0090	PN	Universal	"Referring Physician" is displayed on UI
Patient's Name	0010,0010	PN	Single Value, Wild card	"Patient Name" is displayed on UI
Patient ID	0010,0020	LO	Single Value, Wild card	"Patient ID is displayed on UI.
Patient's Birth Date	0010,0030	DA	Single Value, Universal	
Patient's Sex	0010,0040	CS	Universal	
Study Instance UID	0020,000D	UI	Universal	
Study ID	0020,0010	SH	Single Value, Universal	"Study ID" is displayed on UI
Q/R Series level				
Series Date	0008,0021	DA	Universal	
Series Time	0008,0031	TM	Universal	
Modality	0008,0060	CS	Universal	
Study Instance UID	0020,000D	UI	Universal	
Series Instance UID	0020,000E	UI	Universal	
Series Number	0020,0011	IS	Universal	
Frame of Reference UID	0020,0052	UI	Universal	
Series Description	0008,103E	LO	Universal	Series Description is displayed on the UI.

Table 21: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Matching is complete – No final identifier is supplied	Successful completion of the query.
Failure	A700	Refused – Out of resources	Error code is logged; no query results are displayed in UI

Service Status	Error Code	Further Meaning	Behavior
	A900	Failed- Identifier does not match SOP Class	Error code is logged; no query results are displayed in UI
	C000	Failed – Unable to process	Error code is logged; no query results are displayed in UI
Cancel	FE00	Matching terminated due to Cancel request	No Results Displayed
Pending	FF00	Matches are continuing – Current match is supplied, and any optional keys were supported in the same manner as required keys	Query continues
	FF01	Matches are continuing – Warning that one or more optional keys were not supported for existence and/or matching for this identifier	Optional keys not supported.

5.1.1.3.3 (Real-World) Activity – MOVE as SCU

5.1.1.3.3.1 Description and Sequencing of Activities

The Interventional Workspace Hub implements the Query/Retrieve service class to move selected images per Query/Retrieve SCP. After receiving C-FIND responses, users can copy all or selected images from a remote patient folder to the local database as requested. The Interventional Workspace Hub initiates an association to the selected peer entity, sends a C-MOVE request and receives the related C-MOVE responses. The association is released after the final C-MOVE response (when all selected images have been transmitted).

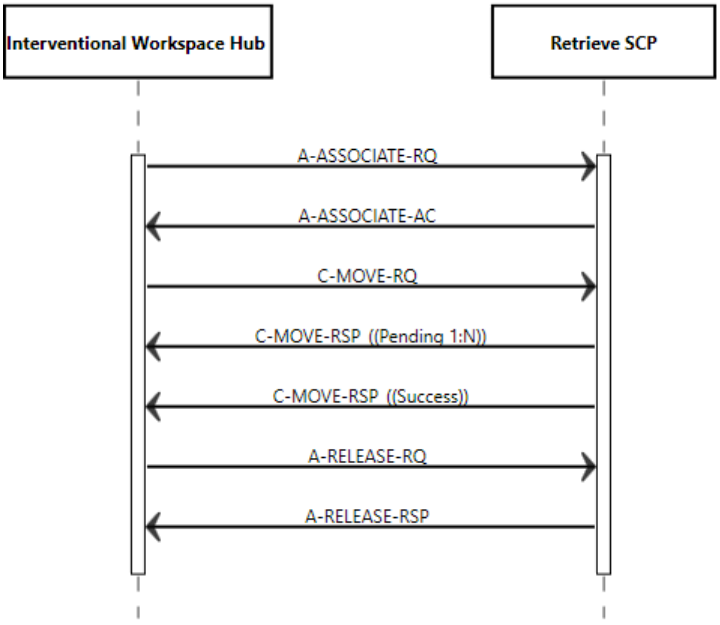


Figure 5: Data Flow Diagram – MOVE as SCU

5.1.1.3.3.2 Proposed Presentation Contexts

The presentation contexts are defined in the below table.

Table 22: Proposed Presentation Contexts for (Real-World) Activity – MOVE as SCU

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Patient Root QR Information Model – MOVE SOP Class	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
Study Root QR Information Model – MOVE SOP Class	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

5.1.1.3.3.3 SOP Specific Conformance for Patient/Study Root QR Information Model – MOVE SOP Class

Once the queried image responses are received by the Interventional Workspace Hub Network AE, the user may retrieve the images from the remote DICOM node. The system shall then initiate a C-MOVE-RQ with the remote DICOM node, with the destination AE. In response the remote node shall initiate a C-Store for the requested images to the destination AE.

5.1.1.3.3.3.1 Dataset Specific Conformance for Patient/Study Root QR Information Model – MOVE SOP Class C-MOVE-SCU

Table 23: Identifiers for Patient Root Information Model MOVE as SCU

Patient/Study Root Information Model			
Attribute Name	**Tag**	**VR**	**Comment**
Query/Retrieve Level	0008,0052	CS	Series
Q/R Series level			
Patient ID	0010,0020	LO	
Study Instance UID	0020,000D	UI	
Series Instance UID	0020,000E	UI	
Specific Character Set	0008,0005	CS	

Table 24: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Sub-operations complete – No failures	Successful completion of the retrieve; also storage warnings may have occurred.
Failure	A701	Refused – Out of resources – Unable to calculate number of matches	Retrieve is failed and Error code is logged
	A702	(Refused: Out of Resources – Unable to perform sub-operations	Retrieve is failed and Error code is logged

Service Status	Error Code	Further Meaning	Behavior
	A801	Refused – Move destination unknown	Retrieve is failed and Error code is logged
	A900	Identifier does not match SOP Class	Retrieve is failed and Error code is logged
	C000	Failed – Unable to process	Retrieve is failed and Error code is logged
Warning	B000	Sub-operations complete – One or more failures	Sub operations complete – one or more warnings
Cancel	FE00	Sub-operations terminated due to Cancel indication	DICOM: Error Information: Move failed in Receive Request, DICOM protocol error
Pending	FF00	Sub-operations are continuing	Move pending.

5.1.1.3.3.4 SOP Specific Conformance for Study Root QR Information Model – MOVE SOP Class

Once the queried image responses are received by the Interventional Workspace Hub Network AE, the user may retrieve the images from the remote DICOM node. The system shall then initiate a C-MOVE-RQ with the remote DICOM node, with the destination AE. In response the remote node shall initiate a C-Store for the requested images to the destination AE.

5.1.1.3.3.4.1 Dataset Specific Conformance for Study Root QR Information Model – MOVE SOP Class C-MOVE-SCU

Table 25: Identifiers for Study Root Information Model MOVE as SCU

Patient/Study Root Information Model			
Attribute Name	**Tag**	**VR**	**Comment**
Query/Retrieve Level	0008,0052	CS	Series
Q/R Series level			
Patient ID	0010,0020	LO	
Study Instance UID	0020,000D	UI	
Series Instance UID	0020,000E	UI	
Specific Character Set	0008,0005	CS	

Table 26: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Sub-operations complete – No failures	Successful completion of the retrieve; also storage warnings may have occurred.
Failure	A701	Refused – Out of resources – Unable to calculate number of matches	Retrieve is failed and Error code is logged
	A702	(Refused: Out of Resources – Unable to perform sub-operations	Retrieve is failed and Error code is logged
	A801	Refused – Move destination unknown	Retrieve is failed and Error code is logged

Service Status	Error Code	Further Meaning	Behavior
	A900	Identifier does not match SOP Class	Retrieve is failed and Error code is logged
	C000	Failed – Unable to process	Retrieve is failed and Error code is logged
Warning	B000	Sub-operations complete – One or more failures	Sub operations complete – one or more warnings
Cancel	FE00	Sub-operations terminated due to Cancel indication	DICOM: Error Information: Move failed in Receive Request, DICOM protocol error
Pending	FF00	Sub-operations are continuing	Move pending.

5.1.1.3.4 (Real-World) Activity – Image Export

5.1.1.3.4.1 Description and Sequencing of Activities

The Interventional Workspace Hub implements the Storage service class to store selected images at an archive or other storage SCP. All actual selected images are exported using one and the same association.

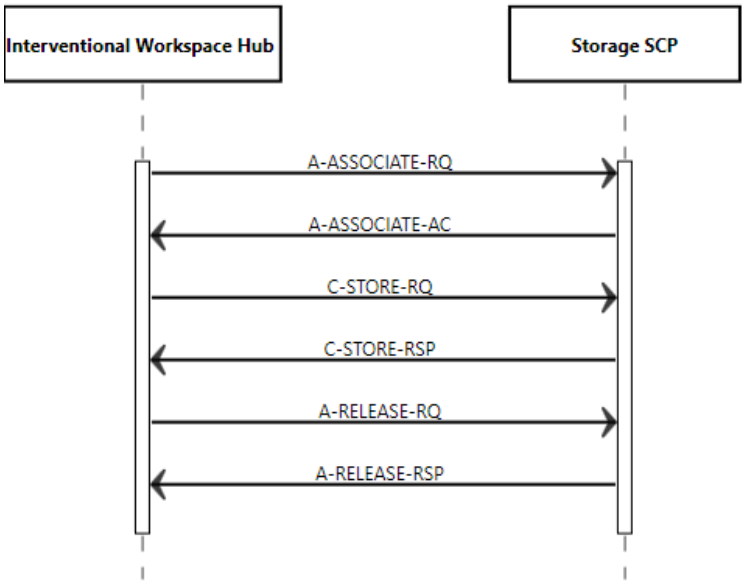


Figure 6: Data Flow Diagram – Storage as SCU

5.1.1.3.4.2 Proposed Presentation Contexts

The presentation contexts are defined in the below table.

Table 27: Proposed Presentation Contexts for (Real-World) Activity – Image Export

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
CT Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		JPEG Lossless, Nonhierarchical (Processes 14)	1.2.840.10008.1.2.4.57		
		JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70		
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		JPEG Lossless, Nonhierarchical (Processes 14)	1.2.840.10008.1.2.4.57		
		JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70		
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		JPEG Lossless, Nonhierarchical (Processes 14)	1.2.840.10008.1.2.4.57		
		JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70		
Surface Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.5	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		JPEG Lossless, Nonhierarchical (Processes 14)	1.2.840.10008.1.2.4.57		
		JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.4	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
		JPEG Lossless, Nonhierarchical (Processes 14)	1.2.840.10008.1.2.4.57		
		JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
		RLE Lossless	1.2.840.10008.1.2.5		
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		JPEG Lossless, Nonhierarchical (Processes 14)	1.2.840.10008.1.2.4.57		
		JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4. 70		
X-Ray 3D Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.13.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		JPEG Lossless, Nonhierarchical (Processes 14)	1.2.840.10008.1.2.4.57		
		JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
X-Ray Angiographic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		JPEG Lossless, Nonhierarchical (Processes 14)	1.2.840.10008.1.2.4.57		
		JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		

Note:

1. Fluoroscopy overlay images cannot be exported and imported.
2. Interventional Workspace Hub exports object with requested Bits Stored (0028,0101) = 0008H/8’.

3. The Interventional Workspace Hub supports the export of surface segmentation SOP class as a secondary capture when the receiving remote node does not support the surface segmentation SOP class.
4. The Interventional Workspace Hub supports the export of the X-Ray 3D Angiographic SOP class as a CT SOP class when the receiving remote node does not support the X-Ray 3D Angiographic SOP class.

5.1.1.3.4.3 SOP Specific Conformance for Storage SOP Class

The Interventional Workspace Hub will export all optional or private image attributes.

Note: These private attributes need to be preserved when the data is exported and imported back – failing which, the data can fail to import or not open in the appropriate viewer. The exact attributes and their meanings are not elaborated in this document.

Choice of format to store private data (Secondary Capture)

The Interventional Workspace Hub also exports private data in Secondary Capture Storage IOD. These attributes are primarily the last seen settings of each application.

Choice of format to store Movie

Interventional Workspace Hub exports movies as Multi-Frame Secondary Capture Images, if that SOP class is supported. It exports movies as series of Single Frame Secondary Capture Images (“Secondary Capture Image Storage” SOP class), if the Remote DICOM node doesn’t accept Multi-Frame Secondary Capture Images.

Choice of format to store Snapshots

Snapshots created in the Interventional Workspace Hub are exported using the Secondary Capture Image Storage SOP class. Stereo Snapshots and Stack of Snapshots are exported as multiple Secondary Capture Images in a Series of their own.

5.1.1.3.4.3.1 Dataset Specific Conformance for C-STORE-RQ

Table 28: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Successful stored	Progress of the export job is updated and connection is retained for the next store. If the store of all the SOP instances is completed then the connection is released.
Failure	A701	Refused: Out of Resources	Error is logged and the export job fails. Connection is released.
	A9xx	Error: Data Set does not match SOP Class	Error is logged and the export job fails. Connection is released.
	C000	Error: cannot understand	Error is logged and the export job fails. Connection is released.
	0117	Invalid Object Instance	Error is logged and the export job fails. Connection is released.
	0212	Mistyped Argument	Error is logged and the export job fails. Connection is released.
	0122	Refused: SOP Class not supported	Error is logged and the export job fails. Connection is released.
	0210	Duplicate invocation	Error is logged and the export job fails. Connection is released.

Service Status	Error Code	Further Meaning	Behavior
	0211	Unrecognized operation	Error is logged and the export job fails. Connection is released.
Warning	B000	Coercion of Data Elements	Warning is logged and the export job continues. Connection is released.
	B007	Data Set does not match SOP Class	Warning is logged and the export job continues. Connection is released.
	B006	Elements Discarded	Warning is logged and the export job continues. Connection is released.
	0107	Attribute List Error	Warning is logged and the export job continues. Connection is released.

