DICOM

Conformance Statement

PCR Eleva Release 1.0

PHILIPS

1. DICOM CONFORMANCE STATEMENT OVERVIEW

This document is the DICOM Conformance Statement for the Philips Medical Systems PCR ELEVA.

The PCR Eleva system is a workstation for cassette-based digital radiography (DICOM image type is 'CR'). It contains an export function based on the DICOM image storage to transfer image data from the PCR Eleva system to a remote system. This DICOM export function and other functions of PCR Eleva are described in this document.

PCR ELEVA in a DICOM network

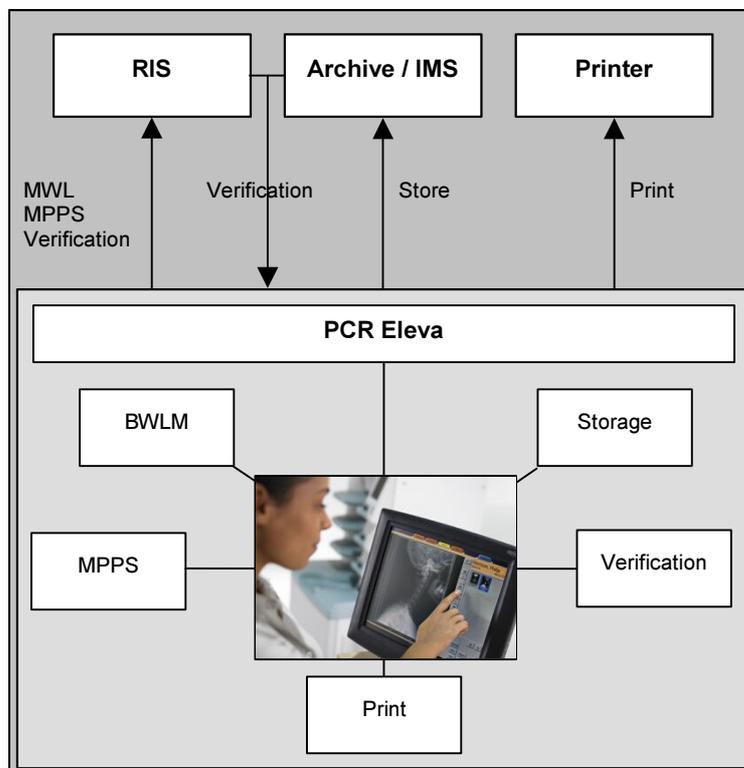The figure below shows the position of PCR Eleva in a radiology environment.

Figure 1: PCR Eleva in a DICOM network

PCR Eleva is an embedded modality system for DICOM images. It provides, among other things, the following features:

  ➢ Verification of application level communication.
  ➢ Basic Worklist Management (BWLM).
  ➢ Storage of images on a remote DICOM system.
  ➢ Study Management per Modality Performed Procedure Step (MPPS).
  ➢ Printing of hardcopies on a remote DICOM printer.

Table 1: Network Services

SOP Class		User of Service (SCU)	Provider of Service (SCP)
Name	**UID**		
Transfer			
StorageCommitment Push Model	1.2.840.10008.1.20.1	Yes	No
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Yes	No
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	No
Workflow Management			
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Yes	No
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	Yes	No
Print Management			
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
Presentation LUT	1.2.840.10008.5.1.1.23	Yes	No

Note: Verification SCP (C-ECHO) is not included in the table above because it is required for any Acceptor of an Association. The Verification SCU details are covered in the details of the conformance statement.
Verification SCU (C-ECHO) is not supported, but the service engineer can initiate an auto configuration of a DICOM node using an A-ASSOCIATE-RQ.

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	Author	Description
1.0	29. Sept. 2005	K. Mühmel	First product release.

3.2. Audience

This Conformance Statement is intended for:

- (potential) customers
- system integrators of medical equipment
- marketing staff interested in system functionality
- software designers implementing DICOM interfaces

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

3.3. Remarks

The DICOM Conformance Statement is contained in chapter 4 through 8 and follows the contents and structuring requirements of [DICOM] PS 3.2.

This DICOM Conformance Statement by itself does not guarantee successful interoperability of Philips equipment with non-Philips equipment. The user (or user's agent) should be aware of the following issues:

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

- **Validation**
  Philips equipment has been carefully tested to 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

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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

DICOM definitions, terms and abbreviations are used throughout this Conformance Statement. For a description of these, see [DICOM] PS 3.3 and PS 3.4.
The word Philips in this document refers to Philips Medical Systems.

The following acronyms and abbreviations are used in this document.

ACSE	Association Control Service Element
AE	Application Entity
AP	Application Profile
BWLM	Basic Worklist Management
CR	Computed Radiography
DICOM	Digital Imaging and Communications in Medicine
DIMSE	DICOM Message Service Element
EBE	DICOM Explicit VR Big Endian
ELE	DICOM Explicit VR Little Endian
GUI	Graphic User Interface
HL7	Health Level Seven
ILE	DICOM Implicit VR Little Endian
IOD	Information Object Definition
MPPS	Modality Performed Procedure Step
NEMA	National Electrical Manufacturers Association
PCR ELEVA	Philips Computed Radiography
PDU	Protocol Data Unit
RIS	Radiology Information System
RWA	Real-World Activity
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

3.5. References

[DICOM]   Digital Imaging and Communications in Medicine (DICOM), Part 1 – 18 (NEMA PS 3.1-XXXX – PS 3.18-XXXX),
National Electrical Manufacturers Association (NEMA)
Publication Sales 1300 N. 17th Street, Suite 1847
Rosslyn, Virginia. 22209, United States of America

4. NETWORKING

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

4.1.   Implementation model

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

4.1.1. Application Data Flow

The PCR Eleva system consists of one single application entity only: the PCR Eleva Application Entity (PCR ELEVA AE).

Figure 2 shows the PCR Eleva application data flow as a functional overview of the PCR ELEVA AE.

It incorporates the following functionality.

- The PCR ELEVA AE can verify application level communication by using the Verification service as SCP.
- The PCR ELEVA AE can request a worklist by using the Basic Worklist Management service as SCU.
- The PCR ELEVA AE can store images by using the Storage service as SCU and use the Storage-Commit SOP-class perform storage-commit as SCU.
- The PCR ELEVA AE can compose the modality performed procedure step by using the Study Management service as SCU.
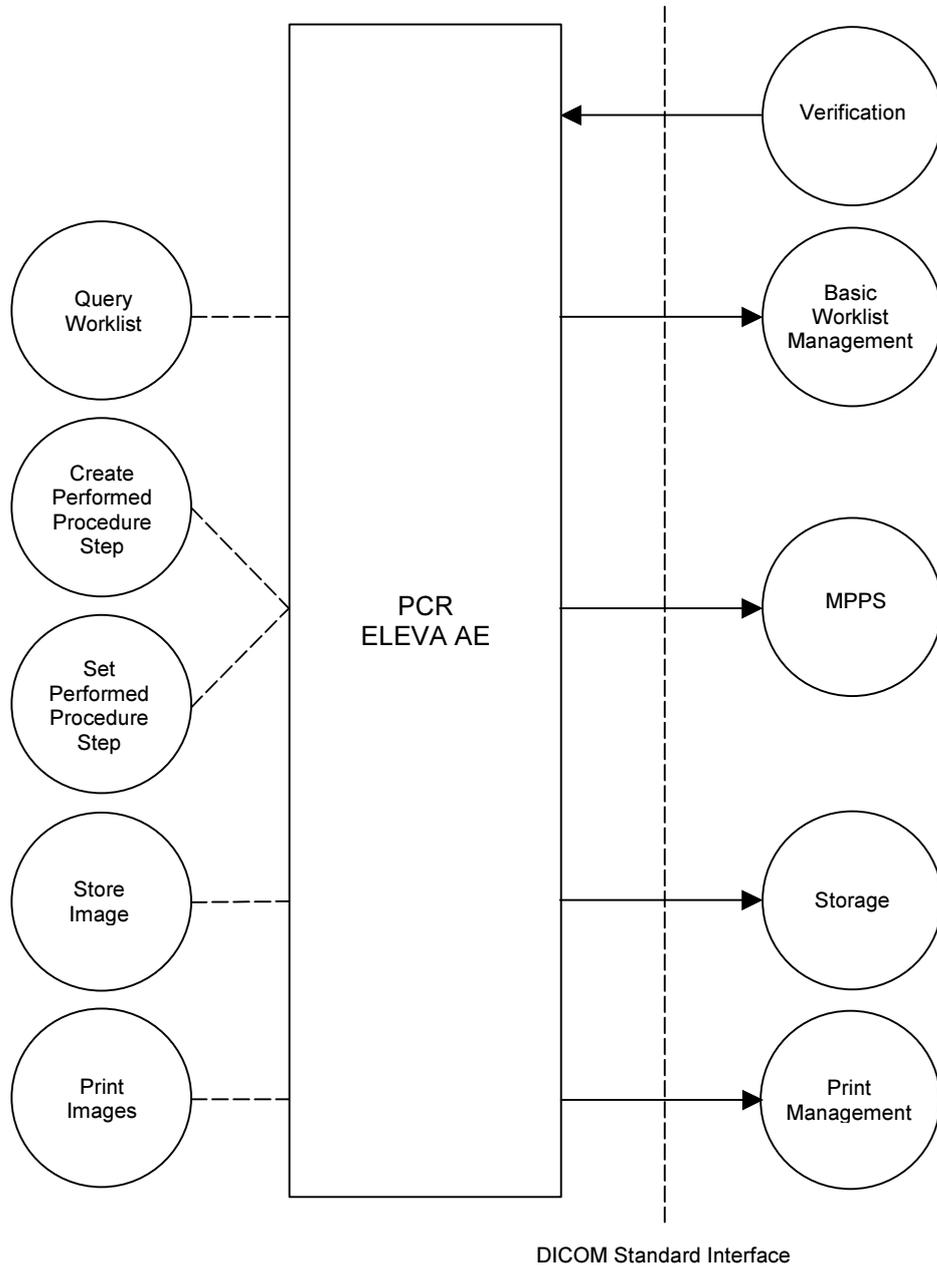- The PCR ELEVA AE can print images by using the Print Management service as SCU PCR ELEVA AE.

Figure 2: Application Data Flow Diagram

4.1.2. Functional Definition of AE's

This section describes in general terms the functions to be performed by the AE, and the DICOM services used to accomplish these functions.

4.1.2.1.   Functional Definition of PCR ELEVA AE

This part shall contain a functional definition for each individual local Application Entity. This shall describe in general terms the functions to be performed by the AE, and the DICOM services used to accomplish these functions. In this sense, "DICOM services" refers not only to DICOM Service Classes, but also to lower level DICOM services, such as Association Services.
The PCR ELEVA AE is the one and only application entity within the PCR Eleva. It includes the following service classes.

Verification Service Class
The PCR ELEVA AE provides the Verification service as SCP (RWA Verify).

A remote SCU shall request an association with the PCR ELEVA AE for Verification SOP class. After accepting the association the PCR ELEVA AE shall receive and respond to the Verification request and release the association when requested.

Basic Worklist Management Service Class
The PCR ELEVA AE may use the Basic Worklist Management service as SCU (RWA Query Worklist).

After initiating the worklist query the PCR ELEVA AE shall request an association with the configured remote Basic Worklist Management SCP. After accepting the association the PCR ELEVA AE shall send the find request, wait for response, and then release the association.

The user interface shall be updated with the query results.

Storage Service Class
The PCR ELEVA AE may use the Storage service as SCU (RWA Store Image).

