DICOM Conformance Statement

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UNIQ Release 1.0




Issued by:

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1. DICOM Conformance Statement Overview

This document is the DICOM Conformance Statement for UNIQ Release 1.0 later referred to as the System.
System is an image acquisition modality. It provides the following DICOM data exchange features: (see Figure 1):

- Query the Department System Scheduler for a Modality Worklist (MWL)
- Update the Performed Procedure Step Manager with information about Performed Procedure Steps (MPPS)
- Transfer of DICOM Images, Grayscale Presentation States and DICOM SR X-Ray Dose to the Image Archive or Image Displays
- Transfer of requests for storage commitment to the Image Archive (for the safekeeping of the previously transmitted images) and handling the storage commitment notifications received from the Image Archive
- Query/Retrieve the Image Archive or Image Displays for a list of entries representing Series of DICOM Images
- Store DICOM Images sent from the Image Archive or Image Displays
- Print Images on DICOM Printers

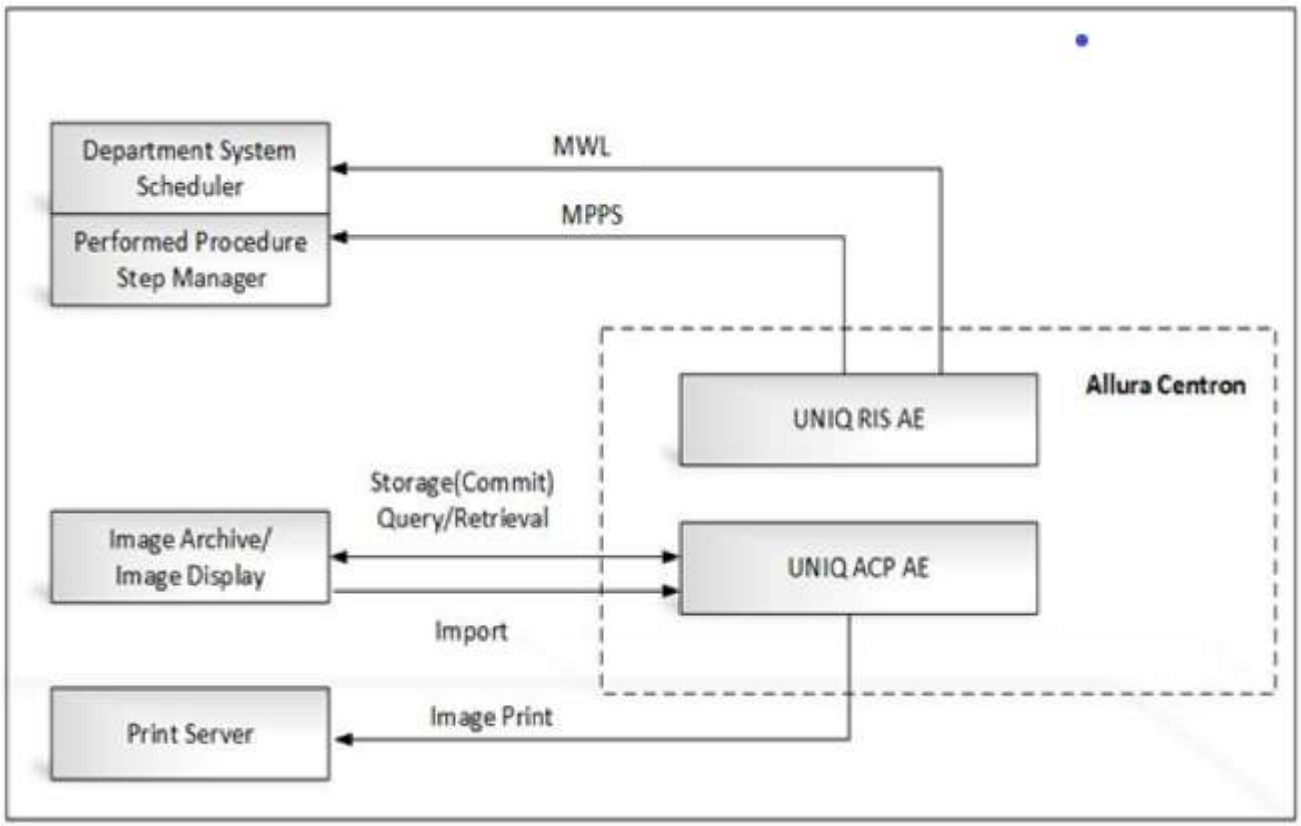

Figure 1 Data Flow of System in a DICOM network

Table 1 presents an overview of all supported by System networking DICOM Service (SOP) Classes with roles (User/Provider), organized in four categories:

- Transfer
- Query/Retrieve
- Workflow Management
- Print Management

Table 1: Network Services

SOP Class		User of Service (SCU)	Provider of Service (SCP)
Name	**UID**		
Other			
Verification SOP Class	1.2.840.10008.1.1	Yes	Yes
Print Management			
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Yes	No
>Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	Yes	No
>Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	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
>Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	Yes	No
Query/Retrieve			
Patient Root QR Information Model - FIND SOP Class	1.2.840.10008.5.1.4.1.2.1.1	Yes	No
Study Root QR Information Model - FIND SOP Class	1.2.840.10008.5.1.4.1.2.2.1	Yes	No
Patient Root QR Information Model - MOVE SOP Class	1.2.840.10008.5.1.4.1.2.1.2	Yes	No
Study Root QR Information Model - MOVE SOP Class	1.2.840.10008.5.1.4.1.2.2.2	Yes	No
Transfer			
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7	Yes	Yes
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1	Yes	Yes
X-Ray Angiographic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.1	Yes	Yes
X-Ray Radiation Dose SR SOP Class	1.2.840.10008.5.1.4.1.1.88.67	Yes	No
Workflow Management			
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	Yes	No
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3	Yes	No
Modality Worklist Information Model - FIND SOP Class	1.2.840.10008.5.1.4.31	Yes	No

2. Table of Contents

3. Introduction

The introduction specifies product and relevant disclaimers as well as any general information that the vendor feels is appropriate.

3.1. Revision History

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

Table 2: Revision History

Document Version	Date of Issue	Description
00	13-Oct-2016	Initial version for UNIQ Release 1.0 on Windows 7
01	11-Jan-2021	Second version for UNIQ Release 1.0 with updated attribute information in section 8. (Document ID updated from ICAP-PF.0025873 to HSDP - 677642)

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 analyse 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 assure 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 3: Definitions, Terms and Abbreviations

Abbreviation/Term	Explanation
AE	Application Entity
ANSI	American National Standard Institute
CD	Compact Disc
CD-R	CD-Recordable
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
ILE	DICOM Implicit VR Little Endian
IOD	Information Object Definition
ISIS	Information System - Imaging System
MPPS	Modality Performed Procedure Step
NEMA	National Electrical Manufacturers Association
PDU	Protocol Data Unit
RWA	Real-World Activity
SC	Secondary Capture
SCP	Service Class Provider
SCU	Service Class User
SOP	Service Object Pair
TCP/IP	Transmission Control Protocol/Internet Protocol
UID	Unique Identifier
WLM	Worklist Management
XA	X-Ray Angiographic

The following terms are used in this document:

Audit Record Repository
A system unit that receives and collects audit records from multiple systems [IHE].

Image Archive
A system that provides long term storage of images, presentation states, Key Image Notes and Evidence Documents [IHE].

Image Display
A system that offers browsing of patients' studies. In addition, it may support the retrieval and display of selected sets of images, presentation states, Key Image Notes, and Evidence Documents [IHE].

Department System Scheduler
A department-based information system that provides functions related to the management of orders received from external systems or through the department system's user interface. Upon a defined workflow action, makes procedures available for charge posting. The actor defines the action/event that actually causes charges to post [IHE].

Performed Procedure Step Manager
A system that re-distribute the Modality Performed Procedure Step Information from the Acquisition Modality or image Creator to the Department System Scheduler/Order Filler and Image Manager [IHE].

Print Server
A system that accepts and processes DICOM print requests as a DICOM Print SCP and performs image rendering on hardcopy media. The system must support pixel rendering according to the DICOM Grayscale Standard Display Function [IHE].

Protected Health Information
Protected Health Information is considered as information records, and not the flow of information between the systems [IHE].

Time Server
A system unit that knows, maintains and distributes the correct time in the enterprise [IHE].

Snapshot
A Snapshot is an image series which contains selected images displayed on all monitors or large screen. An user can make a snapshot series when he thinks images displayed on that moment will give help on further diagnosis.

3.5. References

[DICOM] NEMA PS3 / ISO 12052, Digital Imaging and Communications in Medicine (DICOM) Standard, National Electrical Manufacturers Association, Rosslyn, VA, USA (available free at http://medical.nema.org/)

4. Networking

4.1. Implementation model

The implementation model consists of three sections:

- the application data flow diagram, specifying the relationship between the System Application Entities and the “external world” or Real-World Activities
- a functional description of each Application Entity
- sequencing constraints among the Application Entities

4.1.1. Application Data Flow

System has two Application Entities in its implementation, namely RIS Application Entity (RIS AE) and ACP AE Application Entity (ACP AE). Figure 2 shows the Networking application data flow as a functional overview of these application entities. On the left-hand side, the local Real-World Activities are presented, whereas on the right-hand side, the remote Real-World Activities are presented. As depicted in Figure 2, the RIS AE and ACP AE incorporate the following functionality:

- After RWA Request Modality Worklist, the RIS AE as SCU uses the remote Modality Worklist Information Model SCP functionality to query for Modality Worklist.

- After RWA Create and Set Modality Performed Procedure Step, the RIS AE as SCU uses the remote Modality Performed Procedure Step SOP Class functionality to Report Modality Performed Procedure Step.

- After RWA Verify Application Level Communication (in the service mode), the RIS AE as SCU uses the remote Request Verification SCP functionality to verify communication.

- After RWA Transfer Images + Presentation States, the ACP AE as SCU uses the remote SCP Storage Service Class functionality to store local images and presentation states in a remote database.

- After RWA Import Images + Presentation States, the ACP AE as SCP provides standard Storage Service Class functionality to the requesting SCU.

- After RWA Find Remote Images + Presentation States, the ACP AE as SCU uses the remote SCP Query/Retrieve Service Class functionality to query for remote Series of Images and Series of Presentation States.

- After RWA Move Remote Images, the ACP AE as SCU uses the remote SCP Query/Retrieve Service Class functionality to import remote Series of Images and Series of Presentation States.

- After RWA Request Storage Commitment, the ACP AE as SCU uses the remote SCP Storage Commitment Service Class functionality to commit remote images and presentation states.

- After RWA Print Images, the ACP AE as SCU uses the remote Print Management Service Class to request the remote printer status and to print local images on that printer.

- After RWA Get Printer Status (in the service mode), the ACP AE as SCU uses the remote Print Management Service Class to request the remote printer status.

- After RWA Verify Application Level Communication, the ACP AE as SCU uses the remote Request Verification SCP functionality to verify communication.

- After RWA Request Verification (in the service mode), the ACP AE as SCP provides standard Verification Service Class functionality to the requesting SCU.

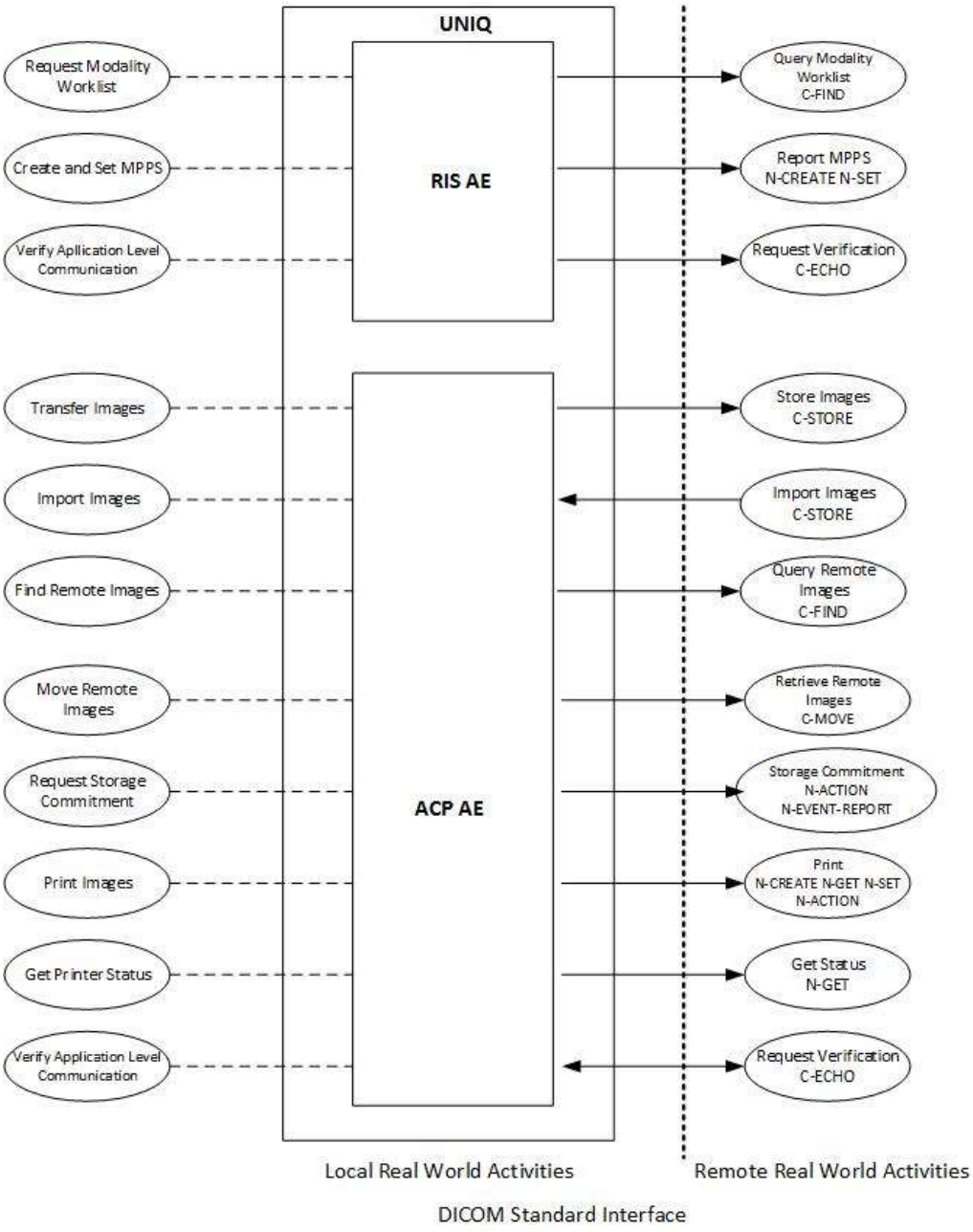

Figure 2 : System Application Flow Diagram

4.1.2. Functional Definition of AE's

This section describes in general terms the functions performed by RIS AE and ACP AE.

4.1.2.1 Functional Definition of RIS AE

4.1.2.1.1. Basic Worklist Management Service Class

The RIS AE can perform (only to the pre-configured Department System Scheduler) the Basic Worklist Management service as SCU (RWA Request Modality Worklist), triggered by the operator. The RIS AE shall request an association. When the association is accepted, the RIS AE shall send the Worklist request, receive the Worklist responses, and request for releasing the association

4.1.2.1.2. Study Management Service Class

The RIS AE can perform (only to the pre-configured Performed Procedure Step Manager) the Study Management service as SCU (RWA Create and Set Modality Performed Procedure Step), triggered by the selection of an examination for acquisition or closing or deletion of an examination. The RIS AE shall request an association. When the association is accepted, the RIS AE shall send the create and set requests, receive the responses, and request for releasing the association.

4.1.2.1.3. Verification Service Class

The RIS AE can perform (only to pre-configured systems) the Verification service as SCU (triggered by the operator in the service mode). The RIS AE shall request an association. When the association is accepted, the RIS AE shall send the Verification request, receive the Verification response, and request for releasing the association.

4.1.2.2 Functional Definition of ACP AE

4.1.2.2.1 Storage Service Class

The ACP AE accepts (only from pre-configured systems) associations from systems that wish to store images and/or presentation states using the C-STORE command (RWA Import Images + Presentation States). A remote SCU shall request an association with the ACP AE for Storage SOP class. After accepting the association, the ACP AE shall receive and respond to the Storage requests, and release the association when requested.
The ACP AE can perform (only to pre-configured systems) the Storage service as SCU (RWA Transfer Images + Presentation States), triggered by the operator or by an event in the system, e.g. closing of an examination, acquisition of images). The ACP AE shall request an association with the selected remote SCP for all applicable Storage SOP classes. When the association is accepted, the ACP AE shall send the Storage requests (including data from local database), receive the Storage responses and act accordingly, and finally request for releasing the association.

4.1.2.2.2 Query/Retrieve Service Class

The ACP AE can perform (only to pre-configured systems) the Query/Retrieve service as SCU (RWA Find Remote Images and Move Remote Images), triggered by the operator. The ACP AE shall request an association with the selected remote SCP for the applicable Query/Retrieve SOP class. When the association is accepted, the ACP AE shall send the Query/Retrieve requests, receive the Query/Retrieve responses and act accordingly, and finally request for releasing the association.
The ACP AE fully supports the Cancel functionality.
For Import jobs the C-MOVE-RQ's for Series with Images are initiated before the C-MOVE-RQ's for Series with Presentation States.

4.1.2.2.3 Storage Commitment Service Class

The ACP AE can perform (only to the Image Archive) the Storage Commitment service as SCU (RWA Request Storage Commitment), triggered by the closing of an examination event in the System). The ACP AE shall request an association with the Image Archive SCP for the Storage Commitment Push Model SOP class. When the association is accepted, the ACP AE shall send the Storage Commitment request, receive the Storage Commitment request responses and act accordingly. The ACP AE shall wait for a synchronous report for a specified amount of time and after that, it shall request for releasing the association. As a result, the Storage Commit SCP must then request a new association to confirm the storage commit asynchronously. After accepting that association, the ACP AE shall receive the Storage Commitment reports, and release the association when requested.

4.1.2.2.4 Print Management Service Class

The ACP AE can perform the Print service as SCU (RWA Print Images), triggered by the operator. For each printed sheet, the ACP AE shall request an association with the selected remote SCP (i.e., a Print Server) for all applicable SOP classes of the applicable Print Management Meta SOP class. When the association is accepted, the ACP AE shall send the Print requests including data from local database (the N-GET-RQ message to get the printer status, the N-CREATE-RQ message to create the FilmSession and the FilmBox, the N-SET-RQ message to set the Image Box on the printer, finally, the N-ACTION-RQ message to give printer the command to print), receive the Print responses and act accordingly, and finally request for releasing the association.
The ACP AE can perform the Print service as SCU (RWA Get Printer Status), triggered by the operator in the service mode. The ACP AE shall request an association with the selected remote SCP (Print Server) for the Printer SOP class. When the association is accepted, the ACP AE shall send the N-Get request, receive the responses from the Print Server and act accordingly, and finally request for releasing the association.

4.1.2.2.5 Verification Service Class

The ACP AE accepts (only from pre-configured systems) associations from systems that wish to verify application level communication using the C-ECHO command (RWA Request Verification). A remote SCU shall request an association with the ACP AE for Verification SOP class. After accepting the association, the ACP AE shall receive and respond to the Verification request, and release the association when requested.
The ACP AE can perform (only to pre-configured systems) the Verification service as SCU (triggered by the operator in the service mode). The ACP AE shall request an association. When the association is accepted, the ACP AE shall send the Verification request, receive the Verification response, and request for releasing the association.

4.1.3 Sequencing of Real World Activities

The following sequence of Real World activities are supported by the System

- The clinical user queries the Department System Scheduler for a (specific) Worklist representing the list of Scheduled Procedure Steps (with demographic information). Based on that query entered at the System), it sends the BWLM C-FIND-RQ message with the query criteria.
- The clinical user starts the examination. As a result, the System notifies the Performed Procedure Step Manager of the start of a new Procedure Step, i.e. it sends the MPPS N-CREATE-RQ message with the "IN PROCESS" status of the examination.
- The clinical user acquires images with a certain procedure. As a result, if background image transfer is configured, the System sends automatically the acquired images (and corresponding presentation states) to the Image Archive and\or the Image Display, i.e., it sends the C-STORE-RQ messages containing the image (and presentation state) information.
- The clinical user completes the examination. As a result, if auto-transfer is configured, the System sends images (and corresponding presentation states) to the Image Archive and/or Image Display (background image transfer), i.e., it sends the C-STORE-RQ messages containing the image (and presentation state) information.
- When all images (and presentation states), which were to be automatically transferred to the Image Archive, have been transferred and if Image Archive supports storage-commit, the System asks the Image Archive to take responsibility for the images (and presentation states) that it has stored that originate from the examination, i.e., it sends the N-ACTION-RQ message containing the request for storage commit.
- The System notifies the Performed Procedure Step Manager of the completion of a Procedure Step, i.e., it sends the N-SET-RQ message with the “COMPLETED” status of the examination.

Additionally to the basic flow of activities, the clinical user may also perform the following steps:

- The clinical user manually transfers images to the Image Archive and/or Image Display. As a result, the System sends the C-STORE-RQ messages containing the image information.
- The clinical user manually prints selected images. As a result, the System sends the N-GET-RQ message to get the printer status, the N-CREATE-RQ message to create the FilmSession and the FilmBox, the N-SET-RQ message to set the Image Box on the printer. Finally, it sends the N-ACTION-RQ message to give printer the command to print.
- The clinical user queries the Image Archive or Image Display for Series entities. As a result, the System sends a number of C-FIND-RQ messages containing the query criteria. The results received from the Image Archive or Image Display (i.e., Series entities) are presented to the clinical user as a list of entries, where each entry represents a set of Series entities with the same Study Instance UID (0020,000D), Protocol Name (0018,1030), and Performing Physician’s Name (0008,1050).

- The clinical user asks for the retrieval of one entry from the Image Archive or Image Display. As a result, the System sends the C-MOVE-RQ messages containing the identification of the Series of images to be imported.
- The clinical user may delete an examination. As a result, if it is a Worklist examination, an association is established for transmitting an N-SET request with the “DISCONTINUED” status.

Figure 3 presents normal scheduled workflow. Other workflow situations (e.g., unscheduled procedure steps) will have other sequencing constraints. For example, printing could equally take place after the acquired images have been stored or after the examination have been closed or could be omitted completely. Query for images could take place before images have been acquired or could be omitted completely.

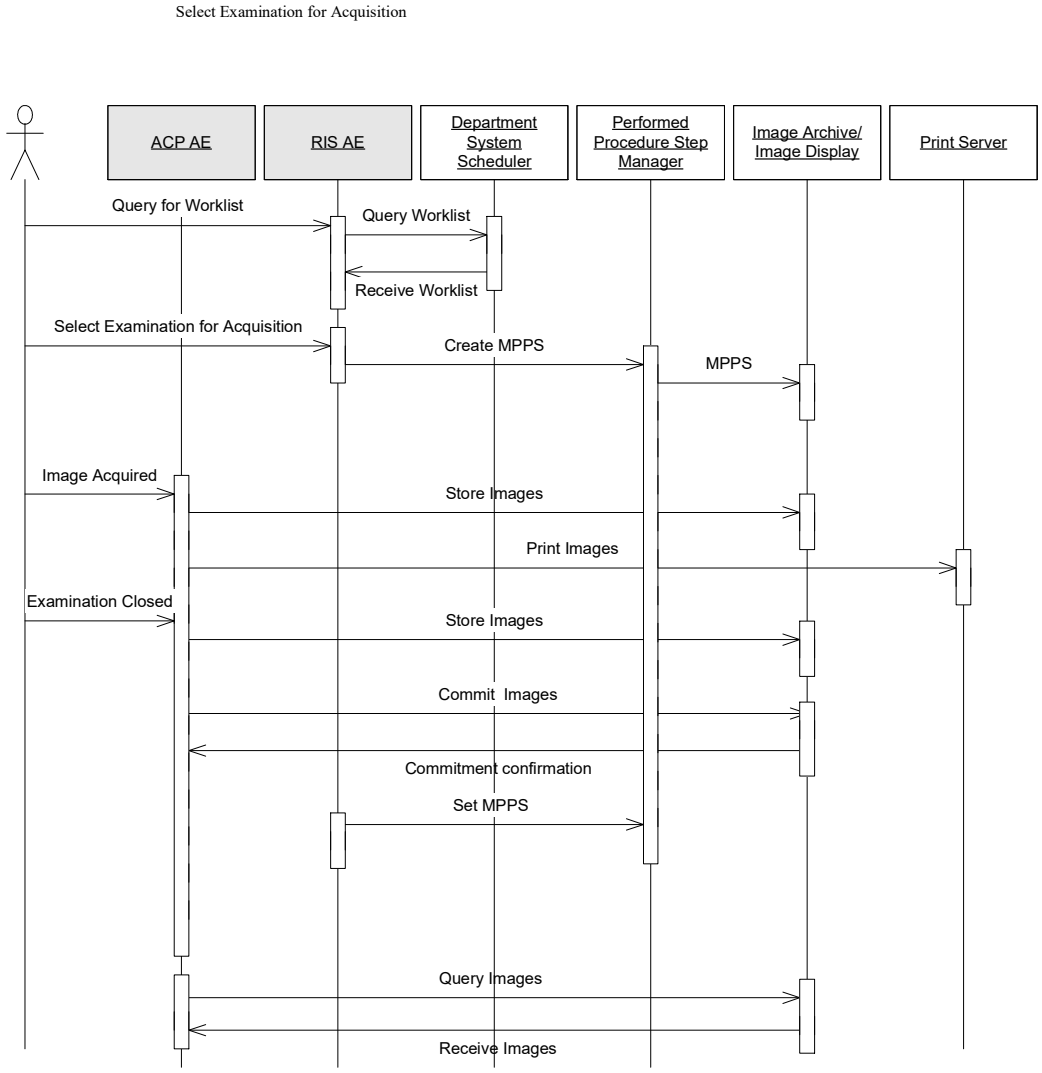

Figure 3 : SystemSequence Diagram

4.2 AE Specifications

The next section contains entity specifications for each application entity.

4.1.1 AE Specification of RIS AE

Every detail of the RIS AE shall be completely specified under this section.

4.1.1.1 SOP Classes

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

Table 4: SOP Classes for RIS AE

SOP Class Name	SOP Class UID	SCU	SCP
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	Yes	No
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Yes	No
Verification	1.2.840.10008.1.1	Yes	No

4.1.1.2 Association Policies

This section contains a description of the general association establishment and acceptance policies of the RIS AE.