5.1.1.3.5 (Real-World) Activity – Print Management as SCU

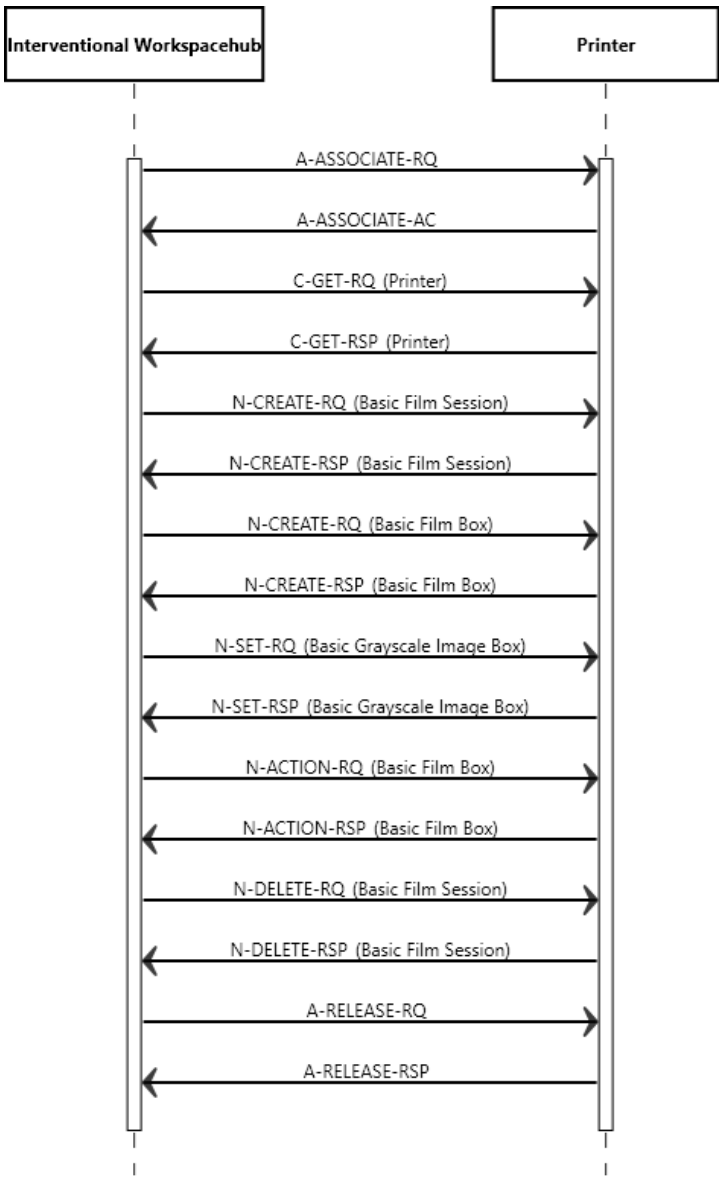


Figure 7: (Real Word) Activity – Print Management as SCU

5.1.1.3.5.1 Description and Sequencing of Activities

The Interventional Workspace Hub Network AE implements the Print Management service class as part of the Print component to send selected images to a printer (SCP).

As a result, the Interventional Workspace Hub Network AE will initiate an association with the selected printer and use it to send the Print Service Elements of the Print SOP Classes. If the association could not be established, the Interventional Workspace Hub Network AE will not retry to establish an association.

If the association could not be established, the Interventional Workstation Network AE will retry to establish an association every 20 seconds during the next hour.

In case of a print job the printer status is requested in that association.. The received printer status is displayed in the Printer Status Tool. On a failure printer status, the Interventional Workstation Network AE will retry and request the printer status every 20 seconds during the next hour.

Associations are proposed for either color or grayscale printing, not for both. The following optional SOP classes from these Meta SOP classes are not supported:

- Print Job SOP class (can be used to get a notification that a job is ready).
- Basic Annotations Box SOP class.
- Reference Image Box SOP class.

The applied order of Print Service Elements (DIMSE's) is specified in Figure 7. Refer to the following sections for a description of the applied optional attributes in these Service Elements (i.e. non-mandatory attributes as Print SCU). Note that the Service Elements order is not specified by the DICOM standard. Overlay Annotation (showing the values of some major identifying attributes) and Shutter information is processed in the images sent to the printer (i.e. burnt-in into the image).

The Status Codes of DIMSE Responses (Success, Warning, and Failure) as returned by the printer will also be logged (for service purposes) and are mapped onto general print job status messages towards the operator. These User Interface messages indicate:

- "Job Completed" indicating that the print job is accepted by the printer; the actual printing will be done afterwards.
- Print Job failed in the Job Viewer indicating that a failure occurred during the DICOM print.

"Print Error" indicating that a failure occurred during the DICOM Print. Also, most warning cases (like default printer values applied on optional print attributes) are interpreted as a print error because this will mostly result in a different print quality or print layout than expected.
The following implementation remarks are important to achieve successful printing:

- The number of Film Boxes per Film Session is one.
- The number of images per Film Box is one.
- The images to be printed on one film are rendered by Interventional Workspace Hub Network AE into one logical image. This logical image is very large, depending on the pixel matrix size (pixels per line, lines per image), use of color or not. A rough indication is 20 Mbytes for grayscale and 80 Mbytes for color. One should take this into account when selecting the DICOM printer and the printer configuration (e.g. the amount of memory).

The Interventional Workspace Hub Network AE does not send an attribute list to the printer. Therefore, the mandatory attributes listed in the following sections are the only attributes that are required to be supported by the printer.

5.1.1.3.5.2 Proposed Presentation Contexts

The presentation contexts are defined in the below table.

Table 29: Proposed Presentation Contexts for (Real-World) Activity – Print Management as SCU

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
>Basic Color Image Box SOP Class	1.2.840.10008.5.1.1.4.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
>Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
>Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
>Printer SOP Class	1.2.840.10008.5.1.1.16	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
>Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
>Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
>Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
>Printer SOP Class	1.2.840.10008.5.1.1.16	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		

5.1.1.3.5.3 SOP Specific Conformance for Basic Film Session SOP Class of the Basic Grayscale Print Management Meta SOP Class

5.1.1.3.5.3.1 Dataset Specific Conformance for Basic Film Session SOP Class N-CREATE-SCU

Table 30: Basic Film Session Presentation Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Number of Copies	2000,0010	IS		ALWAYS	IMPLICIT	
Print Priority	2000,0020	CS		ALWAYS	AUTO	
Medium Type	2000,0030	CS		ALWAYS	IMPLICIT	
Film Destination	2000,0040	CS		ALWAYS	AUTO	
Film Session Label	2000,0050	LO		ALWAYS	AUTO	

Table 31: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Film session successfully created.	The print job continues and completes.
Failure	XXXX	(Any failure)	Print job fails, the error is logged, and the association is not released.
Warning	0116	Attribute Value Out of Range	The print job continues and the warning is logged.
	XXXX	(Any other warning)	Print job fails, the warning is logged, and the association is released.

5.1.1.3.5.3.2 Dataset Specific Conformance for Basic Film Session SOP Class N-DELETE-SCU

Table 32: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Successful command	Print job continues.
Failure	XXXX	(Any failure)	Print job fails, the error is logged and the association is released.
Warning	XXXX	(Any warning)	Print job fails, the warning is logged and the association is released.

5.1.1.3.5.4 SOP Specific Conformance for Basic Film Session SOP Class of the Basic Color Print Management Meta SOP Class

5.1.1.3.5.4.1 Dataset Specific Conformance for Basic Film Session SOP Class N-CREATE-SCU

Table 33: Basic Film Session Presentation Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Number of Copies	2000,0010	IS		ALWAYS	IMPLICIT	
Print Priority	2000,0020	CS		ALWAYS	AUTO	
Medium Type	2000,0030	CS		ALWAYS	IMPLICIT	
Film Destination	2000,0040	CS		ALWAYS	AUTO	

Table 34: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Film session successfully created.	The print job continues and completes.

Service Status	Error Code	Further Meaning	Behavior
Failure	XXXX	(Any failure)	Print job fails, the error is logged, and the association is not released.
Warning	0116	Attribute Value Out of Range	The print job continues and the warning is logged.
	XXXX	(Any other warning)	Print job fails, the warning is logged, and the association is released.

5.1.1.3.5.4.2 Dataset Specific Conformance for Basic Film Session SOP Class N-DELETE-SCU

Table 35: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Successful command	Print job continues.
Failure	XXXX	(Any failure)	Print job fails, the error is logged and the association is released.
Warning	XXXX	(Any warning)	Print job fails, the warning is logged and the association is released.

5.1.1.3.5.5 SOP Specific Conformance for Basic Film Box SOP Class of the Basic Color Print Management Meta SOP Class

5.1.1.3.5.5.1 Dataset Specific Conformance for Basic Film Box SOP Class N-CREATE-SCU

Table 36: Basic Film Box Presentation Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Image Display Format	2010,0010	ST		ALWAYS	AUTO	
Film Orientation	2010,0040	CS		ALWAYS	CONFIG, IMPLICIT	
Film Size ID	2010,0050	CS		ALWAYS	CONFIG, IMPLICIT	
Magnification Type	2010,0060	CS		ALWAYS	AUTO	
Max Density	2010,0130	US		ALWAYS	AUTO	
Border Density	2010,0100	CS		ALWAYS	AUTO	
Trim	2010,0140	CS		ALWAYS	AUTO	
Configuration Information	2010,0150	ST		ALWAYS	AUTO	

Table 37: Basic Film Box Relationship Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Referenced Film Session Sequence	2010,0500	SQ		ALWAYS	AUTO	
>Referenced SOP Class UID	0008,1150	UI		ALWAYS	AUTO	
>Referenced SOP Instance UID	0008,1155	UI		ALWAYS	AUTO	

Table 38: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Film accepted for printing.	The print job continues and completes.

Service Status	Error Code	Further Meaning	Behavior
Failure	XXXX	(Any failure)	Print job fails, the error is logged, and the association is released.
Warning	0107	Attribute List Error	Print job fails, the error is logged, and the association is released.
	0116	Attribute Value Out of Range	Print job fails, the error is logged, and the association is released.
	XXXX	(Any other warning)	Print job fails, the warning is logged, and the association is released.

5.1.1.3.5.5.2 Dataset Specific Conformance for Basic Film Box SOP Class N-ACTION-SCU

Table 39: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Film Box successfully created.	The print job continues and completes.
Failure	XXXX	(Any failure)	Print job fails, the error is logged, and the association is released.
Warning	B605	Requested Min Density or Max Density outside of printer's operating range. The printer will use its respective minimum or maximum density value instead.	The print job continues and the warning is logged.
	0107	Attribute List Error	The print job continues and the warning is logged.
	0116	Attribute value out of range	The print job continues and the warning is logged.
	B600	(not defined)	The print job continues and the warning is logged.
	B601	(not defined)	The print job continues and the warning is logged.
	B602	(not defined)	The print job continues and the warning is logged.
	B603	(not defined)	The print job continues and the warning is logged.
	B604	(not defined)	The print job continues and the warning is logged.
	B606	(not defined)	The print job continues and the warning is logged.
	B608	(not defined)	The print job continues and the warning is logged.
	B609	(not defined)	The print job continues and the warning is logged.
	XXXX	(Any other warning)	Print job fails, the warning is logged, and the association is released.

5.1.1.3.5.6 SOP Specific Conformance for Basic Film Box SOP Class of the Basic Grayscale Print Management Meta SOP Class

5.1.1.3.5.6.1 Dataset Specific Conformance for Basic Film Box SOP Class N-CREATE-SCU

Table 40: Basic Film Box Presentation Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Image Display Format	2010,0010	ST		ALWAYS	AUTO	

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Film Orientation	2010,0040	CS		ALWAYS	CONFIG, IMPLICIT	
Film Size ID	2010,0050	CS		ALWAYS	CONFIG, IMPLICIT	
Magnification Type	2010,0060	CS		ALWAYS	AUTO	
Max Density	2010,0130	US		ALWAYS	AUTO	
Border Density	2010,0100	CS		ALWAYS	AUTO	
Trim	2010,0140	CS		ALWAYS	AUTO	
Illumination	2010,015E	US		ALWAYS	AUTO	
Reflected Ambient Light	2010,0160	US		ALWAYS	AUTO	
Requested Resolution ID	2020,0050	CS		ALWAYS	AUTO	

Table 41: Basic Film Box Relationship Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Referenced Film Session Sequence	2010,0500	SQ		ALWAYS	AUTO	
>Referenced SOP Class UID	0008,1150	UI		ALWAYS	AUTO	
>Referenced SOP Instance UID	0008,1155	UI		ALWAYS	AUTO	
Referenced Presentation LUT Sequence	2010,0500	SQ		ALWAYS	AUTO	
>Referenced SOP Class UID	0008,1150	UI		ALWAYS	AUTO	
>Referenced SOP Instance UID	0008,1155	UI		ALWAYS	AUTO	

Table 42: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Film Box successfully created.	The print job continues and completes.
Failure	XXXX	(Any Failure)	Print job fails, the error is logged, and the association is released.
Warning	0107	Attribute List Error	The print job continues and the warning is logged.
	0116	Attribute value out of range	The print job continues and the warning is logged.
	B603	(Not Defined)	The print job continues and the warning is logged.
	XXXX	(Any Warning)	Print job fails, the warning is logged, and the association is released.

5.1.1.3.5.6.2 Dataset Specific Conformance for Basic Film Box SOP Class N-ACTION-SCU

Table 43: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Film accepted for printing	The print job continues and completes.
Failure	XXXX	(Any failure)	Print job fails, the error is logged, and the association is released.
Warning	B603	Film Box SOP Instance hierarchy does not contain Image Box SOP Instances (empty page).	The print job continues and the warning is logged.

5.1.1.3.5.7 SOP Specific Conformance for Basic Grayscale Image Box SOP Class of the Basic Grayscale Print Management Meta SOP Class

5.1.1.3.5.7.1 Dataset Specific Conformance for Basic Grayscale Image Box SOP Class N-SET-SCU

Table 44: Image Box Pixel Presentation Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Image Box Position	2020,0010	US		ALWAYS	AUTO	
Polarity	2020,0020	CS		ALWAYS	AUTO	
Basic Grayscale Image Sequence	2020,0111	SQ		ALWAYS	AUTO	
>Samples per Pixel	0028,0002	US	MONOCHROME2	ALWAYS	FIXED	
>Photometric Interpretation	0028,0004	CS		ALWAYS	IMPLICIT	
>Rows	0028,0010	US		ALWAYS	IMPLICIT	
>Columns	0028,0011	US		ALWAYS	IMPLICIT	
>Bits Allocated	0028,0100	US		ALWAYS	AUTO	
>Bits Stored	0028,0101	US		ALWAYS	IMPLICIT	
>High Bit	0028,0102	US		ALWAYS	AUTO	
>Pixel Representation	0028,0103	US		ALWAYS	AUTO	
>Pixel Data	7FE0,0010	OW/OB		ALWAYS	AUTO	

This part of the section includes the dataset specific behavior, i.e. error codes, error and exception handling, time-outs, etc.

