DICOM Conformance Statement

MammoDiagnost DR 2.0

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PHILIPS

Issued by:
Philips Medical Systems Nederland BV, a Philips Healthcare company,

P.O. Box 10.000
5680 DA Best
The Netherlands

Email: dicom@philips.com
Internet: http://www.healthcare.philips.com/connectivity

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1. DICOM Conformance Statement Overview

This document is the DICOM Conformance Statement for the Philips Medical Systems MammoDiagnost DR 2.0.

This DICOM Conformance Statement for the Philips Medical Systems MammoDiagnost DR 2.0 is based on the PII 9.1 platform.

The figure below shows the position of the MammoDiagnost DR 2.0 in a radiology environment.

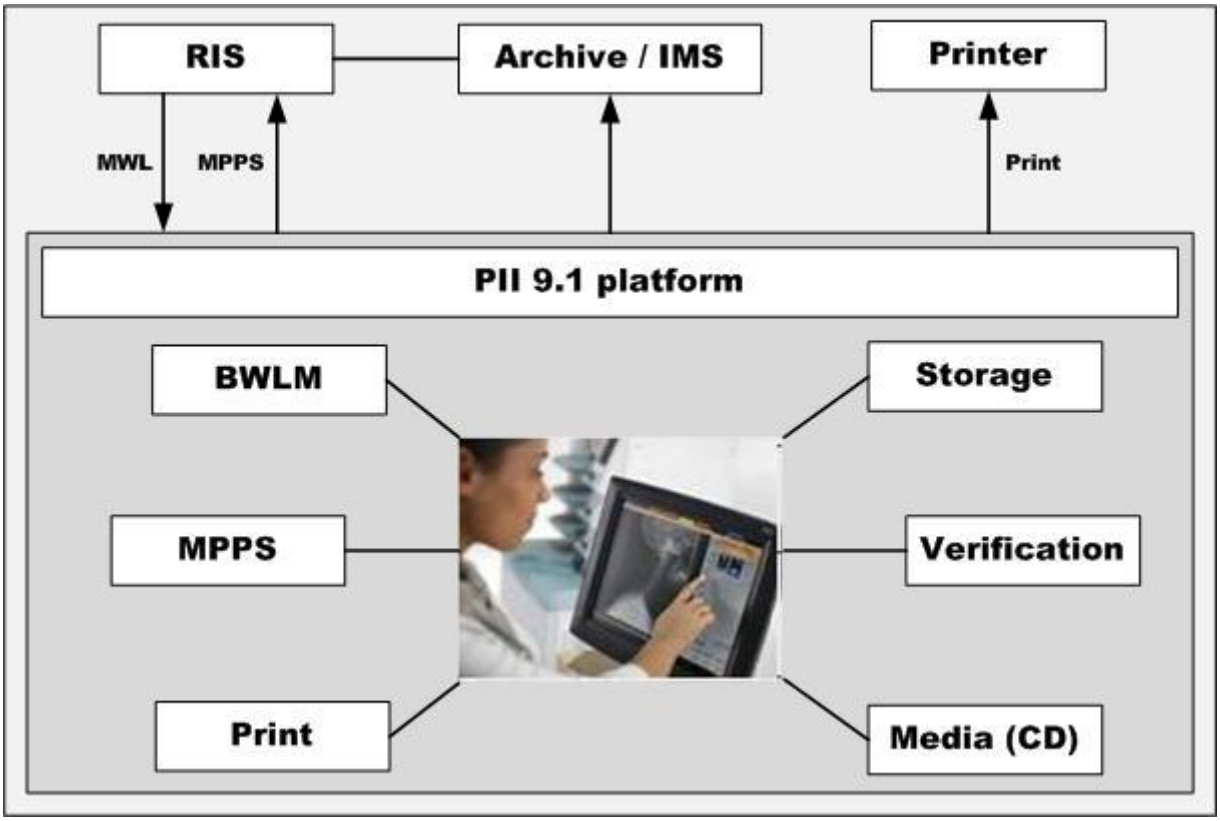

Figure 1: Eleva Workspot in a DICOM network

MammoDiagnost DR 2.0 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.
- Commitment of stored images on a remote DICOM system (Push Model)
- Study management per Modality Performed Procedure Step (MPPS)
- Printing of hardcopies on a remote DICOM Printer.
- Storage of images per DICOM Media only on Compact Disc (CD)

A table of supported network DICOM Service (SOP) classes is provided with roles (User (SCU)/ Provider (SCP)).

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
>Presentation LUT SOP Class	1.2.840.10008.5.1.1.23	Yes	No
Transfer			
Computed Radiography Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.1	Yes	No
Digital Mammography X-Ray Image Storage - Pres. SOP	1.2.840.10008.5.1.4.1.1.1.2	Yes	No
Digital Mammography X-Ray Image Storage - Proc. SOP	1.2.840.10008.5.1.4.1.1.1.2.1	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

The services can be specified as a SCU, SCP or as an Option, which means that it is either configurable or that it can be purchased separately.

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

Table 2: Media Services

Media Storage Application Profile	File-set Creator (FSC)	File-set Updater (FSU)	File-set Reader (FSR)
Compact Disk-Recordable			
General Purpose CD-R Interchange	Yes	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 3: Revision History

Document Version	Date of Issue	Status	Description
00	17-Jun-2011	Final	Updated after review.

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 the user (or user's agent) to specify the appropriate test suite and to carry out the additional validation tests.

- **New versions of the DICOM Standard**
  The DICOM Standard will evolve in future to meet the user's growing requirements and to incorporate new features and technologies. Philips is actively involved in this evolution and plans to adapt its equipment to future versions of the DICOM Standard. In order to do so, Philips reserves the right to make changes to its products or to discontinue its delivery. The user should ensure that any non-Philips provider linking to Philips equipment also adapts to future versions of the DICOM Standard. If not, the incorporation of DICOM enhancements into Philips equipment may lead to loss of connectivity (in case of networking) and incompatibility (in case of media).

3.4. Definitions, Terms and Abbreviations

Table 4: Definitions, Terms and Abbreviations

Abbreviation/Term	Explanation
AE	Application Entity
AP	Application Profile
CD	Compact Disc
CD-R	CD-Recordable
CR	Computed Radiography
DICOM	Digital Imaging and Communications in Medicine
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
MG	Digital Mammography X-Ray
MPPS	Modality Performed Procedure Step
NEMA	National Electrical Manufacturers Association
NM	Nuclear Medicine
OT	Other
PDU	Protocol Data Unit
PX	Panoramic X-Ray
RF	X-Ray Radiofluoroscopic
RIS	Radiology Information System
RWA	Real-World Activity
SC	Secondary Capture
SCM	Study Component Management
SCP	Service Class Provider
SCU	Service Class User
SOP	Service Object Pair
TCP/IP	Transmission Control Protocol/Internet Protocol
UID	Unique Identifier
US	Ultrasound
WLM	Worklist Management
XA	X-Ray Angiographic

3.5. References

[DICOM] Digital Imaging and Communications in Medicine, Parts 1 - 18 (NEMA PS 3.1- PS 3.18),
National Electrical Manufacturers Association (NEMA)
Publication Sales 1300 N. 17th Street, Suite 1752 Rosslyn, Virginia. 22209, United States of America
Internet: http://medical.nema.org/
Note that at any point in time the official standard consists of the most recent yearly edition of the base standard (currently 2009) plus all the supplements and correction items that have been approved as Final Text.

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 Mammo Diagnost DR 2.0 system consists of one single application entity only the Mammo Diagnost DR 2.0 Entity (Eleva AE).

The figure below shows the networking application data flow as a functional overview of the Eleva AE.

It incorporates the following functionality:
The Eleva AE can verify application level communication by using the Verification service as SCP.
The Eleva AE can request a worklist by using the Basic Worklist Management service as SCU.
The Eleva AE can store images by using the Storage service as SCU and use the Storage-Commitment SOP Class perform storage-commit as SCU.
The Eleva AE can compose the Modality Performed Procedure Step by using the Study Management service as SCU.
The Eleva AE can print images by using the Print Management service as SCU Eleva AE.

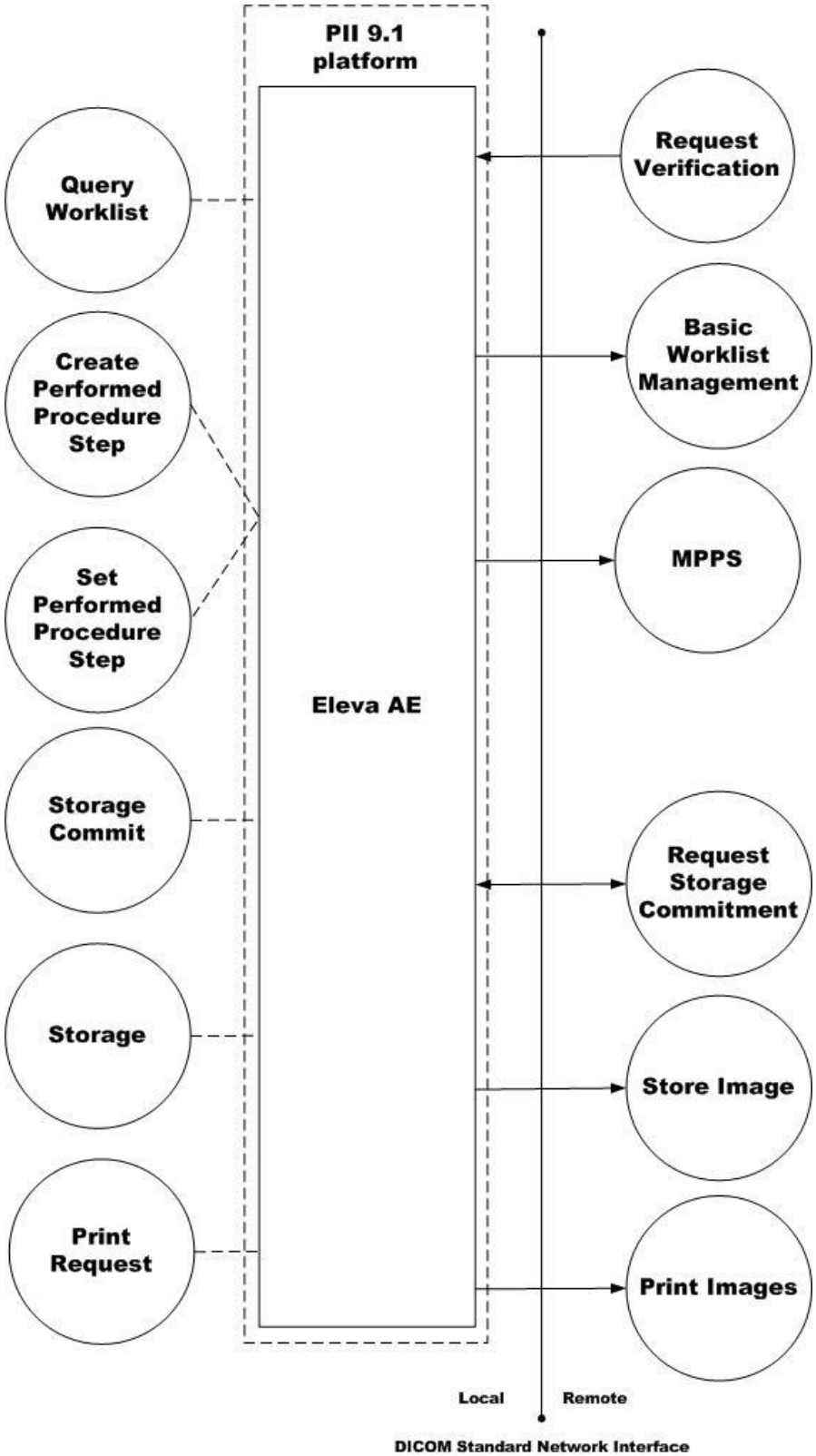

Figure 2: Application Data Flow Diagram

4.1.2. Functional Definition of AE's

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

4.1.2.1. Functional Definition of Eleva

The Eleva AE is the one and only entity within the Mammo Diagnost DR 2.0. It includes the following service classes.

Verification Service Class:
The Eleva AE provides the Verification service as SCP and SCU.

A remote SCU shall request an association with the Eleva AE for Verification SOP class. After accepting the association the Eleva AE shall receive and respond to the Verification request and release the association when requested.
After initiating the Verify, the Eleva AE shall request an association with the selected remote SCP for the Verification SOP class. After accepting the association the Eleva AE shall send the verify request, wait for response, and then release the association.
The user interface shall inform on the status of the verification.

Basic Worklist Management Service Class:
The Eleva AE may use the Basic Worklist Management service as SCU.

After initiating the worklist query the Eleva AE shall request an association with the configured remote Basic Worklist Management SCP. After accepting the association the Eleva AE shall send the find request, wait for response, and the release the association. The user interface shall be updated with the query results.

Storage Service Class:
The Eleva AE may use the Storage service as SCU.

During or after a performed procedure step the 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 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 and in case of failure, the error is notified and logged with the option to redo the job.

Storage Commitment Service Class:
The Eleva AE may use the Storage Commitment service as SCU.

If storage commitment is configured, then, after Store images, the Eleva AE shall automatically request commitment of images at the configured Storage Commitment SCP. It shall request an association with the remote Storage Commitment SCP for the Storage Commitment SOP class. After accepting the association the Eleva AE shall send the action request, wait for response, and then release the association.
Depending on the configuration the storage commitment report may be received either synchronous or asynchronous.
In case of a storage commitment failure, the error is notified and logged.

Basic Grayscale Print Management Meta Class:
The Eleva AE may use the Basic Grayscale Print Management service as SCU.
During or after a performed procedure step, the Eleva AE shall request printing of the images by the configured Print SCP. It shall request an association with the remote Print SCP for the Basic Grayscale Print Management SOP class. After accepting the association the Eleva AE shall send the requests, wait for responses, and then release the association.
Depending on the status and the configuration the Eleva AE may retry to print.

Modality Performed Procedure Step Service Class:
The Eleva AE may use the Modality Performed Procedure Step service as SCU.

After performing a procedure step the Eleva AE shall request an association with the configured remote Study Management SCP. After accepting the association the Eleva AE shall send a create request, wait for response, and then release the association. Next the Eleva AE shall request a new association to send a set request, and after response, release the association.

Depending on the status of creates and set and the configuration the Eleva AE may perform a retry.
The user interface shall be updated with the performed procedure step status.

4.1.3. Sequencing of Real World Activities

The figure blow 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 (acquiring the first image), the RIS is notified (Create Performed Procedure Step).
After the user performs an 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 printer 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.

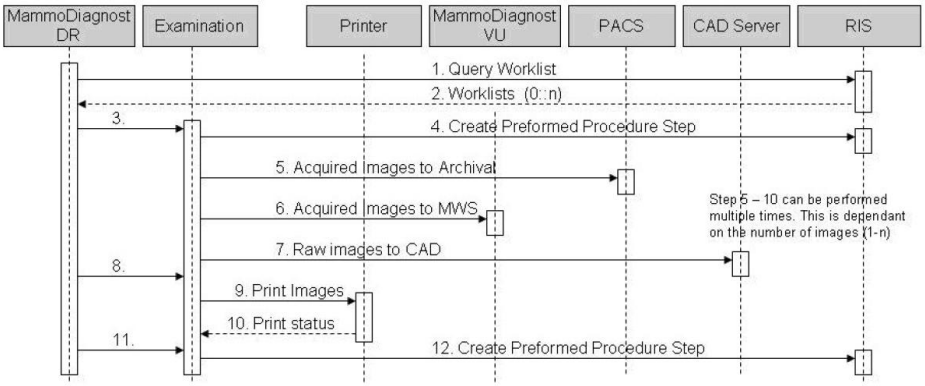

Figure 3: Sequence of an examination

4.2. AE Specifications

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

4.2.1. Eleva

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

4.2.1.1. SOP Classes

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

Table 5: SOP Classes for Eleva

SOP Class Name	SOP Class UID	SCU	SCP
Verification SOP Class	1.2.840.10008.1.1	Yes	Yes
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
Computed Radiography Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.1	Yes	No
Digital Mammography X-Ray Image Storage - Pres. SOP	1.2.840.10008.5.1.4.1.1.1.2	Yes	No
Digital Mammography X-Ray Image Storage - Proc. SOP	1.2.840.10008.5.1.4.1.1.1.2.1	Yes	No
Modality Worklist Information Model - FIND SOP Class	1.2.840.10008.5.1.4.31	Yes	No
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
>Presentation LUT SOP Class	1.2.840.10008.5.1.1.23	Yes	No

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

4.2.1.2. Association Policies

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

4.2.1.2.1. General

The DICOM standard application context is specified below.