4.1.1.2.1 General

The RIS AE always proposes the DICOM Application Context Name (ACN) presented in Table 4. The maximum PDU length for receiving data can be configured. The minimum PDU size is 4 Kbytes (4kB) and the maximum PDU length is 215 Bytes. The PDU length for sending data is unrestricted.

Table 5: DICOM Application Context

Description	Value
Application Context Name	1.2.840.10008.3.1.1.1

4.1.1.2.2 Number of Associations

The RIS AE supports a maximum of two simultaneous associations as SCU. The associations can be either for the execution of Modality Worklist query, or for the execution of Modality Performed Procedure Step (MPPS), or for the execution of Verification of Application Level Communication.
The RIS AE does not handle incoming associations.

Table 6: Maximum number of associations as an Association Initiator for RIS AE

Property	Value
Maximum number of simultaneous associations	2

Table 7: Maximum number of associations as an Association Acceptor for RIS AE

Property	Value
Maximum number of simultaneous associations	N.A.

4.1.1.2.3 Asynchronous Nature

The RIS AE does not support asynchronous operations and will not perform asynchronous window negotiation.

Table 8: Asynchronous Nature as an Association Initiator for RIS AE

Property	Value
Maximum number of outstanding asynchronous transactions	N.A.

4.1.1.2.4 Implementation Identifying Information

The value supplied for Implementation Class UID is presented in Table 9.

Table 9: DICOM Implementation Class and Version for System

Property	Value
Implementation Class UID	1.3.46.670589.7.28.8.2.25
Implementation Version Name	AlluraFixedSys25

4.1.1.2.5 Communication Failure Handling

The behaviour of this application entity during communication failure is summarized in the table below.

Table 10: Communication Failure Behavior

Exception	Behaviour
Timeout	The association is aborted using A-ABORT and the command is marked failed. The reason is logged and reported to the user.
Association aborted	The ABORT is handled by failing the job and the command is marked failed. The reason is logged and reported to the user.

4.1.1.3 Association Initiation Policy

The RIS AE initiates associations as a result of the following events:

- The operator queries for the Worklist (see Section 4.2.1.3.1)
- The operator selects a Worklist-based examination for acquisition (see Section 4.2.1.3.2)
- The operator cancels, removes or closes an examination (see Section 4.2.1.3.2)
- In the service mode, the operator verifies application level communication (see Section 4.2.1.3.3).

4.1.1.3.1 (Real-World) Activity – Modality Worklist as SCU

4.1.1.3.1.1 Description and Sequencing of Activities

For each Broad or Specific Worklist request, the RIS AE opens an association towards the Basic Worklist Management SCP and sends a C-FIND request. After retrieval of all responses containing matching Worklist items, the association is closed (see Figure 4). All returned Worklist items are displayed to the operator who can select an item from the Worklist and perform an examination.

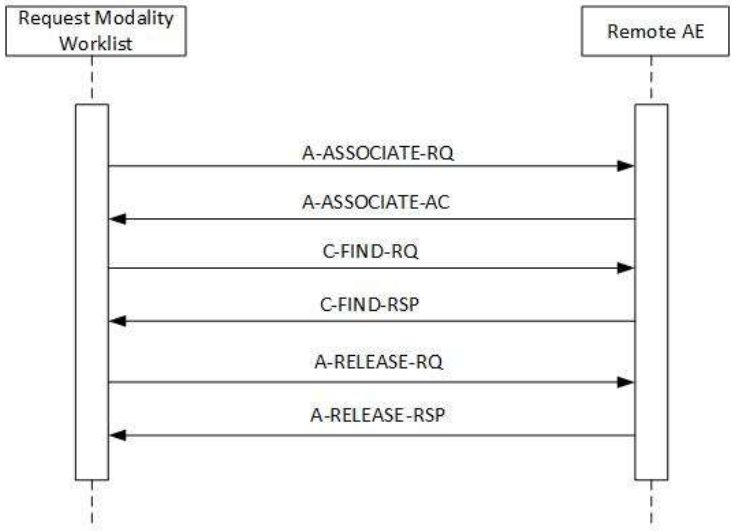

Figure 4: Sequencing of RWA Request Modality Worklist

4.1.1.3.1.2 Proposed Presentation Contexts

Each time an association is initiated, the RIS AE proposes one presentation contexts to be used on that association. The presentation context proposed by the RIS AE for Request Modality Worklist is defined in Table 9.

Table 11: Proposed Presentation Contexts for (Real-World) Activity – Request Modality Worklist

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	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		

The implementation chooses ELE transfer syntax in case multiple transfer syntaxes are accepted in the association acceptance.

4.1.1.3.1.3 SOP Specific Conformance for Verification SOP Class

Two kinds of queries can be done with the RIS AE: a broad query and a specific query.
A broad query for the Worklist is initiated by the operator without filling in any search criteria (the search criteria are based on system configuration). The Matching Keys are presented in Table 10.
A specific Worklist request is initiated by the operator after filling in search criteria in the Graphical User Interface. At least one key should be specified. No verification of query results in relation to the original query criteria is done. The Matching Keys are presented in Table 11.
A received Worklist entry is validated. The entry will be discarded, and an error will be reported when a type-one or type-two attribute is missing, or when the translation of a type-one attribute fails (this includes individual attributes within a sub-sequence).
A received Worklist entry is validated. The entry will be discarded, and an error will be reported when a type-one or type-two attribute is missing, or when the translation of a type-one attribute fails (this includes individual attributes within a sub-sequence).

Attributes related to Worklist Management (C-FIND) can be enabled/disabled by configuration. When the attribute (xxxx, yyyy) is disabled in the configuration, the following holds:

- If the attribute (xxxx, yyyy) is a DICOM return type 3 or a conditional attribute, it will not be in WLM query (C-FIND-RQ) sent out by the X-Ray Modality. In addition, the attribute (xxxx, yyyy) will be ignored when it will still be returned in the C-FIND-RSP.
- If the attribute (xxxx, yyyy) is not a DICOM return type 3 attribute and not a conditional attribute it will be sent out in the WLM query (C-FIND-RQ) by the X-Ray Modality, however the return value for this attribute in the C-FIND-RSP is ignored. When for the attribute DICOM Matching is required, the X-Ray Modality will still validate the return value. If the return value is DICOM incorrect, the C-FIND-RSP is still rejected and an error is logged.

Table 12: Matching Table MWL Information Model – Broad Query

Attribute Name	Tag	Matching Key
Scheduled Station AE Title	(0040,0001)	Single value matching
Scheduled Procedure Step Start Date	(0040,0002)	Universal matching or range matching
Scheduled Procedure Step Start Time	(0040,0003)	Universal matching or range matching
Modality	(0008,0060)	Single value matching and Universal matching

Table 13: Matching Table MWL Information Model – Specific Query

Attribute Name	Tag	Matching Key
Scheduled Station AE Title	(0040,0001)	Universal matching or single value matching
Scheduled Procedure Step Start Date	(0040,0002)	Universal matching or range matching
Modality	(0008,0060)	Universal matching or single value matching
Patient's Name	(0010,0010)	Universal matching or single value matching or wild card matching
Patient ID	(0010,0020)	Universal matching or single value matching
Accession Number	(0008,0050)	Universal matching or single value matching
Requested Procedure ID	(0040,1001)	Universal matching or single value matching

4.1.1.3.1.3.1 Dataset Specific Conformance for Modality Worklist Information Model - FIND SOP Class C-FIND-SCU

This section specifies the Modality Worklist Request Attributes.
For each attribute in the following information is supplied:

Attribute Name:	Attributes supported to build a Modality Worklist Request Identifier.
Tag:	DICOM tag for this attribute.
VR:	DICOM VR for this attribute.
M:	Matching Keys for (automatic) Worklist Update.
R:	Return Keys. An "X" will indicate that this attribute as matching key can be used
Q:	Interactive Query Key. An "X" will indicate that this attribute as matching key can be used.
D:	Displayed Keys. An "X" indicates that this Worklist attribute is displayed the user during a patient registration dialog.
IOD:	An "X" indicates that this Worklist attribute is included into all object Instances created during performance of the related Procedure Step.
Type of Matching:	The following types of matching exists: • Single Value Matching • List of UID Matching

- Wild Card Matching
- Range Matching
- Sequence Matching
- Universal Matching

Table 14: C-FIND-RQ Dataset Specification.

Modality Worklist Information Model - FIND SOP Class									
Attribute Name	**Tag**	**VR**	**M**	**R**	**Q**	**D**	**IOD**	**Type Of Matching**	**Comment**
Scheduled Procedure Step									
Scheduled Procedure Step Sequence	0040,0100	SQ		X				NA	
>Modality	0008,0060	CS		X	X	X	X	Single Value, Universal, Wild Card	
>Requested Contrast Agent	0032,1070	LO		X				Universal	
>Scheduled Station AE Title	0040,0001	AE		X	X	X		Single Value, Universal, Wild Card	
>Scheduled Procedure Step Start Date	0040,0002	DA		X	X	X		Single Value, Universal, Wild Card, range	
>Scheduled Procedure Step Start Time	0040,0003	TM		X		X		Single Value, Range, Universal	
>Scheduled Performing Physician's Name	0040,0006	PN		X	X	X		Single Value, Universal, Wild Card	
>Scheduled Procedure Step Description	0040,0007	LO						Universal	
>Scheduled Protocol Code Sequence	0040,0008	SQ						Universal	
>>Code Value	0008,0100	SH						Universal	
>>Coding Scheme Designator	0008,0102	SH						Universal	
>>Coding Scheme Version	0008,0103	SH						Universal	
>>Code Meaning	0008,0104	LO						Universal	
>>Protocol Context Sequence	0040,0440	SQ						Universal	
>>>Measurement Units Code Sequence	0040,08EA	SQ						Universal	
>>>>Code Value	0008,0100	SH						Universal	
>>>>Coding Scheme Designator	0008,0102	SH						Universal	
>>>>Coding Scheme Version	0008,0103	SH						Universal	
>>>>Code Meaning	0008,0104	LO						Universal	
>>>Value Type	0040,A040	CS						Universal	
>>>Concept Name Code Sequence	0040,A043	SQ						Universal	
>>>>Code Value	0008,0100	SH						Universal	
>>>>Coding Scheme Designator	0008,0102	SH						Universal	
>>>>Coding Scheme Version	0008,0103	SH						Universal	
>>>>Code Meaning	0008,0104	LO						Universal	
>>>DateTime	0040,A120	DT						Universal	

Modality Worklist Information Model - FIND SOP Class									
Attribute Name	**Tag**	**VR**	**M**	**R**	**Q**	**D**	**IOD**	**Type Of Matching**	**Comment**
Scheduled Procedure Step									
>>>Person Name	0040,A123	PN						Universal	
>>>Text Value	0040,A160	UT						Universal	
>>>Concept Code Sequence	0040,A168	SQ						Universal	
>>>>Code Value	0008,0100	SH						Universal	
>>>>Coding Scheme Designator	0008,0102	SH						Universal	
>>>>Coding Scheme Version	0008,0103	SH						Universal	
>>>>Code Meaning	0008,0104	LO						Universal	
>>>Numeric Value	0040,A30A	DS						Universal	
>Scheduled Procedure Step ID	0040,0009	SH						Universal	
>Scheduled Station Name	0040,0010	SH						Universal	
>Scheduled Procedure Step Location	0040,0011	SH						Universal	
>Pre-Medication	0040,0012	LO						Universal	
>Scheduled Procedure Step Status	0040,0020	CS						Universal	
Requested Procedure									
Study Instance UID	0020,000D	UI		X				Universal	
Requested Procedure Code Sequence	0032,1064	SQ						Universal	
>Code Value	0008,0100	SH						Universal	
>Coding Scheme Designator	0008,0102	SH						Universal	
>Coding Scheme Version	0008,0103	SH						Universal	
>Code Meaning	0008,0104	LO						Universal	
Requested Procedure ID	0040,1001	SH	X		X	X		Single Value, Universal, Wild Card	
Patient Transport Arrangements	0040,1004	LO						Universal	
Imaging Service Request									
Accession Number	0008,0050	SH	X		X	X	X	Single Value, Universal, Wild Card	
Referring Physician's Name	0008,0090	PN		X			X	Universal	
Requesting Physician	0032,1032	PN						Universal	
Visit Relationship									
Referenced Patient Sequence	0008,1120	SQ						NA	
>Referenced SOP Class UID	0008,1150	UI						Universal	
>Referenced SOP Instance UID	0008,1155	UI						Universal	
Patient Identification									
Patient's Name	0010,0010	PN	X	X	X	X	X	Single Value, Universal, Wild Card	
Patient ID	0010,0020	LO	X	X	X	X	X	Single Value, Universal, Wild Card	
Patient Demographic									

Modality Worklist Information Model - FIND SOP Class									
Attribute Name	**Tag**	**VR**	**M**	**R**	**Q**	**D**	**IOD**	**Type Of Matching**	**Comment**
Scheduled Procedure Step									
Patients Birth Date	0010,0030	DA		X			X	Single, Universal, Range, Wild Card	
Patient's Sex	0010,0040	CS		X			X	Single Value, Universal	
Patient's Weight	0010,1030	DS		X			X	Universal	
Patient Medical									
Medical Alerts	0010,2000	LO						Universal	
Allergies	0010,2110	LO						Universal	
Pregnancy Status	0010,21C0	US		X				Universal	
Patient State	0038,0500	LO		X				Universal	
Attributes For The Modality Worklist C-Find Identifier									
Specific Character Set	0008,0005	CS					X	Universal	ISO_IR 100, ISO_IR 13, ISO_IR 14, ISO_IR 87 or ISO_IR 159

The behavior of the System for status codes in C-FIND response is summarized in Table 15.

Table 15: Modality Worklist C-FIND Response Status Handling Behavior

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Matching is complete - No final Identifier is supplied.	The result is reported to the user and is logged.
Refused	A700	Out of Resources	Stops with processing the C-FIND Response(s) from the SCP. No responses displayed to the user.
Failed	A900	Identifier Does Not Match SOP Class	Stops with processing the C-FIND Response(s) from the SCP. The reason is logged and the failure is reported to the user. No responses displayed to the user.
	C001	Unable to process	Stops with processing the C-FIND Response(s) from the SCP. The reason is logged and the failure is reported to the user. No responses displayed to the user.
Cancel	FE00	Matching terminated due to Cancel Match request	Stops with processing the C-FIND Response(s) from the SCP. No responses displayed to the user.
Pending	FF00	Matches are continuing – Current. Match is supported in the same manner as supplied and any Optional Keys were Required Keys.	Continues with processing of the C-FIND Response(s) from the SCP
	FF01	Matches are continuing – Warning that one or more	Continues with processing of the C-FIND Response(s) from the SCP.

Service Status	Error Code	Further Meaning	Behavior
		Optional Keys were not supported for existence for this Identifier.	
*	Any other status code	*	The association is aborted using A-ABORT. The reason is logged and the failure is reported to the user. No responses displayed to the user.

The behavior of the System during communication failure is summarized in Table 19.

Table 16: Modality Worklist Communication Failure Behavior

Exception	Behavior
Timeout	The query is marked as failed. The association is aborted using A-ABORT. The reason is logged and reported to the user. The System stops processing the C-FIND Response(s) from the SCP.
Association Aborted	If the association is aborted using A-ABORT, the query is marked as failed. The reason is logged and failure is reported to the user. Stops with processing the C-FIND Response(s) from the SCP.
Association Rejected	The query is marked as failed. The reason is logged and failure is reported to the user. No C-FIND request performed.

4.1.1.3.2 (Real-World) Activity – Modality Performed Procedure Step as SCU

4.1.1.3.2.1 Description and Sequencing of Activities

For each MPPS Job, a new association towards the modality Performed Procedure Step is established and closed when the MPPS Job has been transmitted. There are three kinds of MPPS Jobs:

- *MPPS Create Job*. Only an N-CREATE request with status “IN PROGRESS” is transmitted. Once the response is received, the association is closed. The MPPS Create Job is submitted when:
  - A Worklist examination is selected for acquisition;
  - A local examination is selected for acquisition and the system is configured to be connected to an IHE compatible RIS.
  - An already Completed Worklist examination or an already Completed, local examination, is re-selected for acquisition (IHE Append Use Case).

- *MPPS Set Job*. Only an N-SET request is transmitted. The status field will respectively be set to “DISCONTINUED” or “COMPLETED”. Once the response is received, the association is closed. The MPPS Set Job is submitted when:
- An examination is discontinued/deleted/restored to solve patient mixing or closed and the MPPS Create Job is already handled (transmitted).
- *MPPS Create & Set Job*. Over the same association both the N-CREATE request and the N-SET request corresponding to the same examination are transmitted. The MPPS Create & Set Job is submitted when:
- An examination is discontinued/deleted/restored to solve patient mixing and the MPPS Create Job is not already handled (not transmitted). In such a case the MPPS Create & Set Job replaces the MPPS Create Job.

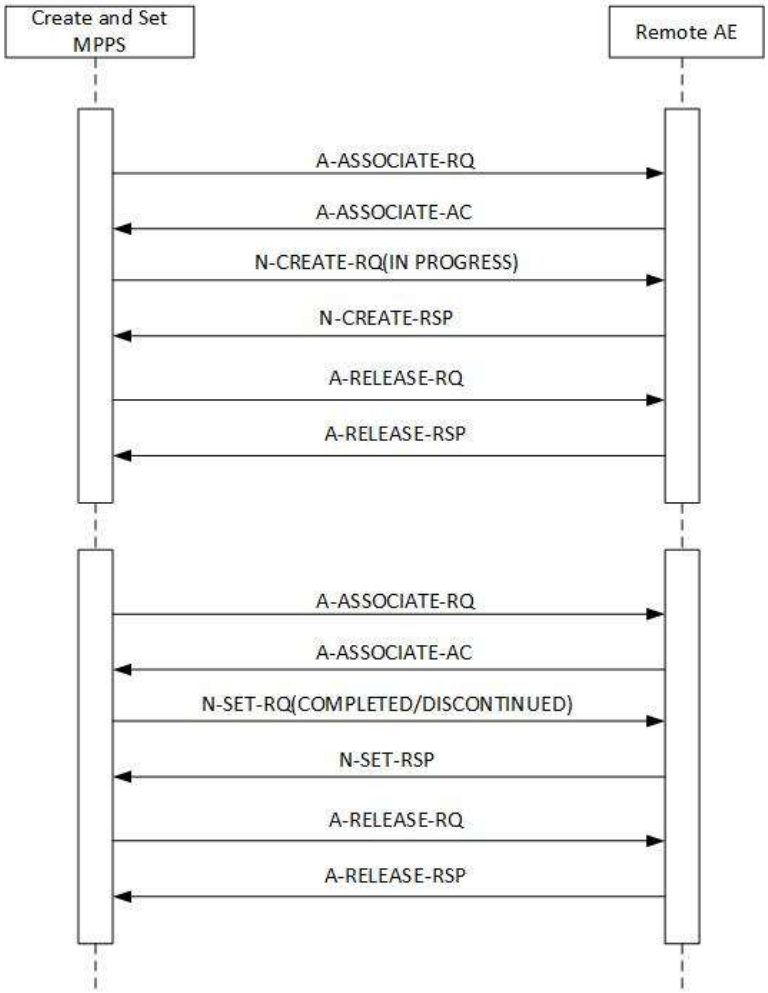

Figure 5: Sequencing of RWA separate MPPS Create and separate MPPS Set Job

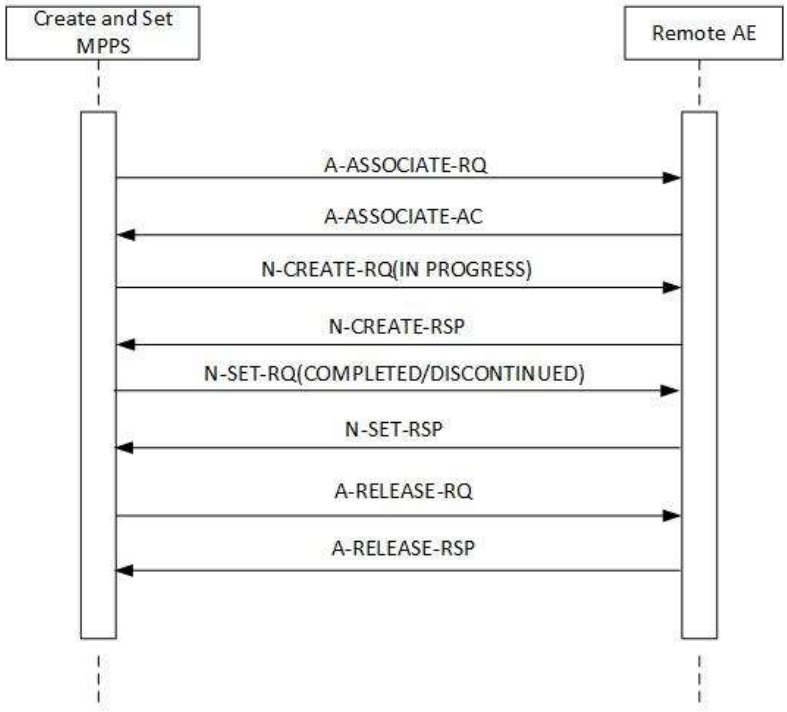

Figure 6: Sequencing of RWA MPPS Create and Set Job

4.1.1.3.2.2 Proposed Presentation Contexts

Each time an association is initiated, the RIS AE proposes one presentation context to be used on that association. The presentation context proposed by the RIS AE for Create and Set Modality Performed Procedure Step is defined in Table 17.

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

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3	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		

4.1.1.3.2.3 SOP Specific Conformance Modality Performed Procedure Step SOP Class

The set of attributes within an N-CREATE and N-SET messages is fixed and it does not depend on configuration settings. In an N-CREATE message, all possible attributes and attribute sequences used in the N-SET are forecasted by defining the attributes and settings their values to NULL. When an N-SET message is transmitted, it may occur that a forecasted attribute isn't actually used. Table 18 up till Table 20 indicate whether or not an attribute and attribute value is sent during N-CREATE.

Table 21 up till Table 22 indicate whether or not an attribute and attribute value is sent during MPPS N-SET.

4.1.1.3.2.3.1 Dataset Specific Conformance for Modality Performed Procedure Step SOP Class N-CREATE-SCU

Table 18: N-CREATE-RQ Dataset Specification.

Modality Performed Procedure Step SOP Class				
Attribute Name	**Tag**	**VR**	**Value**	**Comment**
SOP Common Module				
Specific Character Set	0008,0005	CS		ISO_IR 100, ISO_IR 13, ISO_IR 14, ISO_IR 87 or ISO_IR 159
Performed Procedure Step Relationship				
Referenced Patient Sequence	0008,1120	SQ		
>Referenced SOP Class UID	0008,1150	UI		
>Referenced SOP Instance UID	0008,1155	UI		
Patient's Name	0010,0010	PN		
Patient ID	0010,0020	LO		
Patient's Birth Date	0010,0030	DA		
Patient's Sex	0010,0040	CS		
Scheduled Step Attributes Sequence	0040,0270	SQ		
>Accession Number	0008,0050	SH		
>Referenced Study Sequence	0008,1110	SQ		Empty in case of an unscheduled exam
>>Referenced SOP Class UID	0008,1150	UI		
>>Referenced SOP Instance UID	0008,1155	UI		
>Study Instance UID	0020,000D	UI		
>Requested Procedure Description	0032,1060	LO		Empty in case of an unscheduled exam
>>Code Value	0008,0100	SH		
>>Coding Scheme Designator	0008,0102	SH		
>>Code Meaning	0008,0104	LO		
>>Context Group Extension Flag	0008,010B	CS		
>>Context Identifier	0008,010F	CS		
>>Context UID	0008,0117	UI		
>Scheduled Procedure Step Description	0040,0007	LO		Empty in case of an unscheduled exam
>>Code Value	0008,0100	SH		
>>Coding Scheme Designator	0008,0102	SH		
>>Code Meaning	0008,0104	LO		
>>Context Group Extension Flag	0008,010B	CS		
>>Context Identifier	0008,010F	CS		
>>Context UID	0008,0117	UI		
>>Protocol Context Sequence	0040,0440	SQ		
>>>Content Item Modifier Sequence	0040,0441	SQ		
>>>>Value Type	0040,A040	CS		
>>>>Concept Name Code Sequence	0040,A043	SQ		
>>>>>Code Value	0008,0100	SH		
>>>>>Coding Scheme Designator	0008,0102	SH		
>>>>>Code Meaning	0008,0104	LO		
>>>>>Context Group Extension Flag	0008,010B	CS		
>>>>>Context Identifier	0008,010F	CS		
>>>>>Context UID	0008,0117	UI		
>>>Value Type	0040,A040	CS		

Modality Performed Procedure Step SOP Class				
Attribute Name	**Tag**	**VR**	**Value**	**Comment**
>>>Concept Name Code Sequence	0040,A043	SQ		
>>>>Code Value	0008,0100	SH		
>>>>Coding Scheme Designator	0008,0102	SH		
>>>>Code Meaning	0008,0104	LO		
>>>>Context Group Extension Flag	0008,010B	CS		
>>>>Context Identifier	0008,010F	CS		
>>>>Context UID	0008,0117	UI		
>Scheduled Procedure Step ID	0040,0009	SH		Empty in case of an unscheduled exam
>Requested Procedure ID	0040,1001	SH		Empty in case of an unscheduled exam
Performed Procedure Step Information				
Procedure Code Sequence	0008,1032	SQ		
>Code Value	0008,0100	SH		
>Coding Scheme Designator	0008,0102	SH		
>Code Meaning	0008,0104	LO		
>Context Group Extension Flag	0008,010B	CS		
>Context Identifier	0008,010F	CS		
>Context UID	0008,0117	UI		
Performed Station AE Title	0040,0241	AE		AE Title as configured by the RIS/CIS unit.
Performed Station Name	0040,0242	SH		
Performed Location	0040,0243	SH		Always Empty
Performed Procedure Step Start Date	0040,0244	DA		
Performed Procedure Step Start Time	0040,0245	TM		
Performed Procedure Step End Date	0040,0250	DA		
Performed Procedure Step End Time	0040,0251	TM		
Performed Procedure Step Status	0040,0252	CS		
Performed Procedure Step ID	0040,0253	SH		
Performed Procedure Step Description	0040,0254	LO		
Performed Procedure Type Description	0040,0255	LO		
Image Acquisition Results				
Modality	0008,0060	CS		Applied Value(s): XA
Study ID	0020,0010	SH		If no Study ID is known, the Accession Number will be used as value.
Performed Protocol Code Sequence	0040,0260	SQ		
>Code Value	0008,0100	SH		
>Coding Scheme Designator	0008,0102	SH		
>Coding Scheme Version	0008,0103	SH		
>Code Meaning	0008,0104	LO		
>Context Group Extension Flag	0008,010B	CS		
>Context Identifier	0008,010F	CS		
>Context UID	0008,0117	UI		
>Protocol Context Sequence	0040,0440	SQ		
>>Content Item Modifier Sequence	0040,0441	SQ		
>>>Value Type	0040,A040	CS		

Modality Performed Procedure Step SOP Class				
Attribute Name	**Tag**	**VR**	**Value**	**Comment**
>>>Concept Name Code Sequence	0040,A043	SQ		
>>>>Code Value	0008,0100	SH		
>>>>Coding Scheme Designator	0008,0102	SH		
>>>>Code Meaning	0008,0104	LO		
>>>>Context Group Extension Flag	0008,010B	CS		
>>>>Context Identifier	0008,010F	CS		
>>>>Context UID	0008,0117	UI		
>>Value Type	0040,A040	CS		
>>Concept Name Code Sequence	0040,A043	SQ		
>>>Code Value	0008,0100	SH		
>>>Coding Scheme Designator	0008,0102	SH		
>>>Code Meaning	0008,0104	LO		
>>>Context Group Extension Flag	0008,010B	CS		
>>>Context Identifier	0008,010F	CS		
>>>Context UID	0008,0117	UI		
Performed Series Sequence	0040,0340	SQ		Sequence will be empty when there are no images to report
>Retrieve AE Title	0008,0054	AE		
>Series Description	0008,103E	LO		
>Performing Physician's Name	0008,1050	PN		
>Operators' Name	0008,1070	PN		
>Operator Identification Sequence	0008,1072	SQ		
>>Institution Address	0008,0081	ST		
>>Person Identification Code Sequence	0040,1101	SQ		
>>>Code Value	0008,0100	SH		
>>>Coding Scheme Designator	0008,0102	SH		
>>>Code Meaning	0008,0104	LO		
>>>Context Group Extension Flag	0008,010B	CS		
>>>Context Identifier	0008,010F	CS		
>>>Context UID	0008,0117	UI		
>>Person's Address	0040,1102	ST		
>>Person's Telephone Numbers	0040,1103	LO		
>Referenced Image Sequence	0008,1140	SQ		
>>Referenced SOP Class UID	0008,1150	UI		
>>Referenced SOP Instance UID	0008,1155	UI		
>>Container Identifier	0040,0512	LO		
>>Specimen Description Sequence	0040,0560	SQ		
>>>Specimen Identifier	0040,0551	LO		
>>>Specimen UID	0040,0554	UI		
>Protocol Name	0018,1030	LO		
>Series Instance UID	0020,000E	UI		
>Referenced Non-Image Composite SOP Instance Sequence	0040,0220	SQ		
>>Referenced SOP Class UID	0008,1150	UI		

Modality Performed Procedure Step SOP Class				
Attribute Name	**Tag**	**VR**	**Value**	**Comment**
>>Referenced SOP Instance UID	0008,1155	UI		
Radiation Dose				
Image and Fluoroscopy Area Dose Product	0018,115E	DS		
Total Time of Fluoroscopy	0040,0300	US		
Total Number of Exposures	0040,0301	US		
Entrance Dose	0040,0302	US		
Entrance Dose in mGy	0040,8302	DS		
Billing And Material Management Codes				
Film Consumption Sequence	0040,0321	SQ		Always Empty
>Medium Type	2000,0030	CS		
>Film Size ID	2010,0050	CS		
>Number of Films	2100,0170	IS		

The behavior of the System for status codes in an MPPS N-CREATE response and NSET response is presented in Table 22 and Table 23 respectively. In case of the retransmission attempt each message stored in the persistent queue is sent over a separate association.