Table 45: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Successful command	The print job continues and completes.
Failure	XXXX	(Any failure)	Print job fails, the error is logged, and the association is not released.
Warning	0107	Attribute List Error	The print job continues and the warning is logged.
	XXXX	(Any other warning)	Print job fails, the warning is logged, and the association is released.

5.1.1.3.5.8 SOP Specific Conformance for Basic Color Image Box SOP Class of the Basic Color Print Management Meta SOP Class

5.1.1.3.5.8.1 Dataset Specific Conformance for Basic Color Image Box SOP Class N-SET-SCU

Table 46: Image Box Pixel Presentation Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Image Box Position	2020,0010	US		ALWAYS	AUTO	
Polarity	2020,0020	CS		ALWAYS	AUTO	
Basic Color Image Sequence	2020,0111	SQ		ALWAYS	AUTO	
>Samples per Pixel	0028,0002	US	3	ALWAYS	FIXED	
>Photometric Interpretation	0028,0004	CS		ALWAYS	IMPLICIT	

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
>Rows	0028,0010	US		ALWAYS	IMPLICIT	
>Columns	0028,0011	US		ALWAYS	IMPLICIT	
>Bits Allocated	0028,0100	US		ALWAYS	AUTO	
>Bits Stored	0028,0101	US		ALWAYS	IMPLICIT	
>High Bit	0028,0102	US		ALWAYS	AUTO	
>Pixel Representation	0028,0103	US		ALWAYS	AUTO	
>Pixel Data	7FE0,0010	OW/OB		ALWAYS	AUTO	

Table 47: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Image successfully stored in image box.	The print job continues and completes.
Failure	0106	Not defined	Print job did not conclude gracefully and did not receive release request from SUT after receiving error in N-CREATE-RSP scenarios
	0105	Not defined	Print job did not conclude gracefully and did not receive release request from SUT after receiving error in N-CREATE-RSP scenarios
	0119	Not defined	Print job did not conclude gracefully and did not receive release request from SUT after receiving error in N-CREATE-RSP scenarios
Warning	B604	Image size is larger than image box size, the image has been de magnified.	The print job continues and the warning is logged.
	B605	Requested Min Density or Max Density outside of printer's operating range. The printer will use its respective minimum or maximum density value instead.	The print job continues and the warning is logged.
	B609	Image size is larger than the image box size. The image has been cropped to fit.	The print job continues and the warning is logged.
	B60A	Image size or combined print image size is larger than the image box size. Image or combined print image has been decimated to fit.	The print job continues and the warning is logged.
	0107	Attribute List Error	The print job continues and the warning is logged.
	0116	Attribute Value Out of Range	The print job continues and the warning is logged.
	B600	Memory allocation not supported	The print job continues and the warning is logged.

Service Status	Error Code	Further Meaning	Behavior
	B602	Empty film page	The print job continues and the warning is logged.
	B603	Empty film page	The print job continues and the warning is logged.

5.1.1.3.5.9 SOP Specific Conformance for Printer SOP Class of the Basic Color Print Management Meta SOP Class

5.1.1.3.5.9.1 Dataset Specific Conformance for Printer SOP Class N-GET-SCU

Table 48: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Successful command	The print job continues and completes.
Failure	XXXX	(Any failure)	Print job fails, the error is logged, and the association is released.
Warning	0001	Requested optional attributes are not supported	The print job continues and the warning is logged.
	XXXX	(Any warning)	Print job fails, the warning is logged and the association is released.

5.1.1.3.5.10 SOP Specific Conformance for Printer SOP Class of the Basic Grayscale Print Management Meta SOP Class

5.1.1.3.5.10.1 Dataset Specific Conformance for Printer SOP Class N-GET-SCU

Table 49: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Successful command	The print job continues and completes.
Failure	XXXX	(Any failure)	Print job fails, the error is logged, and the association is released.
Warning	XXXX	(Any warning)	Print job fails, the warning is logged and the association is released.

5.1.1.4. Association Acceptance Policy

The Interventional Workspace Hub Network AE accepts associations for the following purposes:

- To allow remote applications to verify application level communication.
- To allow remote applications to store images in the Interventional Workspace Hub database.
- To allow remote applications to query the Interventional Workspace Hub database.
- To allow remote applications to retrieve images from the Interventional Workspace Hub database.

The Interventional Workspace Hub Network AE rejects association requests from unknown applications, i.e. applications that offer an unknown “calling AE title”. An application is known if and only if it is defined per configuration of the Interventional Workspace Hub system. The Interventional Workspace Hub Network AE also rejects association requests from applications that do not address the Interventional Workspace Hub

Network AE, i.e. that offer a wrong “called AE title”. The Interventional Workspace Hub AE title is defined during configuration.

The Application Entity may reject Association attempts as shown in the table below.

Table 50: Association Reject Reasons

Result	Source	Reason/Diagnosis	Behavior
1 – rejected-permanent	1 – DICOM UL service-user	1 – no-reason-given	Association is not established due to any problem other than that specified for Interventional Workspace Hub SCP.
		2 – application-context-name-not supported	An application context name other than 1.2.840.10008.3.1.1.1 is requested by the SCU during association then the association will be aborted.
		3 – calling-AE-title-not-recognized	The configuration does not contain a repository having the Calling AE Title as per the association request; There is a problem in configuration (related to composing the configuration from the SCU and the SCP configuration) then the association will be aborted.
		7 – called-AE-title-not-recognized	The called AE Title in the association request does not match the AE Title as per the configuration then the association will be aborted.
	2 – DICOM UL service-provider (ACSE related function)	1 – no-reason-given	Association is not established and the connection is released.
		2 – protocol-version-not-supported	Association is not established and the connection is released.
	3 – DICOM UL service-provider (Presentation related function)	1 – temporary-congestion	Association is not established and the connection is released.
		2 – local-limit-exceeded	Association is not established and the connection is released.
2 – rejected-transient	1 – DICOM UL service-user	1 – no-reason-given	Association is not established and the connection is released.
		2 – application-context-name-not-supported	Association is not established and the connection is released.
		3 – calling-AE-title-not-recognized	Association is not established and the connection is released.
		7 – called-AE-title-not-recognized	Association is not established and the connection is released.
	2 – DICOM UL service-provider (ACSE related function)	1 – no-reason-given	Maximum number of associations is exceeded and an association request is received.
		2 – protocol-version-not-supported	Association is not established and the connection is released.
	3 – DICOM UL service-provider (Presentation related function)	1 – temporary-congestion	Association is not established and the connection is released.
		2 – local-limit-exceeded	Association is not established and the connection is released.

Table 51: Association Abort Policies

Source	Reason/Diagnosis	Behavior When Received	Behavior When Sent
0 – DICOM UL service-user (initiated abort)	0- reason-not-specified	When received, the Interventional Workspace Hub Network AE terminates the connection with the following log: Association ABORTED by peer (0: ABORT_SOURCE_dul_user, 0: ABORT_REASON_not_specified).	Association times out due to inactivity; Any other problem than ones specified for Interventional Workspace Hub SCP in the rows below. (Examples: Problem while decoding the DICOM stream, Invalid request, Echo/Find/Move/N-Action SCP was unable to send the Response to SCU, Error writing to SCU stream).
2 – DICOM UL service-provider (initiated abort)	0 – reason-not-specified	When received, the Interventional Workspace Hub Network AE terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 0: ABORT_REASON_not_specified)	Import fails (Import SCP Performer returns fail status)
	1 – unrecognized-PDU	When received, the Interventional Workspace Hub Network AE terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 1: ABORT_REASON_unrecognized_pdu).	An unrecognized PDU type is received[4].
	2 – unexpected-PDU	When received, the Interventional Workspace Hub Network AE terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 2: ABORT_REASON_unexpected_pdu).	The received PDU type is not expected in the current state of connection[5].
	4 – unrecognized-PDU-parameter	When received, the Interventional Workspace Hub Network AE terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 4: ABORT_REASON _unrecognized_pdu_parameter).	An unrecognized Associate PDU item is received.
	5 – unexpected-PDU-parameter	When received, the Interventional Workspace Hub Network AE terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 5: ABORT_REASON _unexpected_pdu_parameter).	One of the Associate PDU items is received more than once. One of the Associate PDU items is received unexpectedly.
	6 – invalid-PDU-parameter-value	When received, the Interventional Workspace Hub Network AE terminates the connection with the following log: Association ABORTED	One of the Associate PDU items is received more than once.

Source	Reason/Diagnosis	Behavior When Received	Behavior When Sent
		by peer (2: ABORT_SOURCE_dul_provider, 6: ABORT_REASON _invalid_pdu_parameter).	One of the Associate PDU items is not received. There is mismatch in the application context names between the SCU and the SCP. Illegal Asynchronous Operations Window invoke value is received. Illegal Asynchronous Operations Window perform value is received. Unknown presentation context id is received. Unknown abstract syntax is received. The length or the format of a received PDU item is invalid.

5.1.1.4.1 (Real-World) Activity – Verification as SCP

5.1.1.4.1.1 Description and Sequencing of Activities

The Interventional Workspace Hub accepts Associations from configured systems that wish to verify application level communication using the C-ECHO command.

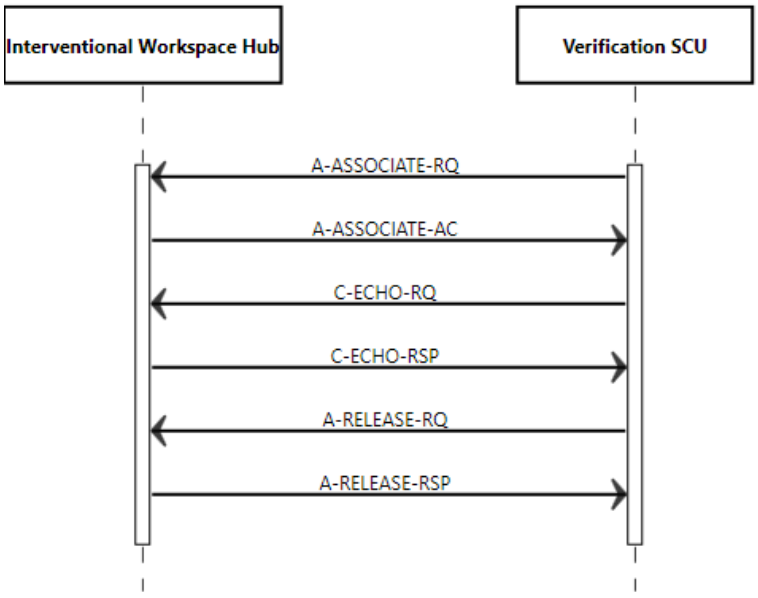


Figure 8: Data Flow Diagram – Verification as SCP

5.1.1.4.1.2 Accepted Presentation Contexts

The presentation contexts are defined in the below table.

Table 52: Accepted Presentation Contexts for (Real-World) Activity – Verification as SCP

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification SOP Class	1.2.840.10008.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		

The Interventional Workspace Hub accepts all contexts in the intersection of the proposed and acceptable Presentation Contexts. This means that multiple proposed presentation contexts with the same SOP class but different transfer syntaxes are accepted by the Interventional Workspace Hub as far as those transfer syntaxes are part of the acceptable transfer syntaxes. There is no check for duplicate contexts and these are therefore accepted.

5.1.1.4.1.3 SOP Specific Conformance for Verification SOP Class

5.1.1.4.1.3.1 Dataset Specific Conformance for Verification C-ECHO SCP

Table 53: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Confirmation	Confirm the verification request.

5.1.1.4.2 (Real-World) Activity – Image Import

5.1.1.4.2.1 Description and Sequencing of Activities

The Interventional Workspace Hub accepts associations from configured systems that wish to store images in the Interventional Workspace Hub database using the C-STORE command.

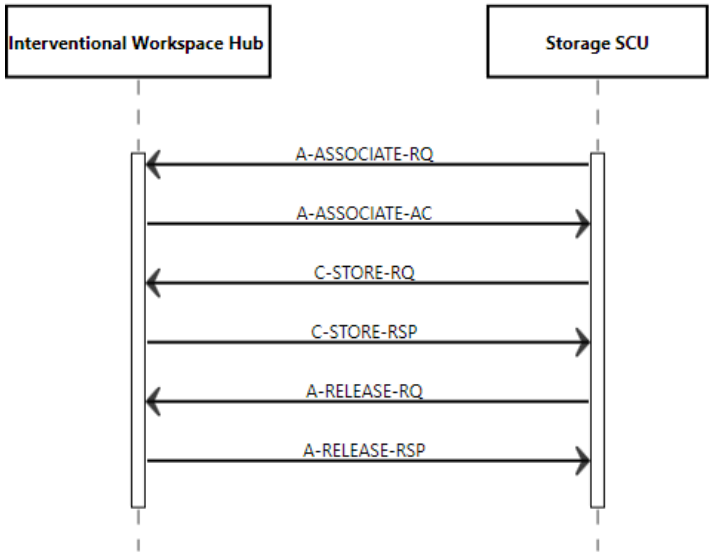


Figure 9: Data Flow Diagram – Storage as SCP

- Interventional Workspace Hub imports patient data which contains more than 5 components in Patient's Name and it displays the patient data in the Patient Directory with name"Comp1, Comp2Comp3, Comp2 and Comp3 are clubbed together and Comp 4, Comp5 are missing

Note: When same data is exported back from Interventional Workspace Hub to other remote note all 6 components are exported.