After a performed procedure step the PCR ELEVA AE shall store the related images at the configured Storage SCP. It shall request an association with the remote Storage SCP for the applicable Storage SOP classes. After accepting the association the PCR ELEVA AE shall send the store request, wait for response, and then release the association.

After successful storage the user interface shall be updated accordingly.

After successful storage, if selected, the PCR ELEVA AE shall request storage commitment per Storage Commitment service (ref. Storage Commitment Service Class)

Storage Commitment Service Class
The PCR ELEVA AE can perform the Storage Commitment service as SCU (RWA Request Storage Commitment).

The PCR ELEVA AE shall request an association with the selected remote SCP for the Storage Commitment Push Model SOP class. When the association is accepted, the PCR ELEVA AE shall send the Storage Commitment requests, receive the Storage Commitment responses and act accordingly, and release the association.
When the remote commitment actions have been finished, the remote SCP should request an association with the PCR ELEVA AE (still SCU). After accepting the association, the PCR ELEVA AE shall receive the Storage Commitment reports, and release the association when requested.

The Storage Commitment Service can be done synchronously and asynchronously. A detailed specification of the Storage Commitment is described in section 4.2.1.3.4 (Real-World Activity: Store Image - ARCHIVE).

Study Management Service Class
The PCR ELEVA AE may use the Study Management service as SCU (RWA Create Performed Procedure Step and RWA Set Performed Procedure Step).

Before performing a procedure step the PCR ELEVA AE shall request an association with the configured remote Study Management SCP. After accepting the association the PCR ELEVA AE shall send a create request, wait for response, and then release the association.

After performing a procedure step the PCR ELEVA AE shall request a new association to send a set request, and after response, release the association.

Depending on the status of create and set and the configuration the PCR ELEVA AE may perform a retry.

The user interface shall be updated with the performed procedure step status.

Basic Grayscale Print Management Meta Class
The PCR ELEVA AE may use the Basic Grayscale Print Management service as SCU (RWA Print Image).

After a performed procedure step the PCR ELEVA AE shall print the related images on the configured Printer. It shall request an association with the remote Basic Grayscale Print Management SCP for the applicable Basic Grayscale Print Management SOP class. After accepting the association the PCR ELEVA AE shall send the print request, wait for response, and then release the association.

After successful printing the user interface shall be updated accordingly.

4.1.3. Sequencing of Real World Activities

Figure 3 shows a typical sequence of an examination using a worklist.
- The user updates the worklist (Query Worklist) and then selects and opens an examination.
- When the user starts the examination (linking the first plate), the RIS is notified (Create Performed Procedure Step).
- After the user confirmed each acquisition (image 1 - N) per default the image is sent to archive (Store Image) and printer (Print Image) simultaneously.
- Finally, when closing the examination, the RIS is notified to update the data of the examination (Set Performed Procedure Step).

Note that Print Image will send images to the printer only when enough images were received to fulfill the configured print format or when the print job is flushed manually. When the last image of an examination is received the print job will be flushed automatically.
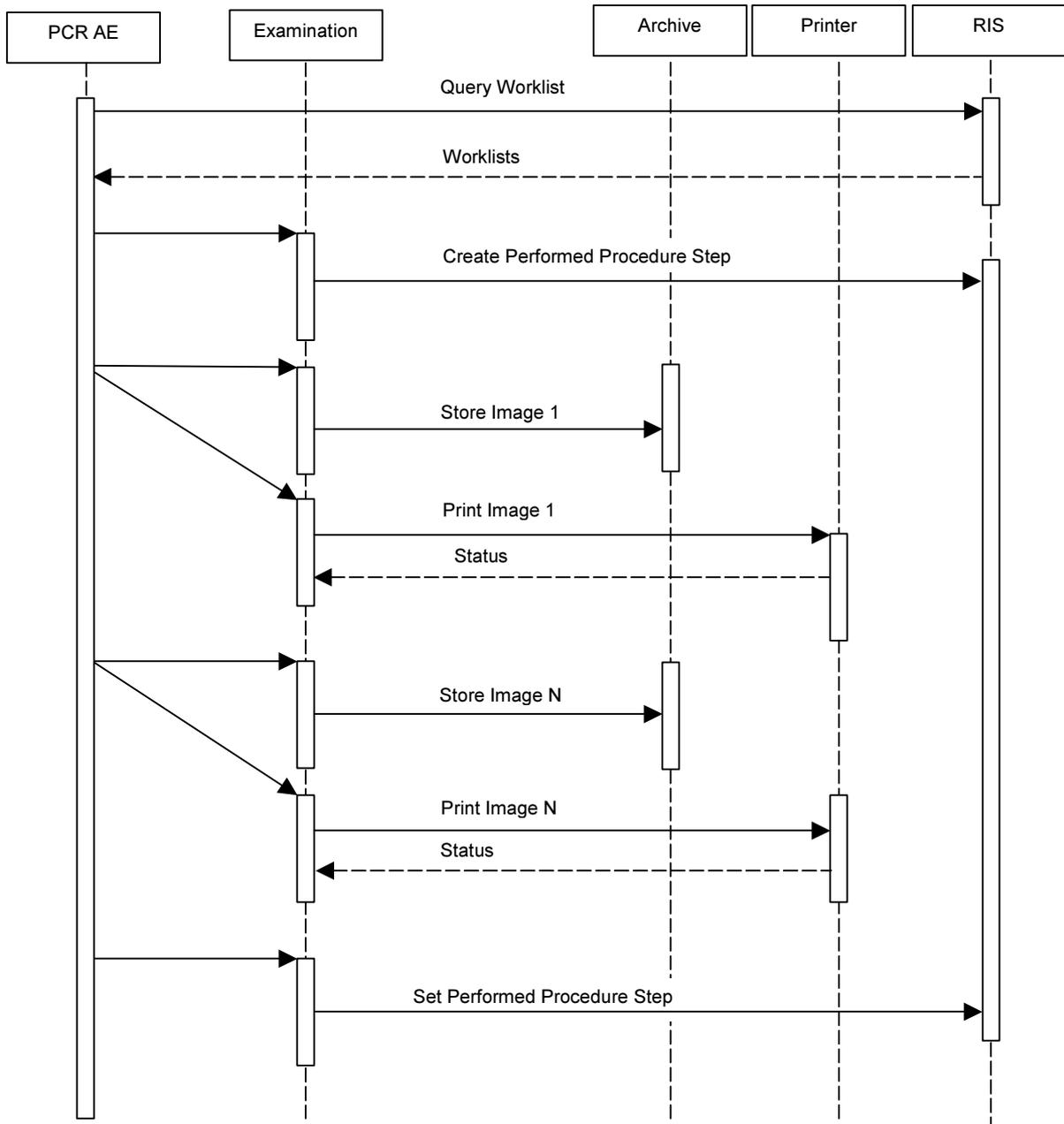
Figure 3: Sequencing of an examination

4.2.   AE Specifications

The next section in the DICOM Conformance Statement contains the specification of the one and only PCR Eleva application entity: PCR ELEVA AE.

4.2.1. PCR ELEVA AE

Every detail of this specific Application Entity shall be completely specified under this section.

4.2.1.1.   Supported SOP Classes of the PCR ELEVA AE

This Application Entity provides standard conformance to the following SOP Classes.

Table 3: SOP Classes for PCR ELEVA AE

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	No	Yes
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Yes	No
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Yes	No
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	No
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	Yes	No
StorageCommitment 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

4.2.1.2.   Association Policies

This section shall contain a description of the general association establishment and acceptance policies of the AE.

4.2.1.2.1.   General

The DICOM standard application context shall be specified.

Table 4: DICOM Application Context

Application Context Name	1.2.840.10008.3.1.1.1

4.2.1.2.2.   Number of Associations

The maximum number of simultaneous associations is unlimited, but the maximum can be limited via the configuration repository (default 2).

Table 5: Number of Associations

Number of incoming associations	Unlimited (default: 2)
Number of outgoing associations	1

4.2.1.2.3. *Asynchronous Nature*

PCR Eleva does not support asynchronous operations and will not perform asynchronous window negotiation.

4.2.1.2.4. *Implementation Identifying Information*

Following Implementation Class UID and Version Name are defined.

Table 6: DICOM Implementation Class and Version for PCR ELEVA AE

Implementation Class UID	1.3.46.670589.30.1.1
Implementation Version Name	PMS_ELEVA_PA_2.0

4.2.1.3. Association Initiation Policy

This describes the conditions under which the AE will initiate an association.

The behavior of the AE during association rejection is summarized in Table 7.

Table 7: DICOM Association Rejection Handling

Result	Source	Reason/Diagnosis	Behavior
1 – rejected-permanent	1 – DICOM UL service-user	1 – no-reason-given	Association is not established. The following error is logged. Association rejected by peer (1: REJECT_RESULT _permanent, 1: REJECT_SOURCE_dul_user, 1: REJECT_REASON _no_reason_given)
		2 – application-context-name-not-supported	Association is not established. The following error is logged. Association rejected by peer (1: REJECT_RESULT _permanent, 1: REJECT_SOURCE_dul_user, 2: REJECT_REASON _application_context_not_support)
		3 – calling-AE-title-not-recognized	Association is not established. The following error is logged. Association rejected by peer (1: REJECT_RESULT _permanent, 1: REJECT_SOURCE_dul_user, 3: REJECT_REASON _calling_aetitle_not_recognized)
		7 – called-AE-title-not-recognized	Association is not established. The following error is logged. Association rejected by peer (1: REJECT_RESULT _permanent, 1: REJECT_SOURCE_dul_user, 7: REJECT_REASON _called_aetitle_not_recognized)

Result	Source	Reason/Diagnosis	Behavior
	2 – DICOM UL service-provider (ACSE related function)	1 – no-reason-given	Association is not established. The following error is logged. Error: UserRecoverable: impl.dicom.access.PEER: Associationrejected by peer (1: REJECT_RESULT _permanent, 2: REJECT_SOURCE _dul_provider (acse), 1: REJECT_REASON _no_reason_given)
		2 – protocol-version-not-supported	Association is not established. The following error is logged. Association rejected by peer (1: REJECT_RESULT _permanent, 2: REJECT_SOURCE _dul_provider (acse), 2: REJECT_REASON _application_context_not_support)
	3 – DICOM UL service-provider (presentation related function)	1 – temporary-congestion	Association is not established. The following error is logged. Association rejected by peer (1: REJECT_RESULT _permanent, 3: REJECT_SOURCE _dul_provider (presentation), 1: REJECT_REASON _no_reason_given)
		2 – local-limit-exceeded	Association is not established. The following error is logged. Association rejected by peer (1: REJECT_RESULT _permanent, 3: REJECT_SOURCE _dul_provider (presentation), 2: REJECT_REASON _application_context_not_support)
2 – rejected-transient	1 – DICOM UL service-user	1 – no-reason-given	Association is not established. The following error is logged. Association rejected by peer (2: REJECT_RESULT_transient, 1: REJECT_SOURCE_dul_user, 1: REJECT_REASON _no_reason_given)
		2 – application-context-name-not-supported	Association is not established. The following error is logged. Association rejected by peer (2: REJECT_RESULT_transient, 1: REJECT_SOURCE_dul_user, 2: REJECT_REASON _application_context_not_support)
		3 – calling-AE-title-not-recognized	Association is not established. The following error is logged. Association rejected by peer (2: REJECT_RESULT_transient, 1: REJECT_SOURCE_dul_user, 3: REJECT_REASON _calling_aetitle_not_recognized)

Result	Source	Reason/Diagnosis	Behavior
		7 – called-AE-title-not-recognized	Association is not established. The following error is logged. Association rejected by peer (2: REJECT_RESULT_transient, 1: REJECT_SOURCE_dul_user, 7: REJECT_REASON _called_aetitle_not_recognized)
	2 – DICOM UL service-provider (ACSE related function)	1 – no-reason-given	Association is not established. The following error is logged. Association rejected by peer (2: REJECT_RESULT_transient, 2: REJECT_SOURCE _dul_provider (acse), 1: REJECT_REASON _no_reason_given)
		2 – protocol-version-not-supported	Association is not established. The following error is logged. Association rejected by peer (2: REJECT_RESULT_transient, 2: REJECT_SOURCE _dul_provider (acse), 2: REJECT_REASON _application_context_not_support)
	3 – DICOM UL service-provider (presentation related function)	1 – temporary-congestion	Association is not established. The following error is logged. Association rejected by peer (2: REJECT_RESULT_transient, 3: REJECT_SOURCE _dul_provider (presentation), 1: REJECT_REASON _no_reason_given)
		2 – local-limit-exceeded	Association is not established. The following error is logged. Association rejected by peer (2: REJECT_RESULT_transient, 3: REJECT_SOURCE _dul_provider (presentation), 2: REJECT_REASON _application_context_not_support)

The behavior of the AE on receiving an association abort is summarized in Table 8.