Table 19: MPPS N-CREATE Response Status Handling Behavior

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Successful operation.	The notify status of the related examination is updated (set to in progress). The examination status is not changed (e.g. still in progress).
Failure	0213	Resource Limitation	The message contents is made persistent and the message is added to the persistent queue and waits for the next retransmission attempt. The examination status is not changed (e.g. still in progress).
*	Any other status code	*	If the response status is reported during initial transmission the message contents is made persistent and the message is added to the persistent queue. If this response status is the result of the retransmission attempt related examination is updated to the state as if the transmission succeeded. This means that the notify status of the related examination is updated (set to in progress) and if this response status is the result of the re-transmission attempt message is removed from the persistent queue. The examination status is not changed (e.g. still in progress).The response status is logged as a warning.

Table 20: MPPS Communication Failure Behavior (N-SET, N_CREATE) Exception Behavior

Exception	Behavior
Timeout	The Association is aborted using A-ABORT. The reason is logged and reported to the user. The message content is made persistent and the message is added to the persistent queue and waits for the next retransmission attempt. The examination status is set to CLOSED.

Association Aborted	The command is marked as failed. The reason is logged and reported to the user. The message content is made persistent and the message is added to the persistent queue and waits for the next retransmission attempt. The examination status is set to CLOSED.
Association Rejected	The command is marked as failed. The reason is logged and reported to the user. The message content is made persistent and the message is added to the persistent queue and waits for the next retransmission attempt. The examination status is set to CLOSED.

4.1.1.3.2.3.2 Dataset Specific Conformance for Modality Performed Procedure Step SOP Class N-SET-SCU

Table 21: N-SET-RQ Dataset Specification.

Modality Performed Procedure Step SOP Class				
Attribute Name	**Tag**	**VR**	**Value**	**Comment**
Sop Common Module				
Specific Character Set	0008,0005	CS		ISO_IR100
Performed Procedure Step Information				
Procedure Code Sequence	0008,1032	SQ		
>Code Value	0008,0100	SH		
>Coding Scheme Designator	0008,0102	SH		
>Code Meaning	0008,0104	LO		
>Context Group Extension Flag	0008,010B	CS		
>Context Identifier	0008,010F	CS		
>Context UID	0008,0117	UI		
Performed Procedure Step End Date	0040,0250	DA		
Performed Procedure Step End Time	0040,0251	TM		
Performed Procedure Step Status	0040,0252	CS		Applied Values: COMPLETED or DISCONTINUED
Performed Procedure Step Description	0040,0254	LO		May be Empty by configuration
Performed Procedure Type Description	0040,0255	LO		
Image Acquisition Results				
Performed Protocol Code Sequence	0040,0260	SQ		Sequence remains empty
>Code Value	0008,0100	SH		
>Coding Scheme Designator	0008,0102	SH		
>Code Meaning	0008,0104	LO		
>Context Group Extension Flag	0008,010B	CS		
>Context Identifier	0008,010F	CS		
>Context UID	0008,0117	UI		
>Protocol Context Sequence	0040,0440	SQ		May be empty when no images to be reported
>>Content Item Modifier Sequence	0040,0441	SQ		
>>>Value Type	0040,A040	CS		
>>>Concept Name Code Sequence	0040,A043	SQ		
>>>>Code Value	0008,0100	SH		
>>>>Coding Scheme Designator	0008,0102	SH		
>>>>Code Meaning	0008,0104	LO		
>>>>Context Group Extension Flag	0008,010B	CS		
>>>>Context Identifier	0008,010F	CS		
>>>>Context UID	0008,0117	UI		
>>Value Type	0040,A040	CS		
>>Concept Name Code Sequence	0040,A043	SQ		
>>>Code Value	0008,0100	SH		
>>>Coding Scheme Designator	0008,0102	SH		

Modality Performed Procedure Step SOP Class				
Attribute Name	**Tag**	**VR**	**Value**	**Comment**
>>>Code Meaning	0008,0104	LO		
>>>Context Group Extension Flag	0008,010B	CS		
>>>Context Identifier	0008,010F	CS		
>>>Context UID	0008,0117	UI		
Performed Series Sequence	0040,0340	SQ		
>Retrieve AE Title	0008,0054	AE		
>Series Description	0008,103E	LO		
>Series Description Code Sequence	0008,103F	SQ		
>>Code Value	0008,0100	SH		
>>Coding Scheme Designator	0008,0102	SH		
>>Code Meaning	0008,0104	LO		
>>Context Group Extension Flag	0008,010B	CS		
>>Context Identifier	0008,010F	CS		
>>Context UID	0008,0117	UI		
>Performing Physician's Name	0008,1050	PN		
>Performing Physician Identification Sequence	0008,1052	SQ		
>>Institution Address	0008,0081	ST		
>>Person Identification Code Sequence	0040,1101	SQ		
>>>Code Value	0008,0100	SH		
>>>Coding Scheme Designator	0008,0102	SH		
>>>Code Meaning	0008,0104	LO		
>>>Context Group Extension Flag	0008,010B	CS		
>>>Context Identifier	0008,010F	CS		
>>>Context UID	0008,0117	UI		
>>Person's Address	0040,1102	ST		
>>Person's Telephone Numbers	0040,1103	LO		
>Operators' Name	0008,1070	PN		
>Operator Identification Sequence	0008,1072	SQ		
>>Institution Address	0008,0081	ST		
>>Person Identification Code Sequence	0040,1101	SQ		
>>>Code Value	0008,0100	SH		
>>>Coding Scheme Designator	0008,0102	SH		
>>>Code Meaning	0008,0104	LO		
>>>Context Group Extension Flag	0008,010B	CS		
>>>Context Identifier	0008,010F	CS		
>>>Context UID	0008,0117	UI		
>>Person's Address	0040,1102	ST		
>>Person's Telephone Numbers	0040,1103	LO		
>Referenced Image Sequence	0008,1140	SQ		
>>Referenced SOP Class UID	0008,1150	UI		
>>Referenced SOP Instance UID	0008,1155	UI		
>>Container Identifier	0040,0512	LO		
>>Specimen Description Sequence	0040,0560	SQ		
>>>Specimen Identifier	0040,0551	LO		
>>>Specimen UID	0040,0554	UI		

Modality Performed Procedure Step SOP Class				
Attribute Name	**Tag**	**VR**	**Value**	**Comment**
>Protocol Name	0018,1030	LO		
>Series Instance UID	0020,000E	UI		
>Referenced Non-Image Composite SOP Instance Sequence	0040,0220	SQ		Refers to Dicom Object that were transferred to the Image Archive.
>>Referenced SOP Class UID	0008,1150	UI		
>>Referenced SOP Instance UID	0008,1155	UI		
>Archive Requested	0040,A494	CS		
Radiation Dose				
Image and Fluoroscopy Area Dose Product	0018,115E	DS		
Total Time of Fluoroscopy	0040,0300	US		
Total Number of Exposures	0040,0301	US		
Entrance Dose	0040,0302	US		
Entrance Dose in mGy	0040,8302	DS		
Billing And Material Management Codes				
Film Consumption Sequence	0040,0321	SQ		
>Medium Type	2000,0030	CS		
>Film Size ID	2010,0050	CS		
>Number of Films	2100,0170	IS		

The behavior of the Systemfor status codes in an MPPS N-SET response is presented in Table 25. In case of the retransmission attempt each message stored in the persistent queue is sent over a separate association.

Table 22: MPPS N-SET Response Status Handling Behavior

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Successful operation.	The notify status of the related examination is updated (set to notified). The examination status is set to COMPLETED and it is logged.
Failure	0213	Resource Limitation	The message contents is made persistent and the message is added to the persistent queue and waits for the next retransmission attempt. The examination status is set to CLOSED.
*	Any other status code	*	If this response status is reported during initial transmission the message contents is made persistent and the message is added to the persistent queue. If this response status is the result of the retransmission attempt related examination is updated to the state as if the transmission succeeded and the message is removed from the persistent queue. Than the notify status of the related examination is updated (set to notified). The response status is logged as a warning. The examination status is set to COMPLETED.

4.1.1.3.3 (Real-World) Activity – Verification as SCU

4.1.1.3.3.1 Description and Sequencing of Activities

For each Verify Application Level Communication request, an association towards the remote system is established and a C-ECHO request is transmitted. Once the response is received, the association is closed.

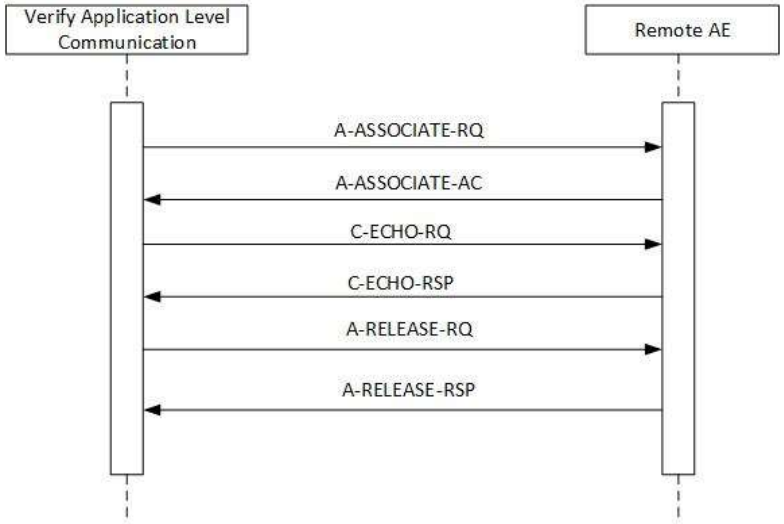

Figure 7: Sequencing of RWA for Verify Application Level Communication

4.1.1.3.3.2 Proposed Presentation Contexts

Each time an association is initiated, the RIS AE proposes one presentation contexts to be used on that association. The presentation context proposed by the RIS AE for Verify Application Level Communication is defined in Table 23.

Table 23: Proposed Presentation Contexts for (Real-World) Verification as SCU

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

The implementation chooses ELE transfer syntax in case multiple transfer syntaxes are accepted in the association acceptance.

4.1.1.3.3.3 SOP Specific Conformance for SOP Classes

The behavior of the RIS AE for status codes in a Verification response is summarized in Table 24.

Table 24: Verification C-ECHO Response Status Handling Behavior

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Successful operation	The success is reported to the operator.
*	Any other status code	*	The failure is reported to the operator.

The behavior of the RIS AE during communication failure is summarized in Table 25.

Table 25: Verification Communication Failure Behavior

Exception	Behavior
Timeout	The association is aborted using A-ABORT. The reason is logged and reported to the user.
Association aborted	The reason is logged and failure is reported to the user.
Association rejected	The reason is logged and failure is reported to the user.

4.1.1.4 Association Acceptance Policy

The RIS AE does not accept associations.

4.1.2 ACP AE

Every detail of the ACP AE shall be completely specified under this section.

4.1.2.1 SOP Classes

The ACP AE provides Standard Conformance to the SOP Classes presented in Table 26.

Table 26: SOP Classes for Error! Reference source not found.

SOP Class Name	SOP Class UID	SCU	SCP
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	Yes
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Yes	Yes
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	Yes	Yes
X-Ray Radiation Dose Structured Report Storage	1.2.840.10008.5.1.4.1.1.88.67	Yes	Yes
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	Yes	No
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Yes	No
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Yes	No
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Yes	No
Storage Commitment Push Model	1.2.840.10008.1.20.1	Yes	No
Basic Grayscale Print Management (Meta)	1.2.840.10008.5.1.1.9	Yes	No
>Basic Film Session	1.2.840.10008.5.1.1.1	Yes	No
>Basic Film Box	1.2.840.10008.5.1.1.2	Yes	No
>Basic Grayscale Image Box	1.2.840.10008.5.1.1.4	Yes	No
>Printer	1.2.840.10008.5.1.1.16	Yes	No
Verification	1.2.840.10008.1.1	Yes	Yes

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

4.1.2.2 Association Policies

This section contains a description of the general association establishment and acceptance policies of the ACP AE.

Table 27: DICOM Application Context

Description	Value
Application Context Name	1.2.840.10008.3.1.1.1

4.1.2.2.1 General

The ACP AE always proposes the DICOM Application Context Name (ACN) presented in Table 27. The maximum PDU length for receiving data is unrestricted and can be configured (0< max. PDU < 2^{32} -1 Bytes). The PDU length for sending data is unrestricted.

4.1.2.2.2 Number of Associations

As a result of local activities, the ACP AE (SCU) can initialize a maximum of six simultaneous associations. One association may be used to issue storage commitment or transfer images requests, another association may be used to find remote Series of Images, another association may be used to move remote Series of Images, another association may be used to print images, another association may be used to handle storage commitment notifications, and finally another association may be used to verify application level communication.
The maximum number of simultaneous associations supported by the ACP AE (SCP) is unlimited by default and can be configured.

Table 28: Maximum number of associations as an Association Initiator for ACP AE

Property	Value
Maximum number of simultaneous associations	6

Table 29: Maximum number of associations as an Association Acceptor for ACP AE

Property	Value
Maximum number of simultaneous associations	Unlimited

4.1.2.2.3 Asynchronous Nature

The ACP AE does not support asynchronous operations except for storage commitment. After the storage commitment N-ACTION request is transmitted, storage commitment notification may be handled on another association.

Table 30: Asynchronous Nature as an Association Initiator for ACP AE

Property	Value
Maximum number of outstanding asynchronous transactions	1

4.1.2.2.4 Implementation Identifying Information

The value supplied for Implementation Class UID is presented in Table 31.

Table 31: DICOM Implementation Class and Version for System)

Property	Value
Implementation Class UID	1.3.46.670589.7.28.8.2.25
Implementation Version Name	AlluraFixedSys25

4.1.2.3 Association Initiation Policy

The ACP AE initiate associations as a result of the following events:

- Images (and Presentation States) are transferred from the System to a remote system (see Section 4.2.2.3.1).
- The operator queries for remote Series of Images and Series of Presentation States (see Section 4.2.2.3.2).
- The operator requests import of remote Series of Images and Series of Presentation States (see Section 4.2.2.3.3).
- A storage commitment for archived images and presentation states is requested (see Section 4.2.2.3.4).
- The operator prints local images (see Section 4.2.2.3.5).
- In the service mode, the operator verifies printer status (see Section 4.2.2.3.6).

- In the service mode, the operator verifies application level communication (see Section 4.2.2.3.7).

4.1.2.3.1 (Real-World) Activity – Image Export

4.1.2.3.1.1 Description and Sequencing of Activities

The operator can select images (and presentation states) and request them to be sent to (pre-configure) multiple destinations. Each request is forwarded to the job queue and processed as individual request to Transfer Images (and Presentation States). If background image and presentation state transfer is configured, the ACP AE sends automatically the acquired images and presentation states. It can be configured which instances will be automatically marked and the destinations where the instances are automatically sent to. The background image and presentation state transfer is triggered by the image acquisition event and/or by the close examination event in the System).
For each request to Transfer Images (and Presentation States) (i.e., transfer job), one association towards the remote system is established. Within the association, for each image or presentation state, a C-STORE request is transmitted. Once the responses are received, the association is closed. A possible sequence of interactions between the ACP AE and a remote AE with only one C-STORE request is presented in Figure 8.

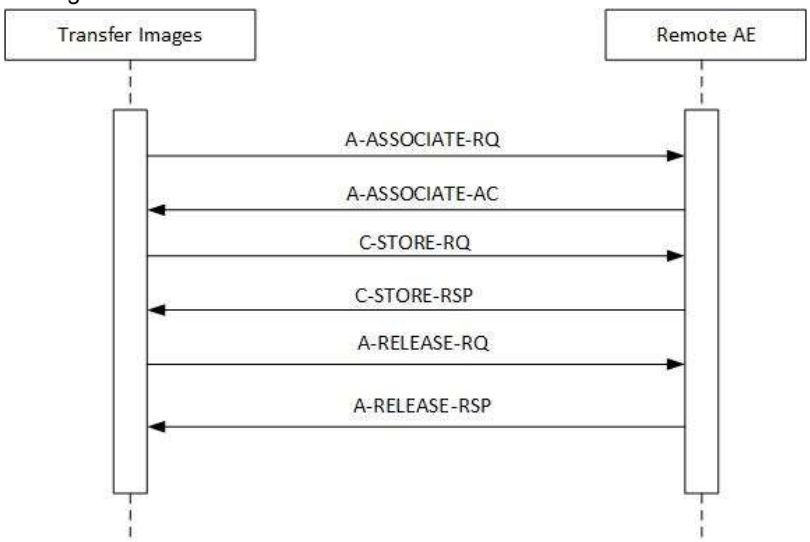

Figure 8 : Sequencing of RWA Image Export

4.1.2.3.1.2 Proposed Presentation Contexts

Each time an association is initiated, the ACP AE proposes two presentation contexts to be used on that association. The presentation context proposed by the ACP AE for Transfer Images is defined in Table 32.

Table 32: Proposed Presentation Contexts for (Real-World) Activity Image Export

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7	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		
		JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14)	1.2.840.10008.1.2.4.70		
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1	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		
X-Ray Angiographic Image	1.2.840.10008.5.1.4.1.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

Storage SOP Class	2.1	Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14)	1.2.840.10008.1.2.4.70		
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67	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		

The implementation proposes each SOP Class only ones in the abstract syntax specifying all possible transfer syntaxes for that SOP Class. Due to the fact that the SCP has to react with a chosen transfer syntax, as the per SOP Class used transfer syntax is forced by the SCP.

4.1.2.3.1.3 SOP Specific Conformance for SOP Classes

The ACP AE can exchange image data in the following formats:

- Standard Extended X-Ray Angiographic (1.2.840.10008.5.1.4.1.1.12.1)

X-Ray Angiographic images can either be sent with raw pixel data or processed pixel data.

- Standard Secondary Capture (1.2.840.10008.5.1.4.1.1.7)
- Standard Extended Softcopy Grayscale Presentation State SOP Class (1.2.840.10008.5.1.4.1.1.11.1)

Furthermore, the ACP AE can exchange non-image data in the following format:

- X-Ray Radiation Dose SR (1.2.840.10008.5.1.4.1.1.88.67)

The behavior of the ACP AE for status codes in a C-STORE response is summarized in Table 33.

Table 33: Storage C-STORE Response Status Handling Behavior

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Successful operation	The SCP has successfully stored the SOP Instances. If all SOP Instances in a send job have status success then the job is marked as completed. Success is logged.
Refused	A700-A7FF	Out of Resources	The association is aborted using A-ABORT and the send job is marked as failed. The failure reason is logged.
Error	A900-A9FF	Data Set does not match SOP Class	The association is aborted using A-ABORT and the send job is marked as failed. The failure reason is logged.
	C000-CFFF	Cannot Understand	The association is aborted using A-ABORT and the send job is marked as failed. The failure reason is logged.
Warning	B000	Coercion of Data Elements	The SCP has successfully stored the SOP Instances. If all SOP Instances in a send job have status success then the job is marked as completed. The Warning is logged.
	B006	Elements discarded	The SCP has successfully stored the SOP Instances. If all SOP Instances in a send job have status success then the job is marked as completed. The Warning is logged.
	B007	Data set does not match SOP class	The SCP has successfully stored the SOP Instances. If all SOP Instances in a send job have status success then the job is marked as completed. The Warning is logged.
*	Any other status code	*	The association is aborted using A-ABORT and the send job is marked as failed. The failure reason is logged.

The behavior of the ACP AE during communication failure is summarized in Table 34.

Table 34: Storage Communication Failure Behavior

Exception	Behavior
Timeout	The association is aborted using A-ABORT and the send job is marked as failed. The failure reason is logged.
Association aborted	The association is aborted using A-ABORT and the send job is marked as failed. The failure reason is logged.
Association rejected	The association is aborted using A-ABORT and the send job is marked as failed. The failure reason is logged.

4.1.2.3.2 (Real-World) Activity – Storage Commitment Push Model as SCU

4.1.2.3.2.1 Description and Sequencing of Activities

If the Remote AE is configured as an Image Archive and images have been sent to that Image Archive, the ACP AE will request storage commitment for instances of these images before it closes the examination. The request is forwarded to the job queue and processed as individual request to Request Storage Commitment. Only if a corresponding storage commitment notification is successfully received, the examination is completed.
For each request to Request Storage Commitment, one association towards the remote system is established, and the N-ACTION request is transmitted. The storage commitment request (N-ACTION) and confirmation (N-EVENT-REPORT) can be handled either in a synchronous (see Figure 12) or asynchronous (see Figure 13) way (a configurable item). The ACP AE can wait for synchronous report for a specified amount of time (configurable) and after that, it will request for releasing the association. As a result, the Storage Commit SCP must then request a new association to confirm the storage commit asynchronously.
The successful completion of the storage commitment request job only indicates that the N-ACTION request has been successfully transmitted to the Remote AE. In case of a synchronous storage commitment, the examination is marked as completed right after the successful completion of the storage commitment request job. In case of an asynchronous storage commitment, the examination is marked as completed only if a corresponding storage commitment notification from the Remote AE has been successfully received.