- Interventional Workspace Hub imports patient data which contains empty values for Patient Name and Patient ID attributes and Patient data is displayed in the Patient directory .
- Interventional Workspace Hub imports a patient data with Study Time which contains value in Retired format ("HH:MM:SS") and display in the patient directory.
- Interventional Workspace Hub imports patient data which contains an illegal value for SOP Instance UID (prefix a numeric component with 0) and its displayed in the patient directory.
- Interventional Workspace Hub imports patient data which contains an illegal value for Modality attribute. The Patient data is displayed in the patient directory.
- Interventional Workspace Hub does not complete C-STORE operation when DIMSE Service is timeout.
- Interventional Workspace Hub imports a patient data with Study Date which contains value in Retired format ("YYYY.MM.DD") and display in the patient directory.
- Interventional Workspace Hub imports a patient data with Study Time which contains value in Retired format ("HH:MM:SS") and display in the patient directory.
- Interventional Workspace Hub imports patient data which has no value for the Series Instance UID attribute.
- Interventional Workspace Hub imports patient data which has no value for the SOP Instance UID attribute.
- Interventional Workspace Hub does not import the patient data when network disconnect occurs.

5.1.1.4.2.2 Accepted Presentation Contexts

The presentation contexts are defined in the below table.

Table 54: Accepted Presentation Contexts for (Real-World) Activity – Image Import

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
CT Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		JPEG Lossless, Nonhierarchical (Processes 14)	1.2.840.10008.1.2.4.57		

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
		JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		JPEG Lossless, Nonhierarchical (Processes 14)	1.2.840.10008.1.2.4.57		
		JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
Multiframe True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		JPEG Lossless, Nonhierarchical (Processes 14)	1.2.840.10008.1.2.4.57		
		JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
Surface Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.5	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.4	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
		RLE Lossless	1.2.840.10008.1.2.5		
X-Ray 3D Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.13.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
		JPEG Lossless, Nonhierarchical (Processes 14)	1.2.840.10008.1.2.4.57		
		JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
X-Ray Angiographic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		JPEG Lossless, Nonhierarchical (Processes 14)	1.2.840.10008.1.2.4.57		
		JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		JPEG Lossless, Nonhierarchical (Processes 14)	1.2.840.10008.1.2.4.57		
		JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		

Note:

1. The supported transfer syntaxes can be configured to include additional syntaxes. See section 6.2, for details.
2. Fluoroscopy overlay images cannot be exported and imported.

5.1.1.4.2.3 SOP Specific Conformance for Storage SOP Class

The Interventional Workspace Hub will only accept associations from configured systems. The Interventional Workspace Hub may provide level 2 (full) conformances, depending on the implemented database.

Remarks:

- Pixel data will be stored in configurable transfer syntax. This implies that transfer syntax conversions might take place during import. Compressed pixel data is always decompressed and afterwards converted to the “configurable transfer syntax”.
- A non-empty BOT may be present in imported JPEG encoded pixel data.

- When importing an image, a default Presentation State object may be created. In case a default Presentation State object is created (also for duplicate images), the following rules apply:
  - If a private Presentation State is present in the image the default Presentation State is always created based upon the private Presentation State.
  - For multi-frame images with one frame it is configurable if a Presentation State should be created for every image in the series or only one Presentation State for the whole series.

Table 55: Conditions for creating Default Presentation State Object

Accepted association contains PR SOP class	Private PR is present in imported image	Default PR object created
Yes	Yes / No	No
No	Yes	Yes
No	No	No

- Value Representation 'UN' (Unknown) is supported, and shall be used for any attributes not known to Interventional Workspace Hub and received per implicit transfer (ILE).
- Attribute values from images may be copied into related Presentation States and vice versa.
- Images must contain the minimum set of attributes prescribed by DICOM. Otherwise the default behavior is that the image is rejected and the association aborted.

5.1.1.4.2.3.1 Dataset Specific Conformance for C-STORE-RSP

Table 56: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Successful command	Successful completion of the store request.
Failure	A900	Data set does not match SOP class	The association is released. The reason is logged. The user is informed.
	C000	Error: cannot understand	The association is released. The reason is logged. The user is informed.
Warning	B006	Elements discarded	The association is released. The reason is logged. The user is informed.
	B007	Data set does not match SOP class	The association is released. The reason is logged. The user is informed.

5.2. Support of Character Sets

Any support for character sets in Network and Media services is described here.

Table 57: Supported DICOM Character Sets

Character Set Description	Defined Term	ESC Sequence	ISO Registration Number	Code Element	Character Set
Default repertoire	ISO 2022 IR 6	-	ISO-IR 6	G0	ISO 646
		-	-	-	-
Latin alphabet No. 1	ISO 2022 IR 100	ESC 02/08 04/02	ISO-IR 6	G0	ISO 646
		ESC 02/13 04/01	ISO-IR 100	G1	Supplementary set of ISO 8859
	ISO 2022 IR 101	ESC 02/08 04/02	ISO-IR 6	G0	ISO 646

Character Set Description	Defined Term	ESC Sequence	ISO Registration Number	Code Element	Character Set
Latin alphabet No. 2		ESC 02/13 04/02	ISO-IR 101	G1	Supplementary set of ISO 8859
Latin alphabet No. 3	ISO 2022 IR 109	ESC 02/08 04/02	ISO-IR 6	G0	ISO 646
		ESC 02/13 04/03	ISO-IR 109	G1	Supplementary set of ISO 8859
Latin alphabet No. 4	ISO 2022 IR 110	ESC 02/08 04/02	ISO-IR 6	G0	ISO 646
		ESC 02/13 04/04	ISO-IR 110	G1	Supplementary set of ISO 8859
Latin alphabet No. 5	ISO 2022 IR 148	ESC 02/08 04/02	ISO-IR 6	G0	ISO 646
		ESC 02/13 04/13	ISO-IR 148	G1	Supplementary set of ISO 8859
Greek	ISO 2022 IR 126	ESC 02/08 04/02	ISO-IR 6	G0	ISO 646
		ESC 02/13 04/06	ISO-IR 126	G1	Supplementary set of ISO 8859
Arabic	ISO 2022 IR 127	ESC 02/08 04/02	ISO-IR 6	G0	ISO 646
		ESC 02/13 04/07	ISO-IR 127	G1	Supplementary set of ISO 8859
Japanese	ISO 2022 IR 13	ESC 02/08 04/10	ISO-IR 14	G0	JIS X 0201: Romaji
		ESC 02/09 04/09	ISO-IR 13	G1	JIS X 0201: Katakana
	ISO 2022 IR 87	ESC 02/04 04/02	ISO-IR 87	G0	JIS X 0208:Kanji
	ISO 2022 IR 159	ESC 02/04 02/08 04/04	ISO-IR 159	G0	JIS X 0212: Supplementary Kanji set
Hebrew	ISO 2022 IR 138	ESC 02/08 04/02	ISO-IR 6	G0	ISO 646
		ESC 02/13 04/08	ISO-IR 138	G1	Supplementary set of ISO 8859
Cyrillic	ISO 2022 IR 144	ESC 02/08 04/02	ISO-IR 6	G0	ISO 646
		ESC 02/13 04/12	ISO-IR 144	G1	Supplementary set of ISO 8859
Chinese	GB18030	-	GB18030	-	-

Interventional Workspace Hub supports all character sets currently defined by DICOM except for the multi-byte character sets without code extensions.

The preferred character set can be configured. If not configured, the default character set shall be ISO-IR 100.

When an unsupported character set is received it shall be tried and decoded according to the preferred character set.

Unsupported characters shall be displayed as “?”.

6. Configuration

Any implementation's DICOM conformance may be dependent upon configuration, which takes place at the time of installation. Issues concerning configuration are addressed in this section.

6.1. AE Title/Presentation Address Mapping

An important installation issue is the translation from AE title to presentation address. How this is to be performed is described here.

6.1.1. Local AE Titles

The Field Service User Interface only allows one AE to be configured.
The following AE specific information must be available to configure a local AE:

- AE title.
- Port number (note that normally all local Interventional Workspace Hub AE's will have a different port number).

6.1.2. Remote AE Title/Presentation Address Mapping

One or more remote AE's may be configured.
The following AE specific information must be available to configure a remote AE:

- AE title.
- Hostname or IP address.
- Port number.

6.2. Parameters

The specification of important operational parameters, their default value and range (if configurable) are specified here.

Table 58: Configuration Parameters Table

Parameter	Configurable	Default Value
General Parameter		
Time-out waiting for acceptance or rejection Response to an Association Open Request (Application Level timeout)	Yes	60 [s] (set 0 for no time-out)
General DIMSE level time-out values (Verification, Storage)	No	-
Time-out for response to TCP/IP connect request. (Low-level timeout)	OS	-
Time-out waiting for acceptance of a TCP/IP message over the network (Low-level timeout)	OS	-
Time-out for waiting for data between TCP/IP packets. (Low-level timeout)	OS	-
Any changes to default TCP/IP settings, such as configurable stack parameters.	OS	-
AE Specific Parameters		
Size constraint in maximum object size	No	-
Maximum PDU size the AE can send and receive	Yes	65780
Association time-out SCP	Yes	0 (no time-out)
Association time-out SCU	Yes	0 (no time-out; set –1 for immediate time-out, or else value in [s])

Parameter	Configurable	Default Value
AE specific DIMSE level time-out values	Yes	60 seconds
Number of simultaneous associations by service and/or SOP class	No	1 per service/SOP class
SOP Class support	Yes	All supported SOP classes
Transfer Syntax support	Yes	ELE – 1.2.840.10008.1.2.1
		EBE – 1.2.840.10008.1.2.2
		ILE – 1.2.840.10008.1.2
		JPEG Lossless (NH-FOP) – 1.2.840.10008.1.2.4.70
		JPEG Baseline – 1.2.840.10008.1.2.4.50
		RLE Lossless – 1.2.840.10008.1.2.5
		JPEG Lossless, Nonhierarchical (Processes 14) – 1.2.840.10008.1.2.4.57
Port Number	Yes	Supported port numbers are between 0 to 49151

Notes:

1. Although it is possible to configure encapsulation transfer syntax for every SOP class, encapsulation transfer syntax is practically not applicable for SOP classes that contain no data to be encoded and such transfer syntax should therefore be omitted.
2. Also note that the order of the specified transfer syntaxes for a SOP class or AE in the configuration determines the preference order of proposed transfer syntaxes. Per default all transfer syntaxes are enabled.
3. A number of presentation contexts are not practical. Some transfer syntaxes may only be used on certain datasets, and should not be proposed for other datasets. E.g., never propose lossy JPEG compression for 16 bits images as this is not applicable.
4. Currently JPEG Extended is applicable to 12 bits images only (process 4).

7. Network and Media Communication Details

7.1. Network Interfaces

7.1.1. Physical Network Interfaces

The System provides only DICOM V3.0 TCP/IP Network Communication Support as defined in PS 3.8 of the standard.
TCP/IP is the only protocol stack supported.
Supported physical medium include:
IEEE 802.3-1995, 10BASE-T
IEEE 802.3-1995, 100BASE-TX (Fast Ethernet)
IEEE 802.3, 1000BASE-X (Fiber Optic Gigabit Ethernet).

The TCP/IP Stack as supported by the underlying Operating System.
The API is the WinSock 2 interface as supported by the underlying Operating System.

7.1.2. Additional Protocols

Not applicable.

7.2. Media Interchange

7.2.1. Implementation model

The implementation model identifies the DICOM Application Entities for Media in specific implementation and relates the Application Entities to Real-World Activities.

7.2.2. Application Data Flow Diagram

The Interventional Workspace Hub implements one media application entity:

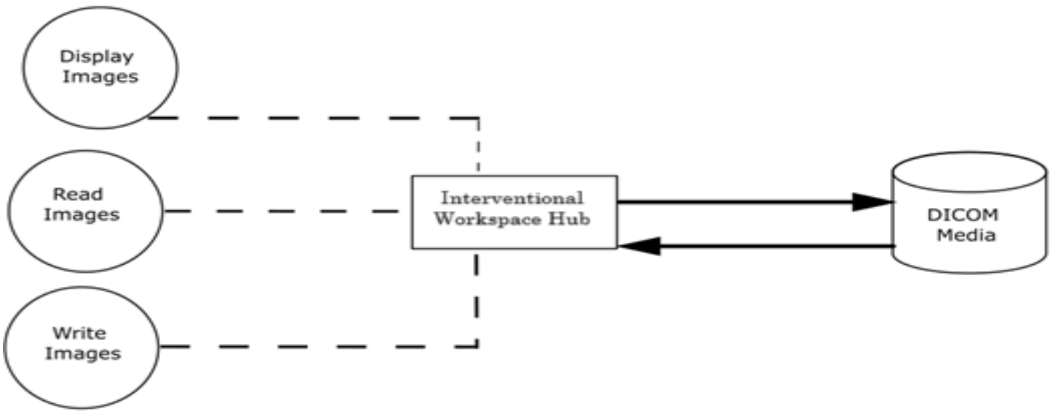


Figure 10: Application Data Flow Diagram

7.2.3. Functional Definitions of AE's

The Interventional Workspace Hub implements the following functions for DICOM media.
- Write a DICOM file-set onto the medium.
- Create a DICOMDIR file.
- Read the DICOMDIR file from the medium.
- Read selected images from the medium.

7.2.4. Sequencing of Real World Activities
Not applicable.

7.2.5. AE Specifications
This section in the DICOM Conformance Statement specifies a set of Media Application Entities.

7.2.6. Interventional Workspace Hub Media AE - Specification
The Interventional Workspace Hub provides standard conformance to the DICOM interchange option of the media storage service class, and follows the specifications as defined in the DICOM standard – Media Storage and File Format for Data Interchange (PS 3.10) and Media Storage Application Profiles (PS 3.11). The Interventional Workspace Hub supports single write for CD-R media. For one or more Application Profiles, the following table shows the Real-World Activities and the roles of each of these Real-World Activities.

The Interventional Workspace Hub supports FSC and FSR onto Media for all supported export storage SOP classes and the private storage SOP classes supported by Interventional Workspace Hub.