Table 6: DICOM Application Context

Description	Value
Application Context Name	1.2.840.10008.3.1.1.1

4.2.1.2.2. Number of Associations

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

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

Description	Value
Maximum number of simultaneous associations	2

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

Description	Value
Maximum number of simultaneous associations	1

4.2.1.2.3. Asynchronous Nature

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

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

Description	Value
Maximum number of outstanding asynchronous transactions	0

4.2.1.2.4. Implementation Identifying Information

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

Table 10: DICOM Implementation Class and Version for Eleva

Implementation Class UID	1.3.46.670589.30.32.0
Implementation Version Name	PMS_ELEVA_32.0

4.2.1.2.5. Communication Failure Handling

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

Table 11: Communication Failure Behavior

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

4.2.1.3. Association Initiation Policy

The Application Entity will respond to a received Association rejection as shown in the next table.

Table 12: Association Rejection response

Result	Source	Reason/Diagnosis	Behavior
1 - rejected-permanent	1 - DICOM UL service-user	1 - no-reason-given	Association is not established. The following error is logged. Association rejected by peer (1: REJECT_RESULT_permanent, 1: REJECT_SOURCE_dul_user, 1: REJECT-REASON_no_reason_given)
		2 - application-context-name-not supported	Association is not established. The following error is logged. Association rejected by peer (1: REJECT_RESULT_permanent, 1: REJECT_SOURCE_dul_user, 2: REJECT-REASON_application_context_not_support)
		3 - calling-AE-title-not-recognized	Association is not established. The following error is logged. Association rejected by peer (1: REJECT_RESULT_permanent, 1: REJECT_SOURCE_dul_user, 3: REJECT-REASON_calling_aetitle_not_recognized)

Result	Source	Reason/Diagnosis	Behavior
		7 - called-AE-title-not-recognized	Association is not established. The following error is logged. Association rejected by peer (1: REJECT_RESULT_permanent, 1: REJECT_SOURCE_dul_user, 7: REJECT-REASON_called_aetitle_not_recognized)
	2 - DICOM UL service-provider (ACSE related function)	1 - no-reason-given	Association is not established. The following error is logged. Error: UserRecoverable: impl.dicom.access.PEER: Association rejected 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)
		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 the next table.

Table 13: Association Abort Handling

Source	Reason/Diagnosis	Behavior
0 - DICOM UL service-user (initiated abort)	0 - reason-not-specified	When received, the Eleva Workspot terminates the connection with the following log: Association ABORTED by peer (0: ABORTED_SOURCE_dul_user, 0: ABORT_REASON_not_specified).
2 - DICOM UL service-provider (initiated abort)	0 - reason-not-specified	When received, the Eleva Workspot terminates the connection with the following log: Association ABORTED by peer (2: ABORTED_SOURCE_dul_provider, 0: ABORT_REASON_not_specified).
	1 - unrecognized-PDU	When received, the Eleva Workspot terminates the connection with the following log: Association ABORTED by peer (2: ABORTED_SOURCE_dul_provider, 1: ABORT_REASON_unrecognized_pdu).
	2 - unexpected-PDU	When received, the Eleva Workspot terminates the connection with the following log: Association ABORTED by peer (2: ABORTED_SOURCE_dul_provider, 2: ABORT_REASON_unexpected_pdu).
	4 - unrecognized-PDU-parameter	When received, the Eleva Workspot terminates the connection with the following log: Association ABORTED by peer (2: ABORTED_SOURCE_dul_provider, 4: ABORT_REASON_unrecognized_pdu_parameter).
	5 - unexpected-PDU-parameter	When received, the Eleva Workspot terminates the connection with the following log: Association ABORTED by peer (2: ABORTED_SOURCE_dul_provider, 5: ABORT_REASON_unexpected_pdu_parameter).
	6 - invalid-PDU-parameter-value	When received, the Eleva Workspot terminates the connection with the following log: Association ABORTED by peer (2: ABORTED_SOURCE_dul_provider, 6: ABORT_REASON_invalid_pdu_parameter).

The behavior of the AE on receiving an association abort is summarized in next table.

Table 14: 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 – Verification as SCU

4.2.1.3.1.1. Description and Sequencing of Activities

On the system, the dialogue is placed in System->Settings->Quality assurance->DICOM verification.
The verification can be performed for each configured AET and is part 3 in an incremental 3-step-test:

- ping (IP level)
- DICOM Association establishment
- DICOM Verification

The result on each level is displayed (OK / Failed).

4.2.1.3.1.2. Proposed Presentation Contexts

The presentation contexts are defined in the next table.

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

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

4.2.1.3.1.3. SOP Specific Conformance for Verification SOP Class

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

4.2.1.3.1.3.1. Dataset Specific Conformance for Verification C-ECHO SCU

Detail regarding the Dataset Specific response behavior will be reported in this section.

4.2.1.3.2. (Real-World) Activity – Modality worklist as SCU

4.2.1.3.2.1. Description and Sequencing of Activities

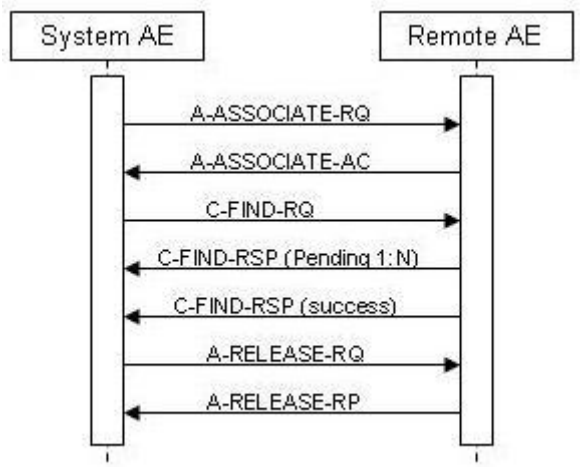

Figure 4: (Real World) Activity - Modality Worklist as SCU

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

This RWA may be initiated in two ways.

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

After clicking the Patient Query button - entering and confirming the matching key values - the Eleva AE shall request an association with the configured remote Basic Worklist Management SCP. When the association is accepted the 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.

4.2.1.3.2.2. Proposed Presentation Contexts

The presentation contexts are defined in the next table.

Table 16: Proposed Presentation Contexts for (Real-World) Activity – Modality worklist As SCU

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Modality Worklist Information Model - FIND SOP Class	1.2.840.10008.5.1.4.31	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		

4.2.1.3.2.3. SOP Specific Conformance for Modality Worklist Information Model - FIND SOP Class

This section includes the SOP specific behavior, i.e. error codes, error and exception handling, time-outs, etc.
Behavior of an Application Entity SOP class is summarized as shown in next Table.
The standard as well as the manufacturer specific status codes and their corresponding behavior are specified.

4.2.1.3.2.3.1. Dataset Specific Conformance for Patient Query

Detail regarding the Dataset Specific response behavior will be reported in this section.
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: Return Keys. An “X” will indicate that 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.

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 17: Worklist Request Identifier

Attribute Name	Tag	VR	M	R	Q	D	IOD	Type of Matching	Comment
Patient Identification Module									
Other Patient IDs	0010,1000	LO		X					
Patient ID	0010,0020	LO	X	X	X	X		Single Value,Universal	
Patient's Name	0010,0010	PN	X	X	X	X		Single Value,Universal, WildCard	
Issuer of Patient ID	0010,0021	LO		X					
Patient Demographic Module									
Confidentiality Constraint on Patient Data Description	0040,3001	LO		X		X			
Ethnic Group	0010,2160	SH		X		X			
Occupation	0010,2180	SH		X		X			
Patient Comments	0010,4000	LT		X		X			
Patient's Age	0010,1010	AS							
Patient's Birth Date	0010,0030	DA		X		X			
Patient's Sex	0010,0040	CS		X		X			
Patient's Size	0010,1020	DS		X		X			
Patient's Weight	0010,1030	DS		X		X			
Patient Medical Module									
Additional Patient History	0010,21B0	LT		X		X			
Allergies	0010,2110	LO		X		X			
Medical Alerts	0010,2000	LO		X		X			
Pregnancy Status	0010,21C0	US		X		X			
Special Needs	0038,0050	LO		X					
Visit Status Module									
Current Patient Location	0038,0300	LO		X					
SOP Common Module									
Specific Character Set	0008,0005	CS		X			X		If configured
Scheduled Procedure Step Module									
Scheduled Procedure Step Sequence	0040,0100	SQ		X					
>Comments on the Scheduled Procedure Step	0040,0400	LT		X					
>Modality	0008,0060	CS	X	X	X			Single Value,Universal	SOP Classes: CR, DX, OT, US, MG, RF, XA, NM
>Pre-Medication	0040,0012	LO		X					
>Requested Contrast Agent	0032,1070	LO		X				Single Value,Universal	

Attribute Name	Tag	VR	M	R	Q	D	IOD	Type of Matching	Comment
>Scheduled Performing Physician's Name	0040,0006	PN		X					
>Scheduled Procedure Step Description	0040,0007	LO		X		X			
>Scheduled Procedure Step End Date	0040,0004	DA		X					
>Scheduled Procedure Step End Time	0040,0005	TM		X					
>Scheduled Procedure Step ID	0040,0009	SH		X					
>Scheduled Procedure Step Location	0040,0011	SH		X					
>Scheduled Procedure Step Start Date	0040,0002	DA	X	X	X	X			
>Scheduled Procedure Step Start Time	0040,0003	TM		X		X			
>Scheduled Procedure Step Status	0040,0020	CS		X					
>Scheduled Station AE Title	0040,0001	AE	X	X	X			Single Value,Universal	Value: All, Today, Today+Tomorrow, Today+Yesterday, Today+Yesterday+Tomorrow
>Scheduled Station Name	0040,0010	SH		X					
>Scheduled Protocol Code Sequence	0040,0008	SQ		X					
>>Code Meaning	0008,0104	LO		X					
>>Code Value	0008,0100	SH		X					
>>Coding Scheme Designator	0008,0102	SH		X					
>>Coding Scheme Version	0008,0103	SH		X					
Requested Procedure Module									
Names of Intended Recipients of Results	0040,1010	PN		X					
Patient Transport Arrangements	0040,1004	LO		X					
Reason for the Requested Procedure	0040,1002	LO		X					
Requested Procedure Comments	0040,1400	LT		X					
Requested Procedure Description	0032,1060	LO		X		X			
Requested Procedure ID	0040,1001	SH	X	X				Single Value,Universal	
Requested Procedure Priority	0040,1003	SH		X					
Study Instance UID	0020,000D	UI		X					
Referenced Study Sequence	0008,1110	SQ		X					
>Referenced SOP Class UID	0008,1150	UI		X					
>Referenced SOP Instance UID	0008,1155	UI		X					
Requested Procedure Code Sequence	0032,1064	SQ		X					
>Code Meaning	0008,0104	LO		X					
>Code Value	0008,0100	SH		X					
>Coding Scheme Designator	0008,0102	SH		X					
>Coding Scheme Version	0008,0103	SH		X					
Imaging Service Request Module									
Accession Number	0008,0050	SH	X	X	X	X		Single	

Attribute Name	Tag	VR	M	R	Q	D	IOD	Type of Matching	Comment
								Value,Universal	
Imaging Service Request Comments	0040,2400	LT		X					
Issue Date of Imaging Service Request	0040,2004	DA		X					
Reason for the Imaging Service Request (retired)	0040,2001	LO		X					
Referring Physician's Name	0008,0090	PN		X					
Requesting Physician	0032,1032	PN		X					
Requesting Service	0032,1033	LO		X					

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

Table 18: Status Response

Service Status	Error 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.

Table 19: 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.

Patient and Study Merge:
The 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.

Scheduled Procedure Step (= Examination) Merge:
If the 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 ELEVA AE's internal database contains already an SPS with the Scheduled Procedure Step ID (0040,0009) identifying an incoming Scheduled Procedure Step, the behavior 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.

4.2.1.3.2.3.2. Dataset Specific Conformance for Broadcast Query

Detail regarding the Dataset Specific response behavior will be reported in this section.

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:	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 o 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 20: Worklist Request Identifier

Attribute Name	Tag	VR	M	R	Q	D	IOD	Type of Matching	Comment
Patient Identification Module									
Other Patient IDs	0010,1000	LO							
Patient ID	0010,0020	LO				X			
Patient's Name	0010,0010	PN				X			Last name, First name, Prefix, Middle name, Suffix
Issuer of Patient ID	0010,0021	LO							
Patient Demographic Module									
Confidentiality Constraint on Patient Data Description	0040,3001	LO							
Ethnic Group	0010,2160	SH							
Occupation	0010,2180	SH							
Patient Comments	0010,4000	LT							
Patient's Age	0010,1010	AS							
Patient's Birth Date	0010,0030	DA				X			
Patient's Sex	0010,0040	CS				X			
Patient's Size	0010,1020	DS							
Patient's Weight	0010,1030	DS				X			

Attribute Name	Tag	VR	M	R	Q	D	IOD	Type of Matching	Comment
Patient Medical Module									
Additional Patient History	0010,21B0	LT							
Allergies	0010,2110	LO							
Medical Alerts	0010,2000	LO				X			
Pregnancy Status	0010,21C0	US				X			
Special Needs	0038,0050	LO							
Visit Status Module									
Current Patient Location	0038,0300	LO							
SOP Common Module									
Specific Character Set	0008,0005	CS		X			X		If Configured
Scheduled Procedure Step Module									
Scheduled Procedure Step Sequence	0040,0100	SQ							
>Comments on the Scheduled Procedure Step	0040,0400	LT							
>Modality	0008,0060	CS							SOP Classes: CR, DX, OT, US, MG, RF, XA, NM
>Pre-Medication	0040,0012	LO							
>Requested Contrast Agent	0032,1070	LO							
>Scheduled Performing Physician's Name	0040,0006	PN				X			
>Scheduled Procedure Step Description	0040,0007	LO							
>Scheduled Procedure Step End Date	0040,0004	DA							
>Scheduled Procedure Step End Time	0040,0005	TM							
>Scheduled Procedure Step ID	0040,0009	SH							
>Scheduled Procedure Step Location	0040,0011	SH							
>Scheduled Procedure Step Start Date	0040,0002	DA							Values: All, Today, Today+Tomorrow, Today+Yesterday, Today+Yesterday+Tomorrow
>Scheduled Procedure Step Start Time	0040,0003	TM							
>Scheduled Procedure Step Status	0040,0020	CS							
>Scheduled Station AE Title	0040,0001	AE							
>Scheduled Station Name	0040,0010	SH							
>Scheduled Protocol Code Sequence	0040,0008	SQ							
>>Code Meaning	0008,0104	LO							
>>Code Value	0008,0100	SH							
>>Coding Scheme Designator	0008,0102	SH							
>>Coding Scheme Version	0008,0103	SH							
Requested Procedure Module									
Names of Intended Recipients of Results	0040,1010	PN							
Patient Transport Arrangements	0040,1004	LO							
Reason for the Requested Procedure	0040,1002	LO							

Attribute Name	Tag	VR	M	R	Q	D	IOD	Type of Matching	Comment
Requested Procedure Comments	0040,1400	LT							
Requested Procedure Description	0032,1060	LO							
Requested Procedure ID	0040,1001	SH							
Requested Procedure Priority	0040,1003	SH							
Study Instance UID	0020,000D	UI							
Referenced Study Sequence	0008,1110	SQ							
>Referenced SOP Class UID	0008,1150	UI							
>Referenced SOP Instance UID	0008,1155	UI							
Requested Procedure Code Sequence	0032,1064	SQ							
>Code Meaning	0008,0104	LO							
>Code Value	0008,0100	SH							
>Coding Scheme Designator	0008,0102	SH							
>Coding Scheme Version	0008,0103	SH							
Imaging Service Request Module									
Accession Number	0008,0050	SH				X			
Imaging Service Request Comments	0040,2400	LT							
Issue Date of Imaging Service Request	0040,2004	DA							
Reason for the Imaging Service Request (retired)	0040,2001	LO							
Referring Physician's Name	0008,0090	PN				X			
Requesting Physician	0032,1032	PN				X			

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

Table 21: Status Response

Service Status	Error 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.

Table 22: 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.

4.2.1.3.2.3.3. Dataset Specific Conformance for Modality Worklist Information Model - FIND C-CANCEL-SCU

Detail regarding the Dataset Specific response behavior will be reported in this section.

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

Table 23: DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	The association is aborted using AP-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.

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

4.2.1.3.3.1. Description and Sequencing of Activities

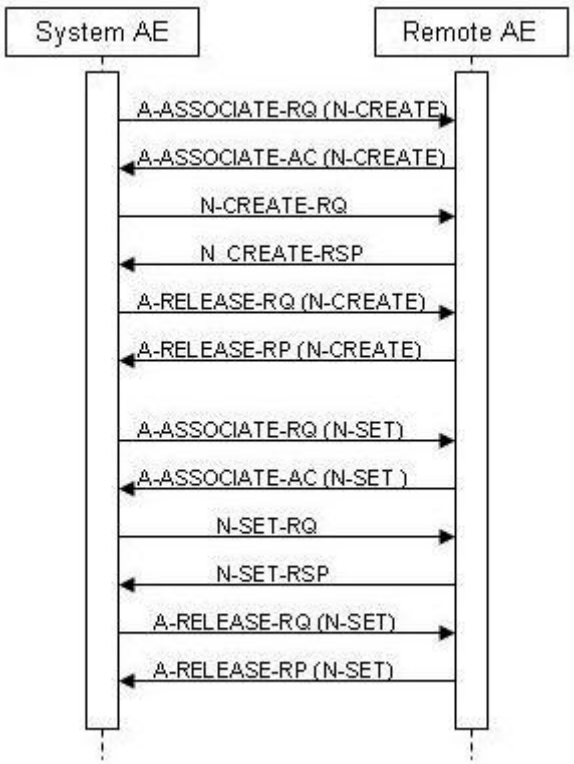

Figure 5: (Real World) Activity - Modlaity Performed Procedure Step as SCU

Description of Activities:
A MammoDiagnost DR 2.0 "Examination" is regarded equivalent to a DICOM Procedure Step. It is scheduled or manually entered before and 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 image for a Scheduled Procedure Step has been acquired, 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 message 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 and MPPS N-SET-FINAL message.

MammoDiagnost DR 2.0 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 DISCONTINUED 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 Eleva AE shall request an association with the configured remote Study Management SCP. After accepting the association the Eleva AE shall send a N-CREATE request, wait for response, and then release the association.

4.2.1.3.3.2. Proposed Presentation Contexts

The presentation contexts are defined in the next table.

Table 24: Proposed Presentation Contexts for (Real-World) Activity – Modality Performed Procedure Step As SCU

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

4.2.1.3.3.3. SOP Specific Conformance for Modality Performed Procedure Step SOP Class

When acquiring the first image of a Scheduled or Unscheduled Procedure Step, MammoDiagnost DR 2.0 generates a MPPS IN PROGRESS message.
MammoDiagnost DR 2.0 does not generate intermediate IN PROGRESS (N-SET) messages and does not support the Performed Procedure Step Exception Management Option.
MammoDiagnost DR 2.0 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.

Assisted Acquisition Protocol Setting Option:
Eleva AE by default derives the specific acquisition protocol form the Scheduled Protocol Code Sequence Items. Any single item results in an examination.
Eleva AE 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 form Request Procedure Code Items -> Code Value (0032,1064).
- Examination is selected from Requested Procedure Description (0032,1060).

Eleva AE does not evaluate the attributes:

- Code Scheme Designator (0008,0102),
- Coding Scheme Version (0008,0103),
- Code Meaning (0008,0104).

Eleva AE only evaluate the attributes Code Value (0008,0100), for mapping the examination settings. I.e. Eleva AE expects that any used Code Value is unique (unambiguous) within a given RIS domain.

Restriction 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>.

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

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

Table 25: MPPS Request Identifiers for N-CREATE-RQ

Attribute Name	Tag	VR	Value	Comment
SOP Common Module				
Specific Character Set	0008,0005	CS		Optional/Config
Performed Procedure Step Relationship Module				
Patient ID	0010,0020	LO		
Patient's Birth Date	0010,0030	DA		
Patient's Name	0010,0010	PN		
Patient's Sex	0010,0040	CS		
Referenced Patient Sequence	0008,1120	SQ		
Scheduled Step Attributes Sequence	0040,0270	SQ		

Attribute Name	Tag	VR	Value	Comment
>Accession Number	0008,0050	SH		
>Requested Procedure Description	0032,1060	LO		
>Requested Procedure ID	0040,1001	SH		
>Scheduled Procedure Step Description	0040,0007	LO		
>Scheduled Procedure Step ID	0040,0009	SH		
>Study Instance UID	0020,000D	UI		
>Referenced Study Sequence	0008,1110	SQ		
>>Referenced SOP Class UID	0008,1150	UI		
>>Referenced SOP Instance UID	0008,1155	UI		
>Scheduled Protocol Code Sequence	0040,0008	SQ		
>>Code Meaning	0008,0104	LO		
>>Code Value	0008,0100	SH		
>>Coding Scheme Designator	0008,0102	SH		
Issuer of Patient ID	0010,0021	LO		
Performed Procedure Step Information Module				
Performed Location	0040,0243	SH		EMPTY
Performed Procedure Step Description	0040,0254	LO		
Performed Procedure Step End Date	0040,0250	DA		Finish of the examination: EMPTY
Performed Procedure Step End Time	0040,0251	TM		Finish of the examination: EMPTY
Performed Procedure Step ID	0040,0253	SH		
Performed Procedure Step Start Date	0040,0244	DA		Start of the examination
Performed Procedure Step Start Time	0040,0245	TM		Start of the examination
Performed Procedure Step Status	0040,0252	CS	COMPLETED, DISCONTINUED, IN PROGRESS	
Performed Procedure Type Description	0040,0255	LO		
Performed Station AE Title	0040,0241	AE	Eleva	
Performed Station Name	0040,0242	SH		EMPTY
Procedure Code Sequence	0008,1032	SQ		
>Code Meaning	0008,0104	LO		
>Code Value	0008,0100	SH		
>Coding Scheme Designator	0008,0102	SH		
>Coding Scheme Version	0008,0103	SH		
Image Acquisition Results Module				
Modality	0008,0060	CS		
Study ID	0020,0010	SH		
Performed Protocol Code Sequence	0040,0260	SQ		
>Code Meaning	0008,0104	LO		
>Code Value	0008,0100	SH		
>Coding Scheme Designator	0008,0102	SH		

Attribute Name	Tag	VR	Value	Comment
>Coding Scheme Version	0008,0103	SH		
Performed Series Sequence	0040,0340	SQ		length of: 0
Radiation Dose Module				
Entrance Dose	0040,0302	US		
Image and Fluoroscopy Area Dose Product	0018,115E	DS		Not sent in case of appended MPPS Instances
Total Number of Exposures	0040,0301	US		
Total Time of Fluoroscopy	0040,0300	US		
Entrance Dose in mGy	0040,8302	DS		
Exposure Dose Sequence	0040,030E	SQ		
>Overlay Data	6000,3000	O W/ OB		
>Overlay Label	6000,1500	LO		
>Overlay Bit Position	6000,0102	US	0	
>Overlay Bits Allocated	6000,0100	US	1	
>Overlay Origin	6000,0050	SS		
>Overlay Type	6000,0040	CS	G	G=Graphics
>Overlay Description	6000,0022	LO		
>Overlay Columns	6000,0011	US		
>Overlay Rows	6000,0010	US		
>Position Reference Indicator	0020,1040	LO		
>Frame of Reference UID	0020,0052	UI		
>Detector Mode	0018,7008	LT	CONTACT, MAG, STEREO	
>View Position	0018,5101	CS		
>Detector Secondary Angle	0018,1531	DS	0°	
>Detector Primary Angle	0018,1530	DS	-15°, 0°, 15°	
Image Type	0008,0008	CS	POSTBIOPSY, STEREO_MINUS/STEREO_PLUS, STEREO_SCOUT, ORIGINAL, PRIMARY	For Scout Views the value STEREO_SCOUT shall be used. For all paired Stereo and Control Views the values STEREO_MINUS / STEREO_PLUS shall be used. For Control 0° Views the value POSTBIOPSY shall be used.
>Organ Dose	0040,0316	DS		
>Organ Exposed	0040,0318	CS		
>View Code Sequence	0054,0220	SQ		
>>View Modifier Code Sequence	0054,0222	SQ		
Billing And Material Management Code Module				
Film Consumption Sequence	0040,0321	SQ		length of: 0

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

Table 26: Status Response

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

Service Status	Error 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 27: DICOM COmmand Communcation Failure Behavior

Exception	Behavior
Timeout	The association is aborted using AP-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.

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

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

Table 28: MPPS Request Identifiers for N-SET-RQ

Attribute Name	Tag	VR	Value	Comment
Performed Procedure Step Information Module				
Performed Procedure Step Description	0040,0254	LO		
Performed Procedure Step End Date	0040,0250	DA		Start of the examination
Performed Procedure Step End Time	0040,0251	TM		Start of the examination
Performed Procedure Step Status	0040,0252	CS	COMPLETED, DISCONTINUED, IN PROGRESS	
Procedure Code Sequence	0008,1032	SQ		
>Code Meaning	0008,0104	LO		
>Code Value	0008,0100	SH		
>Coding Scheme Designator	0008,0102	SH		
Image Acquisition Results Module				
Performed Protocol Code Sequence	0040,0260	SQ		
>Code Meaning	0008,0104	LO		
>Code Value	0008,0100	SH		
>Coding Scheme Designator	0008,0102	SH		
Performed Series Sequence	0040,0340	SQ		
>Operators' Name	0008,1070	PN		N-Values
>Performing Physician's Name	0008,1050	PN		
>Protocol Name	0018,1030	LO		Copied from Performed Protocol Code Sequence - Item code Value.
>Retrieve AE Title	0008,0054	AE		
>Series Description	0008,103E	LO		
>Series Instance UID	0020,000E	UI		
>Referenced Image Sequence	0008,1140	SQ		
>Referenced Non-Image Composite SOP Instance Sequence	0040,0220	SQ		length of: 0

Attribute Name	Tag	VR	Value	Comment
Radiation Dose Module				
Entrance Dose	0040,0302	US		
Image and Fluoroscopy Area Dose Product	0018,115E	DS		Not accumulating: reprocessed images, non-digital images. Not sent in case of appended MPPS instances.
Total Number of Exposures	0040,0301	US		Not accumulating: reprocessed images, non-digital images. Not sent in case of appended MPPS instances.
Total Time of Fluoroscopy	0040,0300	US		
Exposure Dose Sequence	0040,030E	SQ		
Image and Fluoroscopy Area Dose Product	0018,115E	DS		Not accumulating: reprocessed images, non-digital images. Not sent in case of appended MPPS instances.
Total Time of Fluoroscopy	0040,0300	US		
Total Number of Exposures	0040,0301	US		Not accumulating: reprocessed images, non-digital images. Not sent in case of appended MPPS instances.
Entrance Dose	0040,0302	US		
Comments on Radiation Dose	0040,0310	ST		
Entrance Dose in mGy	0040,8302	DS		
Exposure Dose Sequence	0040,030E	SQ		
>Image Type	0008,0008	CS	POSTBIOPSY, STEREO_MINUS/STEREO_PLUS, STEREO_SCOUT, ORIGINAL, PRIMARY	For Scout Views the value STEREO_SCOUT shall be used. For all paired Stereo and Control Views the values STEREO_MINUS / STEREO_PLUS shall be used. For Control 0° Views the value POSTBIOPSY shall be used.
>Detector Primary Angle	0018,1530	DS	-15°, 0°, 15°	
>Detector Secondary Angle	0018,1531	DS	0°	
>View Position	0018,5101	CS		
>Detector Mode	0018,7008	LT	STEREO, CONTACT, MAG	
>Frame of Reference UID	0020,0052	UI		
>Position Reference Indicator	0020,1040	LO		
>Overlay Rows	6000,0010	US		
>Overlay Columns	6000,0011	US		
>Overlay Description	6000,0022	LO		
>Overlay Type	6000,0040	CS	G	
>Overlay Origin	6000,0050	SS		
>Overlay Bits Allocated	6000,0100	US	1	
>Overlay Bit Position	6000,0102	US	0	
>Overlay Label	6000,1500	LO		
>Overlay Data	6000,3000	OW/OB		
>Organ Dose	0040,0316	DS		
>Organ Exposed	0040,0318	CS		
>View Code Sequence	0054,0220	SQ		
>>View Modifier Code Sequence	0054,0222	SQ		
Billing And Material Management Code Module				
Film Consumption Sequence	0040,0321	SQ		
>Film Size ID	2010,0050	CS		
>Medium Type	2000,0030	CS		
>Number of Films	2100,0170	IS		

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

Table 29: Status Response

Service Status	Error 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.

Table 30: DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	The Association is aborted using AP-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.

4.2.1.3.4. (Real-World) Activity – Image Export

4.2.1.3.4.1. Description and Sequencing of Activities

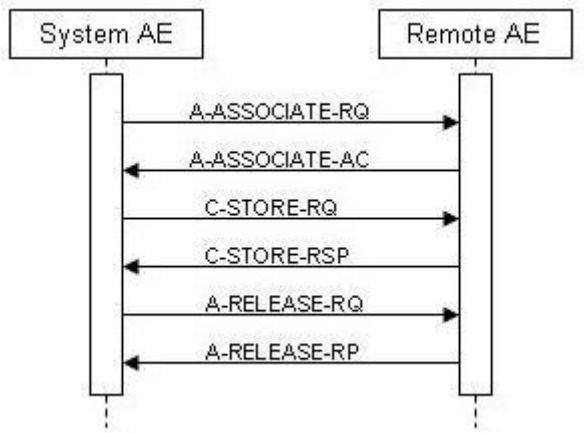

Figure 6: (Real World) Activity - Image Export

Export means that MammoDiagnost DR 2.0 stores images without Storage Commitment.
This RWA may be initiated in two ways.

- Manually in the viewer, after clicking the Store button the Eleva AE will Store the selected images at the selected Storage SCP.
- Automatically during an examination, after clicking the Confirm button the Eleva AE will automatically store the related images or the performed procedure step at the configured Storage SCP.

The Eleva AE will request an association with the remote Storage SCP for the applicable Storage SOP classes. After accepting the association the 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.

Depending on the status of the store the Eleva AE may queue store requests for retries. The queued store requests can be cancelled form the UI.

4.2.1.3.4.2. Proposed Presentation Contexts

The presentation contexts are defined in the next table.

Table 31: Proposed Presentation Contexts for (Real-World) Activity – Image Export

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Computed Radiography Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
Digital Mammography X-Ray Image Storage - Pres. SOP	1.2.840.10008.5.1.4.1.1.1.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
Digital Mammography X-Ray Image Storage - Proc. SOP	1.2.840.10008.5.1.4.1.1.1.2.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		

Note: Only the MG export provides the full set of mammography data attributes (e.g. the IHE MAMMO set), and CR is merely a fall back option.

By default, all images are DICOM Stored according to the SOP Class Digital Mammography X-Ray Image storage - for Presentation attributes that are undefined for MG Images are stored in private attributes.
CR Image attributes that are undefined for DX Images are stored in private attributes.

The Digital Mammography X-Ray Image IOD is used in two SOP Classes as defined in the DICOM Standard, a SOP Class for storage of images intended for Presentation and a SOP Class for storage of images intended for further Processing before presentation. These are distinguished by their SOP Class UID and by the Enumerated Value of the mandatory Attribute in the DX Series Module, Presentation Intent Type (0008,0068).
The SOP Class Digital Mammography X-Ray Image storage - for Processing will be exported if the hospital wants that the Processing DICOM information is also sent to the archive and/or a CAD device is connected for scanning the "for Processing" images for calcification/nodes.
The Numbering Scheme shall support 'Hanging Protocols' of PACS systems & Viewing Stations:
1. The Series Number shall start with 1 for the first Series of every Study Instance, identified by Study Instance UID.
2. The Series Number shall increase by 1 for every new Series Instance within the same Study Instance, by the timely order, the Series Instances are created.
3. The Image Number shall start with 1 for every new Series Instance.
4. The Image Number shall increase by 1 for every new Image Instance within the same Series Instance, by the timely order, the Images are created.
For Digital Mammography X-Ray image Storage SOP Classes is in the DICOM Standard defined:

- The Digital Mammography X-Ray Image IOD specifies an image that has been created by a digital mammography imaging device.
- A MG image shall consist of the result of a single X-Ray exposure, in order to ensure that the anatomical and orientation attributes are meaningful for the image, permitting safe annotation, appropriate image processing and appropriate dissemination.

4.2.1.3.4.3. SOP Specific Conformance for Storage SOP Classes

This section includes the SOP specific behavior, i.e. error codes, error and exception handling, time-outs, etc.
Behavior of an Application Entity SOP class is summarized as shown in next Table.
The standard as well as the manufacturer specific status codes and their corresponding behavior are specified.

4.2.1.3.4.3.1. Dataset Specific Conformance for C-STORE-RQ

Detail regarding the Dataset Specific response behavior will be reported in this section.
This includes the dataset specific behavior, i.e. error codes, error and exception handling, time-outs, etc.

Table 32: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Storage is complete	UI status is updated
Failure	A7xx	Refused: Out of Resources	The association is released. The reason is logged. The user is informed.
	A9xx	Error: Data Set does not match SOP Class	The association is released. The reason is logged. The user is informed.
	Cxxx	Error: 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.
	B007	Data Set does not match SOP Class	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.

Note that the status can be inspected via the user interface.

Table 33: 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.

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

4.2.1.3.5.1. Description and Sequencing of Activities

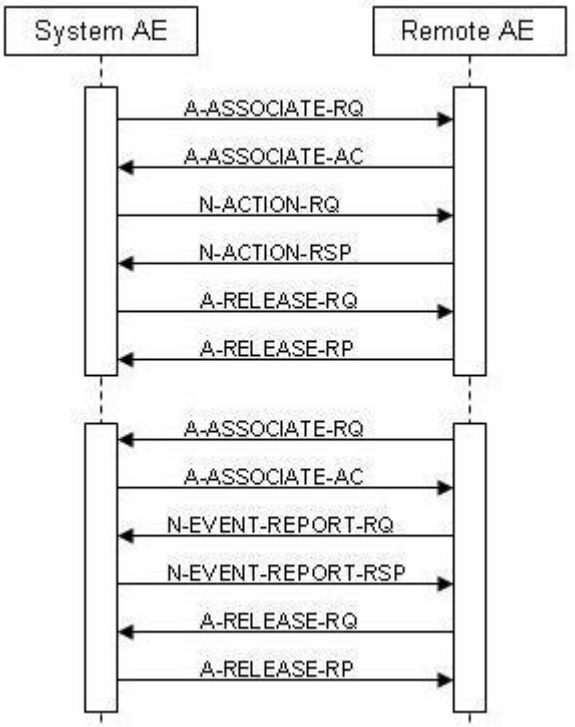

Figure 7: (Real World) Activaty - Storage Commitment Push Model as SCU (Asynchronous)

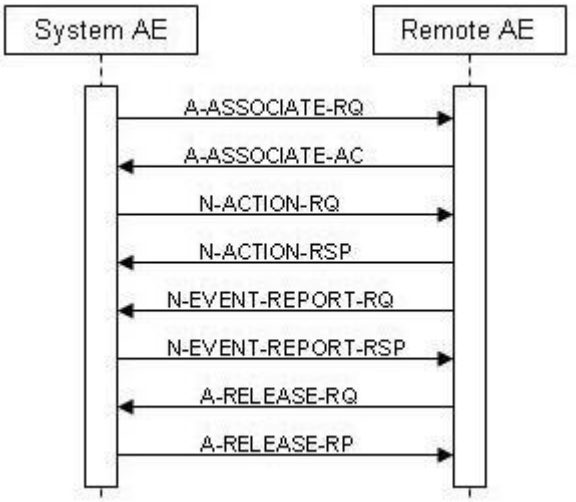

Figure 8: (Real World) Activity - Storage Commitment Push Model as SCU (Synchronous)

Archive means that MammoDiagnost DR 2.0 stores images with Storage Commitment.
This RWA may be initiated in two ways:

- Manually in the viewer, after clicking the store button the Eleva AE will store the selected images at the selected Storage SCP.
- Automatically during examination, after clicking the confirm button the Eleva AE will automatically store the related images of the performed procedure step at the configured storage SCP.

The Eleva AE will request an association with the remote Storage SCP for the applicable Storage SCP classes. After accepting the association the Eleva AE will send the store request, wait for response, and the release the association. 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.

Depending on the status of the store the Eleva AE may queue store requests for retries. The queued store requests can be cancelled form the UI.

When an archive supports DICOM Storage Commitment, this node can be configured for it. For each image that is sent to this node, also a Storage Commitment Request is sent. The image is delete-protected until the Storage Commit Response has been received. The current status is shown in the Image Info Panel.
In case of a wrong configuration (an archive is configured to support Storage Commitment, but does not really do so), the system recognizes this, and our application sees a successful Storage Commitment.

4.2.1.3.5.2. Proposed Presentation Contexts

The presentation contexts are defined in the next table.

Table 34: 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 List**	**UID List**		
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		

4.2.1.3.5.3. SOP Specific Conformance for Storage Commitment Push Model SOP Class

This section includes the SOP specific behavior, i.e. error codes, error and exception handling, time-outs, etc.
Behavior of an Application Entity SOP class is summarized as shown in next Table.
The standard as well as the manufacturer specific status codes and their corresponding behavior are specified.

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

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

Table 35: DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	The association is aborted using AP-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.

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

Detail regarding the Dataset Specific response behavior will be reported in this section.

Table 36: Storage Commitment Attribute for N-ACTION-RQ

Attribute Name	Tag	Comment
Storage Commitment Module		
Transaction UID	0008,1195	
Referenced SOP Sequence	0008,1199	
>Referenced SOP Class UID	0008,1150	
>Referenced SOP Instance UID	0008,1155	

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

Table 37: Status Response

Service Status	Error 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

Table 38: DICOM Command Communication Failure Behavior

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

4.2.1.3.6. (Real-World) Activity – Print Management as SCU

4.2.1.3.6.1. Description and Sequencing of Activities

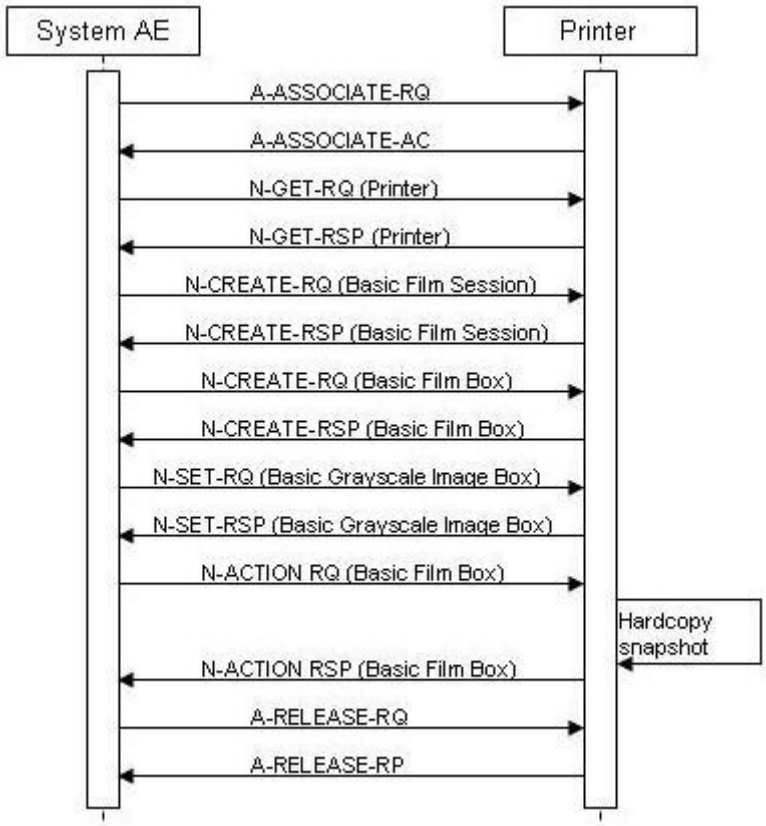

Figure 9: (Real World) Activity - Print Management as SCU

The 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).

Behavior of the Print Component:
The print component of the MammoDiagnost DR 2.0 mainly provides three different print modes, ranging from a highly automated print mode that does not interrupt the clinical acquisition workflow, over a semi-automated print mode which automatically composes the print films but gives the user the opportunity to review and manipulate these films before they are printed, to a fully manual print mode where the user has the full control over the composition of the printed films.
These modes are called 'autoprint', 'autoprint with user check', and 'manual print'. Additionally the print component provides a mechanism to solve conflicts in automatically composed print films. This can be configured to be done either automatically or manually.

Autoprint:
The application gives the user the opportunity to make several settings, stored in a persistent database, that define how the images of an examination should be laid out when they are automatically printed. These settings include the number of images on one film, the medium to print on, the scaling of the images etc. Some of these settings are stored in a so called print template which provides a generic stencil of how images and annotations should be placed on a film. These templates are also used for manual printing.
Once these settings are done, the print component is capable of printing all images of the according examination type fully automatically and without any further user interaction.

Autoprint with User Check:
When an examination is configured to be printed with 'autoprint with user check', the layout of the images on the film will be done according to the same settings that are also used for 'autoprint'. But instead of sending the composed print pages directly to the printer when they are ready to be printed, the user has the opportunity to review these films and to change the layout of the films as (s)he desires. The display of the composed films and the changes to the layout are done via the same user interface as used for manual printing. When all changes are done, the user triggers the printout manually.

Manual Print:
For manual printing, the application provides a user interface that gives the user the opportunity to freely define the layout and content of a print page. Therefore (s)he is provided with a list of images for the selected patient and a section where the film to be printed is displayed. To fill the film the user can simply insert the images via point and click. The layout of the film can be predefined by selecting one of the templates also used for 'autoprint'. Furthermore it is also possible to create new templates or to temporarily change the layout of an existing template. The user interface for manual printing is the same as for 'autoprint with user check'.

Conflict Check:
On some occasions there might be conflicts in automatically laid out print films. One kind of conflict occurs if a film is ready to be printed but not all image placeholders of the according print template are filled. This conflict is called 'incomplete page conflict'. Another conflict might occur if the predefined scale for an image causes it to be cropped when printed on a film. This conflict is called 'scaling conflict'. The user has the opportunity to configure if these conflicts should be solved automatically or if they should be solved by user interaction. If the user chooses to solve these conflicts manually, (s)he will be informed that a conflict occurred, the film will not be printed and the user can review the conflicting film via the user interface in the same manner as if 'autoprint with user check' was configured for this film. After solving the conflict (or not if desired), the user must trigger the printout of the according film manually. To solve a 'scaling conflict' automatically the user has the opportunity to decide that the image should been 'cut', which means that the image will be printed with the predefined scale and eventually be cropped, or (s) he can decide to 'fit' the image, which means that the scale for the image will be recalculated in a way, that it will fully fit into the according placeholder. In both cases no user interaction is required. The automatic solution of an 'incomplete page conflict' can either be done by telling the print component to print the incomplete page or to change the template. The former option causes the print component to print the incomplete page without informing the user about the occurrence of the conflict, the latter causes the print component to automatically change the template so that it only contains the required number of image placeholders. The film will then be printed according to the layout of the newly selected template.

4.2.1.3.6.2. Proposed Presentation Contexts

The presentation contexts are defined in the next table.

Table 39: Proposed Presentation Contexts for (Real-World) Activity – Print Management as SCU

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9			SCU	None
>Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
>Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
>Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
>Printer SOP Class	1.2.840.10008.5.1.1.16	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
>Presentation LUT SOP Class	1.2.840.10008.5.1.1.23	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 behavior of the AE during responses and communication are describes in the next tables.

Table 40: 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.
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.

Table 41: 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).

This section specifies each IOD created (including private IOD's).

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
VNAPCV	The attribute is present under specified condition – if present then its Value is Not Always Present (attribute sent zero length if condition applies and no value is present)
ANAPEV	The attribute is present under specified condition – if present then it will not have any 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

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

This section includes the SOP specific behavior, i.e. error codes, error and exception handling, time-outs, etc.
Behavior of an Application Entity SOP class is summarized as shown in next Table.
The standard as well as the manufacturer specific status codes and their corresponding behavior are specified.

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

Detail regarding the Dataset Specific response behavior will be reported in this section.

Table 42: Basic Film Session Presentation Module

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

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

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

4.2.1.3.6.4.1. Dataset Specific Conformance for Printer SOP Class N-EVENT-REPORT-SCP

Not applicable, since MammoDiagnost does not support N-EVENT-REPORT for printing.

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

This section includes the SOP specific behavior, i.e. error codes, error and exception handling, time-outs, etc.
Behavior of an Application Entity SOP class is summarized as shown in next Table.
The standard as well as the manufacturer specific status codes and their corresponding behavior are specified.

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

Detail regarding the Dataset Specific response behavior will be reported in this section.

Table 43: Basic Film Box Presentation Module

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

Table 44: Basic Film Box Relationship Module

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

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

This part of the section includes the dataset specific behavior, i.e. error codes, error and exception handling, time-outs, etc.
There are no DICOM attribute defined for N-ACTION.

4.2.1.3.6.6. SOP Specific Conformance for Presentation LUT SOP Class

This section includes the SOP specific behavior, i.e. error codes, error and exception handling, time-outs, etc.
Behavior of an Application Entity SOP class is summarized as shown in next Table.
The standard as well as the manufacturer specific status codes and their corresponding behavior are specified

4.2.1.3.6.6.1. Dataset Specific Conformance for Presentation LUT SOP Class N-CREATE-SCU

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

Table 45: Presentation LUT Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Presentation LUT Shape	2050,0020	CS	Value 1: IDENTITY	ALWAYS	Auto	

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

This section includes the SOP specific behavior, i.e. error codes, error and exception handling, time-outs, etc.
Behavior of an Application Entity SOP class is summarized as shown in next Table.
The standard as well as the manufacturer specific status codes and their corresponding behavior are specified.

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

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

Table 46: Image Box Pixel Presentation Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Image Box Position	2020,0010	US		ALWAYS	AUTO	
Polarity	2020,0020	CS		ALWAYS	AUTO	
Basic 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	CONFIG	
>Rows	0028,0010	US		ALWAYS	IMPLICIT	Depending on the selected printer type and film size
>Columns	0028,0011	US		ALWAYS	IMPLICIT	Depending on the selected printer type and film size
>Bits Allocated	0028,0100	US	16, 8	ALWAYS	AUTO	
>Bits Stored	0028,0101	US	12, 8	ALWAYS	IMPLICIT	
>High Bit	0028,0102	US	11, 7	ALWAYS	AUTO	
>Pixel Representation	0028,0103	US	0x0000	ALWAYS	AUTO	
>Pixel Data	7FE0,0010	O W/ OB		ALWAYS	AUTO	

4.2.1.4. Association Acceptance Policy

This section describes the conditions under which the AE will initiate an association.
The behavior of the AE during association rejection is summarized in next table.

- The ELEVA AE accepts associations to allow remote applications to verify application level communication.
- The 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 ELEVA AE rejects association requests from applications that do not address the ELEVA AE, i.e. that offer a wrong "called AE title".

Table 47: Association Reject Reasons

Result	Source	Reason/Diagnosis	Behavior
1 - rejected permanent	1 - DICOM UL service-user	1 - no-reason-given	Association is not established due to any problem other than that specified 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.
	3 - DICOM UL service provider (Presentation related function)	1 - temporary-congestion	Not used.
		2 - local-limit-exceeded	Not used.

The behavior of the AE for sending an Association abort is summarized in next table.

Table 48: Association Abort Policies

Source	Reason/Diagnosis	Behavior
0 - DICOM UL service-user (initiated abort)	0 - reason-not-specified	When received, the Eleva Workspot 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. (Example: Problem while decoding the DICOM stream, Invalid request, Echo SCP was unable to send the Response to SCU, Error writing to SCU stream).

Source	Reason/Diagnosis	Behavior
2 - DICOM UL service-provider (initiated abort)	0 - reason-not-specified	When received, the Eleva Workspot 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 Eleva Workspot 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 Eleva Workspot terminates the connection wiht 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 Eleva Workspot 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.
	5 - unexpected-PDU parameter	When received, the Eleva Workspot 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 Eleva Workspot terminates the connection with the following log: association ABORTED by peer (2: ABORTED_SOURCE_dul_provider, 6: ABORTED_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. 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 – Verification as SCP

4.2.1.4.1.1. Description and Sequencing of Activities

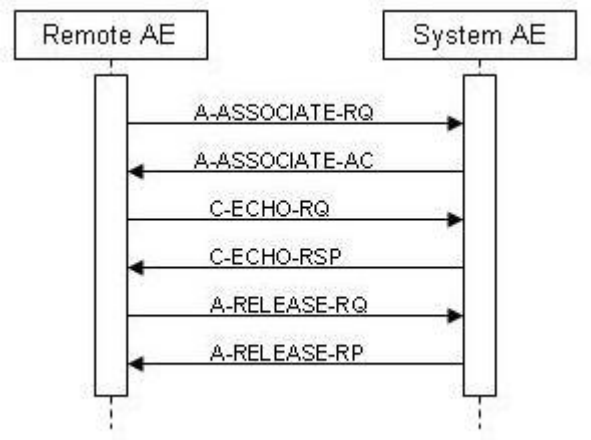

Figure 10: (Real World) Activity - Verification as SCP

The Eleva AE accepts associations from systems that which to verify application level communication using the C-ECHO command.

4.2.1.4.1.2. Accepted Presentation Contexts

The presentation contexts are defined in the next table.

Table 49: 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 Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		

4.2.1.4.1.3. SOP Specific Conformance for Verification SOP Class

This section includes the SOP specific behavior, i.e. error codes, error and exception handling, time-outs, etc.
Behavior of an Application Entity SOP class is summarized as shown in next Table.
The standard as well as the manufacturer specific status codes and their corresponding behavior are specified.

4.2.1.4.1.3.1. Dataset Specific Conformance for Verification C-ECHO SCP

Detail regarding the Dataset Specific response behavior will be reported in this section.

Table 50: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Verification is complete	The MammoDiagnost DR 2.0 has successfully received the verification request

Table 51: DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	The Association is aborted using AP-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.

4.3. Network Interfaces

4.3.1. Physical Network Interfaces

The MammoDiagnost DR 2.0 provides DICOM 3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM 3.0 Standard.

TCP/IP is the only protocol stack supported.

Supported physical medium include:
IEEE 802-3-1995 1000Base-TX (Gigabit Ethernet)

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

The MammoDiagnost DR 2.0 system shall not be connected to a 10 Mb/s (10Base T)
network.

4.3.2. Additional Protocols

No additional protocols are used.

4.4. Configuration

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

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 is described here.

4.4.1.1. Local AE Titles

The local AE title mapping and configuration are specified as:

Table 52: AE Title configuration table

Application Entity	Default AE Title	Default TCP/IP Port
Eleva AE	ELEVA	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 or where the remote application accepts association requests.

4.4.2. Parameters

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

Table 53: Configuration Parameters Table

Parameter	Configurable	Default Value
General Parameter		
Maximum PDU received 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 Allow 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	-
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 Allow 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 Allow values: 1-300 minutes	Yes	240 [minutes]
Background broad query time interval Specifies the time until the background query will be repeated. Allow 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

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

5.1.1. Application Data Flow Diagram

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

Next figure shows the Media Interchange application data flow as a functional overview of the Eleva AE.

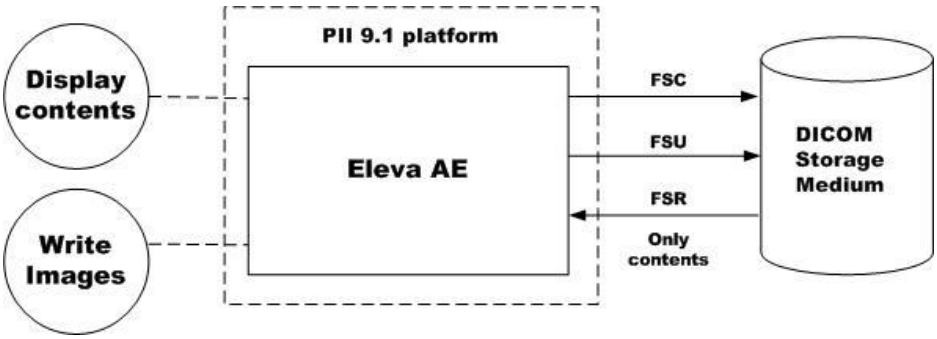

Figure 11: Media Interchange Application Data Flow Diagram

The Eleva AE will act as a FSR when reading the directory of the medium.
The Eleva AE will act as a FSC.FSU when writing the selected images in a patient folder onto the CD-R medium.

5.1.2. Functional Definitions of AE's

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

Functional Definition of MammoDiagnost DR 2.0:
The Eleva AE is the one and only application entity within the MammoDiagnost DR 2.0. It includes the following service class.

Media Storage Service Class:
The Eleva AE can perform the Media Storage service as SCU, with capabilities for RWA Display Directory (as FSR, DICOMDIR only) and RWA Write Images (as FSC/FSU).

5.1.3. Sequencing of Real World Activities

Write image can be initiated by selecting a proper export destination, selecting requested images and clicking the export button.

Whenever a CD-R has to be written the Eleva AE first tries to read the DICOMDIR. The Eleva AE will compile the updated DICOMDIR and any required DICOM images into a CD session image; this CD session image will be written to CD-R.

5.2. AE Specifications

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

5.2.1. Eleva Media - Specification

The Eleva AE provides Standard Conformance to the DICOM Media Storage Service and File Format ([DICOM] PS 3.10) and the Media Storage Application Profiles STD-GEN-CD ([DICOM] PS 3.11) for reading.

Eleva AE supports Multi-Patient and Multi-Session CD-R disks.

On the Eleva AE is only "adding on" of instances is supported for the FSU, deleting is not supported.

The supported Application Profiles, their Roles and the Service Class (SC) options, all defined in DICOM terminology, are listed in next table.

Only adding one of instances is supported for the FSU, deleting is not supported.

Table 54: AE Eleva related Application Profiles, RWA activities and roles

Supported Application Profile	Identifier	Real-World Activities	Roles
General Purpose CD-R Interchange	STD-GEN-CD	Update File-set	FSU
		Create File-set	FSC
		Display Directory	DD

5.2.1.1. File Meta Information for the Eleva

This next table specified the list of values assigned to the File Meta Information attributes that pertain to the Implementation Class and Version.

Table 55: File Meta Information for the Eleva

Implementation Class UID	1.3.46.670589.30.32.0
Implementation Version Name	PMS_ELEVA_32.0

5.2.1.2. Real-World Activities

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

5.2.1.2.1. RWA - Create File-set

When an image transfer to CD-R is initiated then the Eleva AE acts as an FSC or FSU using the interchange option to export SOP Instances from the local database to a CD-R medium.

5.2.1.2.1.1. Media Storage Application Profile

The Eleva AE supports the RWA - Write Images for the STD-GEN-CD Application Profile.

5.2.1.2.1.1.1. Options

The DICOMDIR file will be extended when new images are written. In case some attributes are not present in an image but are specified as mandatory in the DICOMDIR definition in DICOM Media, a generated value will be filled in.

5.2.1.2.2. RWA - Update File-set

When an image transfer to CD-R is initiated then the Eleva AE acts as an FSC or FSU using the interchange option to export SOP Instances form the local database to a CD-R medium.

5.2.1.2.2.1. Media Storage Application Profile

The Eleva AE supports the RWA - Update File-set for the STD-GEN-CD Application Profile.

5.2.1.2.2.1.1. Options

The DICOMDIR file will be extended when new images are written. In case some attributes are not present in an image but are specified as mandatory in the DICOMDIR definition in DICOM Media, a generated value will filled in.

5.2.1.2.3. RWA - Display Directory

This Media Application Entity can display the DICOMDIR (directory) of the multimedia. The ELEVA AE will act as an FSR when reading the directory of the medium. This will result in an overview of the images on the MammoDiagnost DR 2.0 screen.

5.2.1.2.3.1. Media Storage Application Profile

The Eleva AE supports the RWA Display Directory for the STD-GEN-CD Application Profile.

5.2.1.2.3.1.1. Options

Not applicable.

5.3. Augmented and Private Application Profiles

Not applicable

5.4. Media Configuration

By Anonymous patient on CD where change the following DICOM attributes

Table 56: Anonymous patient on CD

Attribute	Tag	Change to
Media Storage SOP Instance UID	0002,0003	New UID
Referenced SOP Instance UID in File	0004,1511	New UID
SOP Instance UID	0008,0018	New UID
Accession Number	0008,0050	empty
Institution Name	0008,0080	empty
Institution Address	0008,0081	empty
Referring Physician's Name	0008,0090	empty
Station Name	0008,1010	empty
Study Description	0008,1030	empty
Series Description	0008,103E	empty
Institutional Department Name	0008,1040	empty
Performing Physicians' Name	0008,1050	empty
Name of Physician(s) Reading Study	0008,1060	empty
Operators' Name	0008,1070	empty
Patient's Name	0010,0010	New ID
Patient ID	0010,0020	New UID
Patient's Birth Data	0010,0030	empty
Patient's Sex	0010,0040	empty
Other Patient Ids	0010,1000	empty
Patient's Age	0010,1010	empty
Patient's Size	0010,1020	0
Patient's Weight	0010,1030	0
Ethnic Group	0010,2160	empty
Additional Patient's History	0010,21B0	empty

Attribute	Tag	Change to
Patient Comments	0010,4000	empty
Device Serial Number	0018,1000	anon string
Protocol Name	0018,1030	empty
Study Instance UID	0020,000D	New UID
Series Instance UID	0020,000E	New UIID
Study ID	0020,0010	New String
Frame of Reference UID	0020,0052	New UID
Image Comments	0020,4000	empty
Requesting Physician	0032,1032	empty
Requested Attributes Sequence	0040,0275	empty Sequence
Requested Procedure ID	0040,1001	New ID

6. Support of Character Sets

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

Table 57: Supported DICOM Character Sets

Character Set Description	Defined Term	ESC Sequence	ISO Registration Number	Code Element	Character Set
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

Not applicable

7.1.1. Security use Profiles

Not applicable

7.1.2. Security Transport Connection Profiles

Eleva AE conforms to the Basic TLS Secure Transport Connection Profile.

Eleva AE provides a service accessible tool to configure private keys and certificates of the local and remote DICOM nodes.

7.1.3. Digital Signature Profiles

Not applicable

7.1.4. Media Storage Security Profiles

Not applicable

7.1.5. Attribute Confidentiality Profiles

Not applicable

7.1.6. Network Address Management Profiles

Not applicable

7.1.7. Time Synchronization Profiles

MammoDiagnost DR 2.0 conforms to the Basic Time Synchronization Profile as NTP client.

MammoDiagnost DR 2.0 does not support secure transactions.

7.1.8. Application Configuration Management Profiles

Eleva AE conforms to the Basic Application Level Confidentiality Profile as de-identifier.

De-identified SOP Instances will be created on DICOM Media if specified by the user.

No instances of the Encrypted Attributes Data Set are created. No Transfer Syntaxes are supported for encoding/decoding of Encrypted Attributes Data Sets.

7.1.9. Audit Trail Profiles

MammoDiagnost DR 2.0 creates audit messages according to the IHE Basic Security Integration Profile. These messages may contain information that identifies the patient.
The following messages will be created and sent to a central Audit Record Repository:

- ActorConfig (when security or networking configuration of the MammoDiagnost DR 2.0 is modified via the field service functionality).
- ActorStartStop (when MammoDiagnost DR 2.0 starts or shuts down).
- BeginStoringIntances and InstancesSent (when an examination is transferred from the MammoDiagnost DR 2.0 to a remote network node).
- DICOMInstancesDeleted (when an examination is deleted for the internal database).
- DICOMInstancesUsed (when an examination is selected in the patient list).
- UserAuthenticated (when the user logs in or logs out).
- SecurityAlert (when an authentication of a secure node during TLS negotiation fails, e.g. due to an invalid certificate).
- Export (when printing job is started).

The time that is part of the audit message is the time provided by the NTP Server.

7.2. Association Level Security

Not supported.

7.3. Application Level Security

Not applicable

8. Annexes of application "Eleva"

8.1. IOD Contents

8.1.1. Created SOP Instance

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.

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
ANAPCV	The attribute is present under specified condition – if present then its Value is Not Always Present (attribute sent zero length if condition applies and no value is present)
ANAPEV	The attribute is present under specified condition – if present then it will not have any 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 for Export

Table 58: List of created SOP Classes for Export

SOP Class Name	SOP Class UID
Computed Radiography Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.1
Digital Mammography X-Ray Image Storage - Pres. SOP	1.2.840.10008.5.1.4.1.1.1.2
Digital Mammography X-Ray Image Storage - Proc. SOP	1.2.840.10008.5.1.4.1.1.1.2.1

8.1.1.2. Computed Radiography Image Storage SOP Class

Table 59: IOD of Created Computed Radiography Image Storage SOP Class Instances

Information Entity	Module	Presence Of Module
Patient	Patient Module	ALWAYS
Study	General Study Module	ALWAYS
Study	Patient Study Module	ALWAYS
Series	General Series Module	ALWAYS
Series	CR Series Module	ALWAYS

Equipment	General Equipment Module	ALWAYS
Image	General Image Module	ALWAYS
Image	Image Pixel Module	ALWAYS
Image	CR Image Module	ALWAYS
Image	Overlay Plane Module	CONDITIONAL
Image	Modality LUT Module	ALWAYS
Image	VOI LUT Module	ALWAYS
Image	SOP Common Module	ALWAYS
	Extended Dicom and Private attributes	ALWAYS

Table 60: Patient Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Patient's Name	0010,0010	PN		VNAP	MWL, USER	
Patient ID	0010,0020	LO		ALWAYS	AUTO, MWL	
Patient's Birth Date	0010,0030	DA		VNAP	MWL, USER	
Patient's Sex	0010,0040	CS	F, M, O	ANAP	MWL, USER	
Other Patient IDs	0010,1000	LO		ANAPCV	MWL, USER	
Ethnic Group	0010,2160	SH		ANAP	AUTO	
Patient Comments	0010,4000	LT		ANAP	MWL, USER	
Issuer of Patient ID	0010,0021	LO		ANAPCV	MWL, USER	

Table 61: 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	MWL, USER	
Referring Physician's Name	0008,0090	PN		VNAP	MWL, USER	
Study Description	0008,1030	LO		ANAP	MWL, USER	
Procedure Code Sequence	0008,1032	SQ		ANAP	MWL	
>Code Value	0008,0100	SH		ALWAYS	MWL	
>Coding Scheme Designator	0008,0102	SH		ALWAYS	MWL	
>Coding Scheme Version	0008,0103	SH		ALWAYS	MWL	
>Code Meaning	0008,0104	LO		ALWAYS	MWL	
Referenced Study Sequence	0008,1110	SQ		ANAP	MWL	
>Referenced SOP Class UID	0008,1150	UI		ANAPEV	MWL	
>Referenced SOP Instance UID	0008,1155	UI		ANAPEV	MWL	
Study Instance UID	0020,000D	UI		ALWAYS	AUTO, MWL	
Study ID	0020,0010	SH		VNAP	AUTO, MWL	

Table 62: Patient Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Patient's Age	0010,1010	AS		ANAP	MWL, USER	
Patient's Size	0010,1020	DS		ANAP	MWL, USER	Default: 0.0
Patient's Weight	0010,1030	DS		ANAP	MWL, USER	Default: 0.0
Occupation	0010,2180	SH		ANAP	MWL, USER	
Additional Patient History	0010,21B0	LT		ANAP	MWL, USER	

Table 63: 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	CR	ALWAYS	CONFIG	
Series Description	0008,103E	LO		ANAP	MPPS, USER	
Performing Physician's Name	0008,1050	PN		ANAP	MPPS, USER	
Operators' Name	0008,1070	PN		ALWAYS	MPPS, USER	Default: Emergency
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	
Protocol Name	0018,1030	LO		ALWAYS	MWL, USER	
Series Instance UID	0020,000E	UI		ALWAYS	AUTO, MPPS	
Series Number	0020,0011	IS		ALWAYS	AUTO, MPPS	
Laterality	0020,0060	CS		VNAP	CONFIG	Required if the body part examined is a paired structure
Request Attributes Sequence	0040,0275	SQ		ANAP	MWL	
>Scheduled Procedure Step Description	0040,0007	LO		ANAP	MWL	
>Scheduled Protocol Code Sequence	0040,0008	SQ		ANAP	MWL	
>>Code Value	0008,0100	SH		ALWAYS	MWL	
>>Coding Scheme Designator	0008,0102	SH		ALWAYS	MWL	
>>Coding Scheme Version	0008,0103	SH		ALWAYS	MWL	
>>Code Meaning	0008,0104	LO		ALWAYS	MWL	
>Scheduled Procedure Step ID	0040,0009	SH		ANAPEV	MWL	
>Requested Procedure ID	0040,1001	SH		ANAPEV	MWL	
Performed Procedure Step Start Date	0040,0244	DA		ANAP	AUTO, MPPS	
Performed Procedure Step Start Time	0040,0245	TM		ANAP	AUTO, MPPS	

Performed Procedure Step ID	0040,0253	SH		ANAP	AUTO, MPPS	
Performed Procedure Step Description	0040,0254	LO		ANAP	AUTO, MPPS	
Performed Protocol Code Sequence	0040,0260	SQ		ANAP	MWL	
>Code Value	0008,0100	SH		ALWAYS	MWL	
>Coding Scheme Designator	0008,0102	SH		ALWAYS	MWL	
>Code Meaning	0008,0104	LO		ALWAYS	MWL	

Table 64: CR Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Body Part Examined	0018,0015	CS		VNAP	MPPS, USER	
View Position	0018,5101	CS		VNAP	AUTO	

Table 65: General Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
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 Model Name	0008,1090	LO	MammoDiagnost DR	ALWAYS	AUTO	
Device Serial Number	0018,1000	LO		ALWAYS	CONFIG	
Software Version(s)	0018,1020	LO		ALWAYS	AUTO	
Spatial Resolution	0018,1050	DS		ALWAYS	AUTO	

Table 66: General Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Image Type	0008,0008	CS	Value 1: ORIGINAL, Value 2: PRIMARY	ALWAYS	AUTO	
Acquisition Date	0008,0022	DA		ALWAYS	AUTO	
Content Date	0008,0023	DA		ALWAYS	AUTO	
Acquisition Time	0008,0032	TM		ALWAYS	AUTO	
Content Time	0008,0033	TM		ALWAYS	AUTO	
Instance Number	0020,0013	IS		VNAP	AUTO	
Patient Orientation	0020,0020	CS		ALWAYS	AUTO, CONFIG	
Quality Control Image	0028,0300	CS		VNAP	AUTO	
Burned In Annotation	0028,0301	CS	NO, YES	ALWAYS	AUTO, USER	
Lossy Image Compression	0028,2110	CS	00	ALWAYS	AUTO	
Presentation LUT Shape	2050,0020	CS	IDENTITY	ALWAYS	AUTO	

Table 67: Image Pixel Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Samples per Pixel	0028,0002	US	1	ALWAYS	AUTO	
Rows	0028,0010	US		ALWAYS	AUTO	

Columns	0028,0011	US		ALWAYS	AUTO	
Bits Allocated	0028,0100	US	16	ALWAYS	AUTO	
Bits Stored	0028,0101	US	10, 12, 15	ALWAYS	CONFIG	
High Bit	0028,0102	US	11, 14, 9	ALWAYS	AUTO	
Pixel Representation	0028,0103	US	0x0000	ALWAYS	AUTO	
Pixel Data	7FE0,0010	O W/ OB		ALWAYS	AUTO	

Table 68: CR Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
KVP	0018,0060	DS		ANAP	AUTO	
Distance Source to Detector	0018,1110	DS		ANAP	AUTO	
Distance Source to Patient	0018,1111	DS		ANAP	AUTO	
Exposure Time	0018,1150	IS		ANAP	AUTO	
Exposure	0018,1152	IS		ANAP	AUTO	
Exposure in µAs	0018,1153	IS		ANAPCV	AUTO	
Imager Pixel Spacing	0018,1164	DS		ALWAYS	AUTO	
Acquisition Device Processing Description	0018,1400	LO		ANAPCV	AUTO	
Relative X-ray Exposure	0018,1405	IS		ANAP	AUTO	
Photometric Interpretation	0028,0004	CS	MONOCHROME2	ALWAYS	AUTO	

Table 69: Overlay Plane Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Overlay Rows	6000,0010	US		ANAP	AUTO	
Overlay Columns	6000,0011	US		ANAP	AUTO	
Overlay Type	6000,0040	CS	G	ANAP	AUTO	
Overlay Origin	6000,0050	SS	Value 1: 1, Value 2: 1	ANAP	AUTO	
Overlay Bits Allocated	6000,0100	US	1	ANAP	AUTO	
Overlay Bit Position	6000,0102	US	0	ANAP	AUTO	
Overlay Data	6000,3000	O W/ OB		ANAP	AUTO	

Table 70: Modality LUT Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Rescale Intercept	0028,1052	DS	0.0	ALWAYS	AUTO	
Rescale Slope	0028,1053	DS	1.0	ALWAYS	AUTO	
Rescale Type	0028,1054	LO	US	ALWAYS	AUTO	

Table 71: VOI LUT Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Window Center	0028,1050	DS	Value 1: 2047.0	ANAP	AUTO	
Window Width	0028,1051	DS	Value 1: 4095.0	ANAP	AUTO	

Table 72: SOP Common Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Specific Character Set	0008,0005	CS		ANAPEV	AUTO	
SOP Class UID	0008,0016	UI		ANAPEV	AUTO	
SOP Instance UID	0008,0018	UI		ANAPEV	AUTO	

8.1.1.3. Digital Mammography X-Ray Image Storage - Pres. SOP

Table 73: IOD of Created Digital Mammography X-Ray Image Storage - Pres. SOP Instances

Information Entity	Module	Presence Of Module
Patient	Patient Module	ALWAYS
Study	General Study Module	ALWAYS
Study	Patient Study Module	CONDITIONAL
Series	General Series Module	ALWAYS
Series	Mammography Series Module	ALWAYS
Series	DX Series Module	ALWAYS
Frame of Reference	Frame of Reference Module	ALWAYS
Equipment	General Equipment Module	ALWAYS
Image	General Image Module	ALWAYS
Image	Image Pixel Module	ALWAYS
Image	Contrast/Bolus Module	CONDITIONAL
Image	Acquisition Context Module	ALWAYS
Image	Display Shutter Module	CONDITIONAL
Image	DX Image Module	ALWAYS
Image	X-Ray Collimator Module	CONDITIONAL
Image	DX Detector Module	ALWAYS
Image	DX Positioning Module	CONDITIONAL
Image	X-Ray Acquisition Dose Module	CONDITIONAL
Image	X-Ray Generation Module	CONDITIONAL
Image	X-Ray Filtration Module	CONDITIONAL
Image	X-Ray Grid Module	CONDITIONAL
Image	Mammography Image Module	ALWAYS
Image	Overlay Plane Module	CONDITIONAL
Image	SOP Common Module	ALWAYS
	Extended Dicom and Private attributes	CONDITIONAL

Table 74: Patient Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Patient's Name	0010,0010	PN		VNAP	MWL, USER	
Patient ID	0010,0020	LO		ALWAYS	MWL, USER	
Patient's Birth Date	0010,0030	DA		VNAP	MWL, USER	
Patient's Sex	0010,0040	CS	F, M, O	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, USER	
Issuer of Patient ID	0010,0021	LO		ANAP	MWL, USER	

Table 75: General Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Study Date	0008,0020	DA		ALWAYS	MPPS	
Study Time	0008,0030	TM		ALWAYS	MPPS	
Accession Number	0008,0050	SH		VNAP	MWL, USER	
Referring Physician's Name	0008,0090	PN		VNAP	MWL, USER	
Study Description	0008,1030	LO		ANAP	MWL, USER	
Procedure Code Sequence	0008,1032	SQ		ANAP	MWL	
>Code Value	0008,0100	SH		ALWAYS	MWL	
>Coding Scheme Designator	0008,0102	SH		ALWAYS	MWL	
>Coding Scheme Version	0008,0103	SH		ANAP	MWL	
>Code Meaning	0008,0104	LO		ALWAYS	MWL	
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		VNAP	AUTO, MPPS	

Table 76: Patient Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Patient's Age	0010,1010	AS		VNAP	MWL, USER	
Patient's Size	0010,1020	DS		ANAP	MWL, USER	
Patient's Weight	0010,1030	DS		ANAP	MWL, USER	
Additional Patient History	0010,21B0	LT		ANAP	MWL, USER	

Table 77: General Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Series Date	0008,0021	DA		ANAP	MPPS	
Series Time	0008,0031	TM		ANAP	MPPS	
Series Description	0008,103E	LO		ANAP	MPPS, USER	
Performing Physician's Name	0008,1050	PN		ANAP	MPPS, USER	
Operators' Name	0008,1070	PN		ANAP	MPPS, USER	
Body Part Examined	0018,0015	CS		ANAP	USER	

Protocol Name	0018,1030	LO		ANAP	MPPS, USER	
Series Instance UID	0020,000E	UI		ALWAYS	AUTO, MPPS	
Series Number	0020,0011	IS		VNAP	AUTO	
Performed Procedure Step Start Date	0040,0244	DA		ANAPCV	MPPS	
Performed Procedure Step Start Time	0040,0245	TM		ANAPCV	MPPS	
Performed Procedure Step ID	0040,0253	SH		ANAPCV	MPPS	
Performed Procedure Step Description	0040,0254	LO		ANAPCV	MPPS	
Performed Protocol Code Sequence	0040,0260	SQ		ANAP	MWL	
>Code Value	0008,0100	SH		ALWAYS	MWL	
>Coding Scheme Designator	0008,0102	SH		ALWAYS	MWL	
>Code Meaning	0008,0104	LO		ALWAYS	MWL	

Table 78: Mammography Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Modality	0008,0060	CS	MG	ALWAYS	AUTO	
Request Attributes Sequence	0040,0275	SQ		ANAP	MWL	
>Scheduled Procedure Step Description	0040,0007	LO		ANAP	MWL	
>Scheduled Protocol Code Sequence	0040,0008	SQ		ANAP	MWL	
>>Code Value	0008,0100	SH		ALWAYS	MWL	
>>Coding Scheme Designator	0008,0102	SH		ALWAYS	MWL	
>>Code Meaning	0008,0104	LO		ALWAYS	MWL	
>Scheduled Procedure Step ID	0040,0009	SH		ANAPEV	MWL	
>Requested Procedure ID	0040,1001	SH		ANAPEV	MWL	

Table 79: DX Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Presentation Intent Type	0008,0068	CS	FOR PRESENTATION	ALWAYS	AUTO	
Referenced Performed Procedure Step Sequence	0008,1111	SQ		ANAP	AUTO	
>Referenced SOP Class UID	0008,1150	UI		ANAP	AUTO	
>Referenced SOP Instance UID	0008,1155	UI	1.2.840.10008.3.1.2.3.3	ANAP	AUTO	

Table 80: Frame of Reference Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Frame of Reference UID	0020,0052	UI		ALWAYS	AUTO	
Position Reference Indicator	0020,1040	LO		VNAP	AUTO	

Table 81: General Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
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 Model Name	0008,1090	LO	MammoDiagnost DR	ALWAYS	AUTO	
Device Serial Number	0018,1000	LO		ALWAYS	CONFIG	
Software Version(s)	0018,1020	LO		ALWAYS	AUTO	
Spatial Resolution	0018,1050	DS		ALWAYS	AUTO	
Pixel Padding Value	0028,0120	US /SS		ALWAYS	AUTO	

Table 82: General Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Acquisition Date	0008,0022	DA		ANAPCV	AUTO	
Content Date	0008,0023	DA		ANAPCV	AUTO	
Acquisition Time	0008,0032	TM		ANAPCV	AUTO	
Content Time	0008,0033	TM		ANAPCV	AUTO	
Source Image Sequence	0008,2112	SQ		ANAPCV	AUTO	
>Spatial Locations Preserved	0028,135A	CS		ANAPCV	AUTO	
>Referenced SOP Class UID	0008,1150	UI		ALWAYS	AUTO	
>Referenced SOP Instance UID	0008,1155	UI		ALWAYS	AUTO	
Instance Number	0020,0013	IS		VNAP	AUTO	
Quality Control Image	0028,0300	CS		ANAPCV	AUTO	
Icon Image Sequence	0088,0200	SQ		ANAP	AUTO	
>Rows	0028,0010	US		ALWAYS	AUTO	
>Columns	0028,0011	US		ALWAYS	AUTO	
>Pixel Aspect Ratio	0028,0034	IS		ANAP	AUTO	
>Pixel Data	7FE0,0010	O W/ OB		ANAP	AUTO	

Table 83: Image Pixel Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Rows	0028,0010	US		ALWAYS	AUTO	
Columns	0028,0011	US		ALWAYS	AUTO	
Pixel Data	7FE0,0010	O W/ OB		ANAP	AUTO	

Table 84: Contrast/Bolus Module

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

Table 85: Acquisition Context Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Acquisition Context Sequence	0040,0555	SQ		VNAP	AUTO	

Table 86: Display Shutter Module

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

Shutter Left Vertical Edge	0018,1602	IS		ANAPEV	AUTO	
Shutter Right Vertical Edge	0018,1604	IS		ANAPEV	AUTO	
Shutter Upper Horizontal Edge	0018,1606	IS		ANAPEV	AUTO	
Shutter Lower Horizontal Edge	0018,1608	IS		ANAPEV	AUTO	
Center of Circular Shutter	0018,1610	IS		ANAPEV	AUTO	
Radius of Circular Shutter	0018,1612	IS		ANAPEV	AUTO	
Vertices of the Polygonal Shutter	0018,1620	IS		ANAPEV	AUTO	

Table 87: DX Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Acquisition Device Processing Description	0018,1400	LO		ANAPCV	AUTO	
Patient Orientation	0020,0020	CS		ALWAYS	AUTO	
Samples per Pixel	0028,0002	US		ALWAYS	AUTO	
Photometric Interpretation	0028,0004	CS	MONOCHROME2	ALWAYS	AUTO	
Bits Allocated	0028,0100	US	16	ALWAYS	AUTO	
Bits Stored	0028,0101	US	10, 12, 15	ALWAYS	CONFIG	
High Bit	0028,0102	US	11, 14, 9	ALWAYS	AUTO	
Pixel Representation	0028,0103	US		ALWAYS	AUTO	
Burned In Annotation	0028,0301	CS		ALWAYS	CONFIG	
Pixel Intensity Relationship	0028,1040	CS	LOG	ALWAYS	AUTO	
Pixel Intensity Relationship Sign	0028,1041	SS	1	ALWAYS	AUTO	
Window Center	0028,1050	DS	Value 1: 2047.0	ANAP	AUTO	
Window Width	0028,1051	DS	Value 1: 4095.0	ANAP	AUTO	
Rescale Intercept	0028,1052	DS		ALWAYS	AUTO	
Rescale Slope	0028,1053	DS		ALWAYS	AUTO	
Rescale Type	0028,1054	LO		ALWAYS	AUTO	
Lossy Image Compression	0028,2110	CS	00	ALWAYS	AUTO	
Presentation LUT Shape	2050,0020	CS	IDENTITY	ALWAYS	AUTO	

Table 88: X-Ray Collimator Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Collimator Shape	0018,1700	CS		ALWAYS	AUTO	
Collimator Left Vertical Edge	0018,1702	IS		ANAP	AUTO	
Collimator Right Vertical Edge	0018,1704	IS		ANAP	AUTO	
Collimator Upper Horizontal Edge	0018,1706	IS		ANAP	AUTO	
Collimator Lower Horizontal Edge	0018,1708	IS		ANAP	AUTO	

Table 89: DX Detector Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Field of View Shape	0018,1147	CS		ANAPCV	AUTO	
Field of View Dimension(s)	0018,1149	IS		ANAPCV	AUTO	
Imager Pixel Spacing	0018,1164	DS		ALWAYS	AUTO	
Field of View Origin	0018,7030	DS		ANAPEV	AUTO	
Field of View Rotation	0018,7032	DS		ANAPEV	AUTO	
Field of View Horizontal Flip	0018,7034	CS		ANAPEV	AUTO	

Detector Temperature	0018,7001	DS		ANAPCV	AUTO	
Detector Type	0018,7004	CS		VNAP	AUTO	
Detector Mode	0018,7008	LT	CONTACT, MAG, STEREO	ANAPCV	AUTO	for non-stereo images CONTACT or MAG
Detector ID	0018,700A	SH		VNAP	AUTO	
Date of Last Detector Calibration	0018,700C	DA		ANAP	AUTO	
Detector Active Shape	0018,7024	CS		ANAPCV	AUTO	
Detector Active Dimension(s)	0018,7026	DS		ANAPCV	AUTO	
Detector Active Origin	0018,7028	DS		ANAPCV	AUTO	
Detector Manufacturer Name	0018,702A	LO		ANAPCV	AUTO	
Detector Manufacturer's Model Name	0018,702B	LO		ANAPCV	AUTO	

Table 90: DX Positioning Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Distance Source to Detector	0018,1110	DS		ANAP	AUTO	
Distance Source to Patient	0018,1111	DS		ANAP	AUTO	
Estimated Radiographic Magnification Factor	0018,1114	DS		ANAP	AUTO	
Body Part Thickness	0018,11A0	DS		ANAP	AUTO	
Compression Force	0018,11A2	DS		ANAP	AUTO	
Detector Primary Angle	0018,1530	DS	-15°, 0°, 15°	ANAP	AUTO	0° for all non-stereo images.
Detector Secondary Angle	0018,1531	DS	0°	ANAP	AUTO	0° for all images.
View Position	0018,5101	CS		ANAP	AUTO	
View Code Sequence	0054,0220	SQ		ANAPCV	AUTO	
>View Modifier Code Sequence	0054,0222	SQ		ANAPCV	AUTO	

Table 91: X-Ray Acquisition Dose Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
KVP	0018,0060	DS		ANAP	AUTO	
Exposure Time	0018,1150	IS		ANAP	AUTO	
Exposure	0018,1152	IS		ANAP	AUTO	
Exposure in µAs	0018,1153	IS		ANAP	AUTO	
Image and Fluoroscopy Area Dose Product	0018,115E	DS		ANAP	AUTO	
Relative X-ray Exposure	0018,1405	IS		ANAP	AUTO	
Entrance Dose	0040,0302	US		ANAP	AUTO	
Organ Dose	0040,0316	DS		ANAP	AUTO	
Entrance Dose in mGy	0040,8302	DS		ANAP	AUTO	

Table 92: X-Ray Generation Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Focal Spot(s)	0018,1190	DS		ANAP	AUTO	
Anode Target Material	0018,1191	CS		ANAP	AUTO	
Exposure Control Mode	0018,7060	CS		ANAP	AUTO	
Exposure Time in mS	0018,8150	DS		ANAP	AUTO	

Table 93: X-Ray Filtration Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Filter Material	0018,7050	CS		ANAP	AUTO	

Table 94: X-Ray Grid Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Grid	0018,1166	CS	FOCUSED, NONE, PARALLEL, RECIPROCATING	VNAP	AUTO	For Magnification-Exposures the applied value is "NONE". For Non-Magnification-Exposures the applied values are "RECIPROCATING\PARALLEL\FOCUSED“

Table 95: Mammography Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Image Type	0008,0008	CS	Value 1: ORIGINAL, Value 2: PRIMARY, Value 3: POSTBIOPSY, STEREO_MINUS/STEREO_PLUS, STEREO_SCOUT	ALWAYS	AUTO	
Positioner Type	0018,1508	CS	MAMMOGRAPHIC	ALWAYS	AUTO	
Positioner Primary Angle	0018,1510	DS		ANAPCV	AUTO	
Image Laterality	0020,0062	CS		ALWAYS	AUTO	
Breast Implant Present	0028,1300	CS		ANAPCV	AUTO	
Partial View	0028,1350	CS		ANAPCV	AUTO	
Organ Exposed	0040,0318	CS	BREAST	ALWAYS	AUTO	
View Code Sequence	0054,0220	SQ		ALWAYS	AUTO	
>View Modifier Code Sequence	0054,0222	SQ		VNAP	AUTO	
>>Code Value	0008,0100	SH		ALWAYS	AUTO	
>>Coding Scheme Designator	0008,0102	SH		ALWAYS	AUTO	
>>Code Meaning	0008,0104	LO		ALWAYS	AUTO	
>Code Value	0008,0100	SH		ALWAYS	AUTO	
>Coding Scheme Designator	0008,0102	SH		ALWAYS	AUTO	
>Code Meaning	0008,0104	LO		ALWAYS	AUTO	
Anatomic Region Sequence	0008,2218	SQ		ANAP	AUTO	
>Anatomic Region Modifier Sequence	0008,2220	SQ		ANAP	AUTO	
>>Code Value	0008,0100	SH		ALWAYS	AUTO	
>>Coding Scheme Designator	0008,0102	SH		ALWAYS	AUTO	
>>Code Meaning	0008,0104	LO		ALWAYS	AUTO	
>Code Value	0008,0100	SH		ALWAYS	AUTO	
>Coding Scheme Designator	0008,0102	SH		ALWAYS	AUTO	
>Code Meaning	0008,0104	LO		ALWAYS	AUTO	

Table 96: Overlay Plane Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Overlay Rows	6000,0010	US		ALWAYS	AUTO	Up to 10 Overlays may be included in Stereo Images

Overlay Columns	6000,0011	US		ALWAYS	AUTO	Up to 10 Overlays may be included in Stereo Images
Overlay Description	6000,0022	LO		ANAPCV	AUTO	May stay empty
Overlay Type	6000,0040	CS	G	ALWAYS	AUTO	
Overlay Origin	6000,0050	SS		ALWAYS	AUTO	Up to 10 Overlays may be included in Stereo Images
Overlay Bits Allocated	6000,0100	US	1	ALWAYS	AUTO	
Overlay Bit Position	6000,0102	US	0	ALWAYS	AUTO	
Overlay Label	6000,1500	LO		ALWAYS	AUTO, USER	
Overlay Data	6000,3000	O W/ OB		ALWAYS	AUTO	Up to 10 Overlays may be included in Stereo Images

Table 97: SOP Common Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Specific Character Set	0008,0005	CS	ISO_IR 100	ANAP	AUTO	
SOP Class UID	0008,0016	UI	1.2.840.10008.5.1.4.1.1.1.2	ALWAYS	AUTO	
SOP Instance UID	0008,0018	UI		ALWAYS	AUTO	

8.1.1.4. Digital Mammography X-Ray Image Storage - Proc. SOP

Table 98: IOD of Created Digital Mammography X-Ray Image Storage - Proc. SOP Instances

Information Entity	Module	Presence Of Module
Patient	Patient Module	ALWAYS
Study	General Study Module	ALWAYS
Study	Patient Study Module	CONDITIONAL
Series	General Series Module	ALWAYS
Series	Mammography Series Module	ALWAYS
Series	DX Series Module	ALWAYS
Frame of Reference	Frame of Reference Module	ALWAYS
Equipment	General Equipment Module	ALWAYS
Image	General Image Module	ALWAYS
Image	Image Pixel Module	ALWAYS
Image	Contrast/Bolus Module	CONDITIONAL
Image	Acquisition Context Module	ALWAYS
Image	Display Shutter Module	CONDITIONAL
Image	DX Image Module	ALWAYS
Image	X-Ray Collimator Module	CONDITIONAL
Image	DX Detector Module	ALWAYS
Image	DX Positioning Module	CONDITIONAL
Image	X-Ray Acquisition Dose Module	CONDITIONAL
Image	X-Ray Generation Module	CONDITIONAL
Image	X-Ray Filtration Module	CONDITIONAL
Image	X-Ray Grid Module	CONDITIONAL
Image	Mammography Image Module	ALWAYS
Image	Overlay Plane Module	CONDITIONAL
Image	SOP Common Module	ALWAYS
	Extended Dicom and Private attributes	CONDITIONAL

Table 99: Patient Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Patient's Name	0010,0010	PN		VNAP	MWL, USER	
Patient ID	0010,0020	LO		ALWAYS	MWL, USER	
Patient's Birth Date	0010,0030	DA		VNAP	MWL, USER	
Patient's Sex	0010,0040	CS	F, M, O	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, USER	
Issuer of Patient ID	0010,0021	LO		ANAP	MWL, USER	

Table 100: General Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Study Date	0008,0020	DA		ALWAYS	MPPS	
Study Time	0008,0030	TM		ALWAYS	MPPS	
Accession Number	0008,0050	SH		VNAP	MWL, USER	
Referring Physician's Name	0008,0090	PN		VNAP	MWL, USER	
Study Description	0008,1030	LO		ANAP	MWL, USER	
Procedure Code Sequence	0008,1032	SQ		ANAP	MWL	
>Code Value	0008,0100	SH		ALWAYS	MWL	
>Coding Scheme Designator	0008,0102	SH		ALWAYS	MWL	
>Coding Scheme Version	0008,0103	SH		ANAP	MWL	
>Code Meaning	0008,0104	LO		ALWAYS	MWL	
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		VNAP	AUTO, MPPS	

Table 101: Patient Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Patient's Age	0010,1010	AS		VNAP	MWL, USER	
Patient's Size	0010,1020	DS		ANAP	MWL, USER	
Patient's Weight	0010,1030	DS		ANAP	MWL, USER	
Additional Patient History	0010,21B0	LT		ANAP	MWL, USER	

Table 102: General Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Series Date	0008,0021	DA		ANAP	MPPS	
Series Time	0008,0031	TM		ANAP	MPPS	
Series Description	0008,103E	LO		ANAP	MPPS, USER	
Performing Physician's Name	0008,1050	PN		ANAP	MPPS, USER	
Operators' Name	0008,1070	PN		ANAP	MPPS, USER	
Body Part Examined	0018,0015	CS		ANAP	USER	
Protocol Name	0018,1030	LO		ANAP	MPPS, USER	
Series Instance UID	0020,000E	UI		ALWAYS	AUTO, MPPS	
Series Number	0020,0011	IS		VNAP	AUTO, MPPS	
Performed Procedure Step Start Date	0040,0244	DA		ANAPCV	MPPS	
Performed Procedure Step Start Time	0040,0245	TM		ANAPCV	MPPS	
Performed Procedure Step ID	0040,0253	SH		ANAPCV	MPPS	
Performed Procedure Step Description	0040,0254	LO		ANAPCV	MPPS	
Performed Protocol Code Sequence	0040,0260	SQ		ANAP	MWL	
>Code Value	0008,0100	SH		ALWAYS	MWL	
>Coding Scheme Designator	0008,0102	SH		ALWAYS	MWL	
>Code Meaning	0008,0104	LO		ALWAYS	MWL	

Table 103: Mammography Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Modality	0008,0060	CS	MG	ALWAYS	AUTO	
Request Attributes Sequence	0040,0275	SQ		ANAP	MWL	
>Scheduled Procedure Step Description	0040,0007	LO		ANAP	MWL	
>Scheduled Protocol Code Sequence	0040,0008	SQ		ANAP	MWL	
>>Code Value	0008,0100	SH		ALWAYS	MWL	
>>Coding Scheme Designator	0008,0102	SH		ALWAYS	MWL	
>>Code Meaning	0008,0104	LO		ALWAYS	MWL	
>Scheduled Procedure Step ID	0040,0009	SH		ANAPEV	MWL	
>Requested Procedure ID	0040,1001	SH		ANAPEV	MWL	

Table 104: DX Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Presentation Intent Type	0008,0068	CS	PROCESSING	ALWAYS	AUTO	
Referenced Performed Procedure Step Sequence	0008,1111	SQ		ANAP	AUTO	
>Referenced SOP Class UID	0008,1150	UI		ALWAYS	AUTO	

>Referenced SOP Instance UID	0008,1155	UI	1.2.840.10008.3.1.2.3.3	ALWAYS	AUTO	

Table 105: Frame of Reference Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Frame of Reference UID	0020,0052	UI		ALWAYS	AUTO	
Position Reference Indicator	0020,1040	LO		VNAP	AUTO	

Table 106: General Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
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 Model Name	0008,1090	LO	MammoDiagnost DR	ALWAYS	AUTO	
Device Serial Number	0018,1000	LO		ALWAYS	CONFIG	
Software Version(s)	0018,1020	LO		ALWAYS	AUTO	
Spatial Resolution	0018,1050	DS		ALWAYS	AUTO	
Pixel Padding Value	0028,0120	US /SS		ALWAYS	AUTO	

Table 107: General Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Acquisition Date	0008,0022	DA		ANAPCV	AUTO	
Content Date	0008,0023	DA		ANAPCV	AUTO	
Acquisition Time	0008,0032	TM		ANAPCV	AUTO	
Content Time	0008,0033	TM		ANAPCV	AUTO	
Source Image Sequence	0008,2112	SQ		ANAPCV	AUTO	
>Spatial Locations Preserved	0028,135A	CS		ANAPCV	AUTO	
>Referenced SOP Class UID	0008,1150	UI		ALWAYS	AUTO	
>Referenced SOP Instance UID	0008,1155	UI		ALWAYS	AUTO	
Instance Number	0020,0013	IS		VNAP	AUTO	
Quality Control Image	0028,0300	CS		ANAPCV	AUTO	
Icon Image Sequence	0088,0200	SQ		ANAP	AUTO	
>Rows	0028,0010	US		ALWAYS	AUTO	
>Columns	0028,0011	US		ALWAYS	AUTO	
>Pixel Aspect Ratio	0028,0034	IS		ANAP	AUTO	
>Pixel Data	7FE0,0010	O W/ OB		ANAP	AUTO	

Table 108: Image Pixel Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Columns	0028,0011	US		ALWAYS	AUTO	
Bits Allocated	0028,0100	US		ALWAYS	AUTO	
Pixel Data	7FE0,0010	O W/ OB		ANAP	AUTO	

Table 109: Contrast/Bolus Module

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

Table 110: Acquisition Context Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Acquisition Context Sequence	0040,0555	SQ		VNAP	AUTO	

Table 111: Display Shutter Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Shutter Shape	0018,1600	CS		ALWAYS	AUTO	
Shutter Left Vertical Edge	0018,1602	IS		ANAPEV	AUTO	
Shutter Right Vertical Edge	0018,1604	IS		ANAPEV	AUTO	
Shutter Upper Horizontal Edge	0018,1606	IS		ANAPEV	AUTO	
Shutter Lower Horizontal Edge	0018,1608	IS		ANAPEV	AUTO	
Center of Circular Shutter	0018,1610	IS		ANAPEV	AUTO	
Radius of Circular Shutter	0018,1612	IS		ANAPEV	AUTO	
Vertices of the Polygonal Shutter	0018,1620	IS		ANAPEV	AUTO	

Table 112: DX Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Acquisition Device Processing Description	0018,1400	LO		ANAPCV	AUTO	
Patient Orientation	0020,0020	CS		ALWAYS	AUTO	
Samples per Pixel	0028,0002	US		ALWAYS	AUTO	
Photometric Interpretation	0028,0004	CS	MONOCHROME2	ALWAYS	AUTO	
Bits Allocated	0028,0100	US	16	ALWAYS	AUTO	
Bits Stored	0028,0101	US	10, 12, 15	ALWAYS	CONFIG	
High Bit	0028,0102	US	11, 14, 9	ALWAYS	AUTO	
Pixel Representation	0028,0103	US		ALWAYS	AUTO	
Burned In Annotation	0028,0301	CS		ALWAYS	CONFIG	
Pixel Intensity Relationship	0028,1040	CS	LOG	ALWAYS	AUTO	
Pixel Intensity Relationship Sign	0028,1041	SS	1	ALWAYS	AUTO	
Window Center	0028,1050	DS	Value 1: 2047.0	ANAP	AUTO	
Window Width	0028,1051	DS	Value 1: 4095.0	ANAP	AUTO	
Rescale Intercept	0028,1052	DS		ALWAYS	AUTO	
Rescale Slope	0028,1053	DS		ALWAYS	AUTO	
Rescale Type	0028,1054	LO		ALWAYS	AUTO	
Lossy Image Compression	0028,2110	CS	00	ALWAYS	AUTO	
Presentation LUT Shape	2050,0020	CS	IDENTITY	ALWAYS	AUTO	

Table 113: X-Ray Collimator Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Collimator Shape	0018,1700	CS		ALWAYS	AUTO	
Collimator Left Vertical Edge	0018,1702	IS		ANAP	AUTO	
Collimator Right Vertical Edge	0018,1704	IS		ANAP	AUTO	

Collimator Upper Horizontal Edge	0018,1706	IS		ANAP	AUTO	
Collimator Lower Horizontal Edge	0018,1708	IS		ANAP	AUTO	

Table 114: DX Detector Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Field of View Shape	0018,1147	CS		ANAPCV	AUTO	
Field of View Dimension(s)	0018,1149	IS		ANAPCV	AUTO	
Imager Pixel Spacing	0018,1164	DS		ALWAYS	AUTO	
Field of View Origin	0018,7030	DS		ANAPEV	AUTO	
Field of View Rotation	0018,7032	DS		ANAPEV	AUTO	
Field of View Horizontal Flip	0018,7034	CS		ANAPEV	AUTO	
Detector Temperature	0018,7001	DS		ANAPCV	AUTO	
Detector Type	0018,7004	CS		VNAP	AUTO	
Detector Mode	0018,7008	LT	CONTACT, MAG, STEREO	ANAPCV	AUTO	for non-stereo images CONTACT or MAG
Detector ID	0018,700A	SH		ANAPCV	AUTO	
Date of Last Detector Calibration	0018,700C	DA		ANAPCV	AUTO	
Detector Active Shape	0018,7024	CS		ANAPCV	AUTO	
Detector Active Dimension(s)	0018,7026	DS		ANAPCV	AUTO	
Detector Active Origin	0018,7028	DS		ANAPCV	AUTO	
Detector Manufacturer Name	0018,702A	LO		ANAPCV	AUTO	
Detector Manufacturer's Model Name	0018,702B	LO		ANAPCV	AUTO	

Table 115: DX Positioning Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Distance Source to Detector	0018,1110	DS		ANAP	AUTO	
Distance Source to Patient	0018,1111	DS		ANAP	AUTO	
Estimated Radiographic Magnification Factor	0018,1114	DS		ANAP	AUTO	
Body Part Thickness	0018,11A0	DS		ANAP	AUTO	
Compression Force	0018,11A2	DS		ANAP	AUTO	
Detector Primary Angle	0018,1530	DS	-15°, 0°, 15°	ANAP	AUTO	0° for all non-stereo images.
Detector Secondary Angle	0018,1531	DS	0°	ANAP	AUTO	0° for all images.
View Position	0018,5101	CS		ANAP	AUTO	
View Code Sequence	0054,0220	SQ		ANAPCV	AUTO	
>View Modifier Code Sequence	0054,0222	SQ		ANAPCV	AUTO	

Table 116: X-Ray Acquisition Dose Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
KVP	0018,0060	DS		ANAP	AUTO	
Exposure	0018,1152	IS		ANAP	AUTO	
Exposure in µAs	0018,1153	IS		ANAP	AUTO	
Image and Fluoroscopy Area Dose Product	0018,115E	DS		ANAP	AUTO	
Relative X-ray Exposure	0018,1405	IS		ANAP	AUTO	
Exposure Time in mS	0018,8150	DS		ANAP	AUTO	

Entrance Dose	0040,0302	US		ANAP	AUTO	
Organ Dose	0040,0316	DS		ANAP	AUTO	
Entrance Dose in mGy	0040,8302	DS		ANAP	AUTO	

Table 117: X-Ray Generation Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Focal Spot(s)	0018,1190	DS		ANAP	AUTO	
Anode Target Material	0018,1191	CS		ANAP	AUTO	
Exposure Control Mode	0018,7060	CS		ANAP	AUTO	
Exposure Time in mS	0018,8150	DS		ANAP	AUTO	

Table 118: X-Ray Filtration Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Filter Material	0018,7050	CS		ANAP	AUTO	

Table 119: X-Ray Grid Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Grid	0018,1166	CS	FOCUSED, NONE, PARALLEL, RECIPROCATING	VNAP	AUTO	For Magnification-Exposures the applied value is "NONE". For Non-Magnification-Exposures the applied values are "RECIPROCATING\PARALLEL\FOCUSED“

Table 120: Mammography Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Image Type	0008,0008	CS	Value 1: ORIGINAL, STEREO_MINUS, STEREO_PLUS, Value 2: PRIMARY, Value 3: POSTBIOPSY, STEREO_MINUS/STEREO_PLUS, STEREO_SCOUT	ALWAYS	AUTO	
Positioner Type	0018,1508	CS	MAMMOGRAPHIC	ALWAYS	AUTO	
Positioner Primary Angle	0018,1510	DS		ANAPCV	AUTO	
Image Laterality	0020,0062	CS		ALWAYS	AUTO	
Breast Implant Present	0028,1300	CS		ANAPCV	AUTO	
Partial View	0028,1350	CS		ANAPCV	AUTO	
Organ Exposed	0040,0318	CS	BREAST	ALWAYS	AUTO	
View Code Sequence	0054,0220	SQ		ALWAYS	AUTO	
>View Modifier Code Sequence	0054,0222	SQ		VNAP	AUTO	
>>Code Value	0008,0100	SH		ALWAYS	AUTO	
>>Coding Scheme Designator	0008,0102	SH		ALWAYS	AUTO	
>>Code Meaning	0008,0104	LO		ALWAYS	AUTO	
>Code Value	0008,0100	SH		ALWAYS	AUTO	
>Coding Scheme Designator	0008,0102	SH		ALWAYS	AUTO	
>Code Meaning	0008,0104	LO		ALWAYS	AUTO	
Anatomic Region Sequence	0008,2218	SQ		ALWAYS	AUTO	

>Anatomic Region Modifier Sequence	0008,2220	SQ		ANAP	AUTO	
>>Code Value	0008,0100	SH		ALWAYS	AUTO	
>>Coding Scheme Designator	0008,0102	SH		ALWAYS	AUTO	
>>Code Meaning	0008,0104	LO		ALWAYS	AUTO	
>Code Value	0008,0100	SH		ALWAYS	AUTO	
>Coding Scheme Designator	0008,0102	SH		ALWAYS	AUTO	
>Code Meaning	0008,0104	LO		ALWAYS	AUTO	

Table 121: Overlay Plane Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Overlay Rows	6000,0010	US		ALWAYS	AUTO	Up to 10 overlays may be included in Stereo Images
Overlay Columns	6000,0011	US		ALWAYS	AUTO	Up to 10 overlays may be included in Stereo Images
Overlay Description	6000,0022	LO		ANAPCV	AUTO	May stay empty
Overlay Type	6000,0040	CS		ALWAYS	AUTO	
Overlay Origin	6000,0050	SS		ALWAYS	AUTO	Up to 10 overlays may be included in Stereo Images
Overlay Bits Allocated	6000,0100	US		ALWAYS	AUTO	
Overlay Bit Position	6000,0102	US		ALWAYS	AUTO	
Overlay Label	6000,1500	LO		ALWAYS	AUTO, USER	
Overlay Data	6000,3000	O W/ OB		ALWAYS	AUTO	Up to 10 overlays may be included in Stereo Images

Table 122: SOP Common Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Specific Character Set	0008,0005	CS	ISO_IR 100	ANAP		
SOP Class UID	0008,0016	UI	1.2.820.10008.5.1.4.1.1.1.2.1	ALWAYS		
SOP Instance UID	0008,0018	UI		ALWAYS		

8.1.2. Usage of Attributes from Received IOD

The MammoDiagnost DR 2.0 has only an export side. The modality cannot read/view images from CD or by import.

8.1.3. Attribute Mapping

Table 123: Attribute mapping during Modality Workflow

Name	WLM tag	MPPS Create tag	MPPSSet tag	Image IOD tag
Accession Number	0008,0050	(0040,0270) >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	(0040,0270) >0008,1110	-	0008,1110

Name	WLM tag	MPPS Create tag	MPPSSet tag	Image IOD tag
Referenced Image Sequence>Referenced SOP Class UID	-	-	(0040,0340)	0008,0016
SOP Class UID			(>0008,1140)	
			>>0008,1150	
Referenced Image Sequence> Referenced SOP Instance UID	-	-	(0040,0340)	0008,0018
SOP Instance UID			(>0008,1140)	
			>>0008,1155	
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
Additional Patient History	0010,21B0	-	-	0010,21B0
Pregnancy Status	0010,21C0	-	-	0010,21C0
Patient Comments	0010,4000	-	-	0010,4000
Protocol Name	-	-	(0040,0340)	0018,1030
			>0018,1030	
Study Instance UID	0020,000D	(0040,0270)	-	0020,000D
		>0020,000D		
Series Instance UID	-	-	0020,000E	0020,000E
Study ID	-	0020,0010	-	0020,0010
Request Service	0032,1033	-	-	0032,1033
Requested Procedure Description	0032,1060	(0040,0270)	-	-
		>0032,1060		
Requested Procedure Code Sequence[1]	0032,1064	0032,1032	0032,1032	0032,1032
Performed Procedure Code Sequence				
Special Needs	0038,0050	-	-	0038,0050
Patient State	0038,0500	-	-	0038,0500
Scheduled Procedure Step Description[2]	(0040,0100)	(0040,0270)	-	(0040,0275)
	>0040,0007	>0040,0007		>0040,0007
Performed Procedure Step Description		0040,254	-	0040,254
Scheduled Protocol Code Sequence[2]	(0040,0100)	(0040,0270)		(0040,0275)
	>0040,0008	>0040,0008		>0040,0008
Scheduled Protocol Code Sequence		0040,0260	0040,0260	0040,0260
Scheduled Procedure Step ID	(0040,0100)	(0040,0270)	-	(0040,0270)
	>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	(0040,0270)	-	(0040,0275)
		>0040,1001		>0040,1001

Note1: If procedure is performed as requested.
Note 2: If protocol is performed as scheduled.

8.1.4. 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 Groups

Not applicable.

8.3.2. Template Specifications

Not applicable.

8.3.3. Private code definitions

Not applicable.

8.4. Grayscale Image consistency

The monitor of MammoDiagnost DR 2.0 system can be calibrated according Grayscale Display Function Standard.

The pixel values exported and printed must be interpreted as P-Value. If the export destination or the printer does not support GSDF, MammoDiagnost DR 2.0 provides calibration and takes into account ambient luminance and light box luminance.

8.5. Standard Extended/Specialized/Private SOPs

Not applicable.

Table 124: List of created SOP Classes

SOP Class Name	SOP Class UID
Computed Radiography Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.1
Digital Mammography X-Ray Image Storage - Pres. SOP	1.2.840.10008.5.1.4.1.1.1.2
Digital Mammography X-Ray Image Storage - Proc. SOP	1.2.840.10008.5.1.4.1.1.1.2.1

8.5.1. Standard Extended/Specialized/Private SOP Instance

8.5.1.1. Computed Radiography Image Storage SOP Class

Table 125: Extended DICOM and private attributes for Computed Radiography Image Storage SOP Class Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Medical Alerts	0010,2000	LO		VNAP	MWL, USER	
Allergies	0010,2110	LO		VNAP	AUTO	
Pregnancy Status	0010,21C0	US	0001, 0002, 0003, 0004	VNAP	MWL, USER	
Image and Fluoroscopy Area Dose Product	(0018,115E)	DS		VNAP	AUTO	

Grid	(0018,1166)	CS	FOCUSED, RECIPROCATING, PARALLEL, NONE	VNAP	AUTO	For Magnification-Exposures the applied value is "NONE". For Non-Magnification-Exposures the applied values are "RECIPROCATING\PARALLEL\FOCUSED“.
Filter Material	0018,7050	CS		VNAP	AUTO	
Frame of Reference UID	0020,0052	UI		VNAP	AUTO	
Pixel Spacing	0028,0030	DS		ANAP	AUTO	
Requesting Physician	0032,1032	PN		VNAP	MWL, USER	
Requesting Service	0032,1033	LO		VNAP	AUTO, MWL, USER	
Requested Procedure Description	0032,1060	LO		VNAP	MWL, USER	
Special Needs	0038,0050	LO		VNAP	MWL, USER	
Patient State	0038,0500	LO		VNAP	MWL, USER	
Performed Station AE Title	0040,0241	AE		VNAP	MWL	
Performed Procedure Step End Date	0040,0250	DA		VNAP	MWL	
Performed Procedure Step End Time	0040,0251	TM		VNAP	MWL	
Performed Procedure Step Status	0040,0252	CS	COMPLETED, DISCONTINUED, IN PROGRESS	VNAP	AUTO, MPPS	
Total Number of Exposures	0040,0301	US		ALWAYS	AUTO	
Exposure Dose Sequence	0040,030E	SQ		VNAP	AUTO	
Organ Exposed	0040,0318	CS		ALWAYS	AUTO	
Film Consumption Sequence	0040,0321	SQ		VNAP	AUTO	
Requested Procedure ID	0040,1001	SH		VNAP	AUTO	
Reason for the Requested Procedure	0040,1002	LO		VNAP	AUTO	
Requested Procedure Priority	0040,1003	SH		VNAP	AUTO	
Patient Transport Arrangements	0040,1004	LO		VNAP	AUTO	
Names of Intended Recipients of Results	0040,1010	PN		VNAP	AUTO	
Reason for the Imaging Service Request (retired)	0040,2001	LO		VNAP	AUTO	
Issue Date of Imaging Service Request	0040,2004	DA		VNAP	AUTO	
Imaging Service Request Comments	0040,2400	LT		VNAP	MWL, USER	

8.5.1.2. Digital Mammography X-Ray Image Storage - Pres. SOP

Table 126: Extended DICOM and private attributes for Digital Mammography X-Ray Image Storage - Pres. SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Medical Alerts	0010,2000	LO		VNAP	MWL, USER	
Allergies	0010,2110	LO		VNAP	MWL, USER	

Pregnancy Status	0010,21C0	US		VNAP	MWL, USER	
Pixel Spacing	0028,0030	DS		ANAP	AUTO	
Requesting Physician	0032,1032	PN		VNAP	MWL, USER	
Requesting Service	0032,1033	LO		VNAP	AUTO, MWL, USER	
Requested Procedure Description	0032,1060	LO		VNAP	MWL, USER	
Special Needs	0038,0050	LO		VNAP	MWL, USER	
Patient State	0038,0500	LO		VNAP	MWL, USER	
Performed Station AE Title	0040,0241	AE		VNAP	AUTO, MPPS	
Performed Procedure Step End Date	0040,0250	DA		VNAP	AUTO, MPPS	
Performed Procedure Step End Time	0040,0251	TM		VNAP	AUTO, MPPS	
Performed Procedure Step Status	0040,0252	CS	COMPLETED, DISCONTINUED, IN PROGRESS	VNAP	AUTO, MPPS	
Total Number of Exposures	0040,0301	US		ALWAYS	AUTO	
Exposure Dose Sequence	0040,030E	SQ		VNAP	AUTO	
>Radiation Mode	0018,115A	CS		ALWAYS	AUTO	
Film Consumption Sequence	0040,0321	SQ		VNAP	AUTO	
Requested Procedure ID	0040,1001	SH		VNAP	AUTO	
Reason for the Requested Procedure	0040,1002	LO		VNAP	AUTO	
Requested Procedure Priority	0040,1003	SH		VNAP	AUTO	
Patient Transport Arrangements	0040,1004	LO		VNAP	AUTO	
Names of Intended Recipients of Results	0040,1010	PN		VNAP	AUTO	
Requested Procedure Comments	0040,1400	LT		ANAP	AUTO	
Reason for the Imaging Service Request (retired)	0040,2001	LO		VNAP	AUTO	
Issue Date of Imaging Service Request	0040,2004	DA		VNAP	AUTO	
Imaging Service Request Comments	0040,2400	LT		VNAP	AUTO	

8.5.1.3. Digital Mammography X-Ray Image Storage - Proc. SOP

Table 127: Extended DICOM and private attributes for Digital Mammography X-Ray Image Storage - Proc. SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Medical Alerts	0010,2000	LO		VNAP	MWL, USER	
Allergies	0010,2110	LO		VNAP	MWL, USER	
Pregnancy Status	0010,21C0	US		VNAP	MWL, USER	

Pixel Spacing	0028,0030	DS		ANAP	AUTO	
Requesting Physician	0032,1032	PN		VNAP	MWL, USER	
Requesting Service	0032,1033	LO		VNAP	AUTO, MWL, USER	
Requested Procedure Description	0032,1060	LO		VNAP	MWL, USER	
Special Needs	0038,0050	LO		VNAP	MWL, USER	
Patient State	0038,0500	LO		VNAP	MWL, USER	
Performed Station AE Title	0040,0241	AE		VNAP	AUTO, MPPS	
Performed Procedure Step End Date	0040,0250	DA		VNAP	AUTO, MPPS	
Performed Procedure Step End Time	0040,0251	TM		VNAP	AUTO, MPPS	
Performed Procedure Step Status	0040,0252	CS	COMPLETED, DISCONTINUED, IN PROGRESS	VNAP	AUTO, MPPS	
Total Number of Exposures	0040,0301	US		ALWAYS	AUTO	
Exposure Dose Sequence	0040,030E	SQ		VNAP	AUTO	
>Radiation Mode	0018,115A	CS		ALWAYS	AUTO	
Film Consumption Sequence	0040,0321	SQ		VNAP	AUTO	
Requested Procedure ID	0040,1001	SH		VNAP	AUTO	
Reason for the Requested Procedure	0040,1002	LO		VNAP	AUTO	
Requested Procedure Priority	0040,1003	SH		VNAP	AUTO	
Patient Transport Arrangements	0040,1004	LO		VNAP	AUTO	
Names of Intended Recipients of Results	0040,1010	PN		VNAP	AUTO	
Requested Procedure Comments	0040,1400	LT		ANAP	AUTO	
Reason for the Imaging Service Request (retired)	0040,2001	LO		VNAP	AUTO	
Issue Date of Imaging Service Request	0040,2004	DA		VNAP	AUTO	
Imaging Service Request Comments	0040,2400	LT		VNAP	AUTO	

8.6. Private Transfer Syntaxes

Not applicable.