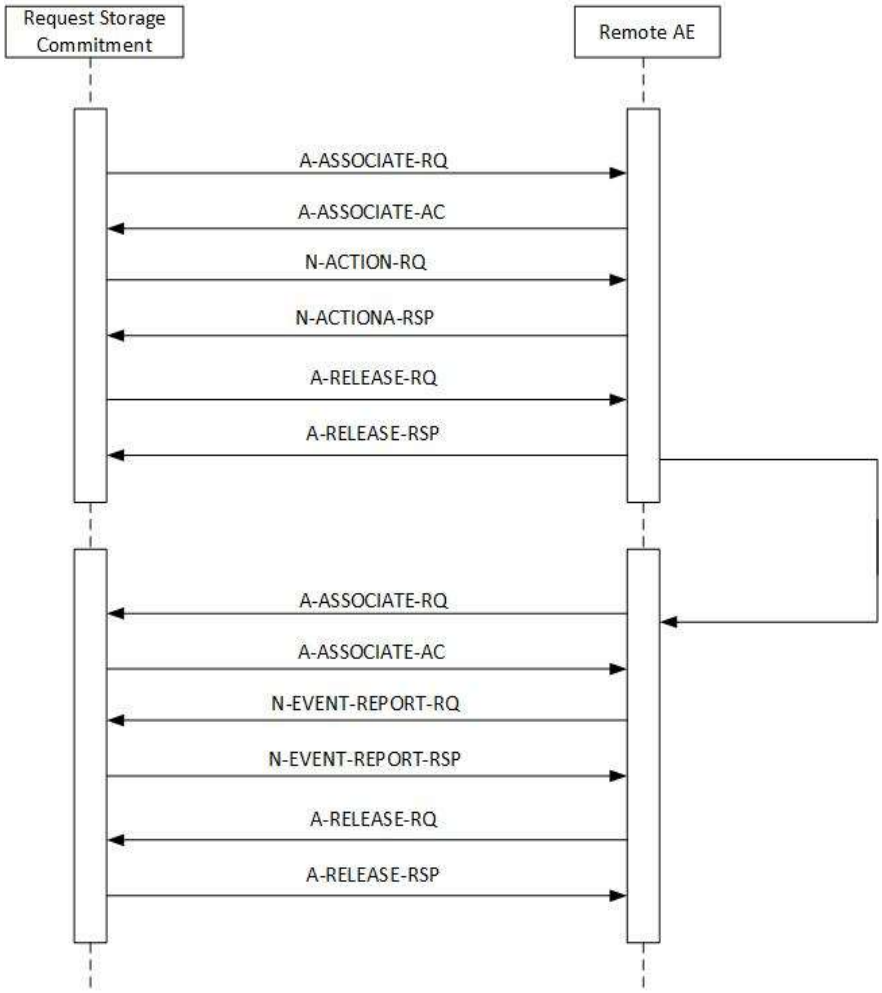

Figure 9: Sequencing of RWA Request Storage Commitment (asynchronous)

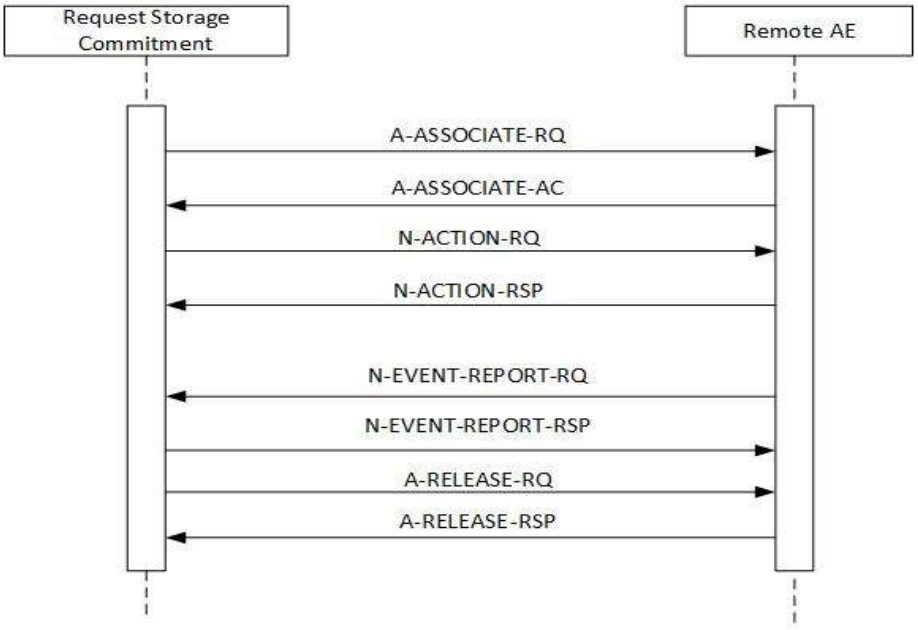

Figure 10: Sequencing of RWA Request Storage Commitment (synchronous)

4.1.2.3.2.2 Proposed Presentation Contexts

Each time an association is initiated, the ACP AE proposes one presentation context to be used on that association. The presentation context proposed by the ACP AE for Request Storage Commitment is defined in Table 35.

Table 35: Proposed Presentation Contexts for (Real-World) Activity – Storage Commitment Push Model as SCU

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	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		

The implementation proposes the SOP Class only ones in the abstract syntax specifying all possible transfer syntaxes for that SOP Class. Due to the fact that the SCP has to react with a chosen transfer syntax, as per the SOP Class used transfer syntax is forced by the SCP.

4.1.2.3.2.3 SOP Specific Conformance for Storage Commitment Push Model SOP Class

This section and sub-section include the manufacturer SOP and Dataset specific information as well the status codes and their corresponding behavior.

4.1.2.3.2.3.1 Dataset Specific Conformance for Storage Commitment Push Model SOP Class N-ACTION-SCU

Details regarding the Dataset Specific response behaviour will be reported in this section.

Table 36: N-ACTION-RQ Dataset Specification.

Storage Commitment Push Model SOP Class			
Attribute Name	**Tag**	**VR**	**Comment**
Sop Common Module			
SOP Class UID	0008,0016	UI	
SOP Instance UID	0008,0018	UI	
Storage Commitment Module			
Transaction UID	0008,1195	UI	
Referenced SOP Sequence	0008,1199	SQ	
>Referenced SOP Class UID	0008,1150	UI	
>Referenced SOP Instance UID	0008,1155	UI	

The details regarding the response behaviour to status codes are provided in Table 37.

Table 37: Storage Commitment N-ACTION Response Status Handling Behavior

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Successful operation	The storage commitment request has been successfully sent. The storage commitment request job is marked as completed. Success is logged.
*	Any other status code	*	The association is aborted using A-ABORT. The storage commitment request job is marked as failed. The failure is also logged.

The behaviour of the ACP AE during communication failure is summarized in Table 38.

Table 38: Storage Commitment N-EVENT-REPORT Behavior

Event Type	Event Type ID	Behavior
Storage Commitment Request Successful	1	The Examination is marked as completed and it becomes a candidate for an automatic deletion from the local database if local resources become scarce.
Storage Commitment Request Complete - Failures Exist	2	The failure is reported to the operator by not marking the examination as completed. The operator may re-transfer the image data (which was previously transferred to the Image Archive).

4.1.2.3.2.3.2 Dataset Specific Conformance for Storage Commitment Push Model SOP Class N-EVENT-REPORT-SCP

Details regarding the Dataset Specific response behaviour will be reported in this Table 39.

Table 39: N-EVENT-REPORT-RSP Dataset Specification.

Storage Commitment Push Model SOP Class			
Attribute Name	**Tag**	**VR**	**Comment**
Sop Common Module			
SOP Class UID	0008,0016	UI	
SOP Instance UID	0008,0018	UI	

The details regarding the response behaviour to status codes are provided in Table 40.

Table 40: Storage Commitment N-EVENT-REPORT Response Status Handling Behavior

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Successful operation	The storage commitment result has been successfully received. The SCP has successfully stored the SOP Instances. The examination is marked as completed.

Event Type	Event Type ID	Behavior
Storage Commitment Request Successful	1	The Examination is marked as completed and it becomes a candidate for an automatic deletion from the local database if local resources become scarce.
Storage Commitment Request Complete - Failures Exist	2	The failure is reported to the operator by not marking the examination as completed. The operator may re-transfer the image data (which was previously transferred to the Image Archive).

4.1.2.3.3 (Real-World) Activity – FIND as SCU

4.1.2.3.3.1 Description and Sequencing of Activities

The operator is able to query a (pre-configured) remote database. The ACP AE initiates an association to the selected Remote AE and uses it to send C-FIND requests (and receive the associated find replies). For each query a number of C-FIND requests is established in one association to the peer entity, which is released when all query results are received. An example sequencing of Activities is presented in Figure 11 and Figure 12.

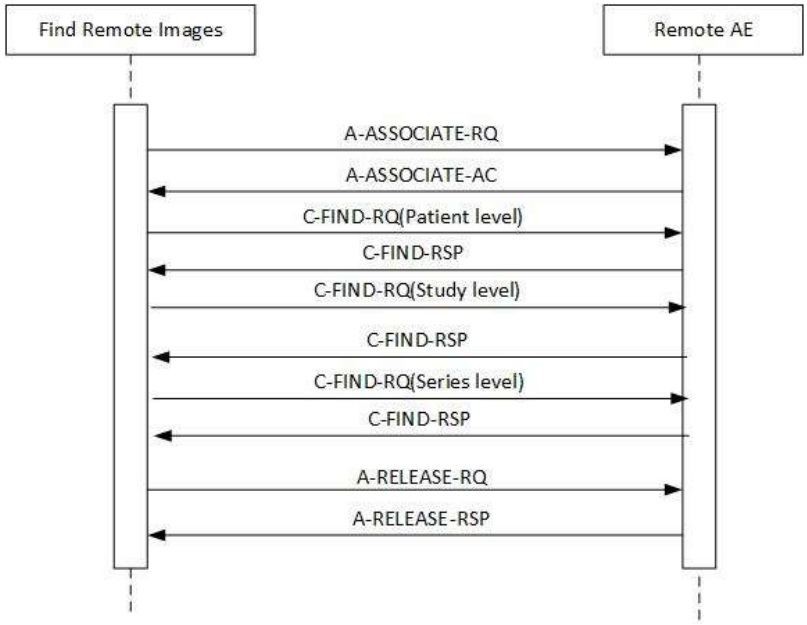

Figure 11: Sequencing of RWA (Patient Root Q/R Information Model)

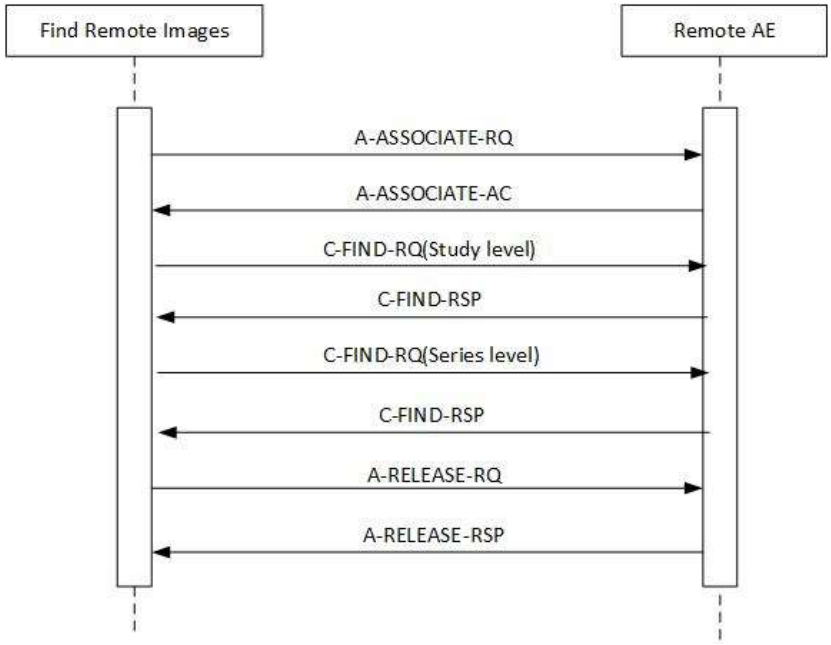

Figure 12: Sequencing of RWA (Study Root Q/R Information Model)

The clinical user may cancel the query to the Image Archive or Image Display. As a result, the System sends a C-FIND Cancel Request to the Image Archive or Image Display.

4.1.2.3.3.2 Proposed Presentation Contexts

Each time an association is initiated, the ACP AE proposes two presentation contexts to be used on that association. The presentation context proposed by the ACP AE for Find Remote Images is defined in Table 41.

Table 41: Proposed Presentation Contexts for (Real-World) Activity – FIND As SCU

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Patient Root QR Information Model - FIND SOP Class	1.2.840.10008.5.1.4.1.2.1.1	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 - FIND 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		

The implementation proposes each SOP Class only ones in the abstract syntax specifying all possible transfer syntaxes for that SOP Class. Due to the fact that the SCP has to react with a chosen transfer syntax, as the per SOP Class used transfer syntax is forced by the SCP.

4.1.2.3.3.3 SOP Specific Conformance for SOP Classes

With the System one can query for Series of Images. Series of Images which have the same Study Instance UID (0020, 000D), Protocol Name (0018,1030), and Performing Physician's Name (0008,1050), will be presented as one query result. The System interprets this as one query result belonging to the same examination.
A query can be done with one of the DICOM attributes presented in Table 42 and Table 45.

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

In Table 42 the supported query keys for each query level are described. Universal matching is supported by default.

Table 42: 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	Single Value	PATIENT, STUDY, SERIES
Specific Character Set	0008,0005	CS		
Q/R Patient Level				
Patient's Name	0010,0010	PN	Single value matching or wild card matching or universal matching	
Patient ID	0010,0020	LO	Single value matching or wild card matching or universal matching	
Patient's Birth Date	0010,0030	DA	Single value matching or universal matching	
Patient's Sex	0010,0040	CS	Universal matching only	
Q/R Study level				
Study Date	0008,0020	DA	Range matching or universal matching	
Study Time	0008,0030	TM	Universal matching only	
Accession Number	0008,0050	SH	Value matching or wild card matching or universal matching	
Query/Retrieve Level	0008,0052	CS	Single	
Modalities in Study	0008,0061	CS	Single	
Study Description	0008,1030)	LO	Universal matching	
Patient's Name	0010,0010	PN	Single value matching or wild card matching or universal matching	
Patient ID	0010,0020	LO	Single value matching or universal matching	
Patient's Birth Date	0010,0030	DA	Single value matching or universal matching	
Patient's Sex	0010,0040	CS	Universal matching only	
Patient Size	0010,1020	DS	Universal matching	
Patient Weight	0010,1030	DS	Universal matching	
Patient Comment	0010,4000	LT	Universal matching	
Study ID	0020,0010	SH	Universal matching only	
Study Instance UID	0020,000D	UI	Universal matching only	
Number Of Study Related Series	0020,1206	IS	Universal matching	
Q/R Series level				
Modality	0008,0060	CS	Universal matching only	

Patient Root Information Model				
Attribute Name	**Tag**	**VR**	**Type Of Matching**	**Comment**
Series Description	0008,103E	LO	Universal matching	
Number Of Series Related Instances	0008,1050	PN	Universal matching only	
Study Instance UID	0020,000D	UI	Single value matching only	
Series Instance UID	0020,000E	UI	Universal matching only	
Series Number	0020,0011	IS	Universal matching only	

The behavior of the System for status codes in C-FIND response is summarized in Table 43.

Table 43: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Matching is complete - No final Identifier is supplied.	Stops with processing the C-Find Response(s) from the SCP. All results are displayed to the operator.
Refused	A700	Out of Resources	Stops with processing the C-Find Response(s) from the SCP. The reason is logged and the failure is reported to the user.
Failed	A900	Identifier Does Not Match SOP Class	Stops with processing the C-Find Response(s) from the SCP. The reason is logged and the failure is reported to the user.
	Cxxx	Unable to process	Stops with processing the C-Find Response(s) from the SCP. The reason is logged and the failure is reported to the user.
Cancel	FE00	Matching terminated due to Cancel Match request	Stops with processing the C-Find Response(s) from the SCP. Results already received up to that point are displayed to the operator.
Pending	FF00	Matches are continuing - Current Match is supported in the same manner as supplied and any Optional Keys were Required Keys.	Continues with processing of the C-Find Response(s) from the SCP
	FF01	Matches are continuing - Warning that one or more Optional Keys were not supported for existence for this Identifier.	Continues with processing of the C-Find Response(s) from the SCP.
*	Any other status code	*	The association is aborted using A-ABORT. The reason is logged and the failure is reported to the user.

The behavior of the System during communication failure is summarized in Table 44.

Table 44: DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	The query is marked as failed. The association is aborted using A-ABORT. The reason is logged and reported to the user. System) stops processing the C-FIND Response(s) from the SCP.
Association aborted	If the association is aborted using A-ABORT, the query is marked as failed. The reason is logged and failure is reported to the user. Stops with processing the C-FIND Response(s) from the SCP.
Association rejected	The query is marked as failed. The reason is logged and failure is reported to the user. No C-FIND request performed.

4.1.2.3.3.4 SOP Specific Conformance for Study Root QR Information Model - FIND SOP Class

The System provides standard conformance to this SOP class. The System AE does not generate queries containing optional keys and it does not generate relational queries.

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

In table 45 the supported query keys for each query level are described. Universal matching is supported as default.

Table 45: 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	Single Value	STUDY, SERIES
Specific Character Set	0008,0005	CS		
Q/R Study level				
Study Date	0008,0020	DA	Range matching or universal matching	
Study Time	0008,0030	TM	Universal matching only	
Accession Number	0008,0050	SH	Value matching or wild card matching or universal matching	
Query/Retrieve Level	0008,0052	CS	Single	STUDY
Modalities in Study	0008,0061	CS	Single	
Study Description	0008,1030)	LO	Universal matching	
Patient's Name	0010,0010	PN	Single value matching or wild card matching or universal matching	
Patient ID	0010,0020	LO	Single value matching or universal matching	
Patient's Birth Date	0010,0030	DA	Single value matching or universal matching	
Patient's Sex	0010,0040	CS	Universal matching only	
Patient Size	0010,1020	DS	Universal matching	
Patient Weight	0010,1030	DS	Universal matching	
Patient Comment	0010,4000	LT	Universal matching	
Study ID	0020,0010	SH	Universal matching only	
Study Instance UID	0020,000D	UI	Universal matching only	
Number Of Study Related Series	0020,1206	IS	Universal matching	
Q/R Series level				
Modality	0008,0060	CS	Universal matching only	
Series Description	0008,103E	LO	Universal matching	
Number Of Series Related Instances	0008,1050	PN	Universal matching only	
Study Instance UID	0020,000D	UI	Single value matching only	
Series Instance UID	0020,000E	UI	Universal matching only	
Series Number	0020,0011	IS	Universal matching only	

The behavior of the System for status codes in C-FIND response is summarized in Table 46.

Table 46: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Matching is complete - No final Identifier is supplied.	Stops with processing the C-Find Response(s) from the SCP. All results are displayed to the operator.
Refused	A700	Out of Resources	Stops with processing the C-Find Response(s) from the SCP. The reason is logged and the failure is reported to the user.
Failed	A900	Identifier Does Not Match SOP Class	Stops with processing the C-Find Response(s) from the SCP. The reason is logged and the failure is reported to the user.
	Cxxx	Unable to process	Stops with processing the C-Find Response(s) from the SCP. The reason is logged and the failure is reported to the user.
Cancel	FE00	Matching terminated due to Cancel Match request	Stops with processing the C-Find Response(s) from the SCP. Results already received up to that point are displayed to the operator.
Pending	FF00	Matches are continuing - Current Match is supported in the same manner as supplied and any Optional Keys were Required Keys.	Continues with processing of the C-Find Response(s) from the SCP
	FF01	Matches are continuing - Warning that one or more Optional Keys were not supported for existence for this Identifier.	Continues with processing of the C-Find Response(s) from the SCP.
*	Any other status code	*	The association is aborted using A-ABORT. The reason is logged and the failure is reported to the user.

The behavior of the System during communication failure is summarized in Table 47.

Table 47: DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	The query is marked as failed. The association is aborted using A-ABORT. The reason is logged and reported to the user. The System stops processing the C-FIND Response(s) from the SCP.
Association aborted	If the association is aborted using A-ABORT, the query is marked as failed. The reason is logged and failure is reported to the user. Stops with processing the C-FIND Response(s) from the SCP.
Association rejected	The query is marked as failed. The reason is logged and failure is reported to the user. No C-FIND request performed.

4.1.2.3.4 (Real-World) Activity – MOVE as SCU

4.1.2.3.4.1 Description and Sequencing of Activities

The request to move remote images is forwarded to the job queue. For each move job, one association towards the remote system is established, and C-MOVE requests are transmitted. Once the responses are received, the association is closed. An example of sequencing of activities is presented in Figure 13. C-MOVE requests are done on the series level.

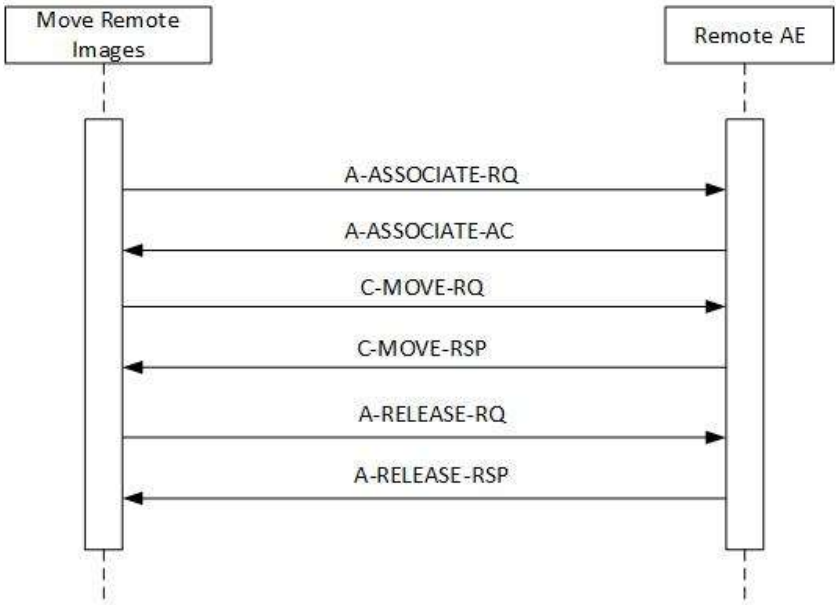

Figure 13: Sequencing of RWA Move Remote Images

The clinical user may cancel the move operation. As a result, the System Sends a C-MOVE Cancel Request to the Image Archive or Image Display.

4.1.2.3.4.2 Proposed Presentation Contexts

Each time an association is initiated, the ACP AE proposes two presentation contexts to be used on that association. The presentation context proposed by the ACP AE for Move Remote Images is defined in Table 48.

Table 48: 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	1.2.840.10008.5.1.4.1.2.1.2	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		
Study Root QR Information Model - MOVE SOP Class	1.2.840.10008.5.1.4.1.2.2.2	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		

The implementation proposes each SOP Class only ones in the abstract syntax specifying all possible transfer syntaxes for that SOP Class. Due to the fact that the SCP has to react with a chosen transfer syntax, the per SOP Class used transfer syntax is forced by the SCP

4.1.2.3.4.3 SOP Specific Conformance for SOP Classes

Selecting a query result can retrieve only whole examinations. It is not possible to retrieve information if Patient ID contains the sign "greater than" or "less than" (> or <).
A C-MOVE can be done with the keys presented in Table 43 or Table 46.

4.1.2.3.4.4 SOP Specific Conformance for Patient Root QR Information Model - MOVE SOP Class

The System provides standard conformance for the Patient Root QR Information Model - MOVE SOP Class.

4.1.2.3.4.4.1 Dataset Specific Conformance for Patient Root QR Information Model - MOVE SOP Class C-MOVE-SCU

The behavior of the Identifiers for MOVE is summarized in Table 49.

Table 49: Identifiers for MOVE Patient Root Information Model as SCU

Patient Root Information Model			
Attribute Name	**Tag**	**VR**	**Comment**
Query/Retrieve Level	0008,0052	CS	Applied value: Series
Q/R Series level			
Patient ID	0010,0020	PN	
Study Instance UID	0020,000D	UI	
Series Instance UID	0020,000E	UI	

The DICOM C-MOVE Patient Root Information Model Command Status Response Handling is shown in the Table 50.

Table 50: Status Response for C-MOVE Patient Root Information Model

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Sub-operations Complete – No Failures	The move job is marked as completed. The association is released. Success is logged.
Refused	A701	Out of Resources – Unable to calculate number of matches	The move job is marked as failed. The association is released. The reason is logged and reported to the user.
	A702	Out of Resources – Unable to perform sub-operations	The move job is marked as failed. The association is released. The reason is logged and reported to the user.
	A801	Move Destination Unknown	The move job is marked as failed. The association is released. The reason is logged and reported to the user.
Failed	A900	Identifier Does Not Match SOP Class	The move job is marked as failed. The association is released. The reason is logged and reported to the user.
	Cxxx	Unable to process	The move job is marked as failed. The association is released. The reason is logged and reported to the user.
Cancel	FE00	Sub-operations terminated due to Cancel Indication	The move job is marked as cancelled. The association is released. The reason is logged and reported to the user.
Warning	B000	Sub-operations Complete – One or more Failures	The move job is marked as failed. The association is released. The reason is logged and reported to the user.
*	Any other status code	*	The association is aborted using A-ABORT. The reason is logged and the failure is reported to the user.

The possible Communication Failures during a C-MOVE as SCU are shown in the Table 51.

Table 51: DICOM Command Communication Failure Behavior for C-MOVE Patient Root Information Model.

Exception	Behavior
Timeout	The query is marked as failed. The association is aborted using A-ABORT. The reason is logged and reported to the user. The System stops processing the C-FIND Response(s) from the SCP.

Exception	Behavior
Association aborted	If the association is aborted using A-ABORT, the query is marked as failed. The reason is logged and failure is reported to the user. Stops with processing the C-FIND Response(s) from the SCP.
Association rejected	The query is marked as failed. The reason is logged and failure is reported to the user. No C-FIND request performed.

4.1.2.3.4.5 SOP Specific Conformance for Study Root QR Information Model - MOVE SOP Class

The System provides standard conformance to this SOP class.

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

The identifiers for C-MOVE as SCU are listed in the Table 52.

Table 52: Identifiers for MOVE Study Root Information Model as SCU

Study Root Information Model			
Attribute Name	**Tag**	**VR**	**Comment**
Query/Retrieve Level	0008,0052	CS	Applied value: SERIES
Q/R Series level			
Series Instance UID	0020,000E	UI	
Study Instance UID	0020,000D	UI	

The DICOM C-MOVE Study Root Information Model Command Status Response Handling is shown in the Table 53.

Table 53: Status response for Study Root Information Model C-MOVE-SCU.

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Sub-operations Complete – No Failures	The move job is marked as completed. The association is released. Success is logged.
Refused	A701	Out of Resources – Unable to calculate number of matches	The move job is marked as failed. The association is released. The reason is logged and reported to the user.
	A702	Out of Resources – Unable to perform sub operations	The move job is marked as failed. The association is released. The reason is logged and reported to the user.
	A801	Move Destination Unknown	The move job is marked as failed. The association is released. The reason is logged and reported to the user.
Failed	A900	Identifier Does Not Match SOP Class	The move job is marked as failed. The association is released. The reason is logged and reported to the user.
	Cxxx	Unable to process	The move job is marked as failed. The association is released. The reason is logged and reported to the user.
Cancel	FE00	Sub-operations terminated due to Cancel Indication	The move job is marked as cancelled. The association is released. The reason is logged and reported to the user.
Warning	B000	Sub-operations Complete – One or more Failures	The move job is marked as failed. The association is released. The reason is logged and reported to the user.
*	Any other status code	*	The association is aborted using A-ABORT. The reason is logged and the failure is reported to the user.

The possible Communication Failures for C-MOVE-SCU are shown in the table 54.

Table 54: DICOM Command Communication Failure Behavior for Study Root Information Model C-MOVE-SCU

Exception	Behavior
Timeout	The query is marked as failed. The association is aborted using A-ABORT. The reason is logged and reported to the user. The System stops processing the C-FIND Response(s) from the SCP.
Association aborted	If the association is aborted using A-ABORT, the query is marked as failed. The reason is logged and failure is reported to the user. Stops with processing the C-FIND Response(s) from the SCP.
Association rejected	The query is marked as failed. The reason is logged and failure is reported to the user. No C-FIND request performed.