Note:
Read File-set = Display Directory and Read Image
Create File-set = Write Image
Update File-set = Update Image

Table 59: AE Interventional Workspace Hub Media AE Related Application Profiles, RWA Activities and Roles

Supported Application Profile	Identifier	Real-World Activities	Roles
General Purpose CD-R Interchange	STD-GEN-CD	Create File-set	FSC
		Read File-set	FSR
General Purpose DVD Interchange with JPEG	STD-GEN-DVD-JPEG	Create File-set	FSC
		Read File-set	FSR
General Purpose USB Media Interchange with JPEG	STD-GEN-USB-JPEG	Create File-set	FSC
		Read File-set	FSR
		Update File-set	FSU

7.2.6.1. File Meta Information for the Interventional Workspace Hub Media AE

Table 60: File Meta Information for the Interventional Workspace Hub Media AE

Implementation Class UID	1.3.46.670589.7.100.1.0
Implementation Version Name	1.0

7.2.6.2. Real-World Activities
The AE specification contains a description of the Real-World Activities, which invoke the particular AE.

7.2.6.2.1 RWA - Read File-set
This Media Application Entity has a File-set Reader functionality which is described here.

Display Directory
The Interventional Workspace Hub will act as a FSR when reading the directory of the medium. This allows the System Integrator to see the results in an overview of the patients, studies and images.

The Interventional Workspace Hub can access DICOM media also when either:
-Patient ID is absent or
-Study Instance UID has no value.

Read Images
The Interventional Workspace Hub will act as a FSR when reading all/selected images from DICOM media. User will be able to see Image thumbnail and will not be able to view the image from CD/DVD.

Product does not read the dataset with Unsupported Transfer Syntax and Unsupported SOP Class from media.

When supported SOP Class dataset with unsupported Transfer Syntax is imported from DICOM media. The Produc will not import the Unsupported transfer syntax dataset.

The Product does not support importing the unsupported SOP Class/Transfer Syntax.

When unsupported SOP Class dataset is imported from DICOM media, the Product does not support importing the unsupported SOP Class dataset.

Product does not save the dataset with Unsupported Transfer Syntax with Supported SOP Class.

7.2.6.2.1.1 Media Storage Application Profile
Refer to the table in section 5.1.1.

7.2.6.2.1.1.1 Options
Not applicable.

7.2.6.2.2 RWA - Create File-set
This Media Application Entity has a File-set Creator functionality which is described here.

Write Images
The Interventional Workspace Hub acts as an FSC when writing DICOM objects onto DICOM media. The Interventional Workspace Hub can also store private attributes.

When the Interventional Workspace Hub has to write objects to DICOM media, it can encounter the following situation.

The objects were previously received via C-STORE operations. Some attributes in the received images have a zero-length value (type 2 attributes). However, the Application Profile specifies some of these attributes as type 1: they must have a value. In such cases the Interventional Workspace Hub supplies a value for the following attributes (if necessary):
- Patient ID
- Study ID
- Series Number
- Instance number
- Study Date
- Study Time

The mechanism of generating a value for Patient ID is to create a new value (i.e. Study Instance UID) for each new study written to the medium, even if this study belongs to a patient recorded earlier.

Study ID is assigned the value of the first Requested Procedure ID (0040,1001) encountered in the Request Attributes Sequence (0040,0275).

Table 61: DICOMDIR Attributes

Attribute Name	Tag	Notes
File Set ID	0004,1130	
Offset of the First Directory Record of the Root Directory Entity	0004,1200	
Offset of the Last Directory Record of the Root Directory Entity	0004,1202	
File Set Consistency Flag	0004,1212	
Directory Record Sequence	0004,1220	
>Offset of the Next Directory Record	0004,1400	
>Record In-use Flag	0004,1410	
>Offset of Referenced Lower-Level Directory Entity	0004,1420	
>Directory Record Type	0004,1430	
> Specific Character Set	0008,0005	
>Referenced File ID	0004,1500	
>Referenced SOP Class UID in File	0004,1510	
>Referenced Transfer Syntax UID in File	0004,1512	
Patient level		
Offset Of The Next Dir Record	0004,1400	
Record In Use Flag	0004,1410	
Offset of Referenced Lower-Level Directory Entity	0004,1420	
Directory Record Type	0004,1430	
Specific Character Set	0008,0005	
Patient's Name	0010,0010	
Patient ID	0010,0020	
Patient's Birth Date	0010,0030	
Patient's Birth Time	0010,0032	
Patient's Sex	0010,0040	
Study Level		
Offset Of The Next Dir Record	0004,1400	
Record In Use Flag	0004,1410	
Offset Of Ref Lower Level Dir Entity	0004,1420	
Directory Record Type	0004,1430	
Specific Character Set	0008,0005	
Study Date	0008,0020	
Study Time	0008,0030	
Accession Number	0008,0050	
Study Description	0008,1030	
Study Instance UID	0020,000D	
Study ID	0020,0010	

Attribute Name	Tag	Notes
Modalities in Study	0008,0061	
Series Level		
Offset Of The Next Directory Record	0004,1400	
Record In-Use Flag	0004,1410	
Offset of Referenced Lower-Level Directory Entity	0004,1420	
Directory Record Type	0004,1430	
Specific Character Set	0008,0005	
Series Date	0008,0021	
Series Time	0008,0031	
Content Time	0008,0033	
Modality	0008,0060	
Manufacturer	0008,0070	
Series Instance UID	0020,000E	
Series Number	0020,0011	
Series Description	0008,103E	
Body Part Examined	0018,0015	
Protocol Name	0018,1030	
Icon Image Sequence	0088,0200	
>Samples per Pixel	0028,0002	
>Photometric Interpretation	0028,0004	
>Rows	0028,0010	
>Columns	0028,0011	
>Pixel Spacing	0028,0030	
>Bits Allocated	0028,0100	
>Bits Stored	0028,0101	
>High Bit	0028,0102	
>Pixel Representation	0028,0103	
>Pixel Data	7FE0,0010	
Image Level		
Offset Of The Next Directory Record	0004,1400	
Record In-Use Flag	0004,1410	
Offset Of Referenced Lower-Level Directory Entity	0004,1420	
Directory Record Type	0004,1430	
Referenced File ID	0004,1500	
Referenced SOP Class UID In File	0004,1510	
Referenced SOP Instance UID In File	0004,1511	
Referenced Transfer Syntax UID In File	0004,1512	
Specific Character Set	0008,0005	
Instance Number	0020,0013	
Image Type	0008,0008	

Attribute Name	Tag	Notes
Instance Creation Date	0008,0012	
Instance Creation Time	0008,0013	
SOP Class UID	0008,0016	
SOP Instance UID	0008,0018	
Acquisition Date	0008,0022	
Acquisition DateTime	0008,002A	
Acquisition Time	0008,0032	
Protocol Name	0018,1030	
Patient Orientation	0020,0020	
Number of Frames	0028,0008	
Rows	0028,0010	
Columns	0028,0011	
Icon Image Sequence	0088,0200	
>Samples per Pixel	0028,0002	
>Photometric Interpretation	0028,0004	
>Rows	0028,0010	
>Columns	0028,0011	
>Pixel Spacing	0028,0030	
>Bits Allocated	0028,0100	
>High Bit	0028,0102	
>Pixel Representation	0028,0103	
>Pixel Data	7FE0,0010	

7.2.6.2.2.1 Media Storage Application Profile

Refers to the table in section 5.2.1.

7.2.6.2.2.1.1 Options

Not applicable.

7.2.6.2.3 RWA - Update File-set

This Media Application Entity has a File-set Updater functionality which is described here.

File-set Updater (FSU) exercises this role by means of M-READ, M-WRITE, and M-DELETE Operations. It reads, but shall not modify, the content of any of the DICOM files in a File-set except for the DICOMDIR File. It will delete existing Files in a File-set by means of an M-DELETE and replace it with updated DICOMDIR File.

7.2.6.2.3.1 Media Storage Application Profile

Refer to the table in section 5.2.1.

7.2.6.2.3.1.1 Options

Not applicable.

7.2.7. Augmented and Private Application Profiles
This section is used for the description of Augmented and Private Application Profiles.

7.2.8. Augmented Application Profiles
Any Augmented Application Profiles used by the Application Entity are described in this section. The rules governing the structure of an Augmented Application Profile are also described.

7.2.8.1. Augmented Application Profile Descriptions
Each Augmented Application Profile has a section that describes the specific features of the Application Profile that make it augmented.

7.2.8.1.1.1 SOP Class Augmentations
The addition of Grayscale Softcopy Presentation State SOP class objects implies augmentation of the standard AP.

7.2.8.1.1.2 Directory Augmentations
Instances of the private SOP classes may be written on the media. This requires a Directory Record Type (0004,1430) with the value “PRIVATE” and configuration of the required Private Record UID. This UID is used to define a non-standard type of Directory Record by reference to its position in a private extension to the DICOM Basic Directory IOD Information Model.

7.2.8.1.1.3 Other Augmentations
Not applicable.

7.2.8.1.2 Private Application Profiles
Not applicable.

7.3. Media Configuration
Not applicable.

8. Security

8.1. Security Profiles

The Interventional Workspace Hub does not fully support DICOM security profiles. However, it does support security measures that will be used for secure authentication of a node and for the generation of audit records. The Interventional Workspace Hub allows the use of a secure DICOM communication and creation of audit trails.

8.1.1. Security use Profiles

Not Applicable.

8.1.2. Security Transport Connection Profiles

The Interventional Workspace Hub supports secure communication using the DICOM TLS Secure Transport Connection Profile over TCP/IP.

TLS Protocol Versions :

- TLS 1.2 is supported and is the recommended secure communication mode.
- The system can optionally be configured to allow TLS 1.0 and TLS 1.1. The configuration of the accepted TLS versions is under customer/site control.

Node authentication and encryption are only possible when the node has:
- a “private and public key”.
- a self-signed certificate or certificate signed by a Certificate Authority.

Furthermore, the Interventional Workspace Hub may communicate using the following Cipher Suites:
- TLS_RSA_WITH_3DES_SHA (Node authentication with encryption)
- TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384
- TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256
- TLS_DHE_RSA_WITH_AES_256_GCM_SHA384
- TLS_DHE_RSA_WITH_AES_128_GCM_SHA256
- TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA384
- TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA256
- TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA
- TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA
- TLS_RSA_WITH_AES_256_GCM_SHA384
- TLS_RSA_WITH_AES_128_GCM_SHA256
- TLS_RSA_WITH_AES_256_CBC_SHA256
- TLS_RSA_WITH_AES_128_CBC_SHA256
- TLS_RSA_WITH_AES_256_CBC_SHA
- TLS_RSA_WITH_AES_128_CBC_SHA
- TLS_RSA_WITH_3DES_EDE_CBC_SHA

Certificates

If two systems communicate with each other, one system will be listening on a port (server node) while the other system sets up a connection (client node). The certificate this server node will send to the other client node is the server certificate. The client node initiates the communication and the certificate that the client node is sending to the server is the client certificate. (Server Client Authentication) The following TLS Certification checks will be done (TLS Handshake). The machine (either server or client) that will send its

certificate will choose the certificate according to Common Name (CN) value in the Subject-field. This name is case-sensitive. All present certificates should have unique CN names.

The server verifies:
- that the client certificate is a valid X.509 certificate.
- that the client certificate is either signed by a CA or is self-signed.
- that the client certificate is in the list of trusted certificates.
- that the client certificate is valid (present time is between “Valid From” and “Valid To” fields of the X.509 certificate).
- that the client certificate has the correct purpose (at least the Client Authenticate purpose).

The client verifies:
- that the server certificate is a valid X.509 certificate.
- that the server certificate either is signed by a CA or is self-signed.
- that the server certificate is in the list of trusted certificates.
- that the server certificate is valid (present time is between “Valid From” and “Valid To” fields of the X.509 certificate).
- that the server certificate has the correct purpose (at least Server Authenticate purpose).

In the Interventional Workspace Hub no verification is done on:
- revocation of certificates.
- limiting the connection to a limited set of IP-addresses.

Additional information:
The value in the Subject-field is determined in the certificate request. The CA will sign the request in case it accepts the values that are present in the request. The CN value can be: IP-number, hostname or hostname.domain. The value in the CN-field must be equal to the value that is used in making a connection to the server. In case the name is specified as hostname.domain that same value should be specified during connect. In the ideal situation the name-IP-number translation will be dealt with by the DNS in the hospital. This check is case-insensitive.

8.1.3. Digital Signature Profiles
Not Applicable.

8.1.4. Media Storage Security Profiles
Not Applicable.

8.1.5. Attribute Confidentiality Profiles

Table 62: De-Identified Attributes

Attribute Name	Tag	Replacement Value
Accession Number	0008,0050	Value removed
Institution Name	0008,0080	Value removed
Referring Physicians Name	0008,0090	Value removed
Station Name	0008,1010	Value removed
Study Description	0008,1030	Value removed
Series Description	0008,103E	Value removed
Institutional Department Name	0008,1040	Value removed

Attribute Name	Tag	Replacement Value
Performing Physician Name	0008,1050	Value removed
Operators Name	0008,1070	Value removed
Patient Name	0010,0010	Replaced with dummy value
Patient Sex	0010,0040	Value removed
Patient Birth Date	0010,0030	Value removed
Other Patient Ids	0010,1000	Value removed
Patients Age	0010,1010	Attribute removed
Patients Size	0010,1020	Value removed
Patients Weight	0010,1030	Value removed
Medical Alerts	0010,2000	Value removed
Ethnic Group	0010,2160	Value removed
Allergies	0010,2110	Value removed
Additional Patient History	0010,21B0	Value removed
Patient Comments	0010,4000	Value removed
Device Serial Number	0018,1000	Value removed
Protocol Name	0018,1030	Value removed
Study Date	0008,0020	Replaced with dummy value
Study Time	0008,0030	Replaced with dummy value
Study ID	0020,0010	Value removed
Requesting Service	0032,1033	Value removed
Performed procedure step description	0040,0254	Value removed
Patient ID	0010,0020	Replaced with dummy value
SOP Instance UID	0008,0018	Replaced with dummy value
TIMEZONEOFFSETFROM_UTC	0008,0201	Replaced with dummy value

While reasonable efforts are made to update attributes during de-identification and the export of personal data to CD, DVD, or over a network—as outlined in the table above—it remains the responsibility of the user to verify that the resulting level of de-identification is appropriate for their intended use and complies with all applicable privacy laws and regulatory requirements.

