DICOM

Conformance Statement

DigitalDiagnost R3.1
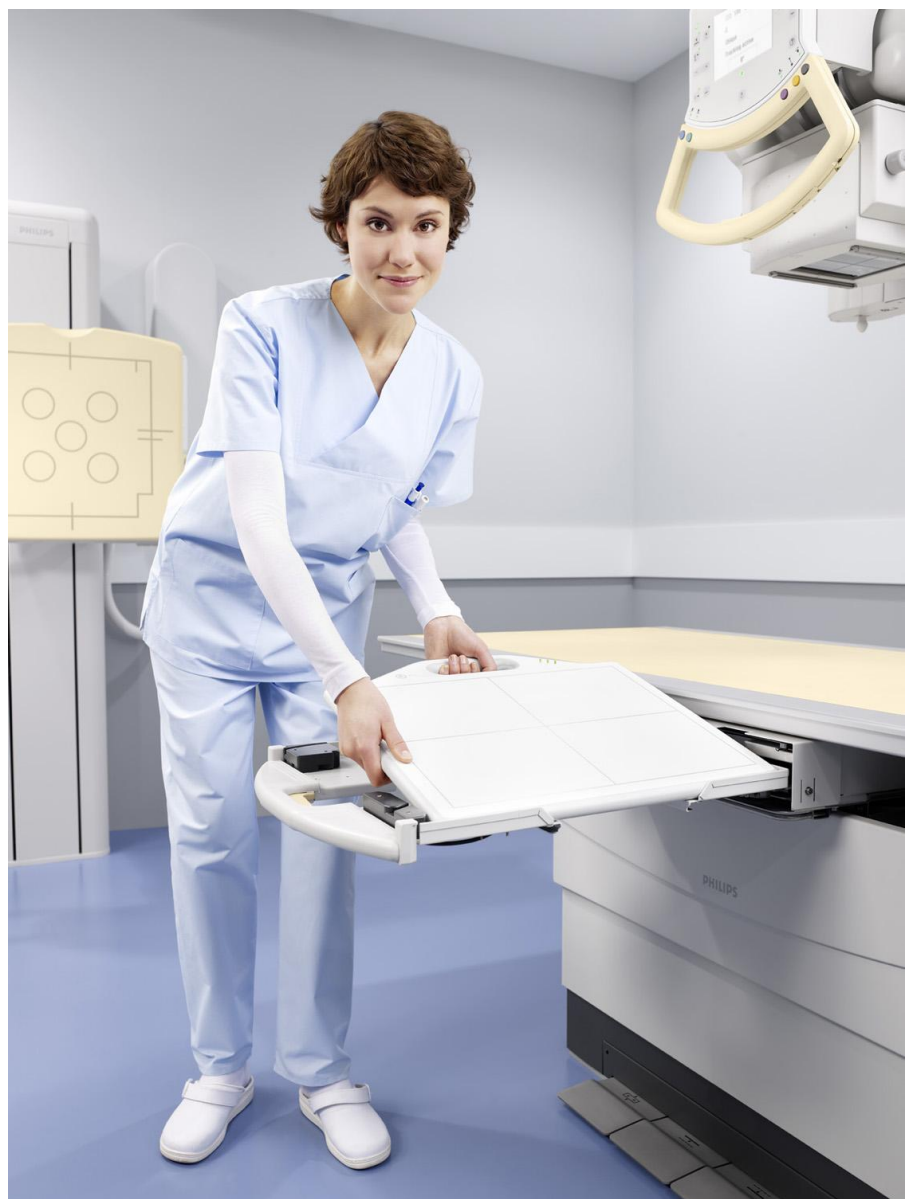
PHILIPS

Document Number: PIIOffc.0001164

1. DICOM CONFORMANCE STATEMENT OVERVIEW

This document is the DICOM Conformance Statement for the Philips Medical Systems DigitalDiagnost R3.1 system.

A table of Supported Networking DICOM Services, (SOP) Classes is provided with roles (User/Provider) and can be found on the next page.

DigitalDiagnost R3.1, which is the third DigitalDiagnost release, is based on the PMS Eleva Platform EWS0409.

The figure below shows the position of the DigitalDiagnost R3.1 in a radiology environment.
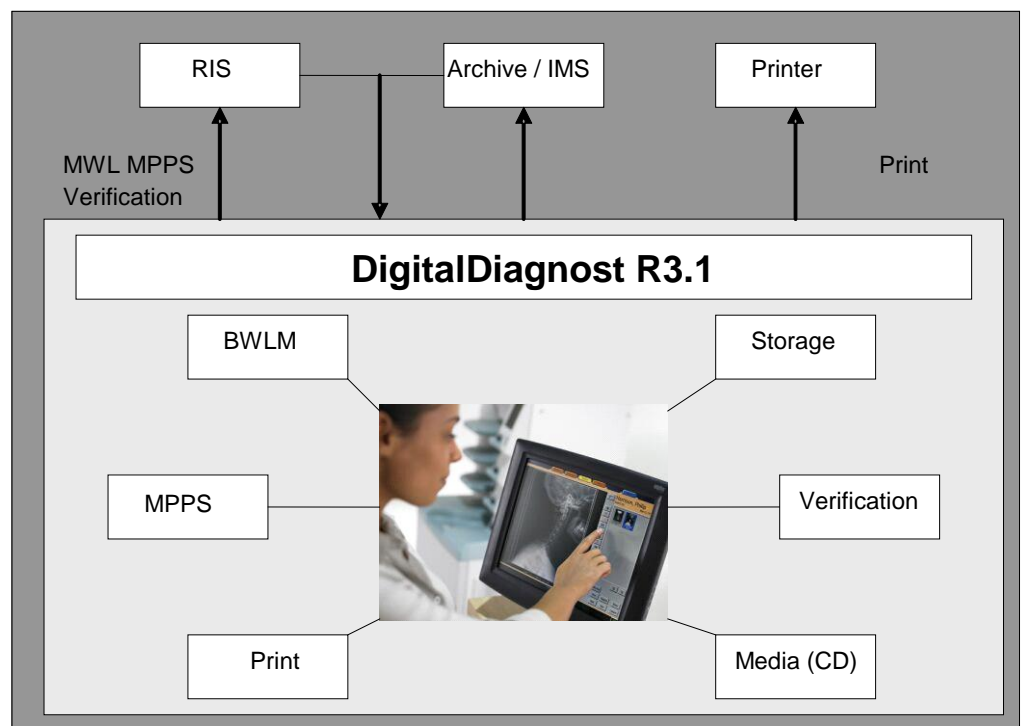

Figure 1: DigitalDiagnost R3.1 in a DICOM network

DigitalDiagnost R3.1 is an embedded modality system for acquiring 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.
- Storage of Dose SR instances on as remote DICOM System.
- 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).

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 Box SOP Class	1.2.840.10008.5.1.1.2	Yes	No
>Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	Yes	No
>Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4	Yes	No
>Printer SOP Class	1.2.840.10008.5.1.1.16	Yes	No
Transfer			
Computed Radiography Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.1	Yes	No
Digital X-Ray Image Storage - For Pres. SOP	1.2.840.10008.5.1.4.1.1.1.1	Yes	No
Digital X-Ray Image Storage - For Proc. SOP	1.2.840.10008.5.1.4.1.1.1.1.1	Yes	No
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7	Yes	No
X-Ray Radiation Dose SR SOP Class	1.2.840.10008.5.1.4.1.1.88.67	Yes	No
Workflow Management			
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
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	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	Write Files (FSC or FSU)	Read Files (FSR)
Compact Disk – Recordable		
General Purpose CD-R Interchange	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	13-March-2013	Authorized	Final version

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

DICOM definitions, terms and abbreviations are used throughout this Conformance Statement. For a description of these, see NEMA PS 3.3 and PS 3.4.

The word Philips in this document refers to Philips Medical Systems.

The following acronyms and abbreviations are used in this document.

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

USMF	Ultrasound Multi-frame
WLM	Worklist Management
XA	X-Ray Angiographic

3.5. References

[DICOM]   Digital Imaging and Communications in Medicine, Part 1 – 18
(NEMA PS 3.1– PS 3.18),
National Electrical Manufacturers Association (NEMA)
Publication Sales 1300 N. 17th Street, Suite 1847
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 2008) 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.

Application Data Flow

The DigitalDiagnost R3.1 system consists of one single application entity, the DigitalDiagnost R3.1 Application 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-Commit 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.
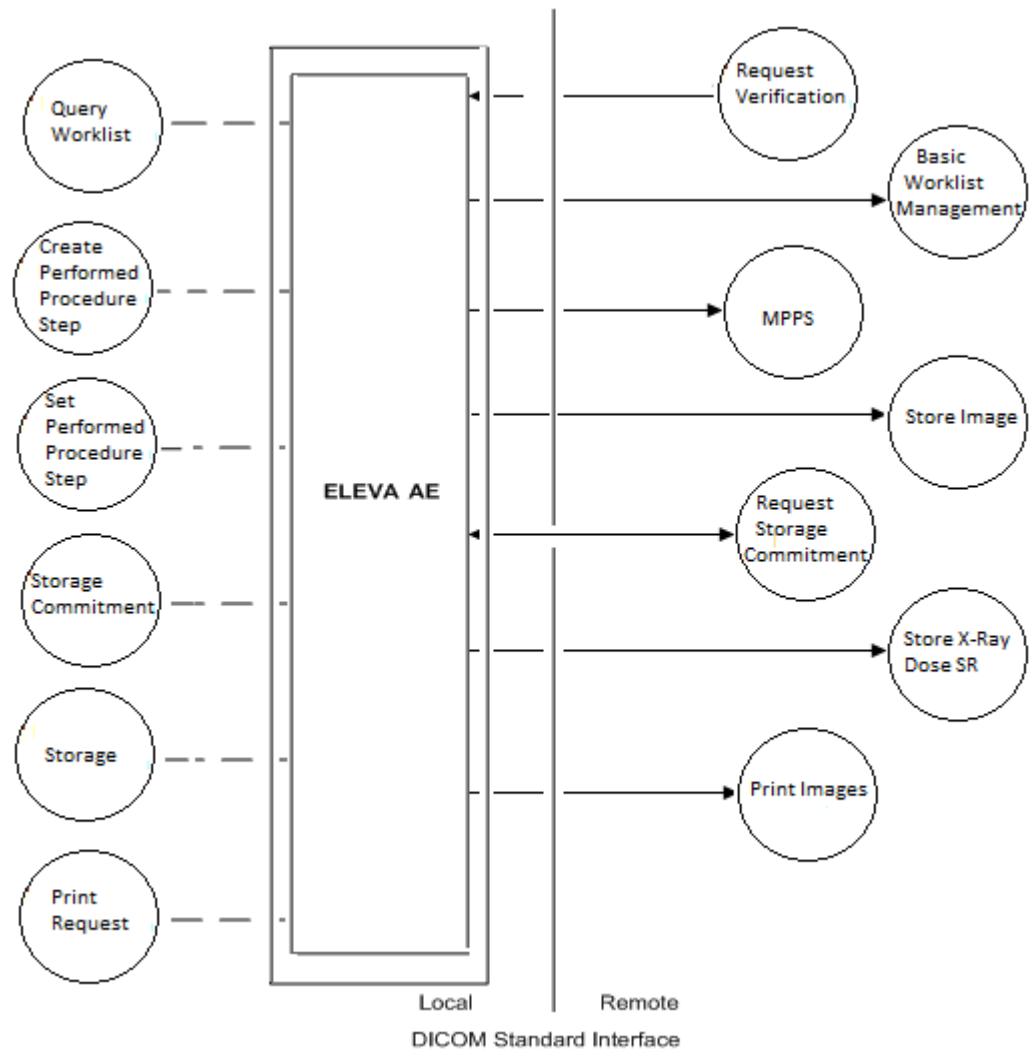
Figure 2: Application Data Flow Diagram

Functional Definition of AE's

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

4.1.1.1. Functional Definition of Eleva

The Eleva AE is the one and only application entity within the Eleva Workspot. It includes the following service classes.

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

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.

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 then 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.

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.

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

Storage Commitment Service Class
The Eleva AE can perform the Storage Commitment service as SCU.

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

The Storage Commitment Service can be done synchronously and asynchronously.
A detailed specification of the Storage Commitment is described in section 4.2.1.3.5 (Real-World Activity: Storage Commitment Push Model as SCU).

Study Management Service Class
The Eleva AE may use the Study Management service as SCU.

Before 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.

After performing a procedure step 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.

Basic Grayscale Print Management Meta Class
The Eleva AE may use the Basic Grayscale Print Management service as SCU.

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

After successful printing the user interface shall be updated accordingly.

Sequencing of Real World Activities

The figure below 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 confirmed each acquisition (image 1-N) per default the image is sent to archive (Store Image) and printer (Print Image) simultaneously. Finally, when closing the examination, the RIS is notified to update the data of the examination (Set Performed Procedure Step).

Note that Print Image will send images to the printer only when enough images were received to fulfill the configured 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.
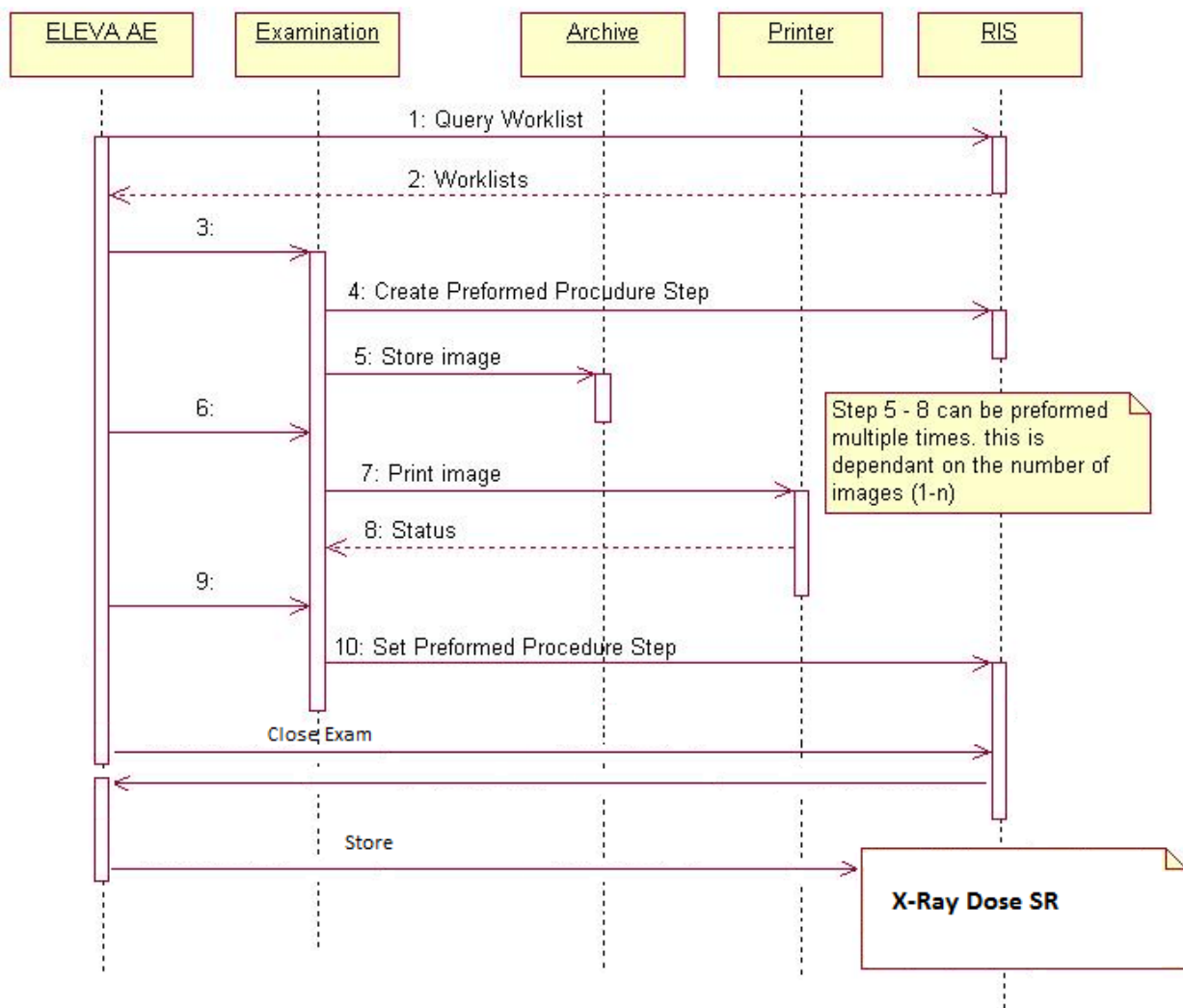
Figure 3: Sequence of an examination

4.2.   AE Specifications

The next 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 4: SOP Classes for Eleva

SOP Class Name	SOP Class UID	SCU	SCP
Computed Radiography Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.1	Yes	No
Digital X-Ray Image Storage - For Pres. SOP	1.2.840.10008.5.1.4.1.1.1.1	Yes	No
Digital X-Ray Image Storage - For Proc. SOP	1.2.840.10008.5.1.4.1.1.1.1.1	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
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7	Yes	No
X-Ray Radiation Dose SR SOP Class	1.2.840.10008.5.1.4.1.1.88.67	Yes	No
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	Yes	No
Verification SOP Class	1.2.840.10008.1.1	Yes	Yes
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Yes	No
>Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	Yes	No
>Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	Yes	No
>Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4	Yes	No
>Printer SOP Class	1.2.840.10008.5.1.1.16	Yes	No

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

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 has specified.

Table 5: DICOM Application Context

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.

Table 6: Number of Associations as an Association Initiator for Eleva

Maximum number of simultaneous associations	2

Table 7: Number of Associations as an Association Acceptor for Eleva

Maximum number of simultaneous associations	1

4.2.1.2.3.   Asynchronous Nature

If the implementation supports negotiation of multiple outstanding transactions this is stated here, along with the maximum number of outstanding transactions supported.

Table 8: Asynchronous Nature as an Association Initiator for Eleva

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 9: DICOM Implementation Class and Version for Eleva

Implementation Class UID	1.3.46.670589.30.1.6
Implementation Version Name	PMS_ELEVA_PA_2.4

4.2.1.2.5. *Communication Failure Handling*

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

Table 10: Communication Failure Behavior

Exception	Behavior

4.2.1.3. Association Initiation Policy

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

The behavior of the AE during association rejection is summarized in next table

Table 11: DICOM Association Rejection Handling

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

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

Result	Source	Reason/Diagnosis	Behavior
	2 – DICOM UL service-provider (ACSE related function)	1 – no-reason-given	Association is not established. The following error is logged. 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 next table

Table 12: DICOM Association Abort Handling

Source	Reason/Diagnosis	Behavior
0 – DICOM UL service-user	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).
2 – DICOM UL service-provider	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, theEleva Workspot terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 1: ABORT_REASON_unrecognized_pdu).
	2 – unexpected-PDU	When received, theEleva Workspot terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 2: ABORT_REASON_unexpected_pdu).
	4 – unrecognized-PDU parameter	When received, the Eleva Workspot terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 4: ABORT_REASON _unrecognized_pdu_parameter).

Source	Reason/Diagnosis	Behavior
	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).
	6 – invalid-PDU-parameter value	When received, the Eleva Workspot terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 6: ABORT_REASON _invalid_pdu_parameter).

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

Table 13: 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
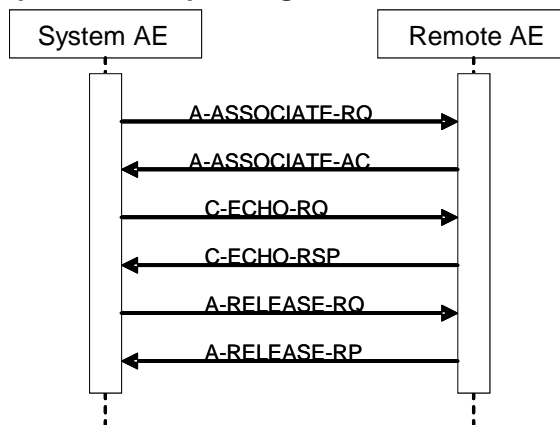
Figure 4: (Real World) Activity - Verification as SCU

The ELEVA AE can initiate associations to remote systems to verify application level communication using the C-ECHO command. This can be done using the DICOM Verification Tab for Server Test in the QA menu.

4.2.1.3.1.2. Proposed Presentation Contexts

Table 14: 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 Explicit VR Little Endian Implicit VR Little Endian	1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2	SCU	None

4.2.1.3.1.3. SOP Specific Conformance for 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.

Table 15: DICOM Command Response Status Handling Behavior for Grayscale Print Management Meta Sop Class

Service Status	Code	Further Meaning	Behavior
Success	0000	Verification is complete	The MobileDiagnost wDR has successfully received the verification request response.

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

Table 16: 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).

4.2.1.3.2.   (Real-World) Activity – Print Management As SCU

4.2.1.3.2.1. Description and Sequencing of Activities
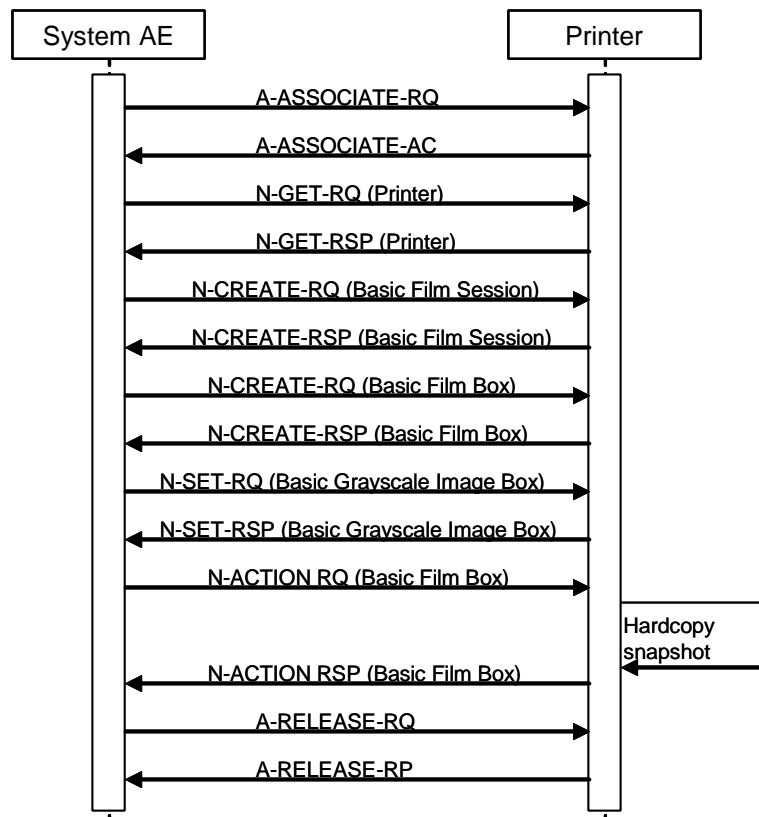
Figure 5: (Real World) Activity - Print Management As SCU

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).

The print component in DigitalDiagnost R3.1 supports a highly automated print from acquisition operation mode, which does not interrupt the clinical acquisition workflow. Supplementary to that is the manual print operation mode that is to be used as advanced interactive print preview and as reprint facility.
There shall be two modes of configuration for automatic printing: auto and easy print.
In auto print mode conflicting and incomplete print jobs are either printed "as is" or must be manually corrected and confirmed.
In easy print mode all automatically started print jobs have to be confirmed manually.
The behavior of the print GUI on entry is dependent on the configuration not on the workflow context.
The three different print modes are:
- No auto print jobs active: Screen is empty.
- Auto print configured: All incomplete pages and conflict jobs are seen for that patient.
- Easy print configured: All current print jobs are seen for that patient.

By Manual Printing the basic composition of films is possible with click and point functions.
To allow for more automation, auto-arranging (AA) is required.
AA takes the configured defaults (2x1P 14x17) and loads the images automatically.

User can make multiple selections of images or all images select/deselect and pressed "arrange". Images are taken for AA in the order they have been selected, if this is relevant for the
Templates if ALL images are selected, then they are taken in order from top left to lower right in rows.
After AA the result can be modified manually.

By Auto Print the operation mode the handling of conflicts between configuration and operation is configurable. This means:
If the collimation and thus the image is larger as originally configured it can be configured if the image shall be cut, scaled or the print job with the conflict shall be manually corrected and confirmed.
If the operator omits one of the routine views configured and a page is thus left half-filled it can be configured if the page is going to be printed half-filled, if a layout suitable for the number of available images is chosen instead or if the page must be manually changed and confirmed.
In case of a manual check configured conflict jobs are sent to the print GUI and handled like the Easy Print. Outstanding jobs are shown to the user by:

- An icon in the patient list at every affected patient / study
- User guidance giving patient name of unprinted film at the time the film ready to be printed

By Easy Print all print jobs are sent to the Print UI for checking first.
The user is not forced to go there, but outstanding jobs are shown to the user by:

- An icon in the patient list at every affected patient / study
- User guidance giving patient name of unprinted film at the time the film ready to be printed

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

4.2.1.3.2.2. Proposed Presentation Contexts

Table 17: 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 Box SOP Class	1.2.840.10008.5.1.1.2	Explicit VR Big Endian Explicit VR Little Endian Implicit VR Little Endian	1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2	SCU	None
>Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	Explicit VR Big Endian Explicit VR Little Endian Implicit VR Little Endian	1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2	SCU	None
>Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4	Explicit VR Big Endian Explicit VR Little Endian Implicit VR Little Endian	1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2	SCU	None
>Printer SOP Class	1.2.840.10008.5.1.1.16	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	None

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

Table 18: 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).

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

Table 19: 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

4.2.1.3.2.3. 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.

4.2.1.3.2.3.1.   Dataset Specific Conformance for Basic Film Session N-CREATE SCU

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

Table 20: 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	

4.2.1.3.2.4. 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.

4.2.1.3.2.4.1.   Dataset Specific Conformance for Basic Film Box N-ACTION SCU

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

4.2.1.3.2.4.2.   Dataset Specific Conformance for Basic Film Box N-CREATE SCU

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

Table 21: 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 22: 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	

4.2.1.3.2.5. 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.

4.2.1.3.2.5.1. Dataset Specific Conformance for Basic Grayscale Image Box N-SET SCU

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

Table 23: Image Box Pixel Presentation Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Image 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	OW/ OB		ALWAYS	AUTO	

4.2.1.3.2.6. SOP Specific Conformance for Printer 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.

4.2.1.3.2.6.1.   Dataset Specific Conformance for Printer N-EVENT-REPORT SCP

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

4.2.1.3.3.   (Real-World) Activity – Image Export

4.2.1.3.3.1. Description and Sequencing of Activities
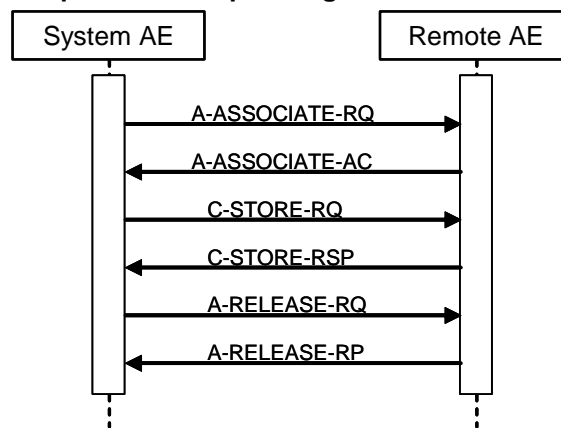
Figure 6: (Real World) Activity - Image Export

Export means that DigitalDiagnost R3.1 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 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 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 from the UI.

4.2.1.3.3.2. Proposed Presentation Contexts

Table 24: 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	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Digital X-Ray Image Storage - For Pres. SOP	1.2.840.10008.5.1.4.1.1.1.1	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 X-Ray Image Storage - For Proc. SOP	1.2.840.10008.5.1.4.1.1.1.1.1	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		
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

By default, all images are DICOM Stored according to the SOP Class Digital XRay. CR Image attributes that are undefined for DX Images are stored in private attributes.

As a configurable choice, Images can be stored as Computed Radiology SOP Class. This capability is required to be compatible with installed radiology equipment. DX Image attributes that are undefined for CR Images are then stored in private attributes.

Another choice can be DICOM Stored according to Secondary Capture SOP Class. This capability is required to be compatible with installed radiology equipment. Optionally only the attributes defined for Secondary Capture Images or all attributes are stored

For DICOM CR images there is a constraint that a change in position, detector, body part or laterality implies a new series. This has been relaxed for DX images through the use of the 'DX Anatomy Imaged' and 'DX Positioning' Modules, which define attributes at <u>image</u> level.

The DX Image IOD is used in two SOP Classes as defined in the DICOM Standard, a SOP Class for storage of images intended for <u>Presentation</u>, and a SOP Class for storage of images intended for further <u>Processing</u> 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).

It is possible to export / store one single image first as a DICOM CR and secondly as a DICOM DX object, therefore the SOP Instance UIDs of both DICOM image instances have to be different.

The Numbering Scheme shall support 'Hanging Protocols' of PACS systems & Viewing Stations, in case of the CR as well as the DX model:
1. The Series Number shall start with 1 for the first Series of every Study Instance, identified by StudyInstanceUID.
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 SeriesInstance, by the timely order, the Images are exported.

For DX SOP Class is in the DICOM Standard defined:
The Digital X-Ray (DX) Image Information Object Definition specifies an image that has been created by a digital projection radiography imaging device.
Notes:
▪ This includes but is not limited to: chest radiography, linear and multi-directional tomography, orthopantomography and skeletal radiography. Acquisition of image data may include but is not limited to: CCD-based sensors, stimulable phosphor imaging plates, amorphous selenium, scintillation based amorphous silicon and secondary capture of film-based images.
▪ Specific IODs are defined for intra-oral radiography and mammography that further specialize the DX IOD.

A DX 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.
Notes:
▪ The requirement for the DigitalDiagnost R3.1 specifically deprecates the common film/screen and Computed Radiography practice of making multiple exposures on different areas of a cassette or plate by using lead occlusion between exposures. Such acquisitions could be separated and transformed into multiple DX images during an appropriate quality assurance step by an operator.
▪ The requirement for the DigitalDiagnost R3.1 does not deprecate the acquisition of multiple paired structures during a single exposure, provided that they can be described by the relevant orientation Attributes. For example, an AP or PA projection of both hands side by side is typically obtained in a single exposure, and can be described by a Patient Orientation (0020,0020) of R\H or L\H since both hands are in the same traditional Anatomical Position.

4.2.1.3.3.3. 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.

Table 25: C-STORE-RQ Status Response

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

The status can be inspected via the user interface.

Table 26: 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.

4.2.1.3.4.   (Real-World) Activity – Structured Dose Report Export

4.2.1.3.4.1. Description and Sequencing of Activities
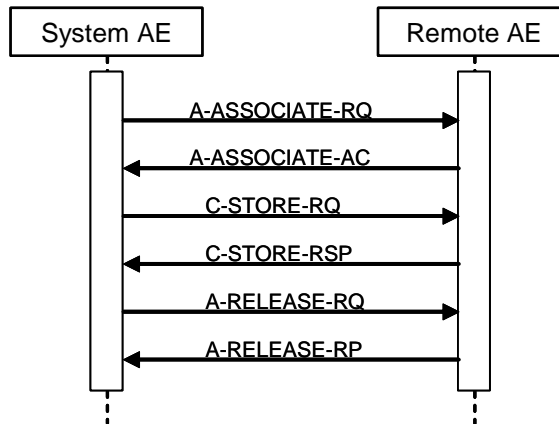
Figure 7: (Real World) Activity – Structured Dose Report Export

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

4.2.1.3.4.2. Proposed Presentation Contexts

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

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
X-Ray Radiation Dose SR SOP Class	1.2.840.10008.5.1.4.1.1.88.67	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

4.2.1.3.4.3. SOP Specific Conformance for Storage SOP Classes
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.

Table 28: C-STORE-RQ Status Response

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

The status can be inspected via the user interface.

Table 29: 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 – Modality Performed Procedure Step As SCU

4.2.1.3.5.1. Description and Sequencing of Activities
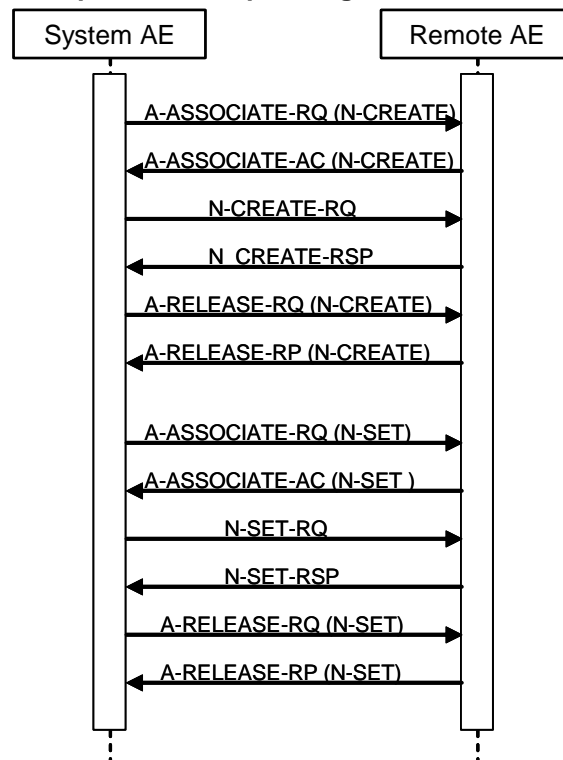
Figure 8: (Real World) Activity - Modality Performed Procedure Step As SCU

Description of Activities

An DigitalDiagnost R3.1 "Examination" is regarded equivalent to a DICOM Procedure Step. It is scheduled or manually entered before an acquisition is taken, and performed by taking acquisitions. If scheduled by the RIS, one Examination is the result of one Scheduled Procedure Step. Since an examination may not be re-opened after having been closed, and each examination workflow context is enclosed in one MPPS, one examination may result in 0:1 MPPS instances. However, image archiving after the examination's closure leads to 1:n MPPS instances per examination (append case).

After the 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 messages for subsequent acquisitions of this Scheduled Procedure Step instance.

After finishing the appropriate acquisition(s), the system will change the MPPS status of the related examination to "COMPLETED" and generate an MPPS N-SET-FINAL message.
DigitalDiagnost R3.1 also generates MPPS messages for unscheduled examinations.

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

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

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

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

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

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

Sequencing of Activities

After storing a performed procedure step the 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.

4.2.1.3.5.2. Proposed Presentation Contexts

Table 30: 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	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

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

When acquiring the first image of a Scheduled or Unscheduled Procedure Step, DigitalDiagnost R3.1 generates a MPPS IN PROGRESS message. DigitalDiagnost R3.1 does not generate intermediate IN PROGRESS (N-SET) messages and does not support the Performed Procedure Step Exception Management Option. DigitalDiagnost R3.1 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 from 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 from Requested Procedure Code Items->Code Value (0032,1064)
- Examination is selected from Requested Procedure Description (0032,1060)

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

Restrictions Depending on Number of Scheduled Protocol Code Items
It is highly recommended that the Scheduled Procedure Step contains only 1 Item in the Scheduled Protocol Code Sequence.

If the Scheduled Procedure Step contains <n> items in the Scheduled Protocol Code Sequence, the Scheduled Procedure Step is split into <n> examinations, where any single examination shows only 1 of the Scheduled Protocol Code Items, but all the other attributes are the same.
When such an examination is returned back via MPPS, also the Performed Protocol Code Sequence will show only 1 item. If all <n> Scheduled Procedure Step Code Items are performed, <n> MPPS instances will be sent back to the RIS, and the sum of all Performed Protocol Code Items will be <n>.

4.2.1.3.5.3.1. Dataset Specific Conformance for Modality Performed Procedure Step N-CREATE SCU

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

Table 31: MPPS Request Identifiers for N-CREATE-RQ

Attribute Name	Tag	VR	Value	Comment
Performed Procedure Step Information Module				
Performed Station AE Title	0040,0241	AE	Eleva	
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		
Performed Procedure Step ID	0040,0253	SH		
Performed Station Name	0040,0242	SH		EMPTY
Performed Location	0040,0243	SH		EMPTY
Performed Procedure Step End Date	0040,0250	DA		Finish of the examination
Performed Procedure Step End Time	0040,0251	TM		Finish of the examination
Performed Procedure Step Description	0040,0254	LO		
Performed Procedure Type Description	0040,0255	LO		
Procedure Code Sequence	0008,1032	SQ		
>Code Value	0008,0100	SH		
>Coding Scheme Designator	0008,0102	SH		
>Code Meaning	0008,0104	LO		
Radiation Dose Module				
Image and Fluoroscopy Area Dose Product	0018,115E	DS		Not sent in case of appended MPPS Instances
Total Time of Fluoroscopy	0040,0300	US		
Total Number of Exposures	0040,0301	US		
Entrance Dose	0040,0302	US		
Exposure Dose Sequence	0040,030E	SQ		
SOP Common Module				
Specific Character Set	0008,0005	CS		Optional
Performed Procedure Step Relationship Module				
Patient's Name	0010,0010	PN		
Patient ID	0010,0020	LO		
Issuer of Patient ID	0010,0021	LO		
Patient's Birth Date	0010,0030	DA		
Patient's Sex	0010,0040	CS		
Scheduled Step Attributes Sequence	0040,0270	SQ		
>Study Instance UID	0020,000D	UI		
>Accession Number	0008,0050	SH		
>Requested Procedure Description	0032,1060	LO		
>Scheduled Procedure Step Description	0040,0007	LO		
>Scheduled Procedure Step ID	0040,0009	SH		
>Requested Procedure ID	0040,1001	SH		
>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 Value	0008,0100	SH		

Attribute Name	Tag	VR	Value	Comment
>>Coding Scheme Designator	0008,0102	SH		
>>Code Meaning	0008,0104	LO		
Referenced Patient Sequence	0008,1120	SQ		
Image Acquisition Results Module				
Modality	0008,0060	CS	DX	
Study ID	0020,0010	SH		
Performed Protocol Code Sequence	0040,0260	SQ		
>Code Value	0008,0100	SH		
>Coding Scheme Designator	0008,0102	SH		
>Code Meaning	0008,0104	LO		
Performed Series Sequence	0040,0340	SQ		
Billing And Material Management Code Module				
Film Consumption Sequence	0040,0321	SQ		

Table 32: N-CREATE-RQ Status Response

Service Status	Code	Further Meaning	Behavior
Success	0000	Successful operation	The SCP has successfully received the modality performed procedure step create request. Log entry.
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 33: 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 Modality Performed Procedure Step N-SET SCU

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

Table 34: MPPS Request Identifiers for N-SET-RQ

Attribute Name	Tag	VR	Value	Comment
Performed Procedure Step Information Module				
Performed Procedure Step End Date	0040,0250	DA		
Performed Procedure Step End Time	0040,0251	TM		
Performed Procedure Step Status	0040,0252	CS		
Performed Procedure Step Description	0040,0254	LO		
Procedure Code Sequence	0008,1032	SQ		
>Code Value	0008,0100	SH		
>Coding Scheme Designator	0008,0102	SH		

Attribute Name	Tag	VR	Value	Comment
>Code Meaning	0008,0104	LO		
Radiation Dose Module				
Image and Fluoroscopy Area Dose Product	0018,115E	DS		Not accumulating: re-processed 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: re-processed images, non-digital images. Not sent in case of appended MPPS instances.
Entrance Dose	0040,0302	US		
Exposure Dose Sequence	0040,030E	SQ		
>Exposure Time	0018,1150	IS		
>Radiation Mode	0018,115A	CS		
Image Acquisition Results Module				
Performed Protocol Code Sequence	0040,0260	SQ		
>Code Value	0008,0100	SH		
>Coding Scheme Designator	0008,0102	SH		
>Code Meaning	0008,0104	LO		
Performed Series Sequence	0040,0340	SQ		
>Protocol Name	0018,1030	LO		Copied from Performed Protocol Code Sequence - Item code Value.
>Series Instance UID	0020,000E	UI		
>Retrieve AE Title	0008,0054	AE		
>Series Description	0008,103E	LO		
>Performing Physician's Name	0008,1050	PN		
>Operators' Name	0008,1070	PN		N-Values
>Referenced Image Sequence	0008,1140	SQ		
>>Referenced SOP Class UID	0008,1150	UI		
>>Referenced SOP Instance UID	0008,1155	UI		
>Referenced Non-Image Composite SOP Instance Sequence	0040,0220	SQ		
Billing And Material Management Code Module				
Film Consumption Sequence	0040,0321	SQ		
>Medium Type	2000,0030	CS		
>Film Size ID	2010,0050	CS		
>Number of Films	2100,0170	IS		

Table 35: N-SET-RQ Status Response

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

Table 36: 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.

4.2.1.3.6. *(Real-World) Activity – Modality Worklist As SCU*

4.2.1.3.6.1. Description and Sequencing of Activities
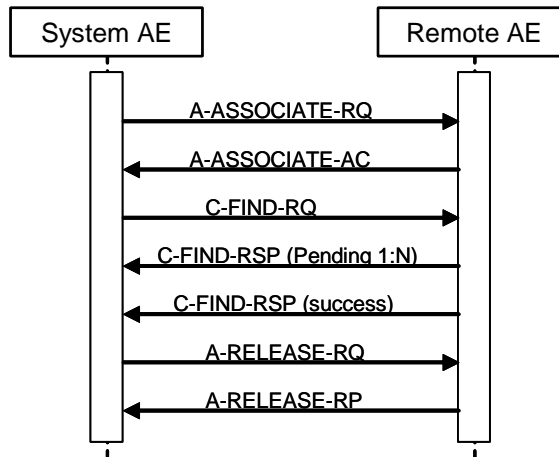
Figure 9: (Real World) Activity - Modality worklist As SCU

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 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.

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.

4.2.1.3.6.2. Proposed Presentation Contexts

Table 37: 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	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

4.2.1.3.6.3. 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.

4.2.1.3.6.3.1. Dataset Specific Conformance for Modality Worklist (Patient query) C-FIND SCU

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

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 can be used as Matching Key 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 the value of this Worklist attribute will be used in the created Instances of this Performed 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 38: Worklist Request Identifier

Attribute Name	Tag	VR	M	R	Q	D	IOD	Type of Matching	Comment
SOP Common Module									
Specific Character Set	0008,0005	CS							

Attribute Name	Tag	VR	M	R	Q	D	IOD	Type of Matching	Comment
Patient Identification Module									
Patient's Name	0010,0010	PN	X	X	X	X		Single Value, Universal, WildCard	
Patient ID	0010,0020	LO	X	X	X	X		Single Value, Universal	
Issuer of Patient ID	0010,0021	LO		X					
Other Patient IDs	0010,1000	LO		X					
Patient Demographic Module									
Patient's Birth Date	0010,0030	DA		X		X			
Patient's Sex	0010,0040	CS		X		X			
Patient's Age	0010,1010	AS							
Patient's Size	0010,1020	DS		X		X			
Patient's Weight	0010,1030	DS		X		X			
Ethnic Group	0010,2160	SH		X		X			
Occupation	0010,2180	SH		X		X			
Patient Comments	0010,4000	LT		X		X			
Confidentiality Constraint on Patient Data Description	0040,3001	LO							
Patient Medical Module									
Medical Alerts	0010,2000	LO		X		X			
Allergies	0010,2110	LO		X		X			
Additional Patient History	0010,21B0	LT		X		X			
Pregnancy Status	0010,21C0	US		X		X			
Special Needs	0038,0050	LO		X					
Patient State	0038,0500	LO		X		X			
Visit Status Module									
Current Patient Location	0038,0300	LO		X					
Scheduled Procedure Step Module									
Scheduled Procedure Step Sequence	0040,0100	SQ		X					
>Modality	0008,0060	CS	X	X	X			Single Value, Universal	SOP Classes: CR, DX, OT, US, MG, RF, XA, PX, NM
>Requested Contrast Agent	0032,1070	LO		X					
>Scheduled Station AE Title	0040,0001	AE	X	X	X			Single Value, Universal	
>Scheduled Procedure Step Start Date	0040,0002	DA	X	X	X	X		Single Value, Universal	Value: All, Today, Tomorrow, Yesterday
>Scheduled Procedure Step Start Time	0040,0003	TM		X		X			
>Scheduled Procedure Step End Date	0040,0004	DA		X					
>Scheduled Procedure Step End Time	0040,0005	TM		X					
>Scheduled Performing Physician's Name	0040,0006	PN		X					
>Scheduled Procedure Step Description	0040,0007	LO		X		X			
>Scheduled Procedure Step ID	0040,0009	SH		X					
>Scheduled Station Name	0040,0010	SH		X					
>Scheduled Procedure Step Location	0040,0011	SH		X					
>Pre-Medication	0040,0012	LO		X					
>Scheduled Procedure Step Status	0040,0020	CS		X					
>Comments on the Scheduled Procedure Step	0040,0400	LT		X					
>Scheduled Protocol Code Sequence	0040,0008	SQ		X					

Attribute Name	Tag	VR	M	R	Q	D	IOD	Type of Matching	Comment
>>Code Value	0008,0100	SH		X					
>>Coding Scheme Designator	0008,0102	SH		X					
>>Coding Scheme Version	0008,0103	SH		X					
>>Code Meaning	0008,0104	LO		X					
Requested Procedure Module									
Study Instance UID	0020,000D	UI		X					
Requested Procedure Description	0032,1060	LO		X	X				
Requested Procedure ID	0040,1001	SH	X					Single Value, Universal	
Reason for the Requested Procedure	0040,1002	LO							
Requested Procedure Priority	0040,1003	SH							
Patient Transport Arrangements	0040,1004	LO							
Names of Intended Recipients of Results	0040,1010	PN							
Requested Procedure Comments	0040,1400	LT							
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 Value	0008,0100	SH		X					
>Coding Scheme Designator	0008,0102	SH		X					
>Coding Scheme Version	0008,0103	SH		X					
>Code Meaning	0008,0104	LO		X					
Imaging Service Request Module									
Accession Number	0008,0050	SH	X	X	X	X		Single Value, Universal	
Referring Physician's Name	0008,0090	PN		X					
Requesting Physician	0032,1032	PN		X					
Requesting Service	0032,1033	LO							
Reason for the Imaging Service Request (RETIRED)	0040,2001	LO		X					
Issue Date of Imaging Service Request	0040,2004	DA							
Imaging Service Request Comments	0040,2400	LT							

Table 39: C-FIND-RQ Status Response

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

Service Status	Code	Further Meaning	Behavior
	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 40: 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.

4.2.1.3.6.3.2. 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.

4.2.1.3.6.3.3. 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.

4.2.1.3.6.3.4. Dataset Specific Conformance for Modality Worklist (Broadcast Query) C-FIND SCU

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

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 can be used as Matching Key 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 the value of this Worklist attribute will be used in the created Instances of this Performed 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 41: Worklist Request Identifier

Attribute Name	Tag	VR	M	R	Q	D	IOD	Type of Matching	Comment
SOP Common Module									
Specific Character Set	0008,0005	CS							
Patient Identification Module									
Patient's Name	0010,0010	PN				X			Last name, First name, Prefix, Middle name, Suffix
Patient ID	0010,0020	LO				X			
Issuer of Patient ID	0010,0021	LO							
Other Patient IDs	0010,1000	LO							
Patient Demographic Module									
Patient's Birth Date	0010,0030	DA				X			
Patient's Sex	0010,0040	CS				X			
Patient's Age	0010,1010	AS							
Patient's Size	0010,1020	DS							
Patient's Weight	0010,1030	DS				X			
Ethnic Group	0010,2160	SH							
Occupation	0010,2180	SH				X			
Patient Comments	0010,4000	LT							
Confidentiality Constraint on Patient Data Description	0040,3001	LO							
Patient Medical Module									
Medical Alerts	0010,2000	LO				X			
Allergies	0010,2110	LO							
Additional Patient History	0010,21B0	LT							
Pregnancy Status	0010,21C0	US				X			
Special Needs	0038,0050	LO							
Patient State	0038,0500	LO							
Visit Status Module									
Current Patient Location	0038,0300	LO							
Scheduled Procedure Step Module									
Scheduled Procedure Step Sequence	0040,0100	SQ							
>Modality	0008,0060	CS							

Attribute Name	Tag	VR	M	R	Q	D	IOD	Type of Matching	Comment
>Requested Contrast Agent	0032,1070	LO							
>Scheduled Station AE Title	0040,0001	AE							
>Scheduled Procedure Step Start Date	0040,0002	DA							
>Scheduled Procedure Step Start Time	0040,0003	TM							
>Scheduled Procedure Step End Date	0040,0004	DA							
>Scheduled Procedure Step End Time	0040,0005	TM							
>Scheduled Performing Physician's Name	0040,0006	PN				X			
>Scheduled Procedure Step Description	0040,0007	LO							
>Scheduled Procedure Step ID	0040,0009	SH							
>Scheduled Station Name	0040,0010	SH							
>Scheduled Procedure Step Location	0040,0011	SH							
>Pre-Medication	0040,0012	LO							
>Scheduled Procedure Step Status	0040,0020	CS							
>Comments on the Scheduled Procedure Step	0040,0400	LT							
>Scheduled Protocol Code Sequence	0040,0008	SQ							
>>Code Value	0008,0100	SH							
>>Coding Scheme Designator	0008,0102	SH							
>>Coding Scheme Version	0008,0103	SH							
>>Code Meaning	0008,0104	LO							
Requested Procedure Module									
Study Instance UID	0020,000D	UI							
Requested Procedure Description	0032,1060	LO							
Requested Procedure ID	0040,1001	SH							
Reason for the Requested Procedure	0040,1002	LO							
Requested Procedure Priority	0040,1003	SH							
Patient Transport Arrangements	0040,1004	LO							
Names of Intended Recipients of Results	0040,1010	PN							
Requested Procedure Comments	0040,1400	LT							
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 Value	0008,0100	SH							
>Coding Scheme Designator	0008,0102	SH							
>Coding Scheme Version	0008,0103	SH							
>Code Meaning	0008,0104	LO							
Imaging Service Request Module									
Accession Number	0008,0050	SH				X			
Referring Physician's Name	0008,0090	PN				X			
Requesting Physician	0032,1032	PN				X			
Requesting Service	0032,1033	LO							
Reason for the Imaging Service Request (RETIRED)	0040,2001	LO							
Issue Date of Imaging Service Request	0040,2004	DA							

Attribute Name	Tag	VR	M	R	Q	D	IOD	Type of Matching	Comment
Imaging Service Request Comments	0040,2400	LT							

Table 42: C-FIND-RQ Status Response

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

Table 43: 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.

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

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

Table 44: 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.

4.2.1.3.7. (Real-World) Activity – Storage Commitment Push Model AS SCU

4.2.1.3.7.1. Description and Sequencing of Activities
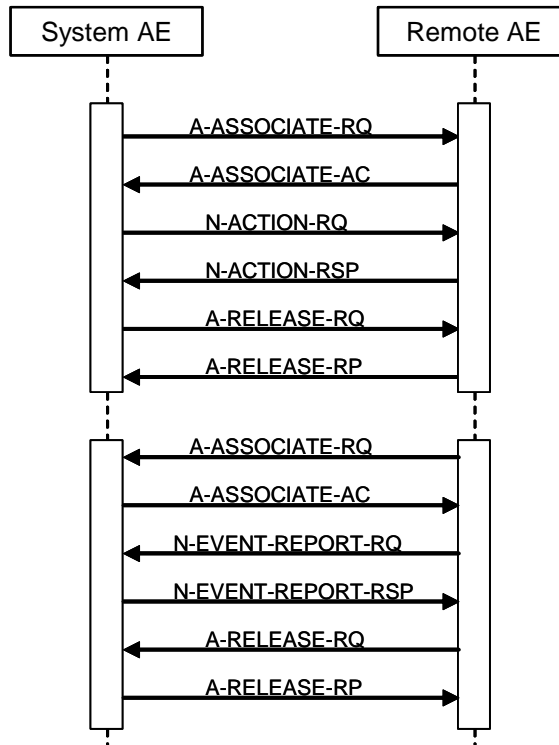
Figure 10: (Real World) Activity – Storage Commitment Push Model as SCU within separate associations (asynchronous)
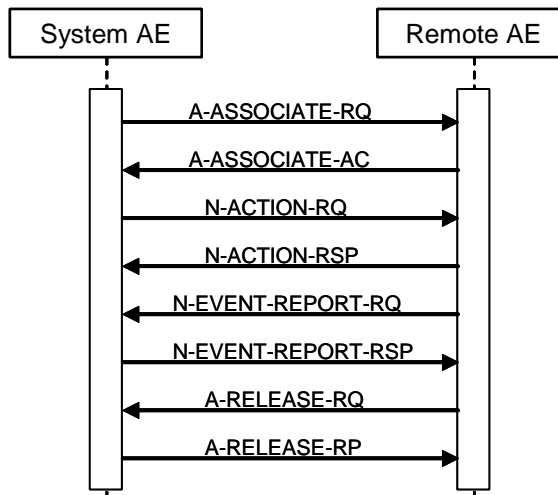
Figure 11: (Real World) Activity – Synchronous Storage Commitment Push Model as SCU within one association (synchronous)

Archive means that DigitalDiagnost R3.1 stores images with Storage Commitment (both synchronous and asynchronous can be configured).
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 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 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. 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 from 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 MIP component recognizes this, and our application sees a successful Storage Commitment.

4.2.1.3.7.2. Proposed Presentation Contexts

Table 45: 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	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

4.2.1.3.7.3. 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.

4.2.1.3.7.3.1.   Dataset Specific Conformance for Storage Commitment Push Model N-ACTION SCU

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

Table 46: Storage Commitment Attribute for N-ACTION-RQ

Attribute Name	Tag	Comment
Storage Commitment Module		
Transaction UID	0008,1195	
Referenced SOP Sequence	0008,1199	

Attribute Name	Tag	Comment
>Referenced SOP Class UID	0008,1150	
>Referenced SOP Instance UID	0008,1155	

Table 47: N-ACTION-RQ Status Response

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

Table 48: DICOM Command Communication Failure Behavior

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

4.2.1.3.7.3.2.   Dataset Specific Conformance for Storage Commitment Push Model N-EVENT-REPORT SCP

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

Table 49: N-EVENT-REPORT-RQ Status Response

Table 50: 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.

4.2.1.4. Association Acceptance Policy

This section describes the conditions under which the AE will accept or reject an association.

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

The behavior of the AE in case an association is rejected is summarized in the table below. 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 51: DICOM Association Rejection Handling

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

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

Table 52: DICOM Association Abort Policies

Source	Reason/Diagnosis	Behavior
0 – DICOM UL service-user	0 – reason-not-specified	When received, the DigitalDiagnost R3.1 terminates the connection with the following log: Association ABORTED by peer (0: ABORT_SOURCE_dul_user, 0: ABORT_REASON_not_specified). Sent when: Association times out due to inactivity Any other problem than ones specified in the rows below. (Examples: Problem while decoding the DICOM stream, Invalid request, Echo SCP was unable to send the Response to SCU, Error writing to SCU stream).
2 – DICOM UL service-provider	0 – reason-not-specified	When received, the DigitalDiagnost R3.1 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 DigitalDiagnost R3.1 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 WorkspDigitalDiagnost R3.1 terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 2: ABORT_REASON_unexpected_pdu). Sent when: The received PDU type is not expected in the current state of connection.
	4 – unrecognized-PDU parameter	When received, the DigitalDiagnost R3.1 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 DigitalDiagnost R3.1 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.

Source	Reason/Diagnosis	Behavior
	6 – invalid-PDU-parameter value	When received, the DigitalDiagnost R3.1 terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 6: ABORT_REASON _invalid_pdu_parameter). Sent when: One of the Associate PDU items is received more than once. One of the Associate PDU items is not received. Empty Called AE Title String (space-only) is received. Empty Calling AE Title String (space-only) is received. Unknown abstract syntax is received The length or the format of the received PDU item is invalid.

4.2.1.4.1. (Real-World) Activity – Verification as SCP

4.2.1.4.1.1. Description and Sequencing of Activities
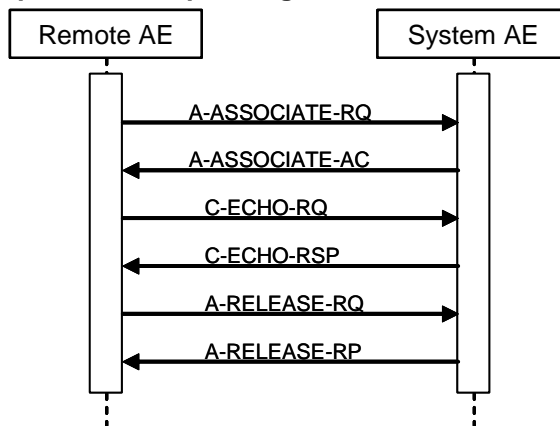
Figure 12: (Real World) Activity - Verification as SCP

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

4.2.1.4.1.2. Accepted Presentation Contexts

Table 53: 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 as SCP

This section includes the SOP specific behavior for the verification SOP Class, i.e. error codes, error and exception handling, time-outs, etc. This behavior is summarized in the tables below. The standard as well as the manufacturer specific status codes and their corresponding behavior are specified.

Table 54: C-ECHO-RSP Status Response

Service Status	Code	Further Meaning	Behavior
Success	0000	Verification is complete	The DigitalDiagnost R3.1 has successfully received the verification request.

Table 55: 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

Physical Network Interfaces

The DigitalDiagnost R3.1 provides DICOM 3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM 3.0 Standard.

The DigitalDiagnost R3.1 system supports ISO 8802-3 10BASE-T and 100Base-TX Ethernet.

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 is addressed in this section.

AE Title/Presentation Address Mapping

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

4.4.1.1. Local AE Titles

The local AE title mapping and configuration are specified.

Table 56: 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 of where the remote application should accept association requests.

Parameters

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

Table 57: Configuration Parameters table

Parameter	Configurable	Default Value
General Parameters		
Maximum PDU receive size	No	-
Maximum PDU send size	Yes	16384
Maximum number of simultaneous associations	Yes	2
Artim Timeout Specifies the time in seconds of the ARTIM (Association Request/Reject/Release TIMer). Allowed values: 0: unlimited waiting time 0 < n: real time in seconds	Yes	60 [seconds]

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

5. MEDIA INTERCHANGE

5.1. Implementation Model

The implementation model shall identify the DICOM Application Entities in a specific implementation and relate the Application Entities to Real-World Activities.

Application Data Flow Diagram

The DigitalDiagnost R3.1 system consists of one single application entity only: the DigitalDiagnost R3.1 Application Entity.

Next figure shows the Media Interchange application data flow as a functional overview of the Eleva AE.
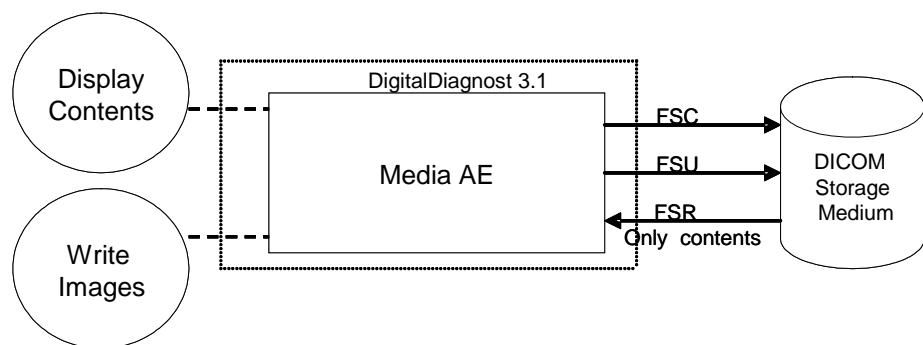
Figure 13: Media Interchange Application Data Flow Diagram

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.

Functional Definitions of AEs

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

5.1.1.1. Functional Definition of DigitalDiagnost R3.1

The ELEVA AE is the one and only application entity within the DigitalDiagnost R3.1. 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 Read File-Set (as FSR) and RWA Create File-Set (as FSC/FSU).

Sequencing of Real World Activities

Write images 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.　　Eleva AE

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

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.

Table 58: 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
		Read File-Set	FSR

5.2.1.1. File Meta Information for the Eleva

In the file Meta information that pertains to the Application Entity the Source Application Entity Title is set to "PMS_ELEVA_PA_2.4"

Table 59: File Meta Information for the Eleva

Implementation Class UID	1.3.46.670589.30.1.6
Implementation Version Name	PMS_ELEVA_PA_2.4

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 - Create File-SET for the STD-GEN-CD Application Profile.

5.2.1.2.1.1.1.   Options

The DICOMDIR file will be created on the CD-R medium 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.

The Eleva AE can write created image to media of the following listed SOP Classes

Table 60: AE related storage SOP Classes for Media

SOP Class Name	SOP Class UID
Computed Radiography Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.1
Digital X-Ray Image Storage - Presentation SOP Class	1.2.840.10008.5.1.4.1.1.1.1
Digital X-Ray Image Storage - Processing SOP Class	1.2.840.10008.5.1.4.1.1.1.1.1
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7

The Eleva AE can write created image to media with the following listed Transfer Syntax.

Table 61: AE related Transfer Syntax for Media

Transfer Syntax	UID List
Explicit VR Little Endian	1.2.840.10008.1.2.1

The Eleva AE can write created image to media with the following listed Media Storage SOP Class.

Table 62: AE Media Store SOP Class

Media Storage SOP Class Name	Media Storage SOP Class UID
Media Storage Directory Storage	1.2.840.10008.1.3.10

It is possible to Store one single image first as a DICOM CR object and secondly as a DICOM DX object, therefore the "SOP Instance UIDs" and "Referenced SOP Instance UIDs" of both DICOM image instances have to be different.

The Numbering Scheme shall support 'Hanging Protocols' of PACS systems & Viewing Stations, in case of the CR as well as the DX model:

- The Series Number starts with 1 for the first Series of every Study Instance, identified by Study Instance UID.
- The "Series Number" increases by 1 for every new Series Instance within the same Study Instance, by the timely order, the Series Instances are created.
- Every Stored image gets also a unique "Series Instance UID" and "Media Storage SOP Instance UID".
- The Image Number starts with 1 for every new Series Instance.
- The Image Number increases by 1 for every new Image Instance within the same Series Instance, by the timely order, the Images are created.

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 – Read File-Set

The Eleva AE acts as an FSR using the interchange option to import SOP Instances from the CD-R medium, DICOMDIR only. This will result in an overview of the images on the Eleva Workspot 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

The Eleva AE only reads CD-Rs written by an Eleva AE system.

5.3. Augmented and Private Application Profiles

Eleva does not support any augmented or private application profiles.

5.4. Media Configuration

When creating a CD with anonymous patient data, the following attributes are changed.

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	0008,0016	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 Physician's Name	0008,1050	[empty]
Operators' Name	0008,1070	[empty]
Patient Name	0010,0010	[empty]
Patient ID	0010,0020	New ID
Patient's Birth Date	0010,0030	[empty]
Patient's Sex	0010,0040	[empty]
Other Patient IDs	0010,1000	[empty]
Patient's Size	0010,1020	[empty]
Patient's Weight	0010,1030	[empty]
Device Serial Number	0018,1000	New ID
Study Instance UID	0020,000D	New UID
Series Instance UID	0020,000E	New UID
Study ID	0020,0010	New ID
Requesting Physician	0032,1032	[empty]
Request Attributes Sequence	0040,0270	[empty sequence]
Requested Procedure ID	0040,1001	New ID

6. SUPPORT OF CHARACTER SETS

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

Table 63: Supported DICOM Character Sets of Eleva Workspot

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

DigitalDiagnost R3.1 conforms to the IHE Basic Security Integration Profile.

DigitalDiagnost R3.1 allows the use of either a conventional (non-secure) DICOM communication or a secure DICOM communication based on the Transport Layer Security (TLS) protocol. If configured DigitalDiagnost R3.1 supports the following security measures:

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

7.1.1. Security use Profiles

Not applicable

7.1.2. Security Transport Connection Profiles

DigitalDiagnost R3.1 conforms to the Basic TLS Secure Transport Connection Profile.

DigitalDiagnost R3.1 initiates TLS Connections and accepts TLS Connections with Storage Commitment. TLS ports are configurable.

DigitalDiagnost R3.1 provides a service accessible tool to configure private keys and certificates of the local and remote DICOM nodes.

Secure communication is a "mode of operation" of DigitalDiagnost R3.1 supported by the implementation of the DICOM Basic TLS Secure Transport Connection Profile. This functionality will be used by the nodes that can authenticate each other before they exchange DICOM information. For secure communication the TLS protocol v1.0 is used which provides message authentication, integrity, and confidentiality. Confidentiality is optional and can be controlled by the encryption settings.

DigitalDiagnost R3.1 may communicate using the following Cipher Suites:
TLS_RSA_WITH_NULL_SHA (Node authentication without encryption)
TLS_RSA_WITH_3DES_SHA (Node authentication with encryption)

DigitalDiagnost R3.1 supports X.509 certificates. The following TLS Certification checks will be done (TLS Handshake). The machine (either server or client) that will send its certificate will:

- Choose the certificate according to Common Name (CN) value in the Subject-field. This name is case-sensitive. All present certificates should have unique CN names.
- The server verifies
  - that the client certificate is a X.509 certificate which is not tampered with
  - that the client certificate is in the list of trusted certificates
  - that the client certificate is not expired (present time is between "Valid From" and "Valid To" fields of the X.509 certificate)
  - that the client certificate has the correct purpose (at least the Client Authentication purpose)

- The client verifies
  - that the server certificate is a X.509 certificate which is not tampered with
  - that the server certificate is in the list of trusted certificates
  - that the server certificate is not expired (present time is between "Valid From" and "Valid To" fields of the X.509 certificate)
  - that the server certificate has the correct purpose (at least Server Authentication purpose)

No verification is done on:
- revocation of certificates
- limiting the connection to a limited set of IP-addresses

Node authentication with or without encryption is only possible when both nodes have:
- an access to their own private keys
- an access to a copy of the certificate of the other node containing its public key

Figure below presents the message flow of TLS handshake supported by DigitalDiagnost R3.1.
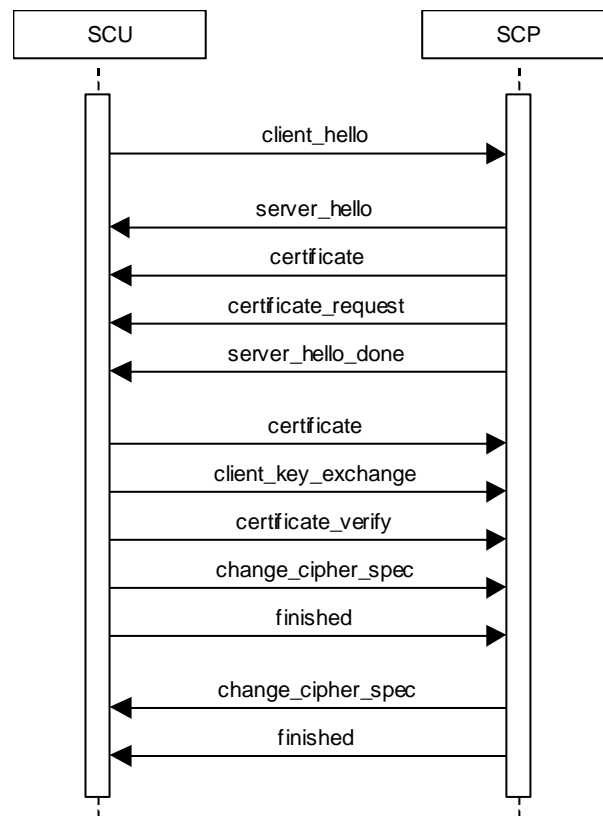
Figure 14: Message flow of TLS handshake

7.1.3. Digital Signature Profiles

Not applicable

7.1.4. Media Storage Security Profiles

Not applicable

7.1.5. Attribute Confidentiality Profiles

DigitalDiagnost R3.1 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.

Table 64 lists the protected attributes as defined in [DICOM], Part 15. It may contain attributes which are currently not part of images created by DigitalDiagnost R3.1. The terms used to describe the replacement value can be read as follows:

empty	The attribute will have a value of zero length.
n. a.	Not applicable, the attribute is not contained in the standard IOD of DigitalDiagnost R3.1
anon string	The original value is mapped onto a string with a length of max 12 characters UID using the procedure described below.
anon UID	The original value is mapped onto a syntactically valid DICOM UID using the procedure described below.

The above mentioned mapping procedure works as follows:
- The original value is taken as a string of arbitrary length.
- This string is mapped onto a 16-byte value using MD5 hash.
- From this value only the first 8 bytes are used further.
  - To create an anon string these first 8 bytes are mapped onto a 12 characters long string using base 64.
  - To create an anon UID the 8 bytes are read as two integers which are used together with the Implementation Class UID and the device serial number to create a valid DICOM UID:
    (ImplClassUID).(DevSerialNu).2.Integer(byte[0-3]).Integer(byte[4-7])

MD5 hash makes practically sure that different strings are mapped to different 16-byte values. So the whole procedure ensures that the relationship between SOP Instances by the means of their UIDs remains consistent.

Table 64: Basic Application Level Confidentiality Profile Attributes

Attribute Name	Tag	Replacement Value
Instance Creator UID	0008,0014	anon UID
SOP Instance UID	0008,0018	anon 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
Physician(s) of Record	0008,1048	empty
Performing Physicians' Name	0008,1050	empty
Name of Physician(s) Reading Study	0008,1060	empty
Operators' Name	0008,1070	empty
Admitting Diagnoses Description	0008,1080	empty
Referenced SOP Instance UID	0008,1155	anon UID
Derivation Description	0008,2111	empty
Patient's Name	0010,0010	empty
Patient ID	0010,0020	anon ID
Patient's Birth Date	0010,0030	empty

Attribute Name	Tag	Replacement Value
Patient's Birth Time	0010,0032	empty
Patient's Sex	0010,0040	empty
Other Patient Ids	0010,1000	empty
Other Patient Names	0010,1001	empty
Patient's Age	0010,1010	empty
Patient's Size	0010,1020	empty
Patient's Weight	0010,1030	empty
Ethnic Group	0010,2160	empty
Occupation	0010,2180	empty
Additional Patient's History	0010,21B0	empty
Patient Comments	0010,4000	empty
Device Serial Number	0018,1000	anon string
Protocol Name	0018,1030	empty
Study Instance UID	0020,000D	anon UID
Series Instance UID	0020,000E	anon UID
Study ID	0020,0010	anon string
Frame of Reference UID	0020,0052	anon UID
Image Comments	0020,4000	empty
Requesting Physician	0032,1032	empty
Requested Attributes Sequence	0040,0275	empty Sequence
Requested Procedure ID	0040,1001	anon ID
UID	0040,A124	anon UID
Content Sequence	0040,A730	empty
Storage Media File-set UID	0088,0140	anon UID

No attributes or attribute values are inserted.

7.1.6. Network Address Management Profiles

Not applicable

7.1.7. Time Synchronization Profiles

DigitalDiagnost R3.1 conforms to the Basic Time Synchronization Profile as NTP Client.

DigitalDiagnost R3.1 does support secure transactions.

7.1.8. Application Configuration Management Profiles

Not applicable

7.1.9. Audit Trail Profiles

DigitalDiagnost R3.1 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 DigitalDiagnost R3.1 is modified via the field service functionality).
- ActorStartStop (when DigitalDiagnost R3.1 starts or shuts down).
- BeginStoringInstances (when an examination is being transferred from the DigitalDiagnost R3.1 to a remote network node).
- InstancesSent (when an examination is transferred from the DigitalDiagnost R3.1 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

None supported.

7.3.   Application Level Security

DigitalDiagnost R3.1 does not support any specific application level security measures.

The Application which gives access to Patient records and DICOM communication requires Login with Username and Password.

The system is used within a secured environment. It is assumed that a secured environment includes at a minimum:
- Firewall or router protections to ensure that only approved external hosts have network access to DigitalDiagnost R3.1.
- Firewall or router protections to ensure that DigitalDiagnost R3.1 only has network access to approved external hosts and services.
- Any communication with external hosts outside the locally secured environment can be configured to use secure network channels.
- A local Anti-Virus client should be installed to protect against malicious software.

Other network security procedures such as automated intrusion detection may be appropriate in some environments.

Additional security features may be established by the local security policy and are beyond the scope of this conformance statement.

8. ANNEXES OF APPLICATION "ELEVA"

8.1.　　IOD Contents

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

The addition of standard an private attributes to the Created SOP Instances can be found in Section 8.5.

8.1.1.1. List of created SOP Classes

Table 65: 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
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7
Digital X-Ray Image Storage - For Pres. SOP	1.2.840.10008.5.1.4.1.1.1.1
Digital X-Ray Image Storage - For Proc. SOP	1.2.840.10008.5.1.4.1.1.1.1.1
X-Ray Radiation Dose SR SOP Class	1.2.840.10008.5.1.4.1.1.88.67

8.1.1.2. Computed Radiography Image Storage SOP Class

Table 66: 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	Contrast/Bolus Module	CONDITIONAL
Image	CR Image Module	ALWAYS
Image	Image Pixel Module	ALWAYS
Image	SOP Common Module	ALWAYS
Image	Overlay Plane Module	CONDITIONAL
Image	Modality LUT Module	ALWAYS
Image	VOI LUT Module	ALWAYS

Table 67: 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/ AUTO	
Patient's Birth Date	0010,0030	DA		VNAP	MWL/ USER	
Patient's Sex	0010,0040	CS	F, M, O	VNAP	MWL /USER	
Issuer of Patient ID	0010,0021	LO		ANAP	MWL/ USER	
Other Patient IDs	0010,1000	LO		ANAP	MWL/ USER	
Ethnic Group	0010,2160	SH		ANAP	AUTO	
Patient Comments	0010,4000	LT		ANAP	MWL/ USER	

Table 68: General Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Study Instance UID	0020,000D	UI		ALWAYS	MWL/ AUTO	
Study Date	0008,0020	DA		VNAP	AUTO	
Study Time	0008,0030	TM		VNAP	AUTO	
Accession Number	0008,0050	SH		VNAP	MWL/ USER	
Referring Physician's Name	0008,0090	PN		VNAP	MWL/ USER	
Study ID	0020,0010	SH		VNAP	MWL/ AUTO	
Study Description	0008,1030	LO		ANAP	MWL/ USER	
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	
Procedure Code Sequence	0008,1032	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 69: 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	
Patient's Weight	0010,1030	DS		ANAP	MWL/ USER	
Additional Patient History	0010,21B0	LT		ANAP	MWL/ USER	

Table 70: General Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Modality	0008,0060	CS	CR	ALWAYS	CONFIG	
Series Instance UID	0020,000E	UI		ALWAYS	MPPS/ AUTO	
Series Number	0020,0011	IS		ALWAYS	MPPS/ AUTO	
Laterality	0020,0060	CS		VNAP	CONFIG	
Series Date	0008,0021	DA		ANAP	AUTO	
Series Time	0008,0031	TM		ANAP	AUTO	
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	
Protocol Name	0018,1030	LO		ALWAYS	MWL/ USER	
Performed Procedure Step Start Date	0040,0244	DA		ANAP	MPPS/ AUTO	
Performed Procedure Step Start Time	0040,0245	TM		ANAP	MPPS/ AUTO	
Performed Procedure Step ID	0040,0253	SH		ANAP	MPPS/ AUTO	
Performed Procedure Step Description	0040,0254	LO		ANAP	MPPS/ AUTO	
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	
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	
Request Attributes Sequence	0040,0275	SQ		ANAP	MWL	
>Scheduled Procedure Step ID	0040,0009	SH		ANAPEV	MWL	
>Requested Procedure ID	0040,1001	SH		ANAPEV	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	

Table 71: 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 72: 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	DigitalDiagnost	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 73: General Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Instance Number	0020,0013	IS		ALWAYS	AUTO	
Content Date	0008,0023	DA		ALWAYS	AUTO	
Content Time	0008,0033	TM		ALWAYS	AUTO	
Patient Orientation	0020,0020	CS		VNAP	AUTO	
Image Type	0008,0008	CS	ORIGINAL, PRIMARY	ALWAYS	AUTO	
Acquisition Date	0008,0022	DA		ALWAYS	AUTO	
Acquisition Time	0008,0032	TM		ALWAYS	AUTO	
Quality Control Image	0028,0300	CS		ALWAYS	AUTO	
Burned In Annotation	0028,0301	CS		ALWAYS	AUTO	
Lossy Image Compression	0028,2110	CS	00	ANAP	AUTO	
Presentation LUT Shape	2050,0020	CS	IDENTITY	ALWAYS	AUTO	

Table 74: Contrast/Bolus Module

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

Table 75: CR Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Photometric Interpretation	0028,0004	CS	MONOCHROME2	ALWAYS	AUTO	
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	
X-ray Tube Current	0018,1151	IS		ANAP	AUTO	
Exposure	0018,1152	IS		ANAP	AUTO	
Exposure in uAs	0018,1153	IS		ANAP	AUTO	
Imager Pixel Spacing	0018,1164	DS		ALWAYS	AUTO	
Acquisition Device Processing Description	0018,1400	LO		ANAP	AUTO	
Relative X-ray Exposure	0018,1405	IS		ANAP	AUTO	

Table 76: 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	15, 12, 10	ALWAYS	AUTO	When Parameter "Increase virtual depth for PACS" is enabled values are : 16,13,11
High Bit	0028,0102	US	14, 11, 9	ALWAYS	AUTO	When Parameter "Increase virtual depth for PACS" is enabled values are : 15,12,10
Pixel Representation	0028,0103	US	0000	ALWAYS	AUTO	
Pixel Data	7FE0,0010	OW/ OB		ALWAYS	AUTO	

Table 77: SOP Common Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Specific Character Set	0008,0005	CS		ANAPCV	AUTO	
SOP Class UID	0008,0016	UI	1.2.840.10008.5.1.4.1.1.1	ALWAYS	AUTO	
SOP Instance UID	0008,0018	UI		ALWAYS	AUTO	

Table 78: 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		ANAP	AUTO	
Overlay Origin	6000,0050	SS		ANAP	AUTO	
Overlay Bits Allocated	6000,0100	US		ANAP	AUTO	
Overlay Bit Position	6000,0102	US		ANAP	AUTO	
Overlay Data	6000,3000	OW/ OB		ANAP	AUTO	

Table 79: Modality LUT Module

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

Table 80: VOI LUT Module

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

8.1.1.3. Secondary Capture Image Storage SOP Class

Table 81: IOD of Created Secondary Capture Image Storage SOP Class Instances

Information Entity	Module	Presence Of Module
Patient	Patient Module	ALWAYS

Study		General Study Module	ALWAYS
Study		Patient Study Module	ALWAYS
Series		General Series Module	ALWAYS
Equipment		General Equipment Module	ALWAYS
Equipment		SC Equipment Module	ALWAYS
Image		General Image Module	ALWAYS
Image		Image Pixel Module	ALWAYS
Image		SC Image Module	ALWAYS
Image		SOP Common Module	ALWAYS
Image		VOI LUT Module	ALWAYS

Table 82: 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		VNAP	MWL/ USER	
Issuer of Patient ID	0010,0021	LO		ANAP	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	

Table 83: General Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Study Instance UID	0020,000D	UI		ALWAYS	MWL/ AUTO	
Study Date	0008,0020	DA		VNAP	AUTO	
Study Time	0008,0030	TM		VNAP	AUTO	
Accession Number	0008,0050	SH		VNAP	MWL/ USER	
Referring Physician's Name	0008,0090	PN		VNAP	MWL/ USER	
Study ID	0020,0010	SH		VNAP	MWL/ AUTO	
Study Description	0008,1030	LO		ANAP	MWL/ USER	
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	
Procedure Code Sequence	0008,1032	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 84: Patient Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Patient's Age	0010,1010	AS		ANAP	MWL/ AUTO	
Patient's Size	0010,1020	DS		ANAP	MWL/ AUTO	

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Patient's Weight	0010,1030	DS		VNAP	MWL/ AUTO	
Additional Patient History	0010,21B0	LT		VNAP	MWL/ AUTO	

Table 85: General Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Series Instance UID	0020,000E	UI		ALWAYS	MPPS/ AUTO	
Series Number	0020,0011	IS		ALWAYS	MPPS/ AUTO	
Laterality	0020,0060	CS		VNAP	CONFIG	
Series Date	0008,0021	DA		ANAP	AUTO	
Series Time	0008,0031	TM		ANAP	AUTO	
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	
Body Part Examined	0018,0015	CS		VNAP	MPPS/ USER	
Protocol Name	0018,1030	LO		ALWAYS	MWL/ USER	
Performed Station AE Title	0040,0241	AE		VNAP	MPPS/ AUTO	
Performed Procedure Step Start Date	0040,0244	DA		ANAP	MPPS/ AUTO	
Performed Procedure Step Start Time	0040,0245	TM		ANAP	MPPS/ AUTO	
Performed Procedure Step Status	0040,0252	CS		VNAP	MPPS/ AUTO	
Performed Procedure Step ID	0040,0253	SH		ANAP	MPPS/ AUTO	
Performed Procedure Step Description	0040,0254	LO		ANAP	MPPS/ AUTO	
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	
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	
Request Attributes Sequence	0040,0275	SQ		ANAP	MWL	
>Scheduled Procedure Step ID	0040,0009	SH		ANAPEV	MWL	
>Requested Procedure ID	0040,1001	SH		ANAPEV	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	

Table 86: General Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Manufacturer	0008,0070	LO		ALWAYS	AUTO	
Institution Name	0008,0080	LO		ALWAYS	CONFIG	

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
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	DigitalDiagnost	ALWAYS	AUTO	
Device Serial Number	0018,1000	LO		ANAP		
Software Version(s)	0018,1020	LO		ALWAYS	AUTO	
Spatial Resolution	0018,1050	DS		ALWAYS	AUTO	

Table 87: SC Equipment Module

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

Table 88: General Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Instance Number	0020,0013	IS		ALWAYS	AUTO	
Content Date	0008,0023	DA		ALWAYS	AUTO	
Content Time	0008,0033	TM		ALWAYS	AUTO	
Patient Orientation	0020,0020	CS		VNAP	USER	
Image Type	0008,0008	CS		ALWAYS	AUTO	
Acquisition Date	0008,0022	DA		ALWAYS	AUTO	
Acquisition Time	0008,0032	TM		ALWAYS	AUTO	
Quality Control Image	0028,0300	CS		ALWAYS	AUTO	
Burned In Annotation	0028,0301	CS		ALWAYS	AUTO	
Lossy Image Compression	0028,2110	CS		ANAP	AUTO	

Table 89: Image Pixel Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Samples per Pixel	0028,0002	US	1	ALWAYS	AUTO	
Photometric Interpretation	0028,0004	CS		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	15, 12, 10	ALWAYS	CONFIG	When Parameter "Increase virtual depth for PACS" is enabled values are : 16,13,11
High Bit	0028,0102	US	14, 11, 9	ALWAYS	AUTO	When Parameter "Increase virtual depth for PACS" is enabled values are : 15,12,10
Pixel Representation	0028,0103	US	0000	ALWAYS	AUTO	
Pixel Data	7FE0,0010	OW/OB		ALWAYS	AUTO	

Table 90: SC Image Module

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

Table 91: SOP Common Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Specific Character Set	0008,0005	CS		ANAPCV	AUTO	

SOP Class UID	0008,0016	UI		ALWAYS	AUTO	
SOP Instance UID	0008,0018	UI		ALWAYS	AUTO	

Table 92: VOI LUT Module

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

8.1.1.4. Digital X-Ray Image Storage - For Pres. SOP

Table 93: IOD of Created Digital X-Ray Image Storage - For 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	DX Series Module	ALWAYS
Equipment	General Equipment Module	ALWAYS
Image	General Image Module	ALWAYS
Image	Image Pixel Module	ALWAYS
Image	Contrast/Bolus Module	CONDITIONAL
Image	Display Shutter Module	CONDITIONAL
Image	DX Anatomy Imaged Module	ALWAYS
Image	DX Image Module	ALWAYS
Image	DX Detector Module	ALWAYS
Image	X-Ray Collimator Module	CONDITIONAL
Image	DX Positioning Module	CONDITIONAL
Image	X-Ray Acquisition Dose Module	CONDITIONAL
Image	Overlay Plane Module	CONDITIONAL
Image	Acquisition Context Module	ALWAYS
Image	SOP Common Module	ALWAYS

Table 94: 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		VNAP	MWL/ USER	
Patient's Birth Date	0010,0030	DA		VNAP	MWL/ USER	
Patient's Sex	0010,0040	CS		VNAP	MWL/ USER	
Issuer of Patient ID	0010,0021	LO		ANAP	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	

Table 95: General Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Study Instance UID	0020,000D	UI		ALWAYS	MPPS/ AUTO	

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Study Date	0008,0020	DA		VNAP	MPPS	
Study Time	0008,0030	TM		VNAP	MPPS	
Accession Number	0008,0050	SH		VNAP	MWL/ USER	
Referring Physician's Name	0008,0090	PN		VNAP	MWL/ USER	
Study ID	0020,0010	SH		VNAP	MPPS/ AUTO	
Study Description	0008,1030	LO		ANAP	MWL/ USER	
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	
Procedure Code Sequence	0008,1032	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 96: 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	
Patient's Weight	0010,1030	DS		ANAP	MWL/ USER	
Additional Patient History	0010,21B0	LT		ANAP	MWL/ USER	

Table 97: General Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Series Instance UID	0020,000E	UI		ALWAYS	MPPS/ AUTO	
Series Number	0020,0011	IS		VNAP	MPPS/ AUTO	
Laterality	0020,0060	CS		ANAPCV	CONFIG	
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	MPPS/ USER	
Protocol Name	0018,1030	LO		ANAP	MWL/ USER	
Performed Procedure Step Start Date	0040,0244	DA		ANAP	MPPS/ AUTO	
Performed Procedure Step Start Time	0040,0245	TM		ANAP	MPPS/ AUTO	
Performed Procedure Step ID	0040,0253	SH		ANAP	MPPS/ AUTO	
Performed Procedure Step Description	0040,0254	LO		ANAP	MPPS/ AUTO	
Performed Protocol Code Sequence	0040,0260	SQ		ANAP	MWL	
>Code Value	0008,0100	SH		ALWAYS	MWL	
>Coding Scheme Designator	0008,0102	SH		ALWAYS	MWL	

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
>Code Meaning	0008,0104	LO		ALWAYS	MWL	
Request Attributes Sequence	0040,0275	SQ		ANAP	MWL	
>Scheduled Procedure Step ID	0040,0009	SH		ANAPEV	MWL	
>Requested Procedure ID	0040,1001	SH		ANAPEV	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	

Table 98: DX Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Modality	0008,0060	CS	DX	ALWAYS	CONFIG	
Presentation Intent Type	0008,0068	CS	FOR PRESENTATION	ALWAYS	AUTO	
Referenced Performed Procedure Step Sequence	0008,1111	SQ		ANAPEV	AUTO	
>Referenced SOP Class UID	0008,1150	UI		ANAPEV	AUTO	
>Referenced SOP Instance UID	0008,1155	UI	1.2.840.10008.3.1.2.3.3	ANAPEV	AUTO	