4.1.2.3.5 (Real-World) Activity – Verification as SCU

4.1.2.3.5.1 Description and Sequencing of Activities

For each Verify Application Level Communication request, an association towards the remote system is established and a C-ECHO request is transmitted. Once the response is received, the association is closed.

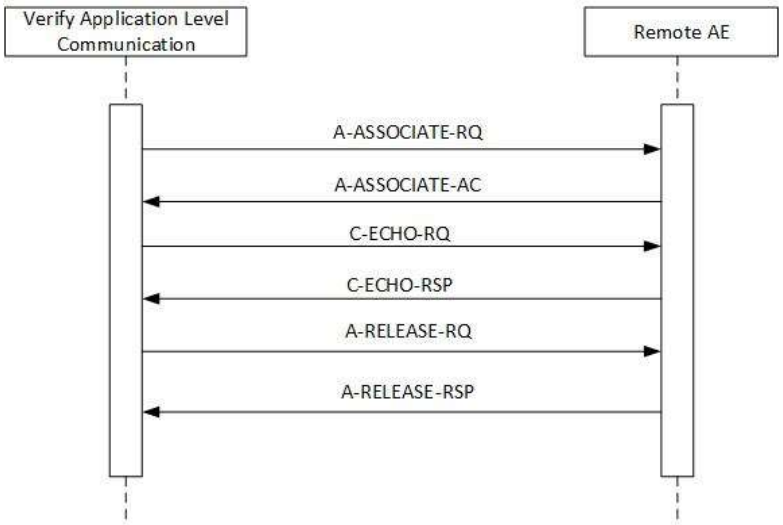

Figure 14: Sequencing of RWA for Verify Application Level Communication

4.1.2.3.5.2 Proposed Presentation Contexts

Each time an association is initiated, the ACP AE proposes one presentation contexts to be used on that association. The presentation context proposed by the ACP AE for Verify Application Level Communication is defined in Table 55.

Table 55: Proposed Presentation Contexts for (Real-World) Verification as SCU

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

The implementation chooses ELE transfer syntax in case multiple transfer syntaxes are accepted in the association acceptance.

4.1.2.3.5.3 SOP Specific Conformance for SOP Classes

The behavior of the ACP AE for status codes in a Verification response is summarized in Table 56.

Table 56: Verification C-ECHO Response Status Handling Behavior

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Successful operation	The success is reported to the operator.
*	Any other status code	*	The failure is reported to the operator.

The behavior of the ACP AE during communication failure is summarized in Table 57.

Table 57: Verification Communication Failure Behavior

Exception	Behavior
Timeout	The association is aborted using A-ABORT. The reason is logged and reported to the user.
Association aborted	The reason is logged and failure is reported to the user.
Association rejected	The reason is logged and failure is reported to the user.

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

4.1.2.3.6.1 Description and Sequencing of Activities

The operator can select images and request them to be printed on a printer (out of choice list of configured printers). Each request is forwarded to the job queue and processed as individual request to Print Images.
The print job consists of data describing the images and graphics to be printed as well as the requested layout and other parameters. One print job on the System may result in a number of film sessions with the printer equal to the number of printed film sheets. Each film sheet within the print job is internally processed, converted to a STANDARD/1, 1 page and then an association towards the remote Print Server is established and the page image is sent to that Print Server. Once the transmission of the film sheet is completed, the association is closed. A sequence of interactions between the ACP AE and a remote AE to print one film sheet is presented in Figure 15.

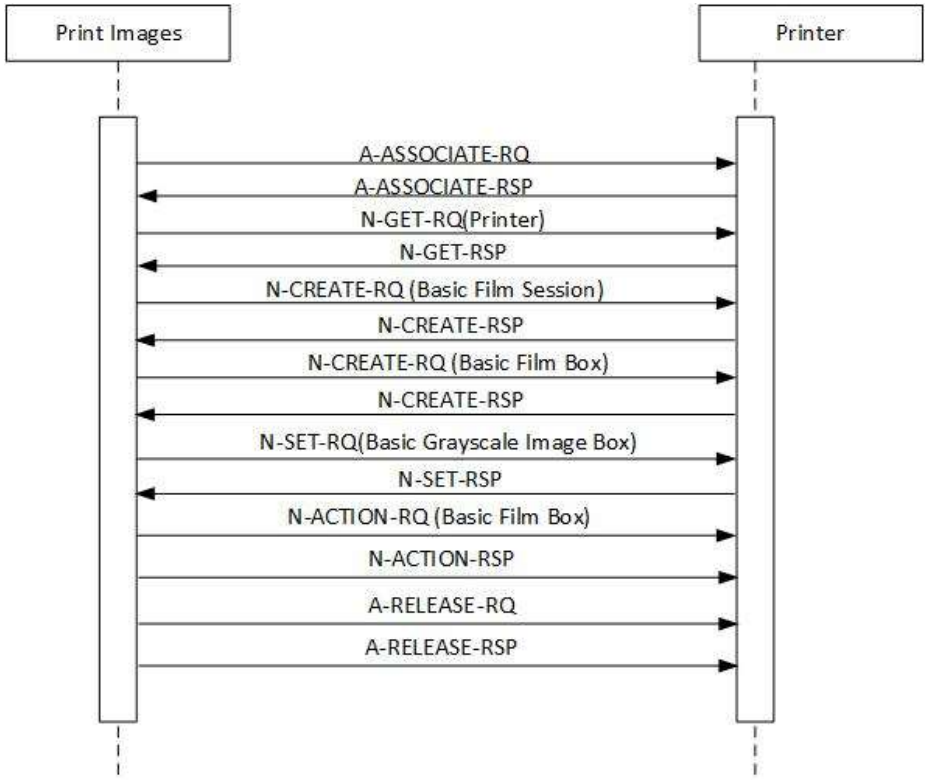

Figure 15: Sequencing of RWA Print Images

The following implementation remarks are important to achieve successful printing:

- Each film sheet is printed in a separate association
- 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 the System into one logical image. This logical image is very large, depending on the pixel matrix size (pixels per line, lines per image). A rough indication is 20 Mbytes. One should take this into account when selecting the DICOM printer and the printer configuration (e.g. the amount of memory).
- The System will request for releasing the association when the print command is given (i.e. the N-ACTION Request). The association is not kept open for receiving N-EVENT-REPORTs of the Printer SOP Class.

4.1.2.3.6.2 Proposed Presentation Contexts

Each time an association is initiated, the System proposes presentation contexts to be used on that association. The presentation contexts proposed by the System for Print Images is defined in Table 60.

The implementation proposes the SOP Class only ones in the abstract syntax specifying all possible transfer syntaxes for that SOP Class. Due to the fact that the SCP has to react with a chosen transfer syntax, as per SOP Class used transfer syntax is forced by the SCP.

Table 58: Proposed Presentation Contexts for (Real-World) Activity – Print Management as SCU

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	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		
>Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	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		
>Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	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		
>Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4	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		
>Printer SOP Class	1.2.840.10008.5.1.1.16	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		

The implementation proposes the SOP Class only ones in the abstract syntax specifying all possible transfer syntaxes for that SOP Class. Due to the fact that the SCP has to react with a chosen transfer syntax, as the per SOP Class used transfer syntax is forced by the SCP.

4.1.2.3.6.3 SOP Specific Conformance for Basic Film Session SOP Class for Basic Grayscale Print Meta

The ACP AE provides standard conformance to the Basic Grayscale Print Management Meta SOP Class. The applied order of Print Service Elements (DIMSE's) is specified in Table 71. A description and the applied optional (i.e. non-mandatory attributes as Print SCU) attributes in these Service Elements are specified as well. Note that the Service Elements order is not specified by the DICOM standard. The ACP AE does not do an explicit N-DELETE request on the created instances; these are deleted implicitly when releasing the association. Overlay, annotation (showing the values of some major identifying attributes) and shutter information is processed in the images sent to the printer.

Table 59: The Applied Order of Print Service Elements

Service Element of SOP Class	Description
N-GET of the Printer SOP Class	Purpose is to retrieve printer information.
N-CREATE of the Basic Film Session SOP Class	Specifies the DICOM Printer about some general presentation parameters, applicable for all films in the Film Session. Applied attributes are: Number of Copies, Print Priority, Medium Type, Film Destination
N-CREATE of the Basic Film Box SOP Class	Specifies the DICOM Printer about some general presentation parameters, applicable for all images in the Film Box. Applied attributes are: Film Orientation, Film Size ID, Magnification Type, Max. Density, Configuration Information, Trim.
N-SET of the Basic Grayscale Image Box SOP Class	Images to be printed. Applied attributes are: Polarity
N-ACTION of the Basic Film Box SOP Class	Triggers the DICOM Printer to print. This actual print action is done at film box level. No attributes are present.

Table 60 specifies the supported Service Elements, which may be generated by the Printer at any time during the association.

Table 60: The Applied Seq. of Print Service Elements and its Optional Attributes

Service Element of SOP Class	Note
N-EVENT-REPORT of the Printer SOP Class	When N-EVENT-REPORT is received, no printer status polling on a separate connection is executed.

An overview of the applied attributes in the applied Service Elements of the supported SOP Classes is presented in Table up till Table
The tables use a number of abbreviations. The abbreviations used in the “Presence of …” column are:

- ALWAYS Always Present
- NEVER Never Present

The abbreviations used in the “Source” column:

- USER the attribute value source is from User input
- AUTO the attribute value is generated automatically

4.1.2.3.6.3.1 Dataset Specific Conformance for Basic Film Session SOP Class for Basic Grayscale Print Meta N-CREATE-SCU

Table 61: N-CREATE-RQ Dataset Specification.

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
SOP Class UID	0008,0016	UI		ALWAYS		
SOP Instance UID	0008,0018	UI		ALWAYS		
Number of Copies	2000,0010	IS	Between 1 and 99	ALWAYS	USER	
Print Priority	2000,0020	CS	HIGH	ALWAYS	AUTO	
Medium Type	2000,0030	CS	PAPER, BLUE FILM, CLEAR FILM	ALWAYS	USER	
Film Destination	2000,0040	CS	MAGAZINE, PROCESSOR	ALWAYS	AUTO	
Film Session Label	2000,0050	LO	Human readable label that identifies the film session	ANAP	AUTO	

The details regarding the response behaviour to status codes are provided in Table 62.

Table 62: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Successful operation	The print job continues.
Warning	0116	Any warning	The print job continues and the warning is logged.
Error	0105	Any error	The association is aborted using A-ABORT. The print job will keep resubmitting the failed sheets until the error is solved or the retry timeout is exceeded.
	0106	Any error	The association is aborted using A-ABORT. The print job will keep resubmitting the failed sheets until the error is solved or the retry timeout is exceeded.

4.1.2.3.6.4 SOP Specific Conformance for Basic Film Box SOP Class for Basic Grayscale Print Meta

4.1.2.3.6.4.1 Dataset Specific Conformance for Basic Film Box SOP Class for Basic Grayscale Print Meta N-CREATE-SCU

The behavior of the System for status codes in an N-CREATE response is summarized in Table 63.

Table 63: N-CREATE-RQ Dataset Specification.

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
SOP Class UID	0008,0016	UI		ALWAYS		
SOP Instance UID	0008,0018	UI		ALWAYS		
Image Display Format	2010,0010	ST	STANDARD\C,R, CUSTOM\i	ANAP	AUTO	
Film Orientation	2010,0040	CS	PORTRAIT, LANDSCAPE	ANAP	USER	
Film Size ID	2010,0050	CS	DICOM specifies a number of Defined Terms; more values are possible and is print configuration dependent.	ANAP	USER	
Magnification Type	2010,0060	CS	Normally sent out, however sometimes send out empty Because some DICOM printers are not able to handle (Value NONE for) this attribute. Applied value(s): NONE	ANAP	AUTO	
Max Density	2010,0130	US	Maximum density of the images on the film, expressed in hundredths of OD. If Max Density is higher than maximum printer density than Max Density is set to maximum printer density.	ANAP	AUTO	
Trim	2010,0140	CS	NO	ANAP	AUTO	
Configuration Information	2010,0150	ST	Contains a vendor specific Lookup-table (LUT); should be applied by the DICOM printer if LUT data is present.	ANAP	AUTO	
Illumination	2010,015E	US		ANAP		
Reflected Ambient Light	2010,0160	US		ANAP		
Referenced Film Session Sequence	2010,0500	SQ		ANAP	AUTO	
>Referenced SOP Class UID	0008,1150	UI		ALWAYS		
>Referenced SOP Instance UID	0008,1155	UI		ALWAYS		
Referenced Presentation LUT Sequence	2050,0500	SQ		ANAP	AUTO	
Image Display Format	2010,0010	ST		ALWAYS	AUTO	
Film Orientation	2010,0040	CS		ALWAYS	AUTO	
Film Size ID	2010,0050	CS		ALWAYS	AUTO	
Magnification Type	2010,0060	CS		ALWAYS	AUTO	
Max Density	2010,0130	US		ALWAYS	AUTO	
Configuration Information	2010,0150	ST		ALWAYS	AUTO	
Configuration Information	2010,0150	ST		ALWAYS		
Illumination	2010,015E	US		VNAP	AUTO	
Reflected Ambient Light	2010,0160	US		VNAP	AUTO	
Referenced Film Session Sequence	2010,0500	SQ	Parent Film Session	ALWAYS	AUTO	
>Referenced SOP	0008,1150	UI	1.2.840.10008.5.1.1.1	ALWAYS	AUTO	

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Class UID						
>Referenced SOP Instance UID	0008,1155	UI	UID of Parent Film Session	ALWAYS	AUTO	
Referenced Film Session Sequence	2010,0500	SQ		ALWAYS		
Referenced Image Box Sequence	2010,0510	SQ		ALWAYS	AUTO	
Referenced Basic Annotation Box Sequence	2010,0520	SQ		VNAP	AUTO	
Referenced Presentation LUT Sequence	2050,0500	SQ		VNAP	AUTO	

The details regarding the response behaviour to status codes are provided in Table 64.

Table 64: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Successful operation	The print job continues.
Warning	0116	Any warning	The print job continues and the warning is logged.
Error	0105	Any error	The association is aborted using A-ABORT. The print job will keep resubmitting the failed sheets until the error is solved or the retry timeout is exceeded.
	0106	Any error	The association is aborted using A-ABORT. The print job will keep resubmitting the failed sheets until the error is solved or the retry timeout is exceeded.

4.1.2.3.6.5 SOP Specific Conformance for Basic Grayscale Image Box SOP Class for Basic Grayscale Print Meta

4.1.2.3.6.5.1 Dataset Specific Conformance for Basic Grayscale Image Box SOP Class for Basic Grayscale Print Meta N-SET-SCU

This application entity supports the attributes described in the table 65.

Table 65: N-SET-RQ Dataset Specification.

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
SOP Class UID	0008,0016	UI		ALWAYS		
SOP Instance UID	0008,0018	UI		ALWAYS		
Image Box Position	2020,0010	US	1	ANAP	AUTO	
Polarity	2020,0020	CS	NORMAL	ANAP	AUTO	
Basic Grayscale Image Sequence	2020,0110	SQ		ANAP		
>Samples Per Pixel	0028,0002	US	1	ANAP	AUTO	
>Photometric	0028,0004	CS	MONOCHROME2	ANAP	AUTO	

Interpretation						
>Rows	0028,0010	US	Depending on the selected printer type and film size.	ANAP	AUTO	
>Columns	0028,0011	US	Depending on the selected printer type and film size.	ANAP	AUTO	
>Pixel Aspect Ratio	0028,0034	IS		ANAP		
>Bits Allocated	0028,0100	US	16, 8	ANAP	AUTO	
>Bits Stored	0028,0101	US	12, 8	ANAP	AUTO	
>High Bit	0028,0102	US	11, 7	ANAP	AUTO	
>Pixel Representation	0028,0103	US	0X0000	ANAP	AUTO	
>Pixel Data	7FE0,0010	OW/OB		ANAP	AUTO	
Image Box Position	2020,0010	US		ALWAYS	AUTO	
Polarity	2020,0020	CS		ALWAYS	AUTO	
Basic Grayscale Image Sequence	2020,0110	SQ		ALWAYS	AUTO	

The details regarding the response behaviour to status codes are provided in Table 66.

Table 66: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Successful operation	The print job continues.
Warning	0107	Any warning	The print job continues and the warning is logged.
Error	0105	Any error	The association is aborted using A-ABORT. The print job will keep resubmitting the failed sheets until the error is solved or the retry timeout is exceeded.
	0106	Any error	The association is aborted using A-ABORT. The print job will keep resubmitting the failed sheets until the error is solved or the retry timeout is exceeded.

4.1.2.3.6.6 SOP Specific Conformance for Basic Grayscale Image Box SOP Class for Basic Grayscale Print Meta

4.1.2.3.6.6.1 Dataset Specific Conformance for Printer SOP Class for Basic Grayscale Print Meta N-GET-SCU

This application entity supports the attributes described in the Table 67.

Table 67: N-GET-RQ Dataset Specification.

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
SOP Class UID	0008,0016	UI		ALWAYS	AUTO	
SOP Instance UID	0008,0018	UI		ALWAYS	AUTO	
Printer Status	2110,0010	CS		ANAP	AUTO	
Printer Status Info	2110,0020	CS		ANAP	AUTO	
Print Priority	2000,0020	CS		ALWAYS	AUTO	
Execution Status	2100,0020	CS		ALWAYS	AUTO	
Execution Status Info	2100,0030	CS		ALWAYS	AUTO	

4.1.2.3.6.6.2 Dataset Specific Conformance for Printer SOP Class for Basic Grayscale Print Meta N-EVENT-REPORT-SCP

This application entity supports the attributes described in the table 68.

Table 68: N-EVENT-REPORT-RSP Dataset Specification.

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
SOP Class UID	0008,0016	UI		ALWAYS	AUTO	
SOP Instance UID	0008,0018	UI		ALWAYS	AUTO	
Printer Status	2110,0010	CS		ANAP	AUTO	
Printer Status Info	2110,0020	CS		ANAP	AUTO	

4.1.2.3.7 (Real-World) Activity - Get Printer Status

4.1.2.3.7.1 Description and Sequencing of Activities

The operator (in the service mode) can select a DICOM printer (out of choice list of configured printers) and test its status. A sequence of interactions between the ACP AE and a remote AE to check the DICOM printer status is presented in Figure 16.

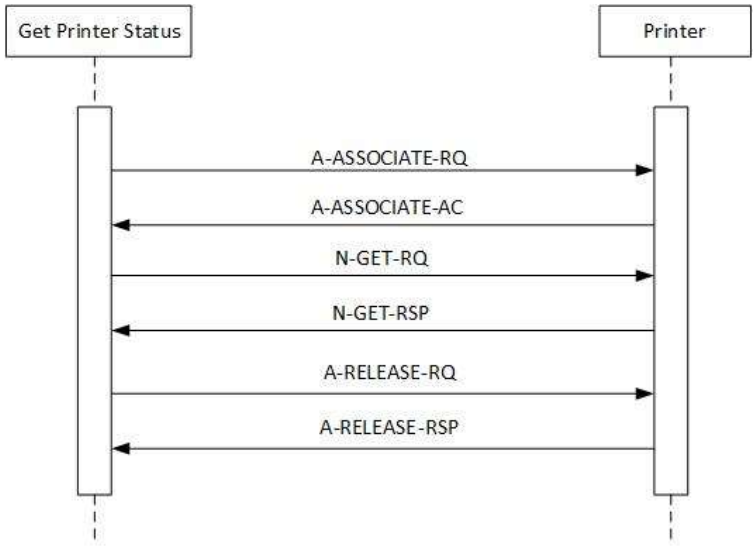

Figure 16: Sequencing of RWA Get printer Status

4.1.2.3.7.2 Proposed Presentation Contexts

Each time an association is initiated, the ACP AE proposes presentation contexts to be used on that association. The presentation contexts proposed by the ACP AE for Get Printer Status is defined in Table 69.

Table 69: Proposed Presentation Contexts for Transfer Images

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Basic Grayscale Print Mgmt.Meta SOP Class	1.2.840.10008.5.1.1.9	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
> Printer SOP Class	1.2.840.10008.5.1.1.16	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None

The implementation proposes the SOP Class only ones in the abstract syntax specifying all possible transfer syntaxes for that SOP Class. Due to the fact that the SCP has to react with a chosen transfer syntax, as the per SOP Class used transfer syntax is forced by the SCP.

4.1.2.3.7.3 SOP Specific Conformance for SOP Classes

The ACP AE provides standard conformance to the Basic Grayscale Print Management Meta SOP Class. The behavior of the ACP AE for status codes in an N-GET response is summarized in Table 70.

Table 70: Printer N-GET Response Status Handling Behavior

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Successful operation	Success is reported to the user and is logged.
Warning	xxx	Any warning	Success is reported to the user and the warning is logged.
Error	xxx	Any error	Failure is reported to the user. The association is aborted using A-ABORT and the failure is logged.

The behavior of the ACP AE during communication failure is presented in Table 71.

Table 71: Printer Communication Failure Behavior

Exception	Behavior
Retry time-out	The print status job fails. The reason is logged and reported to the user.
Any other exception	A retry to resubmit the request for the printer status is repeated until the error is solved, the request is cancelled or the retry time-out is exceeded.

4.1.2.4 Association Acceptance Policy

The ACP AE accepts associations for the following purposes:

- To allow remote applications to store images on the System (see Section 4.2.2.4.1)
- To allow remote applications to verify application level communication with the ACP AE
- To receive the Storage Commitment Notification

The ACP AE provides standard conformance to the rejection of an association. The ACP AE shall reject 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 during configuration of the ACP AE. The ACP AE shall reject association requests from applications that do not address the ACP AE, i.e. applications that offer a wrong “called AE title”. The ACP AE title is defined during configuration of the System).

4.1.2.4.1 (Real-World) Activity – Verification as SCP

4.1.2.4.1.1 Description and Sequencing of Activities

The ACP AE shall accept associations from systems that wish to verify application level communication to the System (see Figure 17).

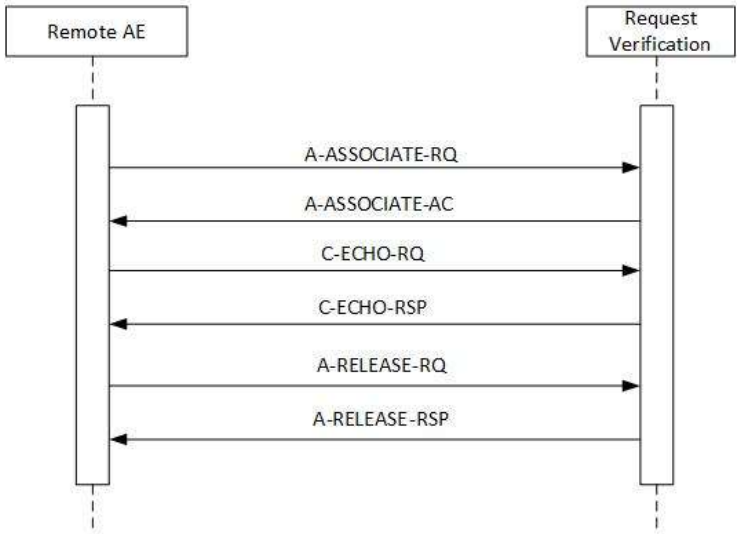

Figure17: (Real World) Activity - Verification as SCP.

4.1.2.4.1.2 Accepted Presentation Contexts

The presentation contexts are defined in Table 72.

Table 72: Acceptable 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 Little Endian	1.2.840.10008.1.2.1	SCP	None
		Implicit VR Little Endian	1.2.840.10008.1.2		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

4.1.2.4.1.3 SOP Specific Conformance for Verification SOP Class

The ACP AE provides standard conformance to the DICOM Verification Service Class.
The behavior of the ACP AE for status codes in a Verification response is summarized in Table 73.

Table 73: Verification C-ECHO Response Status Handling Behavior

Service Status	Error Code	Further Meaning	Behavior
N.A.	N.A.	N.A.	N.A.

4.1.2.4.2 (Real-World) Activity – Image Import

4.1.2.4.2.1 Description and Sequencing of Activities

The ACP AE shall accept associations from systems that wish to store images in the System database using the C-STORE command (see Figure 18).

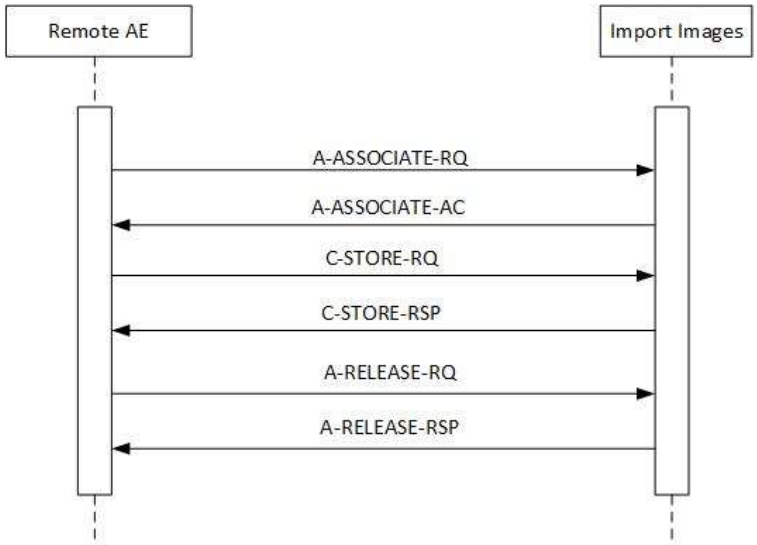

Figure 18: (Real World) Activity - Image Import.

4.1.2.4.2.2 Accepted Presentation Contexts

The presentation contexts are defined in the Table 74.

Table 74: Acceptable Presentation Contexts for (Real-World) Activity – Image Import

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian Hierarchical, First-Order Prediction (Process 14)	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2.4.70	SCP	None
X-Ray Angiographic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.1	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian Hierarchical, First-Order Prediction (Process 14)	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2.4.70	SCP	None
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None
X-Ray Radiation Dose Structured Report Storage SOP Class	1.2.840.10008.5.1.4.1.1.88.67	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None

The ACP AE accepts all contexts in the intersection of the proposed and acceptable Presentation Contexts. This means that the ACP AE accepts multiple Proposed Presentation Contexts with the same SOP Class but different Transfer Syntaxes. There is no check for duplicate contexts and are therefore accepted.

4.1.2.4.2.3 SOP Specific Conformance for Storage SOP Classes

The ACP AE provides standard conformance to the error handling of image import. All error messages occur in a C-STORE response. It provides level 2 (full) conformance.

The behavior of the ACP AE for status codes in a C-STORE response is summarized in Table 75.