8.1.6. Supported Network Address Management Profiles

Not Applicable.

8.1.7. Time Synchronization Profiles

The Time Synchronization component of the Interventional Workspace Hub can be configured via Service. The implementation of the component conforms to the basic time synchronization profile of an NTP Client. The NTP Timeserver with which the client synchronizes its time is configured via Service. The NTP Timeserver is an element of Hospital Infrastructure.

8.1.8. Application Configuration Management Profiles

Not Applicable.

8.1.9. Audit Trail Profiles

Interventional Workspace Hub can create audit messages according to IHE Audit Trail and Node Authentication profile. Created audit records allow security officers in an institution to audit activities, to detect non-compliant behavior in the enterprise, and to facilitate detection of improper creation, access, modification and deletion of Protected Health Information (PHI), where PHI data is considered as information records (Registration, Order, Study/Procedure, Reports and to a lesser degree Images/Presentation States), and not the flow of information between the systems. This includes information exported to and imported from every secured node in the "secured domain".
The messages will be created and sent to a syslog server according to the syslog protocol. The time that is used will be the local time of the system. This time should be maintained by implementing a NTP Timeserver daemon on the system. The timeserver and syslog server are elements of the Hospital infrastructure. The following messages will be created and sent to a central Audit Record Repository.

Table 63: Audit Trail Profiles

Audit Event Trigger	Description	Message DICOM PS 3.15 A.5.3
Actor-start-stop	When Interventional Workspace Hub or a clinical applications (Interventional Tool) has started or is closed.	Application Activity
Begin-storing-instances	Begin storing SOP Instances for a study to an external repository.	Begin Transferring DICOM Instances
Instances-Stored	Storage of SOP instances to a remote repository has been completed.	DICOM Instances Transferred
Node-Authentication-failure	A secure node authentication failure has occurred during TLS negotiation, e.g., invalid certificate.	Security Alert
PHI-export	Any export of PHI to media.	Export
PHI-import	Any import of PHI from media.	Import
Query Information	A query has been initiated from Interventional Workspace Hub to a remote node.	Query
Security Alert	When software, security or networking configuration of the system is changed via the field service functionality.	Security Alert
User Authentication	A user log on or log off, whether successful or not.	User Authentication.
Instances-deleted	When a study is deleted from a specific study. One event covers all instances deleted for the particular study.	DICOM Instances Accessed" or "DICOM Study Deleted
Study-used	SOP Instances from a specific study are created or accessed / Deleted. One event covers all instances used for the particular study.	DICOM Instances Accessed
Patient Record	Event will be triggered when two patients are selected and merged at the patient directory.	Patient Record

Note: In the audit event message for the export of "Multi-frame True Color Secondary Capture Image Storage SOP Class", the SOP Class UID logged corresponds to the Secondary Capture SOP Class UID.

In the audit event message for the export of “Segmentation Storage SOP Class”, the SOP Class UID logged corresponds to the Surface Segmentation Storage SOP Class UID.

8.2. Association Level Security

Interventional Workspace Hub accepts associations only from known applications or an application whose “calling AE Title” is defined in its configuration file. Interventional Workspace Hub will reject association requests from unknown applications, i.e. applications that offer an unknown “calling AE title”. An application entity (AE) is known if – and only if – it is defined during configuration of Interventional Workspace Hub, which is done via the configuration application.

8.3. Application Level Security

Interventional Workspace Hub allows the use of either conventional (non-secure) communication or secure communication based on the Transport Layer Security (TLS 1.2) protocol. If configured, Interventional Workspace Hub supports security measures for:

- secure authentication of a node.
- integrity and confidentiality of transmitted data.
- generation of audit trail records.
- access control and user authentication.

Annexes Clinical Applications supported on "Interventional Workspace Hub"

A.1 IOD Contents

This section specifies each IOD accepted and / or created by Interventional Workspace Hub Application

ACCEPTED The applicable IOD is accepted for storage in the repository of the hosting platform and supported for import in UniGuide Application for viewing and analysis.

CREATED UniGuide Application supports generation of derived data by using the applicable IOD and is able to store this data in the repository of the hosting platform.

Table 64: Supported IOD's

IOD		Supported	
Name	**UID**	**Accepted**	**Created**
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7	Yes	Yes
Multiframe True Color Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7.4	Yes	Yes

A.1.1 Created SOP Instance

This section specifies each IOD created by this application.
This section specifies each IOD created It should specify the attribute name, tag, VR, and value. The value should specify the range and source (e.g. user input, Modality Worklist, automatically generated, etc.). For content items in templates, the range and source of the concept name and concept values should be specified. Whether the value is always present or not shall be specified.

Abbreviations used in the IOD tables for the column "Presence of Module" are:

ALWAYS The module is always present

CONDITIONAL The module is used under specified condition

Abbreviations used in the Module table for the column "Presence of Value" are:

ALWAYS The attribute is always present with a value

EMPTY The attribute is always present without any value (attribute sent zero length)

VNAP The attribute is always present and its Value is Not Always Present (attribute sent zero length if no value is present)

ANAP The attribute is present under specified condition – if present then it will always have a value

The abbreviations used in the Module table for the column "Source" are:

AUTO The attribute value is generated automatically

CONFIG The attribute value source is a configurable parameter

COPY The attribute value source is another SOP instance

FIXED The attribute value is hard-coded in the application

IMPLICIT The attribute value source is a user-implicit setting

MPPS The attribute value is the same as that use for Modality Performed Procedure Step

MWL The attribute value source is a Modality Worklist

USER The attribute value source is explicit user input

A.1.2.1 List of Created SOP Classes

Table 65: List of Created SOP Classes

SOP Class Name	SOP Class UID
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7
Multiframe True Color Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7.4

A.1.1.1.1 Secondary Capture Image Storage SOP Class

The Secondary Capture Image Storage SOP class is used for the storage of the Snapshot object.
In the tables below the attributes and attribute values are specified for above objects

Table 66: IOD of Created Secondary Capture Image Storage SOP Class Instances

Information Entity	Module	Presence Of Module
Patient	Patient Module	ALWAYS
Study	General Study Module	ALWAYS
	Patient Study Module	ALWAYS
Series	General Series Module	ALWAYS
Equipment	General Equipment Module	ALWAYS
	SC Equipment Module	ALWAYS
Image	General Image Module	ALWAYS
	Image Plane Module	CONDITIONAL
	Image Pixel Module	ALWAYS
	SC Image Module	CONDITIONAL
	VOI LUT Module	CONDITIONAL
	SOP Common Module	ALWAYS

Table 67: Patient Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
Patient's Name	0010,0010	PN		VNAP	COPY	
Patient ID	0010,0020	LO		VNAP	COPY	
Patient's Birth Date	0010,0030	DA		VNAP	COPY	
Patient's Sex	0010,0040	CS		VNAP	COPY	
Other Patient IDs	0010,1000	LO		ANAP	COPY	
Ethnic Group	0010,2160	SH		ANAP	COPY	
Patient Comments	0010,4000	LT		ANAP	COPY	

Table 68: General Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
Study Date	0008,0020	DA		ALWAYS	COPY	
Study Time	0008,0030	TM		ALWAYS	COPY	
Accession Number	0008,0050	SH		VNAP	COPY	
Referring Physician's Name	0008,0090	PN		VNAP	COPY	
Study Instance UID	0020,000D	UI		ALWAYS	COPY	
Study ID	0020,0010	SH		VNAP	COPY	
Study Description	0008,1030	LO		ANAP	COPY	
Requesting Service	0032,1033	LO		ANAP	COPY	

Table 69: Patient Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
Patient's Weight	0010,1030	DS		ALWAYS	COPY	
Patient's Age	0010,1010	AS		ANAP	COPY	
Patient's Size	0010,1020	DS		ANAP	COPY	
Medical Alerts	0010,2000	LO		ANAP	COPY	
Allergies	0010,2110	LO		ANAP	COPY	
Additional Patient History	0010,21B0	LT		ANAP	COPY	

Table 70: General Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
Series Date	0008,0021	DA		ALWAYS	AUTO	
Series Time	0008,0031	TM		ALWAYS	AUTO	
Series Description	0008,103E	LO		VNAP	AUTO	
Modality	0008,0060	CS	OT	ALWAYS	FIXED	
Series Instance UID	0020,000E	UI		ALWAYS	AUTO	
Series Number	0020,0011	IS		ALWAYS	AUTO	
Patient Position	0018,5100	CS		ANAP	COPY	
Performed Procedure Step Start Date	0040,0244	DA		ANAP	COPY	
Performed Procedure Step Start Time	0040,0245	TM		ANAP	COPY	
Performing Physician's Name	0008,1050	PN		ANAP	COPY	
Operators' Name	0008,1070	PN		ANAP	COPY	
Performed Procedure Step End Date	0040,0250	DA		ANAP	COPY	
Performed Procedure Step End Time	0040,0251	TM		ANAP	COPY	
Performed Procedure Step Description	0040,0254	LO		ANAP	COPY	
Performed Procedure Step ID	0040,0253	SH		ANAP	COPY	

Table 71: General Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
Manufacturer	0008,0070	LO	Philips	ALWAYS	FIXED	
Institution Name	0008,0080	LO		VNAP	CONFIG	Hospital name configured in IW
Station Name	0008,1010	SH		ANAP	CONFIG	
Manufacturer's Model Name	0008,1090	LO	UniGuide_001400	ALWAYS	FIXED	
Software Version(s)	0018,1020	LO	1.0	ALWAYS	AUTO	

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
Device Serial Number	0018,1000	LO		ALWAYS	AUTO	12 digit MAC address of network card in IW system

Table 72: SC Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
Modality	0008,0060	CS	XA	ALWAYS	FIXED	
Conversion Type	0008,0064	CS	WSD	ALWAYS	FIXED	

Table 73: General Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
Image Type	0008,0008	CS	DERIVED\SECONDARY\SNAPSHOT	ALWAYS	AUTO	
Instance Number	0020,0013	IS		ALWAYS	AUTO	
Patient Orientation	0020,0020	CS		VNAP	AUTO	
Content Date	0008,0023	DA		ANAP	AUTO	
Content Time	0008,0033	TM		ANAP	AUTO	
Burned In Annotation	0028,0301	CS		ANAP	AUTO	
Lossy Image Compression	0028,2110	CS		ANAP	AUTO	
Lossy Image Compression Ratio	0028,2112	DS		ANAP	AUTO	
Lossy Image Compression Method	0028,2114	CS		ANAP	AUTO	

Table 74: Image Pixel Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
Samples per Pixel	0028,0002	US	1: for MONOCHROME1 3: for RGB	ALWAYS	AUTO	
Photometric Interpretation	0028,0004	CS		ALWAYS	AUTO	
Planar Configuration	0028,0006	US		ANAP	AUTO	
Rows	0028,0010	US		ALWAYS	AUTO	
Columns	0028,0011	US		ALWAYS	AUTO	
Bits Allocated	0028,0100	US	8	ALWAYS	AUTO	
Bits Stored	0028,0101	US	8	ALWAYS	AUTO	
High Bit	0028,0102	US	7	ALWAYS	AUTO	
Pixel Representation	0028,0103	US	0	ALWAYS	AUTO	

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
Pixel Data	7FE0,0010	OW /OB		ALWAYS	AUTO	

Table 75: SC Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
Date of Secondary Capture	0018,1012	DA		ANAP	AUTO	
Time of Secondary Capture	0018,1014	TM		ANAP	AUTO	
Pixel Spacing	0028,0030	DS		ANAP	AUTO	

Table 76: Image Plane Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
Pixel Spacing	0028,0030	DS		ANAP	AUTO	

Table 77: VOI LUT Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
Window Center	0028,1050	DS		ANAP	AUTO	
Window Width	0028,1051	DS		ANAP	AUTO	

Table 78: SOP Common Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
Specific Character Set	0008,0005	CS		ANAP	AUTO	As supported by hosting platform
SOP Class UID	0008,0016	UI	1.2.840.10008.5.1.4.1.1.7	ALWAYS	FIXED	
SOP Instance UID	0008,0018	UI		ALWAYS	AUTO	
Instance Creation Date	0008,0012	DA		ALWAYS	AUTO	
Instance Creation Time	0008,0013	TM		ALWAYS	AUTO	
Instance Number	0020,0013	IS		ALWAYS	AUTO	
Timezone Offset From UTC	0008,0201	SH		ANAP	AUTO	

Table 79: Private/Additional Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
Referenced SOP Instance UID	0008,1155	UI		ANAP	AUTO	
Other Patient IDs	0010,1000	LO		ANAP	AUTO	
Scheduled Procedure Step Description	0040,0007	LO	XA02	ANAP	AUTO	
Requested Procedure ID	0040,1001	SH	ID123	ANAP	AUTO	
	5257,0040	LO	Philips X-ray AppEngine Common DD 001	ANAP	AUTO	

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
	5257,4001	LO	Generic	ANAP	AUTO	
	5257,4002	LO	SC	ANAP	AUTO	

A.1.1.1.2 Multi-Frame True Color Secondary Capture Image Storage SOP Class

Multiframe True Color Secondary capture storage objects are used for saving movies.
In the tables below, for the attributes where source value = “COPY” it means that the value is copied from the imported XA run.
The other attribute values are defined by the UniGuide application or by the IW platform.

Note : During association establishment, when a PACS advertises acceptance of multiple Storage SOP Classes including Secondary Capture Image Storage SOP Class the IWH SCU is permitted by DICOM to select any mutually supported SOP Class. Under such circumstances, IWH selects the Secondary Capture SOP Class and decomposes the Multi frame image accordingly. When the PACS restricts its accepted SOP Classes to Multi frame Storage SOP Classes, IWH successfully transmits the object in true Multi frame format.