Table 8: DICOM Association Abort Handling

Source	Reason/Diagnosis	Behavior
0 – DICOM UL service-user	0 – reason-not-specified	When received, the PCR Eleva terminates the connection with the following log: Association ABORTED by peer (0: ABORT_SOURCE_dul_user, 0: ABORT_REASON_not_specified).
2 – DICOM UL service-provider	0 – reason-not-specified	When received, the PCR Eleva terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 0: ABORT_REASON_not_specified).
	1 – unrecognized-PDU	When received, the PCR Eleva terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 1: ABORT_REASON_unrecognized_pdu).

Source	Reason/Diagnosis	Behavior
	2 – unexpected-PDU	When received, the PCR Eleva terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 2: ABORT_REASON_unexpected_pdu).
	4 – unrecognized-PDU parameter	When received, the PCR Eleva terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 4: ABORT_REASON _unrecognized_pdu_parameter).
	5 – unexpected-PDU parameter	When received, the PCR Eleva terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 5: ABORT_REASON _unexpected_pdu_parameter).
	6 – invalid-PDU-parameter value	When received, the PCR Eleva terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 6: ABORT_REASON _invalid_pdu_parameter).

The behavior of the AE during DICOM communication failure is summarized in Table 9.

Table 9: DICOM Command Communication Failure Behavior

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

4.2.1.3.1. Real-World Activity: Query Worklist

4.2.1.3.1.1. Description and Sequencing of Activities

For each Broad or specific Worklist request, an association towards the Basic Worklist Management SCP is established and a C-FIND request is transmitted. The Broad query can be configured with a combination of the Matching Keys:

− Scheduled Station AE Title
− Scheduled Procedure Step Start Date
− Modality

Each of the matching keys is optional. The association will be closed on reception of the last C-FIND response. The Worklist Query result is displayed in the Patient List. The query is interruptible if it was triggered by the user.

After clicking the Query Worklist button the PCR ELEVA AE shall request an association with the configured remote Basic Worklist Management SCP. When the association is accepted the PCR ELEVA AE shall send the broad query find request, wait for response, and then release the association.
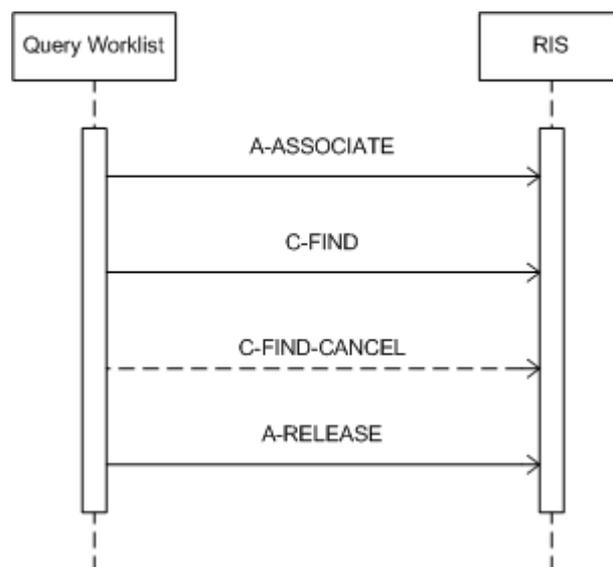
Figure 4: Sequencing of RWA Query Worklist

This RWA may be initiated in two ways.

- After clicking the Query Worklist button the PCR ELEVA AE shall request an association with the configured remote Basic Worklist Management SCP. When the association is accepted the PCR ELEVA AE shall send the Broad Query find request, wait for response, and then release the association.

- After clicking the Patient Query button - entering and confirming the matching key values - the PCR ELEVA AE shall request an association with the configured remote Basic Worklist Management SCP. When the association is accepted the PCR ELEVA AE shall send the patient query find request, wait for response, and then release the association.

Optionally the Broad Query may also be performed automatically in the system background. The time interval between subsequent background queries is

configurable. Manual and automatic background queries are serialized and do not interfere with another.

4.2.1.3.1.2. Proposed Presentation Contexts

The presentation contexts proposed by PCR ELEVA AE for

Real-World Activity: Query Worklist are defined in Table 10.

Table 10: Proposed Presentation Contexts for

Real-World Activity: Query Worklist

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	EBE ELE ILE	1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2	SCU	None

4.2.1.3.1.3. SOP Specific Conformance for MWL-FIND

The worklist received by a broad query is compared to the worklist received by a previous broad query. In case there are any changes, the PCR Eleva patient list is updated. The content of a worklist received by a search query and manually scheduled patients is remains.

A unique match of the following attributes identifies a worklist entry

Table 11: Matching Criteria for Identifying Worklist Entries

Attribute	
Name	Tag
Patient ID	0010,0020
Patient's Name	0010,0010
Issuer of Patient ID	0010,0021
Other Patient Ids	0010,1000
Patient's Birth Date	0010,0030
Patient's Sex	0010,0040

The table below should be read as follows:

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: Range Matching,
     S: Single Value Matching,
     U: Universal Matching
     W: Wildcard Matching (* and ?)
R: Return Keys. An "X" will indicate this attribute as Return Key with zero length for Universal Matching.
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 to 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.

Table 12: Worklist Request Identifier

Attribute Name	Tag	VR	M	R	Q	D	IOD
Patient Identification Module							

Attribute	Tag	VR					
Patient's Name	0010,0010	PN	S|U|W	X	X	X	X
Patient ID	0010,0020	LO	S|U|W	X	X	X	X
Issuer of Patient ID	0010,0021	LO					
Other Patient IDs	0010,1000	LO					
Patient demographic Module							
Patient's Birth Date	0010,0030	DA		X		X	
Patient's Sex	0010,0040	CS		X		X	
Patient's Size	0010,1020	DS				X	
Patient's Weight	0010,1030	DS		X		X	
Ethnic Group	0010,2160	SH					
Patient Comments	0010,4000	LT				X	
Patient Medical Module							
Medical Alerts	0010,2000	LO		X		X	
Contrast Allergies	0010,2110	LO		X		X	
Additional Patient History	0010,21B0	LT				X	
Pregnancy Status	0010,21C0	US		X		X	
Special Needs	0038,0050	LO		X		X	
Visit Status Module							
Current Patient Location	0038,0300	LO		X		X	
Scheduled Procedure Step Module							
Scheduled Procedure Step Sequence	0040,0100	SQ		X			
> Modality [1]	0008,0060	CS	S|U	X	X		
> Requested Contrast Agent	0032,1070	LO				X	
> Scheduled Station AE Title	0040,0001	AE	S|U|W	X	X		
> Scheduled Procedure Step Start Date [2]	0040,0002	DA	U|S	X	X	X	
> Scheduled Procedure Step Start Time	0040,0003	TM		X		X	
> Scheduled Procedure Step End Date	0040,0004	DA					
> Scheduled Procedure Step End Time	0040,0005	TM					
> Scheduled Performing Physician's Name	0040,0006	PN		X			
> Scheduled Procedure Step Description	0040,0007	LO		X		X	
> Scheduled Protocol Code Sequence	0040,0008	SQ		X			
>> Code Value	0008,0100	SH		X		X	
>> Coding Scheme Designator	0008,0102	SH		X		X	
>> Coding Scheme Version	0008,0103	SH				X	
>> Code Meaning	0008,0104	LO		X		X	
> Scheduled Procedure Step ID	0040,0009	SH		X		X	
> Scheduled Station Name	0040,0010	SH		X			
> Scheduled Procedure Step Location	0040,0011	SH		X		X	
> Pre-Medication	0040,0012	LO				X	
> Scheduled Procedure Step Status	0040,0020	CS					
> Comments on the Scheduled Procedure Step	0040,0400	LT					
Requested Procedure Module							
Referenced Study Sequence	0008,1110	SQ		X			
> Referenced SOP Class UID	0008,1150	UI		X			
>Referenced SOP Instance UID	0008,1155	UI		X			
Study Instance UID	0020,000D	UI		X		X	
Requested Procedure Description	0032,1060	LO				X	
Requested Procedure Code Sequence	0032,1064	SQ					
> Code Value	0008,0100	SH				X	
> Coding Scheme Designator	0008,0102	SH				X	
> Coding Scheme Version	0008,0103	SH				X	
> Code Meaning	0008,0104	LO				X	
Requested Procedure ID	0040,1001	SH		X			
Reason for the Requested Procedure	0040,1002	LO				X	

Requested Procedure Priority	0040,1003	SH		X			
Patient Transport Arrangements	0040,1004	LO		X		X	
Names of Intended Recipients of Results	0040,1010	PN					
Requested Procedure Comments	0040,1400	LT				X	
Imaging Service Request Module							
Accession Number	0008,0050	SH	S|U|W	X	X	X	
Referring Physician's Name	0008,0090	PN		X		X	
Requesting Physician	0032,1032	PN		X		X	
Requesting Service	0032,1033	LO				X	
Reason for the Imaging Service Request (RETIRED)	0040,2001	LO				X	
Issue Date of Imaging Service Request	0040,2004	DA					
Imaging Service Request Comments	0040,2400	LT				X	
SOP Common Module							
Specific Character Set	0008,0005	CS					

Notes: *1) CR, DX, OT, US, MG, RF, XA, PX, NM*
           2) All, Today, Tomorrow, Yesterday

All details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors are provided in Table 13.

Table 13: DICOM Command Response Status Handling Behavior

Service Status	Code	Further Meaning	Behavior
Success	0000	Matching is complete	The worklist is updated.
Failure	A700	Refused – Out of resources	The association is released. The reason is logged.
	A900	Failed – Identifier does not match SOP class	The association is released. The reason is logged.
	Cxxx	Failed – Unable to process	The association is released. The reason is logged.
Cancel	FE00	Matching terminated due to Cancel request	The association is released. The reason is logged.
Pending	FF00	Matches are continuing – Current match is supplied and any optional keys were supported in the same manner as required keys	The Query Worklist job continues.
	FF01	Matches are continuing – Warning that one or more optional keys were not supported for existence and/or matching for this identifier	The Query Worklist job continues.

The behavior of the AE during DICOM communication failure is summarized in Table 14.

Table 14: DICOM Command Communication Failure Behavior

Exception	Behavior
RIS query timeout (default 240 seconds)	The Association is aborted using A-ABORT and command marked as failed. The reason is logged and reported to the user.
Association aborted	The command is marked as failed. The reason is logged and reported to the user.