Table 75: Storage C-STORE Response Status Handling Behavior

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Successful operation	The images shall be stored in the System local database. Success shall be logged.
Refused	A700-A7FF	Out of Resources	The System local database is full – recovery from this condition is left to the SCU. The ACP AE shall send a notification, and abort the association. The failure reason is logged.
Error	A900	Data Set does not match SOP Class	SOP class of the image(s) does not match the negotiated abstract syntax. The ACP AE shall send a notification and abort the association. The failure reason is logged.
	C000	Cannot Understand	The image(s) cannot be parsed. The ACP AE shall send a notification and abort the association. The failure reason is logged.
Warning	B000	Coercion of Data Elements	The association is aborted using A-ABORT and the send job is marked as failed. The failure reason is logged.
	B006	Elements discarded	The association is aborted using A-ABORT and the send job is marked as failed. The failure reason is logged.
	B007	Data set does not match SOP class	The association is aborted using A-ABORT and the send job is marked as failed. The failure reason is logged.

4.1.2.4.2.4 Import limitations

The ACP AE has the following import limitations:

- Images with a non-square pixel matrix (e.g. 800x700) are ignored
- Images with a pixel depth (bits stored) not equal to 8 or 10 bits are rejected.
- Images with a photometric interpretation other than monochrome (e.g RGB) are rejected.

4.2 Network Interfaces

4.2.1 Physical Network Interfaces

The System provides DICOM V3.0 TCP/IP Network Communication. The TCP/IP stack is inherited from the .Net Framework/Windows 7 operating system.
The System supports a single network interface: Ethernet ISO.8802-3. Standard AUI, optional twisted pair 10/100-BaseT.

4.2.2 Additional Protocols

4.2.2.1 Basic TLS Secure Transport Connection Profile

System conforms to the Basic TLS Secure Transport Connection Profile (for details see Section 7.2.1: DICOM Basic TLS Secure Transport Connection Profile).

4.2.2.2 Basic Time Synchronization Profile

System conforms to the Basic Time Synchronization Profile as an NTP Client implementing the Maintain Time transaction.

4.2.2.3 Basic Application Level Confidentiality Profile

See Section 7.1.5.

4.2.3 IPv4 and IPv6 Support

System Supports IPv4 and IPv6.

4.3 Configuration

The System RIS AE and ACP AE are configured by means of a Service Application. This Service Application is password protected and intended to be used by Philips Customer Support Service Engineers only. Configuration is stored in a configuration repository.

4.3.1 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.

4.3.1.1 Local AE Titles

The local AE title mapping and configuration are specified as:

Table 76: AE Title Configuration

Application Entity	Default AE Title	Default TCP/IP Port
RIS AE	LOCAL_AETITLE	N.A.
ACP AE	LOCAL_AETITLE	5101

4.3.1.2 Remote AE Title/Presentation Address Mapping

All relevant remote applications that should be able to setup a DICOM association towards System and that should be able to accept a DICOM association from System must be configured during System configuration time.

4.3.2 Parameters

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

Table 77: Configuration Parameters

Parameter	Configurable	Default Value
RIS AE (Local System)		
AE title	Yes	LOCAL_AETITLE
Port number	Yes	-
IP host name/address	Yes	-
Association time out (Time-out waiting for acceptance or rejection Response to an Association Open Request)	Yes	15 seconds
ARTIM time out	Yes	30 seconds
Message time out (Time-out waiting for acceptance of a TCP/IP message over the network)	Yes	15 seconds
Network reply time out (time out waiting for any data (dimse level) exchange over the network)	No	3600 seconds
Maximum PDU size (receiving)	Yes	16384
Maximum PDU size (sending)	No	16384
RIS AE (Basic Worklist Management)		
AE title	Yes	LOCAL_AETITLE
Port number	Yes	104
IP host name/address	Yes	BWLM-SCP-HN
Time span backwards/forwards (the time span before/after the current time and date for which scheduling information is needed)	Yes	2880 minutes (48h)
Is a Secure Node	Yes	No
Encryption On/Off	Yes	Off
Name of Private key-Certificate pair	Yes	BWLM-SCP-CN
RIS AE (Modality Performed Procedure Step)		
AE title	Yes	LOCAL_AETITLE
Port number	Yes	104
IP host name/address	Yes	MPPS-SCP-HN
Expiration time (the time after which the message will expire)	Yes	10080 minutes (1 week)
Retry time	Yes	60 minutes (1h)
Is Performed Procedure Step Manager IHE Compatible	Yes	False
Is a Secure Node	Yes	No
Encryption On/Off	Yes	Off
Name of Private key-Certificate pair	Yes	MPPS-SCP-CN
Delay MPPS for local examinations	Yes	Yes
ACP AE (Local System)		
AE title	Yes	LOCAL_AETITLE
Port number	Yes	5101
IP host name/address	Yes	Localnode
ARTIM time out	Yes	60 seconds
Message time out (Time-out waiting for acceptance of a TCP/IP message over the network)	No	60 seconds
Maximum PDU size (receiving)	Yes	16384
Maximum PDU size (sending)	No	16384
Maximum number of incoming associations	Yes	0
Is a Secure Node	Yes	No
Encryption On/Off	Yes	Off

Parameter	Configurable	Default Value
Name of Private key-Certificate pair	Yes	-
ACP AE (Remote Network Node)		
AE title	Yes	Depends on the type of a configured network node
Port number	Yes	9999
IP host name/address	Yes	Depends on the type of a configured network
Human Readable Name	Yes	Depends on the type of a configured network
ARTIM time out	Yes	60 seconds
Message time out (Time-out waiting for acceptance of a TCP/IP message over the network)	Yes	3600 seconds for export or import network nodes 300 seconds for storage commitment or query/retrieve nodes
Supported transfer syntaxes and preferred order as SCU and SCP	Yes	Depends on the type of a configured network
Supported SOP classes as SCU and SCP	Yes	Depends on the type of a configured network
IsArchive - Supports Storage Commit	Yes	No
Storage Commit Network Node Name	Yes	Disabled
Storage Commit Max Reply Waiting Time	Yes	Disabled. when enabled: 60 seconds.
Automatic conversion settings (e.g., pure, extended DICOM)	Yes	FULL
Is a Secure Node	Yes	No
Encryption On/Off	Yes	Off
Name of Private key-Certificate pair	Yes	-
ACP AE (Remote DICOM Printer)		
AE title	Yes	Depends on the configured printer
Port number	Yes	9999
IP host name/address	Yes	Depends on the configured printer
Human Readable Name	Yes	Depends on the configured printer
ARTIM time out	Yes	60
Message time out (Time-out waiting for acceptance of a TCP/IP message over the network)	Yes	3600 seconds
Print medium type		Depends on the configured printer
Is a Secure Node	Yes	No
Encryption On/Off	Yes	Off
Gray level transformation	Yes	STANDARD
Automatic conversion settings (e.g., pure, extended DICOM)	Yes	FULL

5 Media Interchange

The System does not support DICOM Media Storage.

6 Support of Character Sets

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

Table 78: Supported DICOM Character Sets

Character Set Description	Defined Term	ESC Sequence	ISO Registration Number	Code Element	Character Set
Latin alphabet No. 1	ISO_IR 100	-	ISO-IR 100	G1	Supplementary set of ISO 8859
		-	ISO-IR 6	G0	ISO 646
Japanese	ISO_IR 13	-	ISO-IR 14	G0	JIS X 0201: Romaji
		-	ISO-IR 13	G1	JIS X 0201: Katakana
	ISO 2022 IR 87(only for the patient name)	ESC 02/04 04/02	ISO-IR 87	G0	JIS X 0208: Kanji
	ISO 2022 IR 159 (only for the patient name)	ESC 02/04 02/08 04/04	ISO-IR 159	G0	JIS X 0212: Kanji

7 Security

7.1 Security Profiles

7.1.1 Security use Profiles

Not applicable

7.1.2 Security Transport Connection Profiles

Secure communication is a "mode of operation" supported by the implementation of the DICOM Basic TLS Secure Transport Connection Profile [DICOM]. This functionality will be used by the nodes, which can authenticate each other before they exchange DICOM information. For secure communication the TLS protocol v1.0 is used which provides message authentication, integrity, confidentiality, and replay protection. Confidentiality is optional and can be controlled by the encryption settings. The System may communicate using the following Cipher Suites:

- TLS_RSA_WITH_NULL_SHA (Node authentication without encryption)
- TLS_RSA_WITH_3DES_SHA (Node authentication with encryption)
- TLS_RSA_WITH_AES_128_CBC_SHA (Node authentication with encryption)

The System supports X.509 certificates. 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 X.509 certificate which is not tampered with
- That the client certificate is in the list of trusted certificates
- That the client certificate is not expired (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 Authentication purpose)

The client verifies:

- That the server certificate is a X.509 certificate which is not tampered with
- That the server certificate is in the list of trusted certificates
- That the server certificate is not expired (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 Authentication purpose)

No verification is done on:

- Revocation of certificates
- Limiting the connection to a limited set of IP-addresses

Node authentication with or without encryption is only possible when both nodes have:

- An access to their own private keys
- An access to a copy of the certificate of the other node containing its public key

The System can only read certificates from the certificate stores of the HKEY_LOCAL_MACHINE registry key. It is the responsibility of the Hospital to setup and maintain the certificate stores. This includes the removal of revoked certificates and certificate updates prior to their expiration. Since neither X.500 directories, Lightweight Directory Access Protocol (LDAP) nor Certificate Revocation Lists (CRLs) are supported, the whole certificate chain needs to be replaced after a security breach.

The following figure presents the message flow of TLS handshake supported.

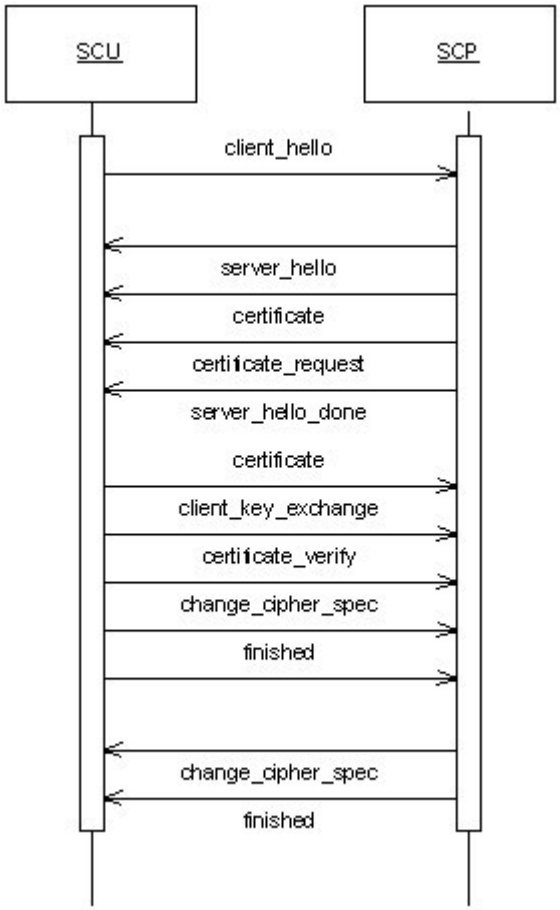

Figure 19: Message flow of TLS handshake

7.1.3 Digital Signature Profiles

Not applicable

7.1.4 Media Storage Security Profiles

Not applicable

7.1.5 Attribute Confidentiality Profiles

System conforms to the Basic Application Level Confidentiality Profile as a de-identifier. This functionality is targeted towards creating a special purpose, de-identified version of an already existing Data set.
Table presents all attributes that can be de-identified by the System). Each Attribute to be protected has its value replaced by a different “replacement value” which does not allow identification of the patient.

Table 79: De-identified Attributes

Attribute Name	Tag	VR	Replacement Value
Patient Name	0010,0010	PN	Assign user-specified value
Patient ID	0010,0020	LO	Generate and provide a new ID
Patient’s Birth Date	0010,0030	DA	Make Empty
Patient’s Sex	0010,0040	CS	Make Empty

Attribute Name	Tag	VR	Replacement Value
Other Patient Ids	0010,1000	LO	Make Empty
Patient's Size	0010,1020	DS	Make Empty
Patient Weight	0010,1030	DS	Make Empty
Ethnic Group	0010,2160	SH	Make Empty
Additional Patient's History	0010,21B0	LT	Make Empty
Patient Comments	0010,4000	LT	Make Empty
SOP Instance UID	0008,0018	UI	Generate and provide new ID
Accession Number	0008,0050	SH	Make Empty
Institution Name	0008,0080	LO	Make Empty
Referring Physician's Name	0008,0090	PN	Make Empty
Device Serial Number	0008,1000	LO	Make Empty
Station Name	0008,1010	SH	Make Empty
Institutional Department Name	0008,1040	LO	Make Empty
Performing Physician's Name	0008,1050	PN	Make Empty
Operators' Name	0008,1070	PN	Make Empty
Referenced SOP Instance UID	0008,1155	UI	Generate and provide a new ID
Protocol Name	0018,1030	LO	Make Empty
Study ID	0020,0010	SH	Make Empty
Study Instance UID	0020,000D	UI	Generate and provide a new ID
Series Instance UID	0020,000E	UI	Generate and provide a new ID
Performed Procedure Step Description	0040,0254	LO	Make Empty
Request Attributes Sequence	0040,0275	SQ	Generate and provide dummy value

7.1.6 Network Address Management Profiles

Not applicable.

7.1.7 Time Synchronization Profiles

System conforms to the IHE Consistent Time Profile. It is possible to synchronize time with the NTP Timeserver using Service Application. The NTP Timeserver is an element of Hospital Infrastructure.

7.1.8 Application Configuration Management Profiles

Not applicable.

7.1.9 Audit Trail Profiles

The System can create audit messages according to the IHE Basic Security Integration Profile [IHE] to audit activities as actor secure node to detect non-compliant behavior in the enterprise, and to facilitate detection of improper creation, access, modification and deletion of Protected Health Information (PHI).

These messages may contain information that identifies the patient. The following messages will be created and sent to a central Audit Record Repository according to the Syslog protocol [SYSLOG]:

- ActorConfig (when security or networking configuration of the System is modified via the field service functionality)
- ActorStartStop (when the System starts or shuts down)
- Export (when an examination is saved to a file for field service purposes or printed on a film/paper)

- BeginStoringInstances (when an examination is transferred from the System to a remote network node)
- DICOMInstancesDeleted (when an examination is deleted and it is not scheduled, prepared, or imported)
- DICOMInstancesUsed (when an examination is selected for acquisition)
- UserAuthenticated (when the user logs in or logs out)
- SecurityAlert (when an authentication of a secure node during TLS negotiation [TLS] fails, e.g. due to an invalid certificate.)

If the central Audit Record Repository is not available, the audit trail record will be stored by the System *in* a local buffer. Once the central Audit Record Repository is available again, the content of that buffer will be transferred to the central Audit Record Repository. The time that is part of the audit message will be the local time of the System. This time will be synchronized with a Time Server. The Time Server and central Audit Record Repository are elements of the Hospital infrastructure.

7.2 Association Level Security

The System shall reject 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 during configuration of the System. The System shall reject association requests from applications that do not address its ACP AE i.e. applications that offer a wrong “called AE title”. The ACP AE title is defined during configuration of the System.

7.3 Application Level Security

The System allows the use of either a conventional (non-secure) DICOM communication or a secure DICOM communication based on the Transport Layer Security (TLS) protocol [TLS]. If configured, the System supports security measures for:

- Secure authentication of a node
- Integrity and confidentiality of transmitted data
- Replay protection
- Generation of audit trail records
- Access control and user authentication.

8 Annexes

8.1 IOD Contents

8.1.1 Created SOP Instances

This section specifies each IOD created by this application and specifies the content for each IOD created (including private IODs).
For each attribute in the IOD the following information is supplied:

- Attribute name
- Tag
- VR – Value representation
- Value - specifies possible values
- Presence of value - specifies if attribute is always present or only under specific conditions
- Source of value - specifies the source of the value
- Comment - gives additional information on the attribute

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.

8.1.1.1 List of Created SOP Classes

Table 80: 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
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1
X-Ray Angiographic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.1
X-Ray Radiation Dose SR SOP Class	1.2.840.10008.5.1.4.1.1.88.67

8.1.1.2 Secondary Capture Image Storage SOP Class

Table 81: SOP Class Modules

Information Entity	Module	Presence	Conditions
Patient	Patient Module	Always	Not Applicable
Study	General Study Module	Always	Not Applicable
	Patient Study Module	Always	Not Applicable
Series	General Series Module	Always	Not Applicable
Equipment	General Equipment Module	Always	Not Applicable
	SC Equipment Module	Always	Not Applicable
Image	General Image Module	Always	Not Applicable
	Image Pixel Module	Always	Not Applicable
	SC Image Module	Always	Not Applicable
	VOI LUT Module	Always	Not Applicable
	SOP Common Module	Always	Not Applicable

Table 82: Patient Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Referenced Patient Sequence	0008,1120	SQ		ANAP	MWL	
>Referenced SOP Class UID	0008,1150	UI		ALWAYS		
>Referenced SOP Instance UID	0008,1155	UI		ALWAYS		
Patient's Name	0010,0010	PN		VNAP	MWL, USER	
Patient ID	0010,0020	LO		VNAP	MWL, USER	
Patient's Birth Date	0010,0030	DA		VNAP	MWL, USER	
Patient's Sex	0010,0040	CS		VNAP	MWL, USER	
Other Patient IDs	0010,1000	LO		ANAP	MWL, USER	
Ethnic Group	0010,2160	SH		ANAP	MWL, USER	
Patient Comments	0010,4000	LT		ANAP	MWL	

Table 83: General Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Study Date	0008,0020	DA		VNAP	AUTO	
Study Time	0008,0030	TM		VNAP	AUTO	
Accession Number	0008,0050	SH		VNAP	AUTO, MWL, USER	
Referring Physician's Name	0008,0090	PN		VNAP	MWL	
Study Description	0008,1030	LO		ANAP	AUTO, MWL	
Procedure Code Sequence	0008,1032	SQ		ANAP	MWL	
>Code Value	0008,0100	SH		ALWAYS		
>Coding Scheme Designator	0008,0102	SH		ALWAYS		

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
>Code Meaning	0008,0104	LO		ALWAYS		
Study Instance UID	0020,000D	UI		ALWAYS	AUTO	
Study ID	0020,0010	SH	In case the Study ID is empty the accession number will be assigned. In case Study ID and Accession Number are the same, the Study ID will be left empty.	VNAP	AUTO, MWL, USER	

Table 84: Patient Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Patient's Size	0010,1020	DS	In meters. When received from the Department System Scheduler, the value can still be modified	ANAP	MWL, USER	
Patient's Weight	0010,1030	DS	In kilograms. When received from the Department System Scheduler, the value can still be modified	ANAP	MWL, USER	
Additional Patient History	0010,21B0	LT		ANAP	MWL	

Table 85: General Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Series Date	0008,0021	DA		ANAP	AUTO	
Series Time	0008,0031	TM		ANAP	AUTO	
Modality	0008,0060	CS		ALWAYS	AUTO	
Series Description	0008,103E	LO		ANAP	AUTO	
Performing Physicians' Name	0008,1050	PN		ANAP	MWL, USER	
Operators' Name	0008,1070	PN		ANAP	MWL, USER	
Referenced Performed Procedure Step Sequence	0008,1111	SQ	Identifies the MPPS SOP Instance to which this image is related	ANAP	AUTO, MPPS	
>Referenced SOP Class UID	0008,1150	UI	MPPS SOP Class UID	ALWAYS	MWL	
>Referenced SOP Instance UID	0008,1155	UI	MPPS SOP Instance UID	ALWAYS	MWL	
Protocol Name	0018,1030	LO		ANAP	AUTO	
Series Instance UID	0020,000E	UI		ALWAYS	AUTO	
Series Number	0020,0011	IS		VNAP	AUTO	
Laterality	0020,0060	CS		ANAP	AUTO	
Performed Procedure Step Start Date	0040,0244	DA		ANAP	AUTO, MPPS	
Performed Procedure Step Start Time	0040,0245	TM		ANAP	AUTO, MPPS	

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Performed Procedure Step ID	0040,0253	SH		ANAP	AUTO, MPPS	
Performed Procedure Step Description	0040,0254	LO		ANAP	MPPS, MWL	
Performed Protocol Code Sequence	0040,0260	SQ		ANAP	MWL	
>Code Value	0008,0100	SH		ALWAYS		
>Coding Scheme Designator	0008,0102	SH		ALWAYS		
>Code Meaning	0008,0104	LO		ALWAYS		

Table 86: General Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Manufacturer	0008,0070	LO	Philips	VNAP	AUTO	
Institution Name	0008,0080	LO		ANAP	CONFIG	
Station Name	0008,1010	SH		ANAP	CONFIG	
Institutional Department Name	0008,1040	LO		ANAP	AUTO	
Manufacturer's Model Name	0008,1090	LO	UNIQ Clarity	ANAP	AUTO	
Device Serial Number	0018,1000	LO		ANAP	AUTO	
Software Versions	0018,1020	LO		ANAP	AUTO	

Table 87: SC Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Modality	0008,0060	CS		ANAP	AUTO	
Conversion Type	0008,0064	CS		ALWAYS	AUTO	

Table 88: General Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Image Type	0008,0008	CS	Value 1: DERIVED	ALWAYS	AUTO	
Content Date	0008,0023	DA		ALWAYS	AUTO	
Content Time	0008,0033	TM		ALWAYS	AUTO	
Derivation Description	0008,2111	ST	“SUBTRACTION” Sent if subtraction has been processed into the exported image.	ANAP	AUTO	
Instance Number	0020,0013	IS		ALWAYS	AUTO	
Patient Orientation	0020,0020	CS		VNAP	AUTO	
Lossy Image Compression	0028,2110	CS	00	ALWAYS	AUTO	

Table 89: Image Pixel Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Samples per Pixel	0028,0002	US		ALWAYS	AUTO	
Photometric Interpretation	0028,0004	CS	MONOCHROME2 Upon import, only images with a photometric interpretation MONOCHROME1 or MONOCHROME2 are accepted.	ALWAYS	AUTO	

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Planar Configuration	0028,0006	US		ANAP	AUTO	
Rows	0028,0010	US	1024 or 512 The pixel matrix is always square.	ALWAYS	AUTO	
Columns	0028,0011	US	1024 or 512 The pixel matrix is always square.	ALWAYS	AUTO	
Bits Allocated	0028,0100	US	16 Note: For Snapshot function, this number can be 8	ALWAYS	AUTO	
Bits Stored	0028,0101	US	10 Upon import, only images with bits stored equal to 8 or 10 bits are accepted.	ALWAYS	AUTO	
High Bit	0028,0102	US		ALWAYS	AUTO	
Pixel Representation	0028,0103	US	0000H	ALWAYS	AUTO	
Smallest Image Pixel Value	0028,0106	US/SS		ANAP	AUTO	
Largest Image Pixel Value	0028,0107	US/SS		ANAP	AUTO	
ICC Profile	0028,2000	OB		ANAP	AUTO	
Pixel Data	7FE0,0010	OW/OB		ALWAYS	AUTO	

Table 90: SC Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Date of Secondary Capture	0018,1012	DA		ANAP	AUTO	
Time of Secondary Capture	0018,1014	TM		ANAP	AUTO	
Nominal Scanned Pixel Spacing	0018,2010	DS		ANAP	AUTO	
Pixel Spacing Calibration Type	0028,0A02	CS		ANAP	AUTO	
Document Class Code Sequence	0040,E008	SQ		ANAP	AUTO	
>Code Value	0008,0100	SH		ALWAYS		
>Coding Scheme Designator	0008,0102	SH		ALWAYS		
>Code Meaning	0008,0104	LO		ALWAYS		
>Context Group Extension Flag	0008,010B	CS		ANAP		
>Context Identifier	0008,010F	CS		ANAP		
>Context UID	0008,0117	UI		ANAP		

Table 91: VOI LUT Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Window Center	0028,1050	DS	Not sent if image is inverted.	ANAP	AUTO	
Window Width	0028,1051	DS	Not sent if image is inverted.	ANAP	AUTO	

Table 92: SOP Common Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Specific Character Set	0008,0005	CS		ANAP	AUTO	
SOP Class UID	0008,0016	UI	1.2.840.10008.5.1.4.1.1.7	ALWAYS	AUTO	

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
SOP Instance UID	0008,0018	UI	Generated by device	ALWAYS		

8.1.1.3 Grayscale Softcopy Presentation State Storage SOP Class

Table 93: SOP Class Modules

Information Entity	Module	Presence	Conditions
Patient	Patient Module	Always	Not Applicable
Study	General Study Module	Always	Not Applicable
	Patient Study Module	Always	Not Applicable
Series	General Series Module	Always	Not Applicable
	Presentation Series Module	Always	Not Applicable
Equipment	General Equipment Module	Always	Not Applicable
Presentation State	Presentation State Identification Module	Always	Not Applicable
	Presentation State Relationship Module	Always	Not Applicable
	Presentation State Shutter Module	Always	Not Applicable
	Display Shutter Module	Always	Not Applicable
	Bitmap Display Shutter Module	Always	Not Applicable
	Displayed Area Module	Always	Not Applicable
	Graphic Layer Module	Always	Not Applicable
	Softcopy Presentation LUT Module	Always	Not Applicable
	SOP Common Module	Always	Not Applicable
	Softcopy VOI LUT module	Always	Not Applicable

Table 94: Patient Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Referenced Patient Sequence	0008,1120	SQ		ANAP	MWL	
>Referenced SOP Class UID	0008,1150	UI		ALWAYS		
>Referenced SOP Instance UID	0008,1155	UI		ALWAYS		
Patient's Name	0010,0010	PN		VNAP	MWL, USER	
Patient ID	0010,0020	LO		VNAP	MWL, USER	
Patient's Birth Date	0010,0030	DA		VNAP	MWL, USER	
Patient's Sex	0010,0040	CS		VNAP	MWL, USER	
Other Patient IDs	0010,1000	LO		ANAP	MWL, USER	
Ethnic Group	0010,2160	SH		ANAP	MWL, USER	
Patient Comments	0010,4000	LT		ANAP	MWL	

Table 95: General Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Study Date	0008,0020	DA		VNAP	AUTO	
Study Time	0008,0030	TM		VNAP	AUTO	

Accession Number	0008,0050	SH		VNAP	AUTO, MWL, USER	
Referring Physician's Name	0008,0090	PN		VNAP	MWL	
Study Description	0008,1030	LO		ANAP	AUTO	
Procedure Code Sequence	0008,1032	SQ		ANAP	AUTO	
>Code Value	0008,0100	SH		ALWAYS		
>Coding Scheme Designator	0008,0102	SH		ALWAYS		
>Code Meaning	0008,0104	LO		ALWAYS		
Referenced Study Sequence	0008,1110	SQ		ANAP	MWL	
>Referenced SOP Class UID	0008,1150	UI		ALWAYS		
>Referenced SOP Instance UID	0008,1155	UI		ALWAYS		
Study Instance UID	0020,000D	UI		ALWAYS	AUTO	
Study ID	0020,0010	SH	In case the Study ID is empty the accession number will be assigned. In case Study ID and Accession Number are the same, the Study ID will be left empty.	VNAP	AUTO, MWL, USER	
Requesting Service Code Sequence	0032,1034	SQ		ANAP	AUTO	
>Code Value	0008,0100	SH		ALWAYS		
>Coding Scheme Designator	0008,0102	SH		ALWAYS		
>Code Meaning	0008,0104	LO		ALWAYS		
>Context Group Extension Flag	0008,010B	CS		ANAP		
>Context Identifier	0008,010F	CS		ANAP		
>Context UID	0008,0117	UI		ANAP		
Reason For Performed Procedure Code Sequence	0040,1012	SQ		ANAP	AUTO	
>Code Value	0008,0100	SH		ALWAYS		
>Coding Scheme Designator	0008,0102	SH		ALWAYS		
>Code Meaning	0008,0104	LO		ALWAYS		
>Context Identifier	0008,010F	CS		ANAP		
>Context UID	0008,0117	UI		ANAP		

Table 96: Patient Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Patient's Size	0010,1020	DS	In meters. When received from the Department System Scheduler, the value can still be modified	ANAP	MWL, USER	
Patient's Weight	0010,1030	DS	In kilograms. When received from the Department System Scheduler, the value can still be modified	ANAP	MWL, USER	
Additional Patient History	0010,21B0	LT		ANAP	MWL	

Table 97: General Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Series Date	0008,0021	DA		ANAP	AUTO	
Series Time	0008,0031	TM		ANAP	AUTO	
Modality	0008,0060	CS	XA	ALWAYS	AUTO	
Series Description	0008,103E	LO		ALWAYS	AUTO	
Performing Physicians' Name	0008,1050	PN		ANAP	MWL, USER	
Operators' Name	0008,1070	PN		ANAP	MWL, USER	
Referenced Performed Procedure Step Sequence	0008,1111	SQ	Identifies the MPPS SOP Instance to which this image is related	ANAP	AUTO, MPPS	
>Referenced SOP Class UID	0008,1150	UI	MPPS SOP Class UID	ALWAYS	MWL	
>Referenced SOP Instance UID	0008,1155	UI	MPPS SOP Instance UID	ALWAYS	MWL	
Protocol Name	0018,1030	LO		ANAP	AUTO	
Series Instance UID	0020,000E	UI		ALWAYS	AUTO	
Series Number	0020,0011	IS		VNAP	AUTO	
Laterality	0020,0060	CS		ANAP	AUTO	
Performed Procedure Step Start Date	0040,0244	DA		ALWAYS	AUTO, MPPS	
Performed Procedure Step Start Time	0040,0245	TM	<hhmmss>	ALWAYS	AUTO, MPPS	
Performed Procedure Step ID	0040,0253	SH	Same as MPPS	ALWAYS	AUTO, MPPS, USER	
Performed Procedure Step Description	0040,0254	LO		ANAP	MPPS, MWL	
Request Attributes Sequence	0040,0275	SQ		ANAP	AUTO	
>Accession Number	0008,0050	SH		ANAP		
>Issuer of Accession Number Sequence	0008,0051	SQ		ANAP		
>Referenced Study Sequence	0008,1110	SQ		ANAP		
>>Referenced SOP Class UID	0008,1150	UI		ALWAYS		
>>Referenced SOP Instance UID	0008,1155	UI		ALWAYS		
>Study Instance UID	0020,000D	UI		ANAP		
>Requested Procedure Description	0032,1060	LO		ANAP		
>Requested Procedure Code Sequence	0032,1064	SQ		ANAP		
>>Code Value	0008,0100	SH		ALWAYS		
>>Coding Scheme Designator	0008,0102	SH		ALWAYS		
>>Code Meaning	0008,0104	LO		ALWAYS		
>Scheduled Protocol Code Sequence	0040,0008	SQ		ANAP		
>>Code Value	0008,0100	SH		ALWAYS		
>>Coding Scheme Designator	0008,0102	SH		ALWAYS		
>>Code Meaning	0008,0104	LO		ALWAYS		
>>Protocol Context Sequence	0040,0440	SQ		ANAP		
>>>Value Type	0040,A040	CS		ALWAYS		
>>>Concept Name Code Sequence	0040,A043	SQ		ALWAYS		
>>>>Code Value	0008,0100	SH		ALWAYS		
>>>>Coding Scheme Designator	0008,0102	SH		ALWAYS		

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
>>>>Code Meaning	0008,0104	LO		ALWAYS		
>Reason for the Requested Procedure	0040,1002	LO		ANAP		
>Reason for Requested Procedure Code Sequence	0040,100A	SQ		ANAP		
>>Code Value	0008,0100	SH		ALWAYS		
>>Coding Scheme Designator	0008,0102	SH		ALWAYS		
>>Code Meaning	0008,0104	LO		ALWAYS		
>>Context Identifier	0008,010F	CS		ANAP		
>>Context UID	0008,0117	UI		ANAP		

Table 98: Presentation Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Modality	0008,0060	CS		ALWAYS	AUTO	

Table 99: General Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Manufacturer	0008,0070	LO	Philips	VNAP	AUTO	
Institution Name	0008,0080	LO		ANAP	AUTO	
Station Name	0008,1010	SH		ANAP	AUTO	
Institutional Department Name	0008,1040	LO		ANAP	AUTO	
Manufacturer's Model Name	0008,1090	LO	UNIQ Clarity	ANAP	AUTO	
Device Serial Number	0018,1000	LO		ANAP	AUTO	
Software Versions	0018,1020	LO		ANAP	AUTO	

Table 100: Presentation State Identification Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Instance Number	0020,0013	IS		ALWAYS	AUTO	
Content Label	0070,0080	CS	AS LAST SEEN	ALWAYS	AUTO	
Content Description	0070,0081	LO		VNAP	AUTO	
Presentation Creation Date	0070,0082	DA		ALWAYS	AUTO	
Presentation Creation Time	0070,0083	TM		ALWAYS	AUTO	
Content Creator’s Name	0070,0084	PN		VNAP	AUTO	

Table 101: Presentation State Relationship Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Referenced Series Sequence	0008,1115	SQ		ALWAYS	AUTO	

>Referenced Image Sequence	0008,1140	SQ		ALWAYS		
>>Referenced SOP Class UID	0008,1150	UI		ALWAYS		
>>Referenced SOP Instance UID	0008,1155	UI		ALWAYS		
>Series Instance UID	0020,000E	UI		ALWAYS		

Table 102: Presentation State Shutter Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Shutter Presentation Value	0018,1622	US		ANAP	AUTO	

Table 103: Display Shutter Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Shutter Shape	0018,1600	CS	RECTANGULAR	ALWAYS	AUTO	
Shutter Left Vertical Edge	0018,1602	IS		ANAP	AUTO	
Shutter Right Vertical Edge	0018,1604	IS		ANAP	AUTO	
Shutter Upper Horizontal Edge	0018,1606	IS		ANAP	AUTO	
Shutter Lower Horizontal Edge	0018,1608	IS		ANAP	AUTO	
Shutter Presentation Value	0018,1622	US		ANAP	AUTO	

Table 104: Bitmap Display Shutter Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Shutter Shape	0018,1600	CS		ALWAYS	AUTO	
Shutter Presentation Value	0018,1622	US		ALWAYS	AUTO	

Table 105: Displayed Area Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Displayed Area Selection Sequence	0070,005A	SQ		ALWAYS	AUTO	
>Referenced Image Sequence	0008,1140	SQ		ANAP	AUTO	
>>Referenced SOP Class UID	0008,1150	UI		ALWAYS	AUTO	
>>Referenced SOP Instance UID	0008,1155	UI		ALWAYS	AUTO	
>Displayed Area Top Left Hand Corner	0070,0052	SL		ALWAYS		
>Displayed Area Bottom Right Hand Corner	0070,0053	SL		ALWAYS		
>Presentation Size Mode	0070,0100	CS		ALWAYS		
>Presentation Pixel Aspect Ratio	0070,0102	IS		ANAP	AUTO	
>Presentation Pixel Magnification Ratio	0070,0103	FL		ANAP	AUTO	

Table 106: Graphic Layer Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Graphic Layer Sequence	0070,0060	SQ		ALWAYS	AUTO	
>Graphic Layer	0070,0002	CS		ALWAYS		
>Graphic Layer Order	0070,0062	IS		ALWAYS		

Table 107: Softcopy Presentation LUT Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Presentation LUT Shape	2050,0020	CS		ANAP	AUTO	

Table 108: SOP Common Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
SOP Class UID	0008,0016	UI	1.2.840.10008.5.1.4.1.1.11.1	ALWAYS	AUTO	
SOP Instance UID	0008,0018	UI	Generated by device	ALWAYS	AUTO	

Table 109: Softcopy VOI LUT module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Softcopy VOI LUT Sequence	0028,3110	SQ		ALWAYS	AUTO	
>Referenced Image Sequence	0008,1140	SQ		ANAP		
>>Referenced SOP Class UID	0008,1150	UI		ALWAYS		
>>Referenced SOP Instance UID	0008,1155	UI		ALWAYS		
>Window Center	0028,1050	DS		ANAP		
>Window Width	0028,1051	DS		ANAP		
>Window Center & Width Explanation	0028,1055	LO		ANAP		
>VOI LUT Function	0028,1056	CS		ANAP		

8.1.1.4 X-Ray Angiographic Image Storage SOP Class

Table 110: SOP Class Modules

Information Entity	Module	Presence	Conditions
Patient	Patient Module	Always	Not Applicable
Study	General Study Module	Always	Not Applicable
	Patient Study Module	Always	Not Applicable
Series	General Series Module	Always	Not Applicable
Equipment	General Equipment Module	Always	Not Applicable
Image	General Image Module	Always	Not Applicable
	Image Pixel Module	Always	Not Applicable
	Contrast/Bolus Module	Always	Not Applicable
	Cine Module	Always	Not Applicable
	Multi-Frame Module	Always	Not Applicable
	Display Shutter Module	Always	Not Applicable
	X-Ray Image Module	Always	Not Applicable
	X-Ray Acquisition Module	Always	Not Applicable
	X-Ray Table Module	Always	Not Applicable
	XA Positioner Module	Always	Not Applicable
	DX Detector Module	Always	Not Applicable
	Modality LUT Module	Always	Not Applicable
	VOI LUT Module	Always	Not Applicable
	SOP Common Module	Always	Not Applicable

Table 111: Patient Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Referenced Patient Sequence	0008,1120	SQ		ANAP	MWL	
>Referenced SOP Class UID	0008,1150	UI		ALWAYS		
>Referenced SOP Instance UID	0008,1155	UI		ALWAYS		
Patient's Name	0010,0010	PN		VNAP	MWL, USER	
Patient ID	0010,0020	LO		VNAP	MWL, USER	
Patient's Birth Date	0010,0030	DA		VNAP	MWL, USER	
Patient's Sex	0010,0040	CS		VNAP	MWL, USER	
Other Patient IDs	0010,1000	LO		ANAP	MWL, USER	
Ethnic Group	0010,2160	SH		ANAP	MWL, USER	
Patient Comments	0010,4000	LT		ANAP	MWL	

Table 112: General Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Study Date	0008,0020	DA		VNAP	AUTO	
Study Time	0008,0030	TM		VNAP	AUTO, MWL, USER	

Accession Number	0008,0050	SH		VNAP	MWL, AUTO	
Referring Physician's Name	0008,0090	PN	.	VNAP	MWL	
Study Description	0008,1030	LO	Based on configuration Study Description is:-not exported -based on schedule procedure step description(WLM) -based on requested procedure step description(WLM) -internal generated performed procedure description	ANAP	AUTO, MWL	
Procedure Code Sequence	0008,1032	SQ		ANAP	AUTO	
>Code Value	0008,0100	SH		ALWAYS		
>Coding Scheme Designator	0008,0102	SH		ALWAYS		
>Code Meaning	0008,0104	LO		ALWAYS		
Referenced Study Sequence	0008,1110	SQ		ANAP	AUTO	
>Referenced SOP Class UID	0008,1150	UI		ALWAYS		
>Referenced SOP Instance UID	0008,1155	UI		ALWAYS		
Study Instance UID	0020,000D	UI		ALWAYS	MWL, AUTO	
Study ID	0020,0010	SH		VNAP	AUTO	
Reason For Performed Procedure Code Sequence	0040,1012	SQ		ANAP	AUTO	
>Code Value	0008,0100	SH		ALWAYS		
>Coding Scheme Designator	0008,0102	SH		ALWAYS		
>Code Meaning	0008,0104	LO		ALWAYS		
>Context Group Extension Flag	0008,010B	CS		ANAP		
>Context Identifier	0008,010F	CS		ANAP		
>Context UID	0008,0117	UI		ANAP		

Table 113: Patient Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Patient's Size	0010,1020	DS	In meters. When received from the Department System Scheduler, the value can still be modified.	ANAP	MWL, USER	
Patient's Weight	0010,1030	DS	In kilograms. When received from the Department System Scheduler, the value can still be modified.	ANAP	MWL, USER	
Additional Patient History	0010,21B0	LT		ANAP	MWL	

Table 114: General Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Series Date	0008,0021	DA		ANAP	AUTO	
Series Time	0008,0031	TM		ANAP	AUTO	

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Modality	0008,0060	CS	XA	ALWAYS	AUTO	
Series Description	0008,103E	LO		ANAP	AUTO	
Performing Physicians' Name	0008,1050	PN		ANAP	MWL, USER	
Operators' Name	0008,1070	PN		ANAP	MWL,USER	
Referenced Performed Procedure Step Sequence	0008,1111	SQ	Identifies the MPPS SOP Instance to which this image is related	ANAP	AUTO, MPPS	
>Referenced SOP Class UID	0008,1150	UI	MPPS SOP Class UID	ALWAYS	MWL	
>Referenced SOP Instance UID	0008,1155	UI	MPPS SOP Instance UID	ALWAYS	MWL	
Protocol Name	0018,1030	LO		ANAP	AUTO	
Series Instance UID	0020,000E	UI		ALWAYS	AUTO	
Series Number	0020,0011	IS		VNAP	AUTO	
Laterality	0020,0060	CS		EMPTY	AUTO	
Performed Procedure Step Start Date	0040,0244	DA		ANAP	AUTO, MPPS	
Performed Procedure Step Start Time	0040,0245	TM		ANAP		
Performed Procedure Step ID	0040,0253	SH	Same as MPPS	ANAP	AUTO, MPPS, USER	
Performed Procedure Step Description	0040,0254	LO	Same as MPPS	ANAP	AUTO, MPPS, USER	
Request Attributes Sequence	0040,0275	SQ		ANAP	AUTO	
>Accession Number	0008,0050	SH		ANAP		
>Issuer of Accession Number Sequence	0008,0051	SQ		ANAP		
>Referenced Study Sequence	0008,1110	SQ		ANAP		
>>Referenced SOP Class UID	0008,1150	UI		ALWAYS		
>>Referenced SOP Instance UID	0008,1155	UI		ALWAYS		
>Study Instance UID	0020,000D	UI		ANAP		
>Requested Procedure Description	0032,1060	LO		ANAP		
>Requested Procedure Code Sequence	0032,1064	SQ		ANAP		
>>Code Value	0008,0100	SH		ALWAYS		
>>Coding Scheme Designator	0008,0102	SH		ALWAYS		
>>Code Meaning	0008,0104	LO		ALWAYS		
>>Context Identifier	0008,010F	CS		ANAP		
>>Context UID	0008,0117	UI		ANAP		
>Scheduled Procedure Step Description	0040,0007	LO		ANAP		
>Scheduled Protocol Code Sequence	0040,0008	SQ		ANAP		
>>Code Value	0008,0100	SH		ALWAYS		
>>Coding Scheme Designator	0008,0102	SH		ALWAYS		
>>Code Meaning	0008,0104	LO		ALWAYS		
>>Context Identifier	0008,010F	CS		ANAP		
>>Context UID	0008,0117	UI		ANAP		
>>Protocol Context Sequence	0040,0440	SQ		ANAP		
>>>Content Item Modifier Sequence	0040,0441	SQ		ANAP		
>>>>Value Type	0040,A040	CS		ALWAYS		
>>>>Concept Name Code Sequence	0040,A043	SQ		ALWAYS		
>>>>>Code Value	0008,0100	SH		ALWAYS		
>>>>>Coding Scheme Designator	0008,0102	SH		ALWAYS		

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
>>>>>Code Meaning	0008,0104	LO		ALWAYS		
>>>Value Type	0040,A040	CS		ALWAYS		
>>>Concept Name Code Sequence	0040,A043	SQ		ALWAYS		
>>>>Code Value	0008,0100	SH		ALWAYS		
>>>>Coding Scheme Designator	0008,0102	SH		ALWAYS		
>>>>Code Meaning	0008,0104	LO		ALWAYS		
>>>>Context Identifier	0008,010F	CS		ANAP		
>>>>Context UID	0008,0117	UI		ANAP		
>Scheduled Procedure Step ID	0040,0009	SH		ANAP		
>Reason for Requested Procedure Code Sequence	0040,100A	SQ		ANAP		
>>Code Value	0008,0100	SH		ALWAYS		
>>Coding Scheme Designator	0008,0102	SH		ALWAYS		
>>Code Meaning	0008,0104	LO		ALWAYS		
>>Context Identifier	0008,010F	CS		ANAP		
>>Context UID	0008,0117	UI		ANAP		

Table 115: General Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Manufacturer	0008,0070	LO	Philips	VNAP	AUTO	
Institution Name	0008,0080	LO		ANAP	AUTO	
Station Name	0008,1010	SH		ANAP	AUTO	
Institutional Department Name	0008,1040	LO		ANAP	AUTO	
Manufacturer's Model Name	0008,1090	LO	UNIQ Clarity	ANAP	AUTO	
Device Serial Number	0018,1000	LO		ANAP	AUTO	
Software Versions	0018,1020	LO		ANAP	AUTO	

Table 116: General Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Image Type	0008,0008	CS	Applied value(s):ORIGINAL DERIVED(if subtraction has been processed into the image) Value 2: PRIMARY Value 3: SINGLE PLANE (if the image is a single plane acquisition)BIPLANE A (if the image is the first plane of a Bi-plane acquisition)BIPLANE B (if the image is the second plane of a Bi-plane acquisition)Value 4:SINGLE A (if the image is derived from plane A of a biplane image and sent as a SINGLE PLANE	ANAP	AUTO	

			image)SINGLE B (if the image is derived from plane B of a biplane image and sent as a SINGLE PLANE image)			
Content Date	0008,0023	DA		ANAP	AUTO	
Content Time	0008,0033	TM		ANAP	AUTO	
Instance Number	0020,0013	IS		VNAP	AUTO	
Patient Orientation	0020,0020	CS		ANAP	AUTO	
Acquisition Date	0008,0022	DA		ANAP	AUTO	
Acquisition Time	0008,0032	TM		ANAP	AUTO	
Lossy Image Compression	0028,2110	CS	00	ALWAYS	AUTO	

Table 117: Image Pixel Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Samples per Pixel	0028,0002	US	1	ALWAYS	AUTO	
Photometric Interpretation	0028,0004	CS	MONOCHROME2: Upon import, only images with a photometric interpretation MONOCHROME1 or MONOCHROME2 are accepted.	ALWAYS	AUTO	
Rows	0028,0010	US	2048, 1024 or 512 The pixel matrix is always square.	ALWAYS	AUTO	
Columns	0028,0011	US	2048, 1024 or 512 The pixel matrix is always square	ALWAYS	AUTO	
Bits Allocated	0028,0100	US	16 or 8	ALWAYS	AUTO	
Bits Stored	0028,0101	US	10 or 8 Upon import, only images with bits stored equal to 8 or 10 bits are accepted.	ALWAYS	AUTO	
High Bit	0028,0102	US		ALWAYS	AUTO	
Pixel Representation	0028,0103	US	0000H	ALWAYS	AUTO	
Pixel Data	7FE0,0010	OW/OB		ANAP	AUTO	

Table 118: Contrast/Bolus Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Contrast/Bolus Agent	0018,0010	LO		VNAP		

Table 119: Cine Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Recommended Display Frame Rate	0008,2144	IS		ANAP	AUTO	
Cine Rate	0018,0040	IS		ANAP	AUTO	
Frame Time	0018,1063	DS		ANAP	AUTO	
Frame Time Vector	0018,1065	DS		ANAP	AUTO	
Frame Delay	0018,1066	DS		ANAP	AUTO	

Table 120: Multi-Frame Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Number of Frames	0028,0008	IS		ALWAYS	AUTO	
Frame Increment Pointer	0028,0009	AT	0x00181065 or 0x00181063	ALWAYS	AUTO	

Table 121: Display Shutter Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Shutter Shape	0018,1600	CS	RECTANGULAR	ALWAYS	AUTO	
Shutter Left Vertical Edge	0018,1602	IS		ANAP	AUTO	
Shutter Right Vertical Edge	0018,1604	IS		ANAP	AUTO	
Shutter Upper Horizontal Edge	0018,1606	IS		ANAP	AUTO	
Shutter Lower Horizontal Edge	0018,1608	IS		ANAP	AUTO	

Table 122: X-Ray Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Image Type	0008,0008	CS		ALWAYS	AUTO	
Derivation Description	0008,2111	ST		ANAP		
Frame Increment Pointer	0028,0009	AT		ALWAYS	AUTO	
Referenced Image Sequence	0008,1140	SQ		ANAP		
>Referenced SOP Class UID	0008,1150	UI		ALWAYS	AUTO	
>Referenced SOP Instance UID	0008,1155	UI		ALWAYS	AUTO	
Samples per Pixel	0028,0002	US	1	ALWAYS	AUTO	
Photometric Interpretation	0028,0004	CS	MONOCHROME2 Upon import, only images with a photometric interpretation MONOCHROME1 or MONOCHROME2 are accepted.	ALWAYS	AUTO	
Bits Allocated	0028,0100	US	16 or 8	ALWAYS	AUTO	
Bits Stored	0028,0101	US	10 or 8.Upon import, only images with bits stored equal to 8 or 10 bits are accepted.	ALWAYS	AUTO	
High Bit	0028,0102	US		ALWAYS	AUTO	
Pixel Representation	0028,0103	US	000H	ALWAYS	AUTO	
Pixel Intensity Relationship	0028,1040	CS		ALWAYS	AUTO	
Lossy Image Compression	0028,2110	CS		ANAP	AUTO	

Table 123: X-Ray Acquisition Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
KVP	0018,0060	DS		ALWAYS	AUTO	
Exposure Time	0018,1150	IS	Only sent if Exposure (0018, 1152) is not sent.	ANAP	AUTO	

X-Ray Tube Current	0018,1151	IS	Only sent if Exposure (0018, 1152) is not sent.	ANAP	AUTO	
Exposure	0018,1152	IS	Only sent if Exposure Time (0018, 1150) and X-Ray Tube Current (0018, 1151) are not sent.	ANAP	AUTO	
Radiation Setting	0018,1155	CS		ALWAYS	AUTO	
Imager Pixel Spacing	0018,1164	DS		ANAP	AUTO	

Table 124: X-Ray Table Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Table Motion	0018,1134	CS	STATIC, DYNAMIC	VNAP	AUTO	
Table Vertical Increment	0018,1135	DS	Incremental change (per frame) in vertical position relatively to the first frame of Multi-Frame image in mm	ANAP	AUTO	
Table Lateral Increment	0018,1136	DS	Incremental change (per frame) in lateral position relatively to the first frame of Multi-Frame image in mm	ANAP	AUTO	
Table Longitudinal Increment	0018,1137	DS	Incremental change (per frame) in longitudinal position relatively to the first frame of Multi-Frame image in mm	ANAP	AUTO	
Table Angle	0018,1138	DS	Angle of table plane in degrees relative to horizontal plane (gravity plane). Positive values indicate that the head of the table is upwards.	ANAP	AUTO	

Table 125: XA Positioner Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Distance Source to Detector	0018,1110	DS		ALWAYS	AUTO	
Distance Source to Patient	0018,1111	DS		ALWAYS	AUTO	
Positioner Motion	0018,1500	CS	STATIC, DYNAMIC	ALWAYS	AUTO	
Positioner Primary Angle	0018,1510	DS		ALWAYS	AUTO	
Positioner Secondary Angle	0018,1511	DS		ALWAYS	AUTO	
Positioner Primary Angle Increment	0018,1520	DS	An array that contains the Positioner Primary Angle Increments between the n-th frame and the previous frame for a Multi-frame image.	ANAP	AUTO	
Positioner Secondary Angle Increment	0018,1521	DS	An array that contains the Positioner Secondary Angle Increments between the n-th frame and the previous frame for a	ANAP	AUTO	

			Multi-frame image.			

Table 126: DX Detector Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Imager Pixel Spacing	0018,1164	DS		ALWAYS	AUTO	
Detector Type	0018,7004	CS		VNAP	AUTO	Note : Attribute is not Available

Table 127: Modality LUT Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Modality LUT Sequence	0028,3000	SQ		ANAP	AUTO	
>LUT Descriptor	0028,3002	US/SS	If 8 bits stored: [value 1]=256 [value 2]=0 [value 3]=8 If 10 bits stored [value 1]=1024 [value 2]=0 [value 3]=10	ANAP	AUTO	
>LUT Explanation	0028,3003	LO		ANAP		
>Modality LUT Type	0028,3004	LO	US	ANAP	AUTO	
>LUT Data	0028,3006	UN		ANAP	AUTO	

Table 128: VOI LUT Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Window Center	0028,1050	DS	Present only if Pixel Data is sent as processed.	ANAP	AUTO	
Window Width	0028,1051	DS	Present only if Pixel Data is sent as processed.	ANAP	AUTO	

Table 129: SOP Common Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Specific Character Set	0008,0005	CS		ANAP	AUTO	
SOP Class UID	0008,0016	UI	1.2.840.10008.5.1.4.1.1.12.1	ALWAYS	AUTO	
SOP Instance UID	0008,0018	UI	Generated by device	ALWAYS	AUTO	

Table 130: General Reference Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Derivation Description	0008,2111	ST		ANAP		

8.1.1.5 X-Ray Radiation Dose SR

Table 131: SOP Class Modules

Information Entity	Module	Presence	Conditions
Patient	Patient Module	Always	Not Applicable
Study	General Study Module	Always	Not Applicable
	Patient Study Module	Always	Not Applicable
Series	SR Document Series Module	Always	Not Applicable
Equipment	General Equipment Module	Always	Not Applicable
	Enhanced General Equipment Module	Always	Not Applicable
Image	SR Document General Module	Always	Not Applicable
	SR Document Content Module	Always	Not Applicable
	SOP Common Module	Always	Not Applicable

Table 132: Patient Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Referenced Patient Sequence	0008,1120	SQ		ANAP	MWL	
>Referenced SOP Class UID	0008,1150	UI		ALWAYS		
>Referenced SOP Instance UID	0008,1155	UI		ALWAYS		
Patient's Name	0010,0010	PN		ALWAYS	MWL, USER	
Patient ID	0010,0020	LO		VNAP	MWL, USER	
Patient's Birth Date	0010,0030	DA		VNAP	MWL, USER	
Patient's Sex	0010,0040	CS		VNAP	MWL, USER	
Other Patient IDs	0010,1000	LO		ANAP	MWL, USER	
Ethnic Group	0010,2160	SH		ANAP	MWL, USER	
Patient Comments	0010,4000	LT		ANAP	MWL	

Table 133: General Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Study Date	0008,0020	DA		ALWAYS		
Study Time	0008,0030	TM		ALWAYS		
Accession Number	0008,0050	SH		ALWAYS	AUTO, MWL, USER	
Referring Physician's Name	0008,0090	PN		VNAP	MWL	
Performing Physician’s Name	0008,1050	PN		VNAP		
Study Description	0008,1030	LO	Based on configuration Study Description is: - not exported - based on schedule procedure step description (WLM) - based on requested procedure step	ANAP	AUTO, MWL	

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
			description (WLM) - internal generated performed procedure description.			
Procedure Code Sequence	0008,1032	SQ		ANAP		
Referenced Study Sequence	0008,1110	SQ		ANAP	MWL	
>Referenced SOP Class UID	0008,1150	UI		ALWAYS	MWL	
>Referenced SOP Instance UID	0008,1155	UI		ALWAYS	MWL	
Study Instance UID	0020,000D	UI		ALWAYS	AUTO	
Study ID	0020,0010	SH	In case the Study ID is empty the accession number will be assigned. In case Study ID and Accession Number are the same, the Study ID will be left empty.	VNAP	AUTO, MWL, USER	

Table 134: Patient Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Patient's Weight	0010,1030	DS	In kilograms. When received from the Department System Scheduler, the value can still be modified.	ANAP	MWL, USER	
Additional Patient History	0010,21B0	LT		ANAP		

Table 135: SR Document Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Series Date	0008,0021	DA		ANAP	AUTO	
Series Time	0008,0031	TM		ANAP	AUTO	
Modality	0008,0060	CS	SR	ALWAYS	AUTO	
Series Description	0008,103E	LO	"Radiation Dose Information"	ANAP	AUTO	
Referenced Performed Procedure Step Sequence	0008,1111	SQ		VNAP	AUTO	
Series Instance UID	0020,000E	UI		ALWAYS	AUTO	
Series Number	0020,0011	IS		ALWAYS	AUTO	

Table 136: General Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Manufacturer	0008,0070	LO	Philips	VNAP	AUTO	
Institution Name	0008,0080	LO		ANAP	CONFIG	
Station Name	0008,1010	SH		ANAP	CONFIG	
Institutional Department Name	0008,1040	LO		ANAP	CONFIG	
Manufacturer's Model Name	0008,1090	LO	UNIQ Clarity	ANAP	AUTO	
Device Serial Number	0018,1000	LO		ANAP	AUTO	

Software Versions	0018,1020	LO		ANAP	AUTO	

Table 137: Enhanced General Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Manufacturer	0008,0070	LO	Philips	ALWAYS	AUTO	
Manufacturer's Model Name	0008,1090	LO	UNIQ Clarity	ALWAYS	AUTO	
Device Serial Number	0018,1000	LO		ALWAYS	AUTO	
Software Versions	0018,1020	LO		ALWAYS	AUTO	

Table 138: SR Document General Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Content Date	0008,0023	DA		ALWAYS	AUTO	
Content Time	0008,0033	TM		ALWAYS	AUTO	
Referenced Instance Sequence	0008,114A	SQ		ANAP	AUTO	
>Referenced SOP Class UID	0008,1150	UI	1.2.840.10008.5.1.4.1.1.12.1	ALWAYS		
>Referenced SOP Instance UID	0008,1155	UI	SOP Instance UID of AcquiredRun as it will be sent to the Archive.	ALWAYS		Note: State of Archive should be checked.
>Purpose of Reference Code Sequence	0040,A170	SQ		ALWAYS		
>>Code Value	0008,0100	SH		ALWAYS		
>>Coding Scheme Designator	0008,0102	SH		ALWAYS		
>>Code Meaning	0008,0104	LO		ALWAYS		
Instance Number	0020,0013	IS		ALWAYS	AUTO	
Referenced Request Sequence	0040,A370	SQ		ANAP	AUTO	
>Study Instance UID	0020,000D	UI		ALWAYS		
>Requested Procedure Description	0032,1060	LO		VNAP		
>Requested Procedure ID	0040,1001	SH		VNAP		
>Reason for the Requested Procedure	0040,1002	LO		ANAP		
>Placer Order Number/Imaging Service Request	0040,2016	LO		VNAP		
>Filler Order Number/Imaging Service Request	0040,2017	LO		VNAP		
Performed Procedure Code Sequence	0040,A372	SQ		VNAP		
Current Requested Procedure Evidence Sequence	0040,A375	SQ		ANAP		
>Referenced Series Sequence	0008,1115	SQ		ALWAYS		
>>Referenced SOP Sequence	0008,1199	SQ		ALWAYS		
>>>Referenced SOP Class UID	0008,1150	UI		ALWAYS		
>>>Referenced SOP Instance UID	0008,1155	UI		ALWAYS		
>>Series Instance UID	0020,000E	UI		ALWAYS		
>Study Instance UID	0020,000D	UI		ALWAYS		
Completion Flag	0040,A491	CS	COMPLETE	ALWAYS	AUTO	
Completion Flag Description	0040,A492	LO	"Complete X-Ray Radiation Dose Structured Report"	ANAP	AUTO	
Verification Flag	0040,A493	CS	UNVERIFIED	ALWAYS		

Table 139: SR Document Content Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Value Type	0040,A040	CS		ALWAYS	AUTO	
Concept Name Code Sequence	0040,A043	SQ		ANAP	AUTO	
>Code Value	0008,0100	SH		ALWAYS		
>Coding Scheme Designator	0008,0102	SH		ALWAYS		
>Code Meaning	0008,0104	LO		ALWAYS		
Continuity of Content	0040,A050	CS		ALWAYS		
Concept Code Sequence	0040,A168	SQ		ALWAYS		
>Code Value	0008,0100	SH		ALWAYS		
>Coding Scheme Designator	0008,0102	SH		ALWAYS		
>Code Meaning	0008,0104	LO		ALWAYS		
Measured Value Sequence	0040,A300	SQ		VNAP		
>Measurement Units Code Sequence	0040,08EA	SQ		ALWAYS		
>>Code Value	0008,0100	SH		ALWAYS		
>>Coding Scheme Designator	0008,0102	SH		ALWAYS		
>>Code Meaning	0008,0104	LO		ALWAYS		
>Numeric Value	0040,A30A	DS		ALWAYS		
Content Template Sequence	0040,A504	SQ		ANAP		
Content Sequence	0040,A730	SQ		ANAP		
>Referenced SOP Sequence	0008,1199	SQ		ALWAYS		
>>Referenced SOP Class UID	0008,1150	UI		ALWAYS		
>>Referenced SOP Instance UID	0008,1155	UI		ALWAYS		
>Relationship Type	0040,A010	CS		ALWAYS		
>Value Type	0040,A040	CS		ALWAYS		
>Concept Name Code Sequence	0040,A043	SQ		ANAP		
>>Code Value	0008,0100	SH		ALWAYS		
>>Coding Scheme Designator	0008,0102	SH		ALWAYS		
>>Code Meaning	0008,0104	LO		ALWAYS		
>Temporal Range Type	0040,A130	CS		ALWAYS		
>Concept Code Sequence	0040,A168	SQ		ALWAYS		
>>Code Value	0008,0100	SH		ALWAYS		
>>Coding Scheme Designator	0008,0102	SH		ALWAYS		
>>Code Meaning	0008,0104	LO		ALWAYS		
>Graphic Data	0070,0022	FL		ALWAYS		
>Graphic Type	0070,0023	CS		ALWAYS		
>Referenced Frame of Reference UID	3006,0024	UI		ALWAYS		

Table 140: SOP Common Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Specific Character Set	0008,0005	CS		ANAP	AUTO	
SOP Class UID	0008,0016	UI	1.2.840.10008.5.1.4.1.1.88.67	ALWAYS	AUTO	
SOP Instance UID	0008,0018	UI	Generated by device	ALWAYS	AUTO	
Instance Number	0020,0013	IS		ANAP	AUTO	

8.1.2 Attribute Mapping

Table 141: Attribute mapping between Modality Worklist, Image IOD and MPPS

Modality Worklist	Image IOD	MPPS IOD
Patient Name	Patient Name	Patient Name
Patient ID	Patient ID	Patient ID
Other Patient Ids		----
Patient's Birth Date	Patient's Birth Date	Patient's Birth Date
Patient's Birth Time		----
Patient's Sex	Patient's Sex	Patient's Sex
Patient's Size		----
Patient's Weight	Patient's Weight	----
Ethnic Group	Ethnic Group	----
Patient Comments	Patient Comments	----
Referring Physician's Name	Referring Physician's Name	----
----	----	Scheduled Step Attributes Sequence
Study Instance UID	Study Instance UID	>Study Instance UID
Referenced Study Sequence	Referenced Study Sequence	>Referenced Study Sequence
Accession Number	Accession Number	>Accession Number
----	----	----
----	Request Attributes Sequence	----
Requested Procedure ID	>Requested Procedure ID	>Requested Procedure ID
Requested Procedure Description		>Requested Procedure Description
Scheduled Procedure Step Sequence	----	----
>Scheduled Procedure Step ID	>Scheduled Procedure Step ID	>Scheduled Procedure Step ID
>Scheduled Action Item Code Sequence		>Scheduled Action Item Code Sequence
>Scheduled Procedure Step Description	>Scheduled Procedure Step Description	>Scheduled Procedure Step Description
Scheduled Protocol Code Sequence	>Scheduled Protocol Code Sequence	----
----	----	Performed Protocol Code Sequence
----	Study ID	Study ID
----	Performed Procedure Step ID	Performed Procedure Step ID
----	Performed Procedure Step Start Date	Performed Procedure Step Start Date
----	Performed Procedure Step Start Time	Performed Procedure Step Start Time
----	Performed Procedure Step Description	Performed Procedure Step Description
----	----	Performed Series Sequence
>Scheduled Performing Physician's Name	Performing Physician's Name	>Performing Physician's Name
	Series Instance UID	>Series Instance UID
Requested Procedure Code Sequence	----	Procedure Code Sequence
----	Protocol Name	Protocol Name

8.1.3 Coerced/Modified Fields

Not applicable

8.2 Data Dictionary of Private Attributes

Not applicable

8.3 Coded Terminology and Templates

Not applicable

8.3.1 Context Group

Not applicable.

8.3.2 Template Specifications

X-RAY RADIATION DOSE SR IOD TEMPLATES

The templates that comprise the X-Ray Radiation Dose SR are interconnected as indicated in the figure below:

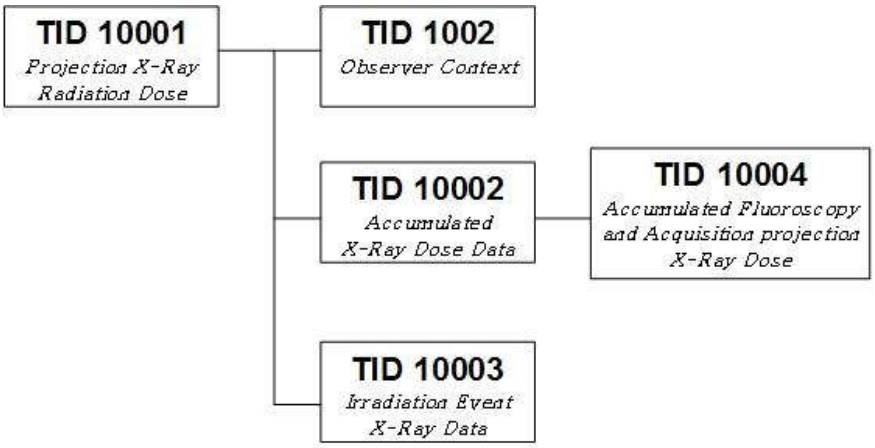

Figure 12: X-Ray Radiation Dose SR IOD Template Structure

This section describes the content of all the templates used in the X-Ray Radiation Dose Reporting SR.

Table 142: Used Templates for X-Ray Radiation Dose Reporting

Template Name	Template ID
Accumulated X-Ray Dose	TID 10002
Irradiation Event X-Ray Data	TID 10003
Accumulated Projection X-Ray Dose	TID 10004
Observer Context	TID 1002
Device Observer Identifying Attributes	TID 1004

8.3.2.1.1 TID 10001 Projection X-Ray Radiation Dose

Table 143: Projection X-Ray Radiation Dose

NL	Relation with Parent	Concept Name	VT	VM	Presence of Value	Value
		X-Ray Radiation Dose Report		1	ALWAYS	
>	HAS CONCEPT MOD	Procedure reported	CODE	1	ALWAYS	Projection X-Ray
>>	HAS CONCEPT MOD	Has Intent	CODE	1	ALWAYS	Combined Diagnostic and Therapeutic Procedure

8.3.2.1.2 TID 10002 Accumulated X-Ray Dose

Table 144: Accumulated X-Ray Dose

NL	Relation with Parent	Concept Name	VT	VM	Presence of Value	Value
	CONTAINS	Accumulated X-Ray Dose Data (DCM, 113702)	CONTAINER	1	ALWAYS	DCMR, 10002
>	HAS CONCEPT MOD	Acquisition Plane (DCM, 113764)	CODE	1	ALWAYS	Single Plane (DCM, 113622)
>	CONTAINS	Calibration (DCM, 122505)	CONTAINER	1	ALWAYS	DCMR, 122505
>>	CONTAINS	Calibration Factor (DCM, 122322)	NUM	1	ALWAYS	
>>	CONTAINS	Calibration Date (DCM, 113723)	DATETIME	1	ALWAYS	
>>	CONTAINS	Calibration Responsible Party (DCM, 113724)	TEXT	1	ALWAYS	
>>	HAS CONCEPT MOD	Dose Measurement Device (DCM, 113794)	CODE	1	ALWAYS	Dosimeter (SRT, A-2C090)
>>	CONTAINS	Calibration Uncertainty (DCM, 113763)	NUM	1	ALWAYS	Percent (UCUM, %)
>	CONTAINS	Dose Area Product Total (DCM, 113722)	NUM	1	ALWAYS	
>	CONTAINS	Acquisition Dose Area Product Total (DCM, 113727)	NUM	1	ALWAYS	
>	CONTAINS	Total Acquisition Time (DCM, 113855)	NUM	1	ALWAYS	
NL	**Relation with Parent**	**Concept Name**	**VT**	**VM**	**Presence of Value**	**Value**
>	CONTAINS	Total Number of Radiographic Frames (DCM, 113731)	NUM	1	ALWAYS	
>	CONTAINS	Dose (RP) Total (DCM, 113725)	NUM	1	ALWAYS	
>	CONTAINS	Acquisition Dose (RP) Total (DCM, 113729)	NUM	1	ALWAYS	
>	CONTAINS	Reference Point Definition (DCM, 113780)	TEXT	1	ALWAYS	15cm below BeamIsocenter
>	CONTAINS	Height of System (99PHI-IXR-XPER, 001)	NUM	1	ALWAYS	
>	CONTAINS	Focal Spot to ISO Center (99PHI-IXR-XPER, 002)	NUM	1	ALWAYS	

8.3.2.1.3 TID 10003 Irradiation Event X-Ray Data

Table 145: Irradiation Event X-Ray Data

NL	Relation with Parent	Concept Name	VT	VM	Presence of Value	Value
	CONTAINS	Irradiation Event X-Ray Data (DCM, 113706)	CONTAINER	1	ALWAYS	
>	HAS CONCEPT MOD	Acquisition Plane (DCM, 113764)	CODE	1	ALWAYS	Single Plane (DCM, 113622)
>	CONTAINS	DateTime Started (DCM, 111526)	DATETIME	1	ALWAYS	

NL	Relation with Parent	Concept Name	VT	VM	Presence of Value	Value
>	CONTAINS	Irradiation Event Type (DCM, 113721)	CODE	1	ALWAYS	Stationary Acquisition (DCM, 113611), Fluoroscopy (SRT, P5-06000), Rotational Acquisition (DCM, 113613)
>	CONTAINS	Dose (RP) (DCM, 113738)	NUM	1	ALWAYS	
>	CONTAINS	Reference Point Definition (DCM, 113780)	TEXT	1	ALWAYS	15cm below BeamIsocenter
>	CONTAINS	Irradiation Event UID (DCM, 113769)	UIDREF	1	ALWAYS	
>	CONTAINS	Dose Area Product (DCM, 122130)	NUM	1	ALWAYS	
>	CONTAINS	Positioner Primary Angle (DCM, 112011)	NUM	1	ALWAYS	
>	CONTAINS	Positioner Secondary Angle (DCM, 112012)	NUM	1	ALWAYS	
>	CONTAINS	X-Ray Filters (DCM, 113771)	CONTAINER	1	ALWAYS	DCMR, 10007
>>	CONTAINS	X-Ray Filter Type (DCM, 113772)	CODE	1	ALWAYS	Strip filter (DCM, 113650)
>>	CONTAINS	X-Ray Filter Material (DCM, 113757)	CODE	1	ALWAYS	Aluminum or Aluminum compound (SRT, C-120F9)
>>	CONTAINS	X-Ray Filter Thickness Minimum (DCM, 113758)	NUM	1	ALWAYS	
>>	CONTAINS	X-Ray Filter Thickness Maximum (DCM, 113773)	NUM	1	ALWAYS	
>>	CONTAINS	X-Ray Filters (DCM, 113771)	CONTAINER	1	ALWAYS	DCMR, 10007
>>>	CONTAINS	X-Ray Filter Type (DCM, 113772)	CODE	1	ALWAYS	Strip filter (DCM, 113650)
>>>	CONTAINS	X-Ray Filter Material (DCM, 113757)	CODE	1	ALWAYS	Copper or Copper compound (SRT, C-127F9)
>>>	CONTAINS	X-Ray Filter Thickness Minimum (DCM, 113758)	NUM	1	ALWAYS	
>>>	CONTAINS	X-Ray Filter Thickness Maximum (DCM, 113773)	NUM	1	ALWAYS	
>>>	CONTAINS	Number of Pulses (DCM, 113768)	NUM	1	ALWAYS	
>>>	CONTAINS	KVP (DCM, 113733)	NUM	1	ALWAYS	
>>>	CONTAINS	Collimated Field Area (DCM, 113790)	NUM	1	ALWAYS	
>>>	CONTAINS	Collimated Field Height (DCM, 113788)	NUM	1	ALWAYS	
>>>	CONTAINS	Collimated Field Width (DCM, 113789)	NUM	1	ALWAYS	
>>>	CONTAINS	Pulse Width (DCM, 113793)	NUM	1	ALWAYS	
>>>	CONTAINS	Exposure (DCM, 113736)	NUM	1	ALWAYS	
>>>	CONTAINS	Irradiation Duration (DCM, 113742)	NUM	1	ALWAYS	
>>>	CONTAINS	Average X-Ray Tube Current (DCM, 113767)	NUM	1	ALWAYS	
>>>	CONTAINS	Patient Table Relationship (DCM, 113745)	CODE	1	ALWAYS	feet-first (SRT, F-10480), headfirst (SRT, F-10470)
>>>	CONTAINS	Patient Orientation (DCM, 113743)	CODE	1	ALWAYS	recumbent (SRT, F-10450)
>>>>	HAS CONCEPT MOD	Patient Orientation Modifier (DCM, 113744)	CODE	1	ALWAYS	supine (SRT, F-10340), prone (SRT, F-10310)
>>>	CONTAINS	Distance Source to Isocenter (DCM,	NUM	1	ALWAYS	

NL	Relation with Parent	Concept Name	VT	VM	Presence of Value	Value
		113748)				
>>>	CONTAINS	Distance Source to Detector (DCM, 113750)	NUM	1	ALWAYS	
>>>	CONTAINS	Table Longitudinal Position (DCM, 113751)	NUM	1	ALWAYS	
>>>	CONTAINS	Table Lateral Position (DCM, 113752)	NUM	1	ALWAYS	
>>>	CONTAINS	Table Height Position (DCM, 113753)	NUM	1	ALWAYS	
>>>	CONTAINS	Table Head Tilt Angle (DCM, 113754)	NUM	1	ALWAYS	
>>>	CONTAINS	Table Cradle Tilt Angle (DCM, 113756)	NUM	1	ALWAYS	
>>>	CONTAINS	Target Region (DCM, 123014)	CODE	1	ALWAYS	Chest (SRT, T-D3000)
>>>	CONTAINS	Comment (DCM, 121106)	TEXT	1	ALWAYS	
>>>	CONTAINS	Number of Frames (DCM, 121140)	NUM	1	ALWAYS	
>>>	CONTAINS	SubImages per Frame (99PHI-IXR-XPER, 004)	NUM	1	ALWAYS	
>>>	CONTAINS	Wedges and Shutters (99PHI-IXR-XPER, 005)	CONTAINER	1	ALWAYS	DCMR, 005
>>>>	CONTAINS	Bottom Shutter (99PHI-IXR-XPER, 006)	NUM	1	ALWAYS	
>>>>	CONTAINS	Left Shutter (99PHI-IXR-XPER, 007)	NUM	1	ALWAYS	
>>>>	CONTAINS	Right Shutter (99PHI-IXR-XPER, 008)	NUM	1	ALWAYS	
>>>>	CONTAINS	Top Shutter (99PHI-IXR-XPER, 009)	NUM	1	ALWAYS	
>>>>	CONTAINS	Distance Wedge 1 (99PHI-IXR-XPER, 010)	NUM	1	ALWAYS	
>>>>	CONTAINS	Distance Wedge 2 (99PHI-IXR-XPER, 011)	NUM	1	ALWAYS	
>>>>	CONTAINS	Angle Wedge 1 (99PHI-IXR-XPER, 012)	NUM	1	ALWAYS	
>>>>	CONTAINS	Angle Wedge 2 (99PHI-IXR-XPER, 013)	NUM	1	ALWAYS	
>>>	CONTAINS	Beam Position (99PHI-IXR-XPER, 014)	CONTAINER	1	ALWAYS	
>>>>	CONTAINS	Longitudinal Beam Position (99PHI-IXR-XPER, 015)	NUM	1	ALWAYS	
>>>>	CONTAINS	Lateral Beam Position (99PHI-IXR-XPER, 016)	NUM	1	ALWAYS	
>>>>	CONTAINS	Beam Angle (99PHI-IXR-XPER, 017)	NUM	1	ALWAYS	
>>>	CONTAINS	Final Distance Source to Detector (99PHI-IXR-XPER, 018)	NUM	1	ALWAYS	
>>>	CONTAINS	Final Table Cradle Angle (99PHI-IXR-XPER, 019)	NUM	1	ALWAYS	
>>>	CONTAINS	Table Height Position (99PHI-IXR-XPER, 021)	NUM	1	ALWAYS	
>>>	CONTAINS	Final Table Tilt Angle (99PHI-IXR-XPER, 022)	NUM	1	ALWAYS	
>>>	CONTAINS	Detector Field Size (99PHI-IXR-XPER, 023)	CONTAINER	1	ALWAYS	DCMR, 023
>>>>	CONTAINS	X Side (99PHI-IXR-XPER, 024)	NUM	1	ALWAYS	
>>>>	CONTAINS	Y Side (99PHI-IXR-XPER, 025)	NUM	1	ALWAYS	
>>>	CONTAINS	Object Thickness (99PHI-IXR-XPER, 026)	NUM	1	ALWAYS	
>>>	CONTAINS	Application Name (99PHI-IXR-XPER, 029)	TEXT	1	ALWAYS	
>>>	CONTAINS	Fluoro Flavour (99PHI-IXR-XPER, 030)	TEXT	1	ALWAYS	
>	CONTAINS	Comment (DCM, 121106)	TEXT	1	ALWAYS	
>	CONTAINS	Source of Dose Information (DCM, 113854)	CODE	1	ALWAYS	Automated Data Collection (DCM, 113856)

8.3.2.1.4 TID 1002 Observer Context

Table 146: Observer Context

NL	Relation with Parent	Concept Name	VT	VM	Presence of Value	Value
>	HAS OBS CONTEXT	Observer Type (DCM, 121005)	CODE	1	ALWAYS	Device (DCM, 121007)

8.3.2.1.5 TID 1004 Device Observer Identifying Attributes

Table 147: Device Observer Identifying Attributes

NL	Relation with Parent	Concept Name	VT	VM	Presence of Value	Value
>	HAS OBS CONTEXT	Device Observer Manufacturer (DCM, 121014)	TEXT	1	ALWAYS	
>	HAS OBS CONTEXT	Observer Type (DCM, 121005)	CODE	1	ALWAYS	Device (DCM, 121007)
>	HAS OBS CONTEXT	Device Observer Manufacturer (DCM, 121014)	TEXT	1	ALWAYS	
>	HAS OBS CONTEXT	Device Observer Model Name (DCM, 121015)	TEXT	1	ALWAYS	
>	HAS OBS CONTEXT	Device Observer Name (DCM, 121013)	TEXT	1	ALWAYS	
>	HAS OBS CONTEXT	Device Observer Serial Number (DCM, 121016)	TEXT	1	ALWAYS	
>	HAS OBS CONTEXT	Device Observer UID (DCM, 121012)	UIDREF	1	ALWAYS	
NL	**Relation with Parent**	**Concept Name**	**VT**	**VM**	**Presence of Value**	**Value**
>	HAS OBS CONTEXT	Scope of Accumulation (DCM, 113705)	CODE	1	ALWAYS	Study (DCM, 113014)
>>	HAS PROPERTIES	Study Instance UID (DCM, 110180)	UIDREF	1	ALWAYS	

8.3.2.2 Private Code Definitions

Not applicable.

8.4 Grayscale Image Consistency

The monitors and printers attached to the product can be calibrated by using the Service Application.

8.5 Standard/Extended/Specialized/Private SOP Classes

Not applicable.