Table 80: IOD of Created Multi-Frame True Color Secondary Capture Image Storage SOP Class Instances

Information Entity	Module	Presence Of Module
Patient	Patient Module	ALWAYS
Study	General Study Module	ALWAYS
	Patient Study Module	ALWAYS
Series	General Series Module	ALWAYS
Equipment	General Equipment Module	ALWAYS
	SC Equipment Module	ALWAYS
Image	General Image Module	ALWAYS
	Image Pixel Module	ALWAYS
	Cine Module	ALWAYS
	Multi-Frame Module	ALWAYS
	Multi-Frame Functional Groups Module	ALWAYS
	SC Image Module	ALWAYS
	SC Multi-Frame Image Module	ALWAYS
	SC Multi-frame Vector Module	CONDITIONAL
	SOP Common Module	ALWAYS

Table 81: Patient Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
Patient's Name	0010,0010	PN		VNAP	COPY	
Patient ID	0010,0020	LO		VNAP	COPY	
Patient's Birth Date	0010,0030	DA		VNAP	COPY	
Patient's Sex	0010,0040	CS		VNAP	COPY	
Other Patient IDs	0010,1000	LO		ANAP	COPY	
Other Patient IDs Sequence	0010,1002	SQ		ANAP	AUTO	
> Patient ID	0010,0020	LO		ALWAYS	AUTO	
> Issuer of Patient ID	0010,0021	LO		ANAP	AUTO	
Ethnic Group	0010,2160	SH		ANAP	COPY	

Table 82: General Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
Study Date	0008,0020	DA		ALWAYS	COPY	
Study Time	0008,0030	TM		ALWAYS	COPY	
Accession Number	0008,0050	SH		VNAP	COPY	
Referring Physician's Name	0008,0090	PN		VNAP	COPY	
Study Instance UID	0020,000D	UI		ALWAYS	COPY	
Study ID	0020,0010	SH		VNAP	COPY	
Study Description	0008,1030	LO		ANAP	COPY	
Requesting Service	0032,1033	LO		ANAP	COPY	

Table 83: Patient Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
Patient's Weight	0010,1030	DS		ALWAYS	COPY	
Patient's Size	0010,1020	DS		ALWAYS	USER	
Patient Age	0010,1010	AS		ANAP	USER	
Medical Alerts	0010,2000	LO		ANAP	COPY	
Allergies	0010,2110	LO		ANAP	COPY	
Additional Patient History	0010,21B0	LT		ANAP	COPY	

Table 84: General Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
Series Date	0008,0021	DA		ALWAYS	AUTO	
Series Time	0008,0031	TM		ALWAYS	AUTO	
Modality	0008,0060	CS	OT	ALWAYS	FIXED	
Series Description	0008,103E	LO		ALWAYS	AUTO	
Series Instance UID	0020,000E	UI		ALWAYS	AUTO	Each DICOM movie has a unique value
Series Number	0020,0011	IS		ALWAYS	AUTO	
Performed Procedure Step Start Date	0040,0244	DA		ANAP	COPY	
Performed Procedure Step Start Time	0040,0245	TM		ANAP	COPY	
Performing Physician's Name	0008,1050	PN		ANAP	USER	
Operators' Name	0008,1070	PN		ANAP	USER	
Protocol Name	0018,1030	LO		ANAP	AUTO	
Performed Procedure Step End Date	0040,0250	DA		ANAP	AUTO	

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
Performed Procedure Step End Time	0040,0251	TM		ANAP	AUTO	
Performed Procedure Step Description	0040,0254	LO		ANAP	USER	
Performed Procedure Step ID	0040,0253	SH		ANAP	COPY	

Table 85: General Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
Manufacturer	0008,0070	LO	Philips	ALWAYS	FIXED	
Institution Name	0008,0080	LO		VNAP	CONFIG	Hospital Name Configured in IWH
Station Name	0008,1010	SH		ANAP	CONFIG	
Institutional Department Name	0008,1040	LO		VNAP	AUTO	
Manufacturer's Model Name	0008,1090	LO	UniGuide_001400	ALWAYS	FIXED	
Software Version(s)	0018,1020	LO	1.0	ALWAYS	AUTO	
Device Serial Number	0018,1000	LO		ALWAYS	AUTO	12 digit MAC address of network card in IWH system

Table 86: SC Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
Modality	0008,0060	CS	OT	ALWAYS	FIXED	
Conversion Type	0008,0064	CS	WSD	ALWAYS	FIXED	
Secondary Capture Device Manufacturer	0018,1016	LO		ALWAYS	AUTO	
Secondary Capture Device Manufacturer's Model Name	0018,1018	LO		ALWAYS	AUTO	
Secondary Capture Device Software Versions	0018,1019	LO		ALWAYS	AUTO	

Table 87: General Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
Image Type	0008,0008	CS	DERIVED\SECONDARY \SNAPSHOT	ALWAYS	AUTO	

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
Content Date	0008,0023	DA		ALWAYS	AUTO	
Content Time	0008,0033	TM		ALWAYS	AUTO	
Instance Number	0020,0013	IS		ALWAYS	AUTO	
Patient Orientation	0020,0020	CS		ANAP	AUTO	
Burned in Annotation	0028,0301	CS	YES	ALWAYS	AUTO	
Lossy Image Compression	0028,2110	CS		ANAP	AUTO	
Lossy Image Compression Ratio	0028,2112	DS		ANAP	AUTO	
Lossy Image Compression Method	0028,2114	CS		ANAP	AUTO	

Table 88: Image Pixel Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
Samples per Pixel	0028,0002	US	3	ALWAYS	AUTO	
Photometric Interpretation	0028,0004	CS	RGB	ALWAYS	AUTO	
Planar Configuration	0028,0006	US	0	ALWAYS	AUTO	
Rows	0028,0010	US		ALWAYS	AUTO	Value depends on: - monitor resolution - navigation pane expanded (Y/N) - main view maximized (Y/N)
Columns	0028,0011	US		ALWAYS	AUTO	Value depends on: - monitor resolution - navigation pane expanded (Y/N) - main view maximized (Y/N)
Bits Allocated	0028,0100	US	8	ALWAYS	AUTO	
Bits Stored	0028,0101	US	8	ALWAYS	AUTO	
High Bit	0028,0102	US	7	ALWAYS	AUTO	
Pixel Representation	0028,0103	US	0	ALWAYS	AUTO	

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
Pixel Data	7FE0,0010	OW /OB		ALWAYS	AUTO	

Table 89: Cine Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
Recommended Display Frame Rate	0008,2144	IS		ANAP	AUTO	
Frame Time Vector	0018,1065	DS		ANAP	AUTO	

Table 90: Multi-Frame Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
Number of Frames	0028,0008	IS		ALWAYS	AUTO	Value depends on: - movie type (auto or free) - 2D or 3D view recording - slice thickness (2D)
Frame Increment Pointer	0028,0009	AT	00181063	ALWAYS	AUTO	

Table 91: Multi-Frame Functional Groups Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
Instance Number	0020,0013	IS		ALWAYS	AUTO	
Number of Frames	0028,0008	IS		ALWAYS	AUTO	Value depends on: - movie type (auto or free) - 2D or 3D view recording - slice thickness (2D)
Content Date	0008,0023	DA		ALWAYS	AUTO	
Content Time	0008,0033	TM		ALWAYS	AUTO	

Table 92: SC Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
Date of Secondary Capture	0018,1012	DA		ALWAYS	AUTO	
Time of Secondary Capture	0018,1014	TM		ALWAYS	AUTO	
Pixel Spacing	0028,0030	DS		ANAP	AUTO	

Table 93: SC Multi-Frame Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
Frame Increment Pointer	0028,0009	AT	00181063	ALWAYS	AUTO	
Burned In Annotation	0028,0301	CS	YES	ALWAYS	AUTO	
Pixel Spacing	0028,0030	DS		ANAP	AUTO	

Table 94: SC Multi-frame Vector Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
Frame Time Vector	0018,1065	DS		ANAP	AUTO	

Table 95: SOP Common Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
SOP Class UID	0008,0016	UI	1.2.840.10008.5.1.4.1.1.7.4	ALWAYS	FIXED	
Specific Character Set	0008,0005	CS		ANAP	AUTO	As supported by hosting platform
SOP Instance UID	0008,0018	UI		ALWAYS	AUTO	
Instance Creation Date	0008,0012	DA		ALWAYS	AUTO	
Instance Creation Time	0008,0013	TM		ALWAYS	AUTO	
Instance Number	0020,0013	IS		ALWAYS	AUTO	)
Timezone Offset From UTC	0008,0201	SH		ANAP	AUTO	

Table 96: Private/Additional Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comments
Referenced SOP Instance UID	0008,1155	UI				
Other Patient IDs	0010,1000	LO				
Scheduled Procedure Step Description	0040,0007	LO	XA02			
Requested Procedure ID	0040,1001	SH	ID123			
	5257,0040	LO	Philips X-ray AppEngine Common DD 001			
	5257,4001	LO	Vascular			
	5257,4002	LO	SC			

A.1.2 Input SOP Instance

Interventional Workspace Hub platform and UniGuide application support the consumption of Segmentation Objects (SO) and Surface Segmentation Objects (SSO) data provided by third-party systems or Philips applications as an input during the procedure and overlaying live X-ray images with planning

objects to provide live guidance. This section describes the supported SOP Classes, accepted IOD modules and the secondary capture fallback functionality.

The planning data must be captured in a Segmentation Series object, i.e. Modality is SEG. This series can contain a Surface Segmentation IOD Instance defining mesh objects and/or centerlines. Furthermore, a Segmentation IOD Instance can be provided in the same series, defining a binary segmentation.

The focus of these requirements is on the DICOM attributes that are specifically relevant for capturing these planning objects correctly so they can be shown in the clinical applications.

•The planning data shall be captured in a Segmentation Series.
•A Segmentation Series can contain a Surface Segmentation IOD Instance, Segmentation IOD Instance(s), or both.
•All planning data (Surface Segmentation Instance and/or Segmentation Instance(s)) shall be combined in a single Segmentation Series.

A.1.2.1 List of Supported Input SOP Classes

Table 97: List of Supported Input SOP Classes

SOP Class Name	SOP Class UID	Input	Process
Segmentation Storage SOP Class	1.2.840.10008.5.1.4.1.1.66.4	Y	Y
Surface Segmentation Storage SOP Class	1.2.840.10008.5.1.4.1.1.66.5	Y	Y

The following IEs and Modules are generic for the Surface Segmentation IOD Instance and Segmentation IOD Instance(s):

Table 98: General Series Module

Information Entity	Module
Patient	Patient
Study	General Study
	Patient Study
Series	General Series
	Segmentation Series
Frame of Reference	Frame of Reference
Equipment	General Equipment
	Enhanced General Equipment
Surface / Segmentation	Common Instance Reference
	SOP Common

Note: The Patient Study module is not mandatory. In case it is present, it shall contain the same information as the related 3D volume.

Table 99: General Series Module

Attribute Name	Tag	VR	Value	Comments
Modality	0008,0060	CS	SEG	Type of device, process or method that originally acquired or produced the data used to create the Instances in this Series. Only ‘SEG’ is supported.

Table 100: General Equipment Module

The attributes below shall provide information regarding the planning workstation on which the planning data is created.

Attribute Name	Tag	VR	Value	Comments
Manufacturer	0008,0070	LO		Manufacturer of the equipment that contributed to the Composite Instance.
Manufacturer's Model Name	0008,1090	LO		Manufacturer's model name of the equipment that contributed to the Composite Instance.
Software Versions	0018,1020	LO		Manufacturer's designation of the software version of the equipment that contributed to the Composite Instance. The Software Versions attribute is a multi-valued attribute. It shall at least contain the version of the planning data interface, which shall be indicated with a value that starts with “Philips SEG”. For this version of the interface, the complete version value is: “Philips SEG 1.0”. Next to that it shall contain the software version of the planning product.

Table 101: SOP Common Module

Attribute Name	Tag	VR	Value	Comments
Creation Date	0008,0012	DA		Shall contain the creation date of the planning data.
Creation Time	0008,0013	TM		Shall contain the creation time of the planning data.

Note: the date/time can be used in case multiple planning instances are created based on a 3D volume.

Table 102: Common Instance Reference Module

Attribute Name	Tag	VR	Value	Comments
Referenced Series Sequence	0008,1115	SQ		Shall contain a reference to the 3D volume on which the planning data is created. In case no 3D volume is present, the planning data cannot be opened in the clinical product. Only one item shall be included in this sequence.
> Series Instance UID	0020,000E	UI		Unique identifier of the Series containing the referenced Instances.
> Referenced Instance Sequence	0008,114A	SQ		Sequence of Items each providing a reference to an Instance that is part of the Series defined by Series Instance UID (0020,000E) in the enclosing Item. This sequence refers to all slices in the related 3D volume.
>> Referenced SOP Class UID	0008,1150	UI		Uniquely identifies the referenced SOP Class.
>> Referenced SOP Instance UID	0008,1155	UI		Uniquely identifies the referenced SOP Instance.

Table 103: Frame Of Reference Module

Attribute Name	Tag	VR	Value	Comments
Frame of Reference UID	0020,0052	UI		The Frame of Reference value shall be the same as for the 3D volume on which the planning data is based.

A.1.2.1.1 Segmentation Storage SOP Class

Table 104: IOD of Segmentation Storage SOP Class Instances

Information Entity	Module	Presence Of Module
Patient	Patient Module	ALWAYS
Study	General Study Module	ALWAYS
	Patient Study Module	CONDITIONAL
Series	General Series Module	ALWAYS
	Segmentation Series	ALWAYS
Frame of Reference	Frame of Reference	ALWAYS
Equipment	General Equipment Module	ALWAYS
	Enhanced General Equipment	ALWAYS
Image	General Image Module	ALWAYS
	General Reference	CONDITIONAL
	Image Pixel Module	ALWAYS
	Segmentation Image	ALWAYS
	Multi-frame Functional Groups	ALWAYS
	Multi-frame Dimension	ALWAYS
	SOP Common Module	ALWAYS

Table 105: Image Pixel Module

Attribute Name	Tag	VR	Value	Comments
Image Type	0008,0008	CS	['DERIVED', 'PRIMARY']	Value 1 shall be DERIVED (binary segmentation involves processing the original image). Value 2 shall be PRIMARY (primary data output of the segmentation process). No other values shall be present.
Samples per Pixel	0028,0002	US	1	Number of samples (planes) in this image. Only one (1) plane is supported (monochrome).
Photometric Interpretation	0028,0004	CS	MONOCHROME2	Specifies the intended interpretation of the pixel data. Only MONOCHROME2 is supported.
Rows	0028,0010	US		Number of rows in the image. Defines the number of rows in a slice of the binary segmentation.
Columns	0028,0011	US		Number of columns in the image. Defines the number of columns in a slice of the binary segmentation.
Pixel Aspect Ratio	0028,0034	IS		Ratio of the vertical size and horizontal size of the pixels in the image. The binary segmentation shall match with the referenced 3D volume
Bits Allocated	0028,0100	US	1	Number of bits allocated for each pixel sample. Only one (1) bit per pixel supported for binary segmentation.
Bits Stored	0028,0101	US	1	Number of bits stored for each pixel sample. Only one (1) bit per pixel supported for binary segmentation.
High Bit	0028,0102	US	0	Most significant bit for pixel sample data. High Bit (0028,0102) shall be one less than Bits Stored (0028,0101).
Pixel Representation	0028,0103	US	0	Data representation of the pixel samples. Only unsigned integer (0) is supported.