4.2.1.3.1.4. Patient and Study Merge

The PCR ELEVA AE looks in its internal database for a Study with the same Study Instance UID (0020,000D) as given in the Scheduled Procedure Step.

If a Study Instance UID match was not found, it looks for a Patient with the same Patient ID (0010,0020) as given in the Scheduled Procedure Step. If no Patient match is found, a new Patient is created, using attributes from Scheduled Procedure Step. If Patient with a matching Patient ID was found, attributes are updated for the internal Patient, based on the attributes as given in the Scheduled Procedure Step.
A new Study with a Study Instance UID as given in the Scheduled Procedure Step is created.

If a Study Instance UID match was found, all Patient attributes as given in the Scheduled Procedure Step are updated in the internal database for the parent patient of this study. Study attributes are updated for the internal study based on the attributes as given in the Scheduled Procedure Step.

4.2.1.3.1.5. Scheduled Procedure Step (= Examination) Merge

If the PCR ELEVA AE's internal database contains no SPS with Scheduled Procedure Step ID (0040,0009) identifying an incoming Scheduled Procedure Step, it creates a new one and creates an corresponding Examination referencing this Scheduled Procedure Step ID.

If the PCR ELEVA AE's internal database contains already an SPS with the Scheduled Procedure Step ID (0040,0009) identifying an incoming Scheduled Procedure Step, the behaviour depends on the corresponding Examination state.

If the Examination is still "scheduled", the SPS attributes are compared to the attributes sent with the most recent WLM query. If at least one attribute differs, the scheduled Examination is deleted and re-scheduled. Manual changes the user might have performed on this Examination are lost.

If the Examination has already started, no changes are performed, and the potential changes of the incoming Scheduled Procedure Step are disregarded.

4.2.1.3.2. Real-World Activity: Modality Performed Procedure Step

The MPPS option of PCR Eleva requires that the Basic Worklist Management option is enabled.

4.2.1.3.2.1. Description and Sequencing of Activities

Description of Activities

A PCR ELEVA "Examination" is regarded equivalent to a DICOM Procedure Step. It is scheduled or manually entered before an acquisition is taken, and performed by taking acquisitions. If scheduled by the RIS, one Examination is the result of one Scheduled Procedure Step. Since an examination may not be re-opened after having been closed, and each examination workflow context is enclosed in one MPPS, one examination may result in 0:1 MPPS instances. However, image archiving after the examination's closure leads to 1:n MPPS instances per examination (append case).

After the first image plate for a Scheduled Procedure Step has been linked, the system sets the MPPS status of the related examination to "IN PROGRESS" and generates an initial MPPS IN PROGRESS message. The system does not generate intermediate MPPS IN PROGRESS messages for subsequent acquisitions of this Scheduled Procedure Step instance.

After finishing the appropriate acquisition(s), the system will change the MPPS status of the related examination to "COMPLETED" and generate an MPPS N-SET-FINAL message.
PCR Eleva also generates MPPS messages for unscheduled examinations.

The MPPS COMPLETED message will list the UID's of all related DICOM archived images and the format of (optionally) generated direct prints.

After abandoning or discontinuing a procedure step, the operator may set the MPPS status of the related examination to "DISCONTINUED" and the system generates a MPPS DICONTINUED message. The reason for abandoning or discontinuing a procedure step is unspecified.

The operator may interchange the performed sequence order of scheduled procedure steps.

MPPS messages may interleave. Depending on the application workflow optimization by the user, an MPPS sequence like this may come up:

MPPS / SOP Instance UID 1: N-CREATE (IN PROGRESS)
MPPS / SOP Instance UID 2: N-CREATE (IN PROGRESS)
MPPS / SOP Instance UID 3: N-CREATE (IN PROGRESS)
...
MPPS / SOP Instance UID 2: N-SET (COMPLETED)
MPPS / SOP Instance UID 1: N-SET (COMPLETED)
MPPS / SOP Instance UID 3: N-SET (COMPLETED)

(i.e.: running multiple procedure steps 'in parallel').

Sequencing of Activities

After storing a performed procedure step the PCR ELEVA AE shall request an association with the configured remote Study Management SCP. After accepting the

association the PCR ELEVA AE shall send a Create request, wait for response, and then release the association.
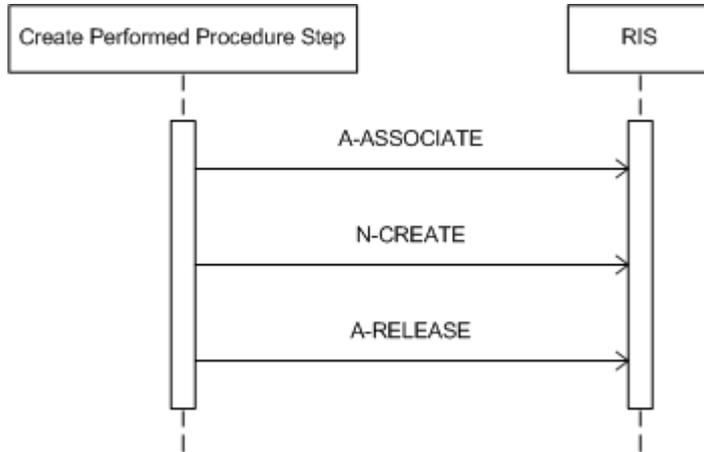
Figure 5: Sequencing of RWA: Create Performed Procedure Step
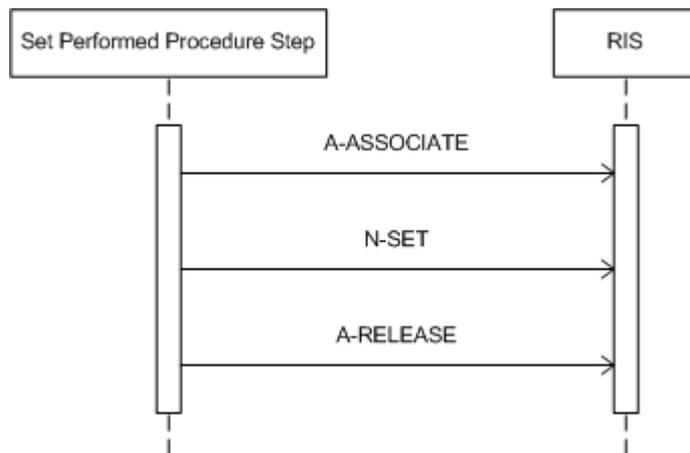
Figure 6: Sequencing of RWA: SET Performed Procedure Step

Depending on the Create status and the configuration the PCR ELEVA AE may perform a retry.

4.2.1.3.2.2. Proposed Presentation Contexts

The presentation contexts proposed by the PCR ELEVA AE for are defined in Table 15.

Table 15: Proposed Presentation Contexts for Modality Performed Procedure Step

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	EBE ELE ILE	1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2	SCU	None

4.2.1.3.2.3. SOP Specific Conformance for SOP Classes

When linking the first image plate of a Scheduled or Unscheduled Procedure Step, PCR Eleva generates a MPPS IN PROGRESS message.
PCR Eleva does not generate intermediate IN PROGRESS (N-SET) messages and does not support the Performed Procedure Step Exception Management Option. PCR Eleva has no Billing Code Tables and does not support the Performed Procedure Step Billing and Material Management Option, except default values for Medium Type (2000,0030) and Film Size ID (2010,0050), if optional Local Print is configured.

Table 16: MPPS Request Identifiers

Attribute Name	Tag	VR	N-CREATE	N-SET
SOP Common Module				
Specific Character Set	0008,0005	CS	ISO_IR 100	ISO_IR 100
SOP Class UID	0008,0016	UI	-	1.2.840.10008.3.1.2.3.3
SOP Instance UID	0008,0018	UI	-	X
Image Acquisition Results Module				
Modality	0008,0060	CS	From WLM	-
Study ID	0020,0010	SH	If scheduled: Req. Procedure ID, else: equipment generated Study identifier	-
Performed Protocol Code Sequence	0040,0260	SQ	EMPTY	1 item
> Code Value	0008,0100	SH	-	X
> Coding Scheme Designator	0008,0102	SH	-	X
> Code Scheme Version	0008,0103	SH	-	X
> Code Meaning	0008,0104	LO	-	X
Performed Series Sequence	0040,0340	SQ	EMPTY	N-items
>Retrieve AE Title	0008,0054	AE	-	EMPTY
>Series Description	0008,103E	LO	-	EMPTY
>Performing Physician's Name	0008,1050	PN	-	EMPTY
>Operator's Name	0008,1070	PN	-	N-Values
>Referenced Image Sequence	0008,1140	SQ	-	In Non-Tomo Examinations 1 item only. In Tomo-Examinations N items. Missing after conventional acquisition
>>Referenced SOP Class UID	0008,1150	UI	-	Presently only RF class
>>Referenced SOP Instance UID	0008,1155	UI	-	Presently only RF class
>Protocol Name (Technologist)	0018,1030	LO	-	Copy of Perf. Act. Item -> Code Value
>Series Instance UID	0020,000E	UI	-	X

Attribute Name	Tag	VR	N-CREATE	N-SET
>Referenced Standalone SOP Instance Sequence	0040,0220	SQ	-	EMPTY
Performed Procedure Step Information Module				
Procedure Code Sequence	0008,1032	SQ	X	-
>Code Value	0008,0100	SH	X	-
>Coding Scheme Designator	0008,0102	SH	X	-
>Coding Scheme Version	0008,0103	SH	X	-
>Code Meaning	0008,0104	LO	X	-
Performed Station AE Title	0040,0241	AE	X	-
Performed Station Name	0040,0242	SH	EMPTY	-
Performed Location	0040,0243	SH	EMPTY	-
Performed Procedure Step Start Date	0040,0244	DA	X	-
Performed Procedure Step Start Time	0040,0245	TM	X	-
Performed Procedure Step End Date	0040,0250	DA	EMPTY	X
Performed Procedure Step End Time	0040,0251	TM	EMPTY	X
Performed Procedure Step Status	0040,0252	CS	IN PROGRESS	COMPLETED or DISCONTINUED
Performed Procedure Step ID	0040,0253	SH	X	-
Performed Procedure Step Description	0040,0254	LO	EMPTY	X
Performed Procedure Type Description	0040,0255	LO	EMPTY	-
Performed Procedure Step Relationship Module				
Referenced Patient Sequence	0008,1120	SQ	EMPTY	-
Patient's Name	0010,0010	PN	X	-
Patient ID	0010,0020	LO	X	-
Patient's Birth Date	0010,0030	DA	X	-
Patient's Sex	0010,0040	CS	X	-
Scheduled Step Attribute Sequence	0040,0270	SQ	X	-
>Accession Number	0008,0050	SH	X	-
>Referenced Study Sequence	0008,1110	SQ	0 length if unscheduled	-
>>Referenced SOP Class UID	0008,1150	UI	Only if scheduled	-
>>Referenced SOP Instance UID	0008,1155	UI	Only if scheduled	-
>Study Instance UID	0020,000D	UI		-
>Requested Procedure Description	0032,1060	LO	0 length if unscheduled	-
>Scheduled Procedure Step Description	0040,0007	LO	0 length if unscheduled	-
>Scheduled Protocol Code Sequence	0040,0008	SQ	X	-
>> Code Value	0008,0100	SH	X	-
>> Coding Scheme Designator	0008,0102	SH	X	-
>> Code Scheme Version	0008,0103	SH	X	-
>> Code Meaning	0008,0104	LO	X	-
> Scheduled Procedure Step ID	0040,0009	SH	X	-
> Requested Procedure ID	0040,1001	SH	X	-
Radiation Dose Module				
Image Area Dose Product	0018,115E	DS	Not sent in case of appended MPPS instances	Not accumulating: re-processed images, non-digital images Not sent in case of appended MPPS instances
Total Number of Exposures	0040,0301	US	Not sent in case of appended MPPS instances	Not counting: re-processed images Not sent in case of appended MPPS instances

Attribute Name	Tag	VR	N-CREATE	N-SET
Total Time Of Fluoroscopy	0040,0300	US	Not sent in case of appended MPPS instances	Not sent in case of appended MPPS instances
Entrance Dose	0040,0302	US	Not sent in case of appended MPPS instances	Not sent in case of appended MPPS instances
Comments on Radiation Dose	0040,0310	ST	X	X
Additional Attribute Module				
Issuer of Patient ID	0010,0021	LO	X	-

"-" indicates that the attribute is not sent; "EMPTY" indicates that the attribute is sent with zero length; "X" or an explicit value indicate that the attribute is sent with an appropriate value.

Assisted Acquisition Protocol Setting Option

PCR Eleva by default derives the specific acquisition protocol from the Scheduled Protocol Code Sequence Items. Any single Item results in an Examination.

PCR Eleva supports 3 more (configurable) mapping relations, as shown below:

- Examination is selected from Scheduled Protocol Code Items->Code Value (0040,0008) (default)
- Examination is selected from Scheduled Procedure Step Description (0040,0007)
- Examination is selected from Requested Procedure Code Items->Code Value (0032,1064)
- Examination is selected from Requested Procedure Description (0032,1060)

PCR ELEVA does not evaluate the attributes Coding Scheme Version (0008,0103), Coding Scheme Designator (0008,0102), Code Meaning (0008,0104), but only the Code Value (0008,0100), for mapping the examination settings. I.e. PCR Eleva expects that any used Code Value is unique (unambiguous) within a given RIS domain.

Restrictions Depending on Number of Scheduled Protocol Code Items

It is highly recommended that the Scheduled Procedure Step contains only 1 Item in the Scheduled Protocol Code Sequence.

If the Scheduled Procedure Step contains <n> items in the Scheduled Protocol Code Sequence, the Scheduled Procedure Step is split into <n> examinations, where any single examination shows only 1 of the Scheduled Protocol Code Items, but all the other attributes are the same.

When such an examination is returned back via MPPS, also the Performed Protocol Code Sequence will show only 1 item. If all <n> Scheduled Procedure Step Code Items are performed, <n> MPPS instances will be sent back to the RIS, and the sum of all Performed Protocol Code Items will be <n>.

All details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors are provided in Table 17 and Table 18.

Table 17: N-CREATE Command Response Status Handling Behavior

Service Status	Code	Further Meaning	Behavior
Success	0000	Successful operation	The SCP has successfully received the modality performed procedure step create request. Log entry.

Service Status	Code	Further Meaning	Behavior
Failure	0213	Resource limitation	The command is reported to the user as failed. The reason is logged. After a configured period of time the storage will be retried up to a configured number of times.
	xxxx	Any failure accept	The command is reported to the user as failed. The reason is logged. No retry.

Table 18: N-SET Command Response Status Handling Behavior

Service Status	Code	Further Meaning	Behavior
Success	0000	Confirmation	The association is released.
Failure	0110	Processing failure – performed procedure step object may no longer be updated	The reason is logged.
	xxxx	(any other failure)	The reason is logged.

4.2.1.3.3. Real-World Activity: Store Image - EXPORT

4.2.1.3.3.1. Description and Sequencing of Activities

Export means that PCR Eleva stores images without Storage Commitment.
This RWA may be initiated in two ways.

- Manually in the viewer, after clicking the Store button the PCR ELEVA AE will store the selected images at the selected Storage SCP.

- Automatically during an examination, after clicking the Confirm button the PCR ELEVA AE will automatically store the related images of the performed procedure step at the configured Storage SCP.

The PCR ELEVA AE will request an association with the remote Storage SCP for the applicable Storage SOP classes. After accepting the association the PCR ELEVA AE will send the store request, wait for response, and then release the association. The store response status may be inspected on the UI.

Figure 7: Sequencing of RWA: Export without Store Commitment

Depending on the status of the store the PCR ELEVA AE may queue store requests for retries. The queued store requests can be cancelled from the UI.

4.2.1.3.3.2. Proposed Presentation Contexts

The presentation context proposed by the PCR ELEVA AE for Real-World-Activity Store Image - EXPORT is defined in Table 19: Proposed Presentation Context for Store-Image SOP-Class.

Table 19: Proposed Presentation Context for Store-Image SOP-Class

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	EBE ELE ILE	1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	EBE ELE ILE	1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2	SCU	None

4.2.1.3.3.3. SOP Specific Conformance for SOP Classes

All details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors are provided in Table 20.

Table 20: DICOM Command Response Status Handling Behavior

Service Status	Code	Further Meaning	Behavior
Success	0000	Storage is complete	UI status is updated
Refused	A7xx	Out of resources	The association is released. The reason is logged. The user is informed.
Error	A9xx	Data set does not match SOP class	The association is released. The reason is logged. The user is informed.
	Cxxx	Cannot understand	The association is released. The reason is logged. The user is informed.
Warning	B000	Coercion of data elements	The association is released. The reason is logged. The user is informed.
	B006	Elements discarded	The association is released. The reason is logged. The user is informed.
	B007	Data set does not match SOP class	The association is released. The reason is logged. The user is informed.

The status can be inspected via the user interface.

The behavior of the AE during DICOM communication failure is summarized in Table 21.

Table 21: DICOM Command Communication Failure Behavior

Exception	Behavior
Association aborted	The command is marked as failed. The reason is logged and reported to the user.

4.2.1.3.4. Real-World Activity: Store Image - ARCHIVE

4.2.1.3.4.1. Description and Sequencing of Activities

Archive means that PCR Eleva stores images with Storage Commitment.
This RWA may be initiated in two ways.

- Manually in the viewer, after clicking the Store button the PCR ELEVA AE will store the selected images at the selected Storage SCP.

- Automatically during an examination, after clicking the Confirm button the PCR ELEVA AE will automatically store the related images of the performed procedure step at the configured Storage SCP.

The PCR ELEVA AE will request an association with the remote Storage SCP for the applicable Storage SOP classes. After accepting the association the PCR ELEVA AE will send the store request, wait for response, and then release the associ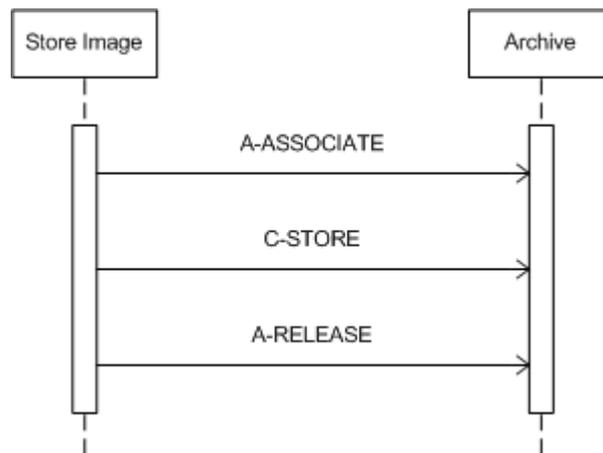ation. The store response status may be inspected on the UI. The transferred image shall not be deleted from the system until the Storage Commit N-Event is received.
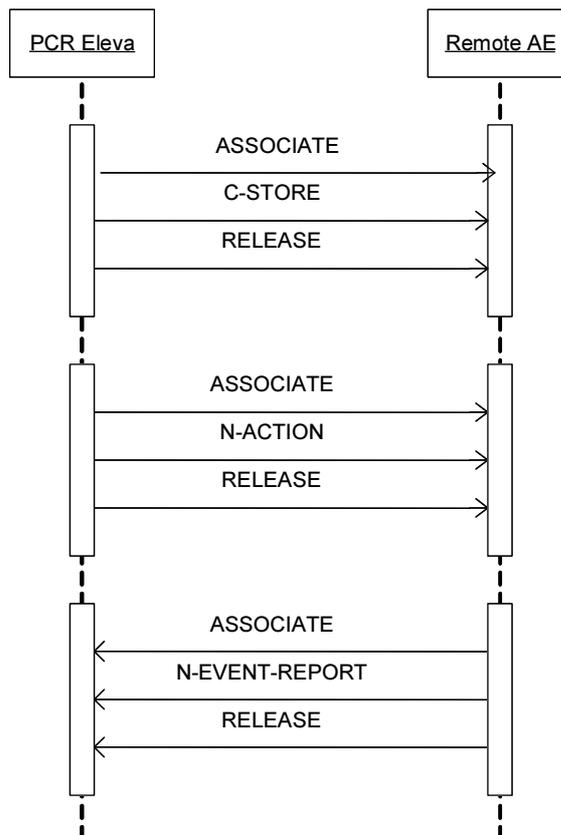
Figure 8: Sequencing of RWA: Archive with Store and Storage Commitment

Depending on the status of the store the PCR ELEVA AE may queue store requests for retries. The queued store requests can be cancelled from the UI.

4.2.1.3.4.2. Proposed Presentation Contexts

The presentation context proposed by the PCR ELEVA AE for Real-World-Activity Store Image - ARCHIVE is defined in Table 22 and Table 23.

Table 22: Proposed Presentation Context for Store-Image SOP-Class

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	EBE ELE ILE	1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	EBE ELE ILE	1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2	SCU	None

Table 23: Proposed Presentation Context for Storage Commitment SOP-Class

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Storage Commitment Push Model	1.2.840.10008.1.20.1	EBE ELE ILE	1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2	SCU	None

4.2.1.3.4.3. SOP Specific Conformance for SOP Classes

All details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors are provided in Table 24.

Table 24: DICOM Command Response Status Handling Behavior

Service Status	Code	Further Meaning	Behavior
Success	0000	Storage is complete	UI status is updated
Refused	A7xx	Out of resources	The association is released. The reason is logged. The user is informed.
Error	A9xx	Data set does not match SOP class	The association is released. The reason is logged. The user is informed.
	Cxxx	Cannot understand	The association is released. The reason is logged. The user is informed.
Warning	B000	Coercion of data elements	The association is released. The reason is logged. The user is informed.
	B006	Elements discarded	The association is released. The reason is logged. The user is informed.
	B007	Data set does not match SOP class	The association is released. The reason is logged. The user is informed.

The status can be inspected via the user interface.

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

Table 25: DICOM Command Communication Failure Behavior

Exception	Behavior
Association aborted	The command is marked as failed. The reason is logged and reported to the user.

4.2.1.3.5. Real World Activity: Print Image

4.2.1.3.5.1. Description and Sequencing of Activities

The RWA Real World Activity Print-Image involves the printing of an image by sending the selected image data to a Print Management SCP (i.e. printer).
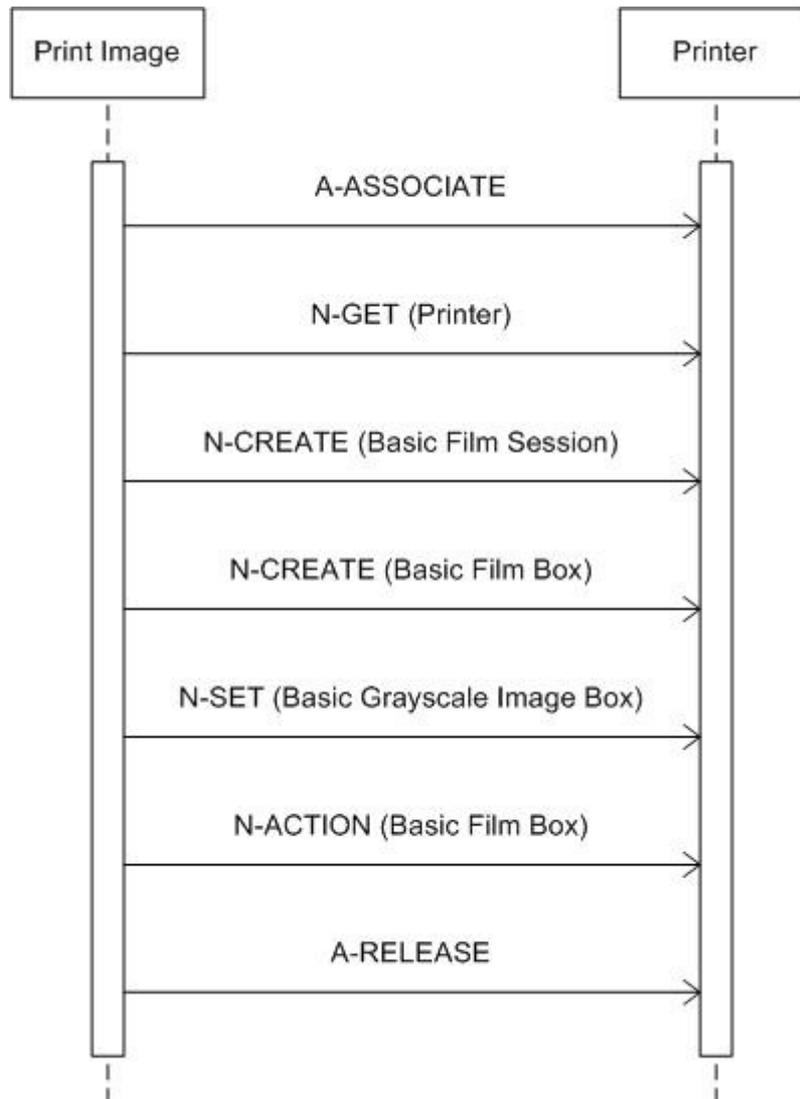
Figure 9: Sequencing of RWA PrintImage

The PCR ELEVA AE cannot handle any N-EVENT-REPORT messages.

A print job (film session) comprises one single film box with one single image (that is composed of 1..N modality images).

Print jobs may be generated in two modes:

- Manually in the print tool, after clicking the print button the PCR ELEVA AE will send the selected images to the selected printer.

- Automatically during an examination, after clicking the Confirm button the PCR ELEVA AE will automatically send the related images of the performed procedure step to the configured printer as soon as all images for a film sheet are acquired.

In AutoPrint mode, (1..N) modality images are composed to one logical film image (film page) according to a preconfigured Examination specific layout (size, orientation, image number, image position, scaling, overlay, annotation and shutter information, etc.).

In Manual Print mode, (1..N) modality images are composed on one film image by manual arrangement of the user, allowing for a print preview or by using predefined layouts.

Depending on the response status of set and the configuration the PCR ELEVA AE may perform a retry.

4.2.1.3.5.2. Proposed Presentation Contexts

The presentation contexts proposed by the PCR ELEVA AE for are defined in Table 26.

Table 26: Proposed Presentation Contexts for Print Images

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Basic Grayscale Print Management (Meta)	1.2.840.10008.5.1.1.9	ELE ILE EBE	1.2.840.10008.1.2.1 1.2.840.10008.1.2 1.2.840.10008.1.2.2	SCU	None

4.2.1.3.5.3. Specific Conformance to Grayscale Print Management Meta Sop Class

Images are printed using the Basic Grayscale Print Management Meta SOP Class. If any of the return statuses is not Success, the print job is aborted and association is released.
After successful print job the Printer Status (2100,0010) and Printer Status Info (2100,0020) are queried using N-GET.

Details regarding the status handling behaviour from the application level and communication errors are provided in Table 27.

Table 27: DICOM Command Response Status Handling Behavior for Grayscale Print Management Meta Sop Class

Service Status	Code	Further Meaning	Behavior
Success	0000	Successful operation	The print job continues.

Service Status	Code	Further Meaning	Behavior
Failure	xxxx	Any failure	In the AutoPrint mode a GUI is invoked. The status panel of this GUI displays a message based on the 'Further Meaning'. The warning or failure response of a print request that is invoked by the Manual Print Composer GUI will be displayed by a pop-up window (if the user has not closed the GUI before the printer status was delivered).
Warning	xxxx	Any warning	In the AutoPrint mode a GUI is invoked. The status panel of this GUI displays a message based on the 'Further Meaning'. The warning or failure response of a print request that is invoked by the Manual Print Composer GUI will be displayed by a pop-up window (if the user has not closed the GUI before the printer status was delivered).

The behavior of the AE during communication failure is summarized in Table 28.

Table 28: DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	The Association is aborted using A-ABORT and the command is marked as failed. The reason is logged. After a maximum number of retries the user is notified via pop-up (in preview mode only).
Association aborted	The command is marked as failed. The reason is logged. After a maximum number of retries the user is notified via pop-up (in preview mode only).
Failed to connect	Log entry. After a maximum number of retries the user is notified via pop-up (in preview mode only).

Used abbreviations are:

ALWAYS	the module or attribute shall always be present with value
ANAP	Attribute Not Always Present
VNAP	Value Not Always Present (attribute sent zero length if no value is present)
EMPTY	Attribute is sent without a value
MAYBE	the module may be present under specified condition
OPTIONAL	the module may be available, depending on source object
AUTO	the attribute value is generated automatically
CONF	the attribute value source is a configurable parameter
IMPL	the attribute value source is a user-implicit configuration setting
SPEC	the attribute value source is a specific DICOM object
USER	the attribute value source is explicit user input

4.2.1.3.5.4. SOP Specific Conformance Printer SOP Class

The Printer process conforms to the Printer Sop Class.
The following DIMSE service element is supported:

N-GET

N-GET DIMSE does not create any Data Set Attributes.

4.2.1.3.5.5. SOP Specific Conformance Basic Film Session SOP Class

The Printer process conforms to the Basic Film Session Sop Class.
The following DIMSE service element is supported:

N-CREATE

The following table lists the supported attributes for the N-CREATE DIMSE.

Table 29: Basic Film Session Presentation Module

Attribute Name	Tag	VR	Value	Presence of Value	Source
Number of Copies	2000,0010	IS	1	ALWAYS	AUTO
Print Priority	2000,0020	CS	HIGH	ALWAYS	AUTO
Medium Type	2000,0030	CS	BLUE FILM, CLEAR FILM, PAPER	ALWAYS	USER/ IMPL
Film Destination	2000,0040	CS	MAGAZINE, PROCESSOR	ALWAYS	CONF
Film Session Label	2000,0050	LO	Philips Medical Systems	ALWAYS	AUTO

4.2.1.3.5.6. SOP Specific Conformance Basic Film Box SOP Class

The Printer process conforms to the Basic Film Box Sop Class.
The following DIMSE service elements are supported:

N-CREATE
N-ACTION

The following table lists the supported attributes for the N-CREATE DIMSE

Table 30: Basic Film Box Presentation Module

Attribute Name	Tag	VR	Value	Presence of Value	Source
Image Display Format	2010,0010	ST	STANDARD\1,1 CUSTOM\1	ALWAYS	CONF
Film Orientation	2010,0040	CS	PORTRAIT; LANDSCAPE	ALWAYS	CONF
Film Size ID	2010,0050	CS	A, A3, A4, 8INX10IN, 8_5INX11IN, 10INX12IN, 10INX14IN, 11INX14IN, 11INX17IN, 14INX14IN, 14INX17IN, 24CMX24CM, 24CMX30CM	ALWAYS	CONF
Magnification Type	2010,0060	CS	NONE	VNAP	CONF
Max Density	2010,0130	US		ALWAYS	CONF
Trim	2010,0140	CS	NO, YES	ANAP	CONF
Configuration Information	2010,0150	ST		ALWAYS	CONF

Table 31: Basic Film Box Relationship Module

Attribute Name	Tag	VR	Value	Presence of Value	Source
Referenced Film Session Sequence	2010,0500	SQ	Parent film session	ALWAYS	AUTO
>Referenced SOP Class UID	0008,1150	UI	Enumerated value: 1.2.840.10008.5.1.1.1 (Basic Film Session)	ALWAYS	AUTO
>Referenced SOP Instance UID	0008,1155	UI	-	ALWAYS	AUTO

N-ACTION DIMSE does not create any Data Set Attributes.

4.2.1.3.5.7. SOP Specific Conformance Basic Grayscale Image Box SOP Class

The Printer process conforms to the Basic Grayscale Image Box Sop Class.
The following DIMSE service element is supported:

N-SET

The following table lists the supported attributes for the N-SET DIMSE

Table 32: Basic Grayscale Image Box SOP Class - N-SET-RQ - Pixel Presentation Module

Attribute Name	Tag	VR	Value	Presence of Value	Source
Image Position	2020,0010	US	1	ALWAYS	AUTO
Polarity	2020,0020	CS	NORMAL	ALWAYS	AUTO
Basic Grayscale Image Sequence	2020,0110	SQ		ALWAYS	AUTO
>Samples per Pixel	0028,0002	US	1	ALWAYS	AUTO
>Photometric Interpretation	0028,0004	CS	MONOCHROME1, MONOCHROME2	ALWAYS	CONF
>Rows	0028,0010	US	Depending on the selected printer type and film size.	ALWAYS	IMPL
>Columns	0028,0011	US	Depending on the selected printer type and film size	ALWAYS	IMPL
>Bits Allocated	0028,0100	US	8, 16	ALWAYS	AUTO
>Bits Stored	0028,0101	US	8,12	ALWAYS	IMPL
>High Bit	0028,0102	US	7,11	ALWAYS	AUTO
>Pixel Representation	0028,0103	US	0	ALWAYS	AUTO
>Pixel Data	7FE0,0010	OB/ OW		ALWAYS	AUTO

4.2.1.4.   Association Acceptance Policy

The PCR ELEVA AE accepts associations to allow remote applications to verify application level communication.

The PCR ELEVA AE rejects association requests from unknown applications, i.e. applications that offer an unknown "calling AE title". An application is known if and only if it is defined per configuration.

The PCR ELEVA AE rejects association requests from applications that do not address the PCR ELEVA AE, i.e. that offer a wrong "called AE title".

The AE association rejection policies are summarized in Table 33.

Table 33: DICOM Association Rejection Policies

Result	Source	Reason/Diagnosis	Explanation
1 – rejected-permanent	1 – DICOM UL service-user	1 – no-reason-given	Association is not established due to any problem other than that specified in the rows below. (Example: Problem while decoding the DICOM stream).
		2 – application-context-name-not-supported	An application context name other than 1.2.840.10008.3.1.1.1 is requested by the SCU during association.
		3 – calling-AE-title-not-recognized	- The configuration does not contain a repository having the Calling AE Title as per the association request. - There is a problem in configuration (related to composing the configuration from the SCU and the SCP configuration).
		7 – called-AE-title-not-recognized	The called AE Title in the association request does not match the AE Title as per the configuration.
	2 – DICOM UL service-provider (ACSE related function)	1 – no-reason-given	Not used.
		2 – protocol-version-not-supported	Not used.
	3 – DICOM UL service-provider (presentation related function)	1 – temporary-congestion	Not used.
		2 – local-limit-exceeded	Not used.
2 – rejected-transient	1 – DICOM UL service-user	1 – no-reason-given	Not used.
		2 – application-context-name-not-supported	Not used.
		3 – calling-AE-title-not-recognized	Not used.
		7 – called-AE-title-not-recognized	Not used.
	2 – DICOM UL service-provider (ACSE related function)	1 – no-reason-given	Maximum number of associations is exceeded and an association request is received.
		2 – protocol-version-not-supported	Not used.

Result	Source	Reason/Diagnosis	Explanation
	3 – DICOM UL service-provider (presentation related function)	1 – temporary-congestion	Not used.
		2 – local-limit-exceeded	Not used.

The behavior of the AE during association abort is summarized in Table 34.

Table 34: DICOM Association Abort Handling

Source	Reason/Diagnosis	Behavior
0 – DICOM UL service-user	0 – reason-not-specified	When received, the PCR Eleva terminates the connection with the following log: Association ABORTED by peer (0: ABORT_SOURCE_dul_user, 0: ABORT_REASON_not_specified). Sent when: Association times out due to inactivity Any other problem than ones specified in the rows below. (Examples: Problem while decoding the DICOM stream, Invalid request, Echo SCP was unable to send the Response to SCU, Error writing to SCU stream).
2 – DICOM UL service-provider	0 – reason-not-specified	When received, the PCR Eleva terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 0: ABORT_REASON_not_specified)
	1 – unrecognized-PDU	When received, the PCR Eleva terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 1: ABORT_REASON_unrecognized_pdu). Sent when: An unrecognized PDU type is received.
	2 – unexpected-PDU	When received, the PCR Eleva terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 2: ABORT_REASON_unexpected_pdu). Sent when: The received PDU type is not expected in the current state of connection.
	4 – unrecognized-PDU parameter	When received, the PCR Eleva terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 4: ABORT_REASON _unrecognized_pdu_parameter). Sent when: An unrecognized Associate PDU item is received.

Source	Reason/Diagnosis	Behavior
	5 – unexpected-PDU parameter	When received, the PCR Eleva terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 5: ABORT_REASON _unexpected_pdu_parameter). Sent when: One of the Associate PDU items is received more than once. One of the Associate PDU items is received unexpectedly.
	6 – invalid-PDU-parameter value	When received, the PCR Eleva terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 6: ABORT_REASON _invalid_pdu_parameter). Sent when: One of the Associate PDU items is received more than once. One of the Associate PDU items is not received. Empty Called AE Title String (space-only) is received. Empty Calling AE Title String (space-only) is received. Unknown abstract syntax is received The length or the format of the received PDU item is invalid.

4.2.1.4.1. Real-World Activity: Verify

4.2.1.4.1.1. Description and Sequencing of Activities

The PCR ELEVA AE accepts associations from systems that whish to verify application level communication using the C-ECHO command.
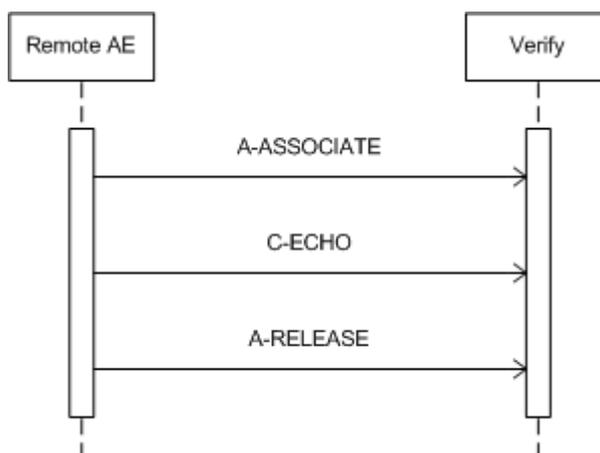
Figure 10: Sequencing of RWA Verify

4.2.1.4.1.2. Accepted Presentation Contexts

The following table gives an overview of the presentation context accepted by the PCR ELEVA AE.

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Verification	1.2.840.10008.1.1	ILE	1.2.840.10008.1.2	SCP	None
		ELE	1.2.840.10008.1.2.1	SCP	None
		EBE	1.2.840.10008.1.2.2	SCP	None

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

4.2.1.4.1.3. SOP Specific Conformance for SOP Classes

PCR Eleva provides standard conformance to the DICOM Verification Service Class.

Table 35: Verification C-ECHO Response Status Handling Behavior

Service Status	Code	Further Meaning	Behavior
Success	0000	Verification is complete	The PCR Eleva has successfully received the verification request.

4.3.   Network Interfaces

4.3.1. Physical Network Interface

The PCR Eleva provides DICOM 3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM 3.0 Standard.

The PCR Eleva system supports ISO 8802-3 10BASE-T and 100Base-TX Ethernet.

4.3.2. Additional Protocols

No additional protocols are used.

4.4. Configuration

The configuration of a PCR Eleva system is done by means of updating the configuration database. This should be done by Philips service engineers only.

4.4.1. AE Title/Presentation Address Mapping

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

4.4.1.1. Local AE Titles

The local AE title mapping and configuration is as specified in the following table.

Table 36: AE Title Configuration Table

Application Entity	Default AE Title	Default TCP/IP Port
PCR ELEVA AE	PCREleva01	3010

4.4.1.2. Remote AE Title/Presentation Address Mapping

All remote applications to be selected as destination (SCP) are configurable for the following items:
➢ The Application Entity Title of the remote application.
➢ The Presentation Address of where the remote application should accept association requests.

4.4.2. Parameters

This section specifies important operational parameters and, if configurable, their default value and range.

Table 37: Configuration Parameters

Parameter	Configurable	Default Value
General Parameters		
Maximum PDU receive size	No	-
Maximum PDU send size	Yes	16384
Maximum number of simultaneous associations	Yes	2
Artim Timeout Specifies the time in seconds of the ARTIM (Association Request/Reject/Release TIMer). Allowed values: 0: unlimited waiting time 0 < n: real time in seconds	Yes	60 [seconds]
Automatic Association Timeout Specifies the association inactivity timeout in seconds after which the association is closed automatically. Allowed values: -1: immediate timeout 0: unlimited waiting time 0 < n: real time in seconds	Yes	0 [unlimited]
Transfer Syntax support: ILE, ELE, EBE	Yes	ILE, ELE, EBE
Storage Specific Parameters		
Automatic export to a configurable destination	Yes	-

Parameter	Configurable	Default Value
Storage Commitment Specific Parameters		
Storage Commit Max Reply Waiting Time Specifies the time in seconds that is waited for a storage commitment event report message. After this time the association will be terminated Allowed values: -1: immediate timeout 0: unlimited waiting time 0 < n: real time in seconds	Yes	-1 [asynchronous]
Basic Worklist Management Specific Parameters		
RIS query timeout Specifies the time after which the query is automatically aborted Allowed values: 1- 300 minutes	Yes	240 [minutes]
Background broad query time interval Specifies the time until the background query will be repeated. Allowed values: 0: no broad query 0 < n: real time in minutes	Yes	0 [no broad query]
Print Management Specific Parameters		
Automatic print to a configurable destination	Yes	-

5. MEDIA INTERCHANGE

5.1.   Implementation Model

No media implemented on the PCR Eleva

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6. SUPPORT OF CHARACTER SETS

Any support for character sets beyond the default character repertoire in Network and Media services shall be described here.

Table 38: Supported DICOM Character Sets of PCR Eleva

Character Set Description	Defined Term	ESC Sequence	ISO Registration Number	Code Element	Character Set
Single-byte Character Sets without Code Extensions					
Latin alphabet No. 1	ISO_IR 100	-	ISO-IR 6	G0	ISO 646
		-	ISO-IR 100	G1	Supplementary set of ISO 8859

7. SECURITY

7.1. Security Profiles

The PCR Eleva does not support any specific security measures.

8. ANNEXES

8.1. IOD Contents

8.1.1. Created SOP Instances

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

Recommended abbreviations to be used for the IOD tables are:

ALWAYS	the module is always present
CONDITIONAL	the module is used under specified condition

Recommended abbreviations to be used for the module tables 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 Not Always Present
VNAPCV	Value is Not Always Present (attribute sent zero length if Condition applies and no Value is present)
ANAPEV	the Attribute is Not Present if Empty Value

Recommended abbreviations to be used for the source of the data values in the tables 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 source is a 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. Computed Radiography Image IOD

Table 39: IOD of Created Computed Radiography Image module

Table 40: IOD of created CR Image module

IE	Module	Reference	Presence of Module
Patient	Patient Module	Table 42	ALWAYS
	Patient Medical Module	Table 43	ALWAYS
Study	General Study Module	Table 44	ALWAYS
	Study Scheduling Module	Table 45	ALWAYS
	Patient Study Module	Table 46	ALWAYS
Series	General Series Module	Table 47	ALWAYS

	CR Series Module	Table 48	ALWAYS
Equipment	General Equipment Module	Table 49	ALWAYS
Image	General Image Module	Table 51	ALWAYS
	Image Pixel Module	Table 52	ALWAYS
	Image Plane Module	Table 54	ALWAYS
	CR Image Module	Table 55	ALWAYS
	Contrast/Bolus Module	Table 56	CONDITIONAL
	X-Ray Acquisition Module	Table 57	ALWAYS
	Modality LUT module	Table 58	ALWAYS
	Overlay Plane Module	Table 59	CONDITIONAL
	VOI LUT	Table 60	ALWAYS
	SOP Common	Table 61	ALWAYS
Additional	Performed Procedure Step Information Module	Table 62	CONDITIONAL
	Requested Procedure Module	Table 63	CONDITIONAL
	Imaging Service Request Module	Table 64	CONDITIONAL

8.1.1.2. Secondary Capture Image IOD

Table 41: IOD of Created Secondary Capture Image module

IE	Module	Reference	Presence of Module
Patient	Patient Module	Table 42	ALWAYS
Study	General Study Module	Table 44	ALWAYS
	Patient Study Module	Table 46	ALWAYS
Series	General Series Module	Table 47	ALWAYS
Equipment	General Equipment Module	Table 49	ALWAYS
	SC Equipment Module	Table 50	ALWAYS
Image	General Image Module	Table 51	ALWAYS
	Image Pixel Module	Table 52	ALWAYS
	SC Image Module	Table 53	ALWAYS
	Modality LUT Module	Table 58	ALWAYS
	VOI LUT Module	Table 60	ALWAYS
	SOP Common Module	Table 61	ALWAYS

8.1.1.3. General Modules

Table 42: Patient Module

Attribute Name	Tag	VR	Value	Presence of Value	Source
Patient's Name	0010,0010	PN		VNAP	MWL / USER
Patient ID	0010,0020	LO		ALWAYS	MWL / AUTO
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
Patient Comments	0010,4000	LT		ANAP	MWL / USER

Table 43: Patient Medical Module

Attribute Name	Tag	VR	Value	Presence of Value	Source
Medical Alerts	0010,2000	LO		ANAP	MWL / USER
Contrast Allergies	0010,2110	LO		ANAP	MWL / USER
Additional Patient History	0010,21B0	US		ANAP	MWL / USER
Pregnancy Status	0010,21C0	US		ANAP	MWL / USER
Special Needs	0038,0050	LO		ANAP	MWL / USER
Patient State	0038,0500	LO		ANAP	USER

Table 44: General Study Module

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

Table 45: Study Scheduling Module

Attribute Name	Tag	VR	Value	Presence of Value	Source
Requesting Physician	0032,1032	PN		ANAP	MWL / USER
Requesting Service	0032,1033	LO		ANAP	AUTO
Requested Procedure Description	0032,1060	LO		ANAP	AUTO

Table 46: Patient Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source
Patient's Size	0010,1020	DS		ANAP	AUTO
Patient's Weight	0010,1030	DS		ANAP	AUTO
Additional Patient's History	0010,21B0	LT		ANAP	AUTO

Table 47: General Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source
Modality	0008,0060	CS	CR	ALWAYS	AUTO
Series Instance UID	0020,000E	UI		ALWAYS	AUTO
Series Number	0020,0011	IS		ALWAYS	AUTO

Laterality	0020,0060	CS		VNAP	CONFIG / USER
Performing Physicians' Name	0008,1050	PN		ANAP	MWL
Operators' Name	0008,1070	PN		ALWAYS	AUTO / USER
Referenced Performed Procedure Step Sequence	0008,1111	SQ		ALWAYS	AUTO
>Referenced SOP Class UID	0008,1150	UI		ALWAYS	AUTO
>Referenced SOP Instance UID	0008,1155	UI		ALWAYS	AUTO
Body Part Examined	0018,0015	CS		VNAP	AUTO / USER
Protocol Name	0018,1030	LO		ALWAYS	AUTO
Performed Procedure Step Start Date	0040,0244	DA		ANAP	AUTO
Performed Procedure Step Start Time	0040,0245	TM		ANAP	AUTO
Performed Procedure Step ID	0040,0253	SH		ANAP	AUTO
Performed Procedure Step Description	0040,0254	LO		ANAP	MWL

Table 48: CR Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source
Body Part Examined	0018,0015	CS	(Only for CR)	VNAP	AUTO / USER
View Position	0018,5101	CS	(Only for CR)	VNAP	AUTO / USER

Table 49: General Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source
Manufacturer	0008,0070	LO	"Philips Medical Systems"	ALWAYS	AUTO
Institution Name	0008,0080	LO		ALWAYS	CONFIG
Institution Address	0008,0081	ST		ALWAYS	CONFIG
Station Name	0008,1010	SH		ALWAYS	CONFIG
Institutional Department Name	0008,1040	LO		ALWAYS	CONFIG
Manufacturer's Module Name	0008,1090	LO	"PCR Eleva"	ALWAYS	AUTO
Device Serial Number	0018,1000	LO		ALWAYS	AUTO
Software Versions	0018,1020	LO		ALWAYS	AUTO
Spatial Resolution	0018,1050	DS		ALWAYS	AUTO

Table 50: SC Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source
Modality	0008,0060	CS	CR (only for SC)	ALWAYS	AUTO
Conversion Type	0008,0064	CS	WSD (only for SC)	ALWAYS	AUTO

Table 51: General Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source
Image Type	0008,0008	CS	"ORIGINAL","PRIMARY"	ALWAYS	AUTO
Content Date	0008,0023	DA		ALWAYS	AUTO
Content Time	0008,0033	TM		ALWAYS	AUTO
Instance Number	0020,0013	IS		ALWAYS	AUTO
Patient Orientation	0020,0020	CS		VNAP	AUTO /

					USER
Burned in Annotation	0028,0301	CS	""	ALWAYS	AUTO
Presentation LUT Shape	2050,0020	CS		ALWAYS	AUTO

Table 52: Image Pixel Module

Attribute Name	Tag	VR	Value	Presence of Value	Source
Samples per Pixel	0028,0002	US	1	ALWAYS	AUTO
Photometric Interpretation	0028,0004	CS	(Only for SC)	ALWAYS	AUTO
Planar Configuration	0028,0006	US	(Only for SC)	ALWAYS	AUTO
Row	0028,0010	US		ALWAYS	AUTO
Columns	0028,0011	US		ALWAYS	AUTO
Pixel Aspect Ratio	0028,0034	IS	1 / 1	ALWAYS	AUTO
Bits Allocated	0028,0100	US	16	ALWAYS	AUTO
Bits Stored	0028,0101	US	10, 12	ALWAYS	AUTO
High Bit	0028,0102	US	9, 11	ALWAYS	AUTO
Pixel Representation	0028,0103	US	0	ALWAYS	AUTO
Pixel Data	7FE0,0010	OW		ALWAYS	AUTO

Table 53: SC Image Module Module

Attribute Name	Tag	VR	Value	Presence of Value	Source
Date of Secondary Capture	0018,1012	DA		ALWAYS	AUTO
Time of Secondary Capture	0018,1014	TM		ALWAYS	AUTO

Table 54: Image Plane Module

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

Table 55: CR Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source
Photometric Interpretation	0028,0004	CS		ALWAYS	AUTO
Plate ID	0018,1004	LO		ALWAYS	AUTO
Imager Pixel Spacing	0018,1164	DS		ALWAYS	AUTO
Acquisition Device Processing Description	0018,1400	LO		ALWAYS	AUTO
Cassette Size	0018,1403	CS		ALWAYS	AUTO
Sensitivity	0018,6000	DS		ALWAYS	AUTO

Table 56: Contrast/Bolus Module

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

Table 57: X-Ray Acquisition Module

Attribute Name	Tag	VR	Value	Presence of Value	Source
Image Area Dose Product	0018,115E	DS		ANAP	USER

Table 58: Modality LUT Module

Attribute Name	Tag	VR	Value	Presence of Value	Source
Rescale Intercept	0028,1052	DS		ALWAYS	AUTO
Rescale Slope	0028,1053	DS		ALWAYS	AUTO
Rescale Type	0028,1054	LO		ALWAYS	AUTO

Table 59: Overlay Plane Module

Attribute Name	Tag	VR	Value	Presence of Value	Source
Overlay Rows	6000,0010	US		ANAP	AUTO
Overlay Columns	6000,0011	US		ANAP	AUTO
Overlay Type	6000,0040	CS		ANAP	AUTO
Overlay Origin	6000,0050	SS		ANAP	AUTO
Overlay Bits Allocated	6000,0100	US		ANAP	AUTO
Overlay Bit Position	6000,0102	US		ANAP	AUTO
Overlay Data	6000,3000	OW		ANAP	AUTO

Table 60: VOI LUT Module

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

Table 61: SOP Common Module

Attribute Name	Tag	VR	Value	Presence of Value	Source
Specific Character SET	0008,0005	CS	ISO_IR 100	ANAPEV	AUTO
SOP Class UID	0008,0016	UI	1.2.840.10008.5.1.4.1.1.7/ 1.2.840.10008.5.1.4.1.1.1	ALWAYS	AUTO
SOP Instance UID	0008,0018	UI		ALWAYS	AUTO

Table 62: Performed Procedure Step Information Module

Attribute Name	Tag	VR	Value	Presence of Value	Source
Performed Station AE Title	0040,0241	AE		ANAP	AUTO
Performed Procedure Step Start Date	0040,0244	DA		ANAP	AUTO
Performed Procedure Step Start Time	0040,0245	TM		ANAP	AUTO
Performed Procedure Step End Date	0040,0250	DA		ANAP	AUTO
Performed Procedure Step End Time	0040,0251	TM		ANAP	AUTO
Performed Procedure Step Status	0040,0252	CS		ANAP	AUTO
Performed Procedure Step Description	0040,0254	LO		ANAP	MWL / USER

Table 63: Requested Procedure Module

Attribute Name	Tag	VR	Value	Presence of Value	Source
Requested Procedure ID	0040,1001	SH		ANAP	MWL
Reason for the Requested Procedure	0040,1002	LO		ANAP	MWL
Requested Procedure Priority	0040,1003	SH		ANAP	MWL
Patient Transport Arrangements	0040,1004	LO		ANAP	MWL
Names of Intended Recipients of Results	0040,1010	PN		ANAP	MWL
Requested Procedure Comments	0040,1400	LT		ANAP	MWL
Reason for the Imaging Service Request (RETIRED)	0040,2001	LO		ANAP	MWL

Table 64: Imaging Service Request Module

Attribute Name	Tag	VR	Value	Presence of Value	Source
Issue Date of Imaging Service Request	0040,2004	DA		ANAP	MWL
Imaging Service Request Comments	0040,2400	LT		ANAP	MWL

8.1.2. Usage of Attributes from Received IOD's

Each application that depends on certain fields to function correctly should specify which ones are required for it to perform its intended function.

8.1.3. Attribute Mapping

The following table shows the relation between BWLM and MPPS and image storage attributes.

Table 65: Attribute Mapping during Modality Workflow

Name	BWLM Tag	MPPS Create Tag	MPPS Set Tag	Image IOD Tag
Accession Number	0008,0050	0008,0050	-	0008,0050
Modality	-	0008,0060	-	0008,0060
Referring Physician's Name	0008,0090	-	-	0008,0090
Operators' Name	-	-	0008,1070	0008,1070
Referenced Study Sequence	0008,1110	0008,1110	-	0008,1110
Referenced Image Sequence	-	-	(0008,1140)	-
> Referenced SOP Class UID SOP Class UID	-	-	0008,1150	0008,0016
> Referenced SOP Instance UID SOP Instance UID	-	-	0008,1155	0008,0018
Patient's Name	0010,0010	0010,0010	-	0010,0010
Patient ID	0010,0020	0010,0020	-	0010,0020
Issuer of Patient ID	0010,0021	0010,0021	-	0010,0021
Patient's Birth Date	0010,0030	0010,0030	-	0010,0030
Patient's Sex	0010,0040	0010,0040	-	0010,0040
Other Patient IDs	0010,1000	0010,1000	-	0010,1000
Medical Alerts	0010,2000	-	-	0010,2000
Contrast Allergies	0010,2110	-	-	0010,2110
Ethnic group	0010,2160	-	-	0010,2160

Name	BWLM Tag	MPPS Create Tag	MPPS Set Tag	Image IOD Tag
Additional Patient History	0010,21B0	-	-	0010,21B0
Pregnancy Status	0010,21C0	-	-	0010,21C0
Patient Comments	0010,4000	-	-	0010,4000
Protocol Name	-	-	0018,1030	0018,1030
Study Instance UID	0020,000D	0020,000D	-	0020,000D
Series Instance UID			0020,000E	0020,000E
Study ID	-	0020,0010	-	0020,0010
Requesting Service	0032,1033	-	-	0032,1033
Requested Procedure Description	0032,1060	0032,1060	-	-
Requested Procedure Code Sequence[3]	0032,1064	0008,1032	0008,1032	0008,1032
Performed Procedure Code Sequence				
Special Needs	0038,0050	-	-	0038,0050
Patient State	0038,0500	-	-	0038,0500
Scheduled Procedure Step Description[4]	0040,0007	0040,0007	-	0040,0007
Performed Procedure Step Description		0040,0254	-	0040,0254
Scheduled Protocol Code Sequence[4]	0040,0008	0040,0260	0040,0260	0040,0008
Performed Protocol Code Sequence				0040,0260
Scheduled Procedure Step ID	0040,0009	0040,0009	-	0040,0009
Performed Procedure Step Start Date	-	0040,0244	-	0040,0244
Performed Procedure Step Start Time	-	0040,0245	-	0040,0245
Performed Procedure Step ID	-	0040,0253	-	0040,0253
Requested Procedure ID	0040,1001	0040,1001	-	0040,1001

Note 1: Value accumulated from all performed acquisitions including dropped (repeated) acquisitions.
Note 2: Image related specific value.
Note 3: If procedure is performed as requested.
Note 4: If protocol is performed as scheduled.

8.1.4. Coerced/Modified fields

8.2.   Data Dictionary of Private Attributes

Not applicable.

8.3.   Coded Terminology and Templates

Not applicable.

8.4.   Grayscale Image consistency

The monitor of PCR Eleva system can be calibrated according Grayscale Display Function Standard.

The pixel values exported and printed should be interpreted as P-Value. If the export destination or the printer does not support GSDF, PCR Eleva provides calibration tools to adapt to this device to afford grayscale image consistency. The calibration takes into account ambient luminance and lightbox luminance.

8.5.   Standard Extended/Specialized/Private SOPs

Not applicable.

8.6.   Private Transfer Syntaxes

Not applicable.