Attribute Name	Tag	VR	Value	Comments
Pixel Data	7FE0,0010			A data stream of the pixel samples that comprise the Image. The first pixel is stored in the least significant bit (LSB) of the byte.

Optionally, lossless compression can be used to reduce the size of the Pixel Data; only RLE lossless compression (1.2.840.10008.1.2.5) is supported.

Table 106: Segmentation Image Module

Attribute Name	Tag	VR	Value	Comments
Segmentation Type	0062,0001	CS	BINARY	The type of encoding used to indicate the presence of the segmented property at a pixel/voxel location. Only 'BINARY' is supported.
Segment Sequence	0062,0002	SQ		Describes the segments that are contained within the data. Only one item shall be included in this sequence.
> Segment Number	0062,0004	US		Identification number of the segment.
> Segment Label	0062,0005	LO		User-defined label identifying this segment. Shall contain the name of the structure defined by the binary segmentation.

Table 107: MultiFrame Functional Groups Module

In this module, the Derivation Image macro and Frame Content macro are used.

Attribute Name	Tag	VR	Value	Comments
Number of Frames	0028,0008	IS		Number of frames in a multi-frame image. It shall be the same as the number of slices in the related 3D volume.
Shared Functional Groups Sequence	5200,9229	SQ		Sequence that contains the Functional Group Macros that are shared for all frames in this SOP Instance and Concatenation. Only a single Item shall be included in this Sequence.
> Segment Identification Sequence	0062,000A	SQ		Identifies the characteristics of this frame. Only a single Item shall be included in this Sequence.
>> Referenced Segment Number	0062,000B	US		Uniquely identifies the segment described in Segment Sequence (0062,0002) by reference to Segment Number (0062,0004).
> Plane Orientation Sequence	0020,9116	SQ		Identifies orientation of the plane of this frame. Only a single Item shall be included in this Sequence.
>> Image Orientation (Patient)	0020,0037	DS		The direction cosines of the first row and the first column with respect to the patient.

Attribute Name	Tag	VR	Value	Comments
Per-Frame Functional Groups Sequence	5200,9230	SQ		Sequence that contains the Functional Group Macros corresponding to each frame of the Multi-frame Image. The first Item corresponds with the first frame of the binary segmentation, and so on. When a multi-frame SOP instance (e.g. Enhanced CT) is referenced, it is required the ordering of the binary segmentation matches the ordering of the multi frame SOP instance.
> Derivation Image Sequence	0008,9124	SQ		The set of Images or other composite SOP Instances that were used to derive this frame. Only a single Item shall be included in this Sequence. Derivation Image Sequence shall provide pixel spacing, spacing between slices, image orientation and plane position information.
>> Derivation Description	0008,2111	ST	Bone removal	A text description of how this frame data was derived. Text value 'Bone removal' shall be used.
>> Derivation Code Sequence	0008,9215	SQ		A coded description of how this frame was derived.
>>> Code Value	0008,0100	SH	113076	The identifier of the Coded Entry. Only value 113076 is supported (as indicated in DICOM section A.51.5.1 Segmentation Functional Groups Description).
>>> Coding Scheme Designator	0008,0102	SH	DCM	The identifier of the coding scheme in which the Coded Entry is defined. Only 'DCM' is supported.
>>> Code Meaning	0008,0104	LO	Segmentation	Text that conveys the meaning of the Coded Entry. Only 'Segmentation' is supported.
>> Source Image Sequence	0008,2112	SQ		The set of Images or other Composite SOP Instances that were used to derive this frame. This sequence shall contain only one item (only one slice in the related image volume is used as source for the specific frame in the binary segmentation).
>>> Referenced SOP Class UID	0008,1150	UI	1.2.840.10008.5.1.4.1.1.2	Uniquely identifies the referenced SOP Class. Only CT ('1.2.840.10008.5.1.4.1.1.2') is supported.

Attribute Name	Tag	VR	Value	Comments
>>> Referenced SOP Instance UID	0008,1155	UI		Uniquely identifies the referenced SOP Instance. Refers to the related slice in the original volume.
>>> Referenced Frame Number	0008,1160	IS		Identifies the frame number within the Referenced SOP Instance to which the reference applies. This attribute is mandatory in case of referring to a multi-frame 3D volume.
>>> Purpose of Reference Code Sequence	0040,A170	SQ		Describes the purpose for which the reference is made, that is what role the source image or frame played in the derivation of this image or frame. This sequence shall contain only one item.
>>>> Code Value	0008,0100	SH	121322	The identifier of the Coded Entry. Only value 121322 is supported (as indicated in DICOM section A.51.5.1 Segmentation Functional Groups Description).
>>>> Coding Scheme Designator	0008,0102	SH	DCM	The identifier of the coding scheme in which the Coded Entry is defined. Only 'DCM' is supported.
>>>> Code Meaning	0008,0104	LO	Source image for image processing operation	Text that conveys the meaning of the Coded Entry. Only 'Source image for image processing operation' is supported.
>>> Spatial Locations Preserved	0028,135A	CS	YES	The extent to which the spatial locations of all pixels are preserved during the processing of the source image that resulted in the current image or frame. Only value 'YES' is supported.
> Frame Content Sequence	0020,9111	SQ		Identifies general characteristics of this frame. Only a single Item shall be included in this Sequence.
>> Stack ID	0020,9056	SH		Identification of a group of frames, with different positions and/or orientations that belong together, within a dimension organization. In case the 3D volume is multi-frame, the same stack number shall be used as of the 3D volume, otherwise '1'.
>> In-Stack Position Number	0020,9057	UL		The ordinal number of a frame in a group of frames, with the same Stack ID (0020,9056). Shall be the same as the number of the related slice in the 3D volume stack.

Attribute Name	Tag	VR	Value	Comments
>> Dimension Index Values	0020,9157	UL		Contains the values of the indices defined in the Dimension Index Sequence (0020,9222) for this multi-frame header frame. The number of values is equal to the number of Items of the Dimension Index Sequence and shall be applied in the same order. It shall contain the “Stack ID” and “In-Stack Position Number”.
> Plane Position Sequence	0020,9113	SQ		Identifies the position of the plane of this frame. Only a single Item shall be included in this Sequence.
>> Image Position (Patient)	0020,0032	DS		The x, y, and z coordinates of the upper left-hand corner (center of the first voxel transmitted) of the frame, in mm.

Table 108: MultiFrame Dimension Module

Attribute Name	Tag	VR	Value	Comments
Dimension Organization Sequence	0020,9221	SQ		Sequence that lists the Dimension Organization UIDs referenced by the containing SOP Instance.
> Dimension Organization UID	0020,9164	UI		Uniquely identifies a set of dimensions referenced within the containing SOP Instance. Shall be generated.
Dimension Index Sequence	0020,9222	SQ		Identifies the Sequence containing the indices used to specify the dimension of the multi-frame object. This sequence shall contain 2 items.
> Dimension Organization UID	0020,9164	UI		Uniquely identifies a set of dimensions referenced within the containing SOP Instance. Shall be the same as defined in the “Dimension Organization UID” attribute of “Dimension Organization Sequence"
> Dimension Index Pointer	0020,9165	AT	(0020,9056) (0020,9057)	For first sequence item the Stack ID shall be (0020,9056) referenced. For the second sequence item the In-Stack Position Number shall be referenced.
> Functional Group Pointer	0020,9167	AT	(0020,9111) (0020,9111)	For the first sequence item, the pointer to the Stack ID Functional Group shall be given. For the second sequence item, the pointer to the In-Stack Position Number Functional Group shall be given.

Attribute Name	Tag	VR	Value	Comments
> Dimension Description Label	0020,9421	LO	Stack ID In-Stack Position Number	For the first sequence item “Stack ID” shall be provided. For the second sequence item “In-Stack Position Number” shall be provided.

A.1.2.1.2 Surface Segmentation Storage SOP Class

Table 109: IOD of Surface Segmentation Storage SOP Class Instances

Information Entity	Module	Presence Of Module
Patient	Patient Module	ALWAYS
Study	General Study Module	ALWAYS
	Patient Study Module	ALWAYS
Series	General Series Module	ALWAYS
	Segmentation Series	ALWAYS
Frame of Reference	Frame of Reference	ALWAYS
Equipment	General Equipment Module	ALWAYS
	Enhanced General Equipment	ALWAYS
Surface	Surface Segmentation	ALWAYS
	Surface Mesh	ALWAYS
	Common Instance Reference	ALWAYS
	SOP Common Module	ALWAYS

Table 110: Surface Mesh Module (for mesh objects)

Attribute Name	Tag	VR	Value	Comments
Surface Comments	0066,0004	LT		Shall contain the name of the structure defined by the mesh.
Recommended Presentation Type	0066,000D	CS		SURFACE
Recommended Display CIELab Value	0062,000D	US		Shall contain the display color of the structure.
Surface Points Sequence	0066,0011	SQ		Shall contain the sequence of surface points representing vertices of the surface.
> Point Coordinates Data	0066,0016	OF		Shall contain the point positions representing vertices of the surface.
Surface Mesh Primitives Sequence	0066,0013	SQ		Shall contain the sequence of mesh primitives.
> Long Triangle Point Index List	0066,0041	OL		Shall define the Triangles of the structure based on the Surface Points.

Table 111: Surface Mesh Module (for polyline objects)

Attribute Name	Tag	VR	Value	Comments
Surface Comments	0066,0004	LT		Shall contain the name of the structure defined by the polyline.
Recommended Presentation Type	0066,000D	CS		POINTS

Attribute Name	Tag	VR	Value	Comments
Recommended Display CIELab Value	0062,000D	US		Shall contain the display color of the structure.
Surface Points Sequence	0066,0011	SQ		Shall contain the sequence of points on the polyline.
> Point Coordinates Data	0066,0016	OF		Shall contain all the point positions on the polyline. The points shall be in the order as they are on the polyline.

It shall be possible to provide a measurement value for a surface object (either a mesh or a polyline).

- At most one measurement value can be provided for a surface object.
- When providing a measurement value, the following DICOM structure shall be present within the Sequence Item defining the surface object:

Attribute Name	Tag	VR	Value	Comments
Measured Value Sequence	0040,A300	SQ		Contains a sequence of measured values. Only one measurement shall be included in this sequence.
> Measurement Units Code Sequence	0040,08EA	SQ		Specifies the unit of measurement. Only one item shall be included in this sequence.
>> Code Value	0008,0100	SH		The identifier of the Coded Entry. Only Code Values from CID 7460 (Linear Measurement Unit) are supported. Only 'mm' is supported.
>> Coding scheme Designator	0008,0102	SH	UCUM	The identifier of the coding scheme in which the Coded Entry is defined. Only the value 'UCUM' is supported.
>> Code Meaning	0008,0104	LO		Conveys the meaning of the Coded Entry (e.g. 'millimeter')
> Numeric Value	0040,A30A	DS		Shall contain the numeric measurement value.

- The Numeric Value together with the Code Value will be shown as measurements value in the UI of the clinical product, e.g. "2.3 mm".

Viewing angles can be planned upfront in the planning product, and then be recalled during the procedure on the X-ray system to get optimal views of the anatomy. Some private attributes are used to define the viewing angles.

The following tags shall be used to define viewing angles.

Attribute Name	Tag	VR	Value	Comments
Private Creator	202B,0010	LO	Philips Imaging ICAP 001	Mandatory attribute related to private attribute below.
Viewing Angle Sequence	202B,100D	SQ		This tag shall be used to indicate the start of a sequence of one or more viewing angles (items).
> Positioner Primary Angle	0018,1510	DS		Position of the X-ray Image Intensifier about the patient from the RAO to LAO direction where movement from RAO to vertical (up) is positive.

Attribute Name	Tag	VR	Value	Comments
> Positioner Secondary Angle	0018,1511	DS		Position of the X-Ray Image Intensifier about the patient from the CAU to CRA direction where movement from CAU to vertical (up) is positive.
> Private Creator	202B,0010	LO	Philips Imaging ICAP 001	Mandatory attribute related to private attribute below.
> Viewing Angle Name	202B,100E	ST		Shall contain the name of the viewing angle.

A.1.2.1.3 Secondary Capture fallback

In case the planning data is first sent to a DICOM node not supporting this IOD before sending it to the clinical product of image guided systems, the Secondary Capture format shall be used as a fallback.

If needed, the Surface Segmentation planning data can be captured in a Secondary Capture Image IOD instance. All the attributes of the Surface Segmentation instance shall be placed in a Secondary Capture instance.

IOD	
Name	**UID**
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7

To indicate that the Secondary Capture instance contains planning data of a Surface Segmentation Instance, the following attribute in the SOP Common module shall be used:

Attribute Name	Tag	VR	Value[1]	Comments
Original Specialized SOP Class UID	0008,001B	UI	1.2.840.10008.5.1.4.1.1.66.5	The SOP Class in which the Instance was originally encoded that has been replaced during a fallback conversion to the current Related General SOP Class. The only supported values is 1.2.840.10008.5.1.4.1.1.66.5 (Surface Segmentation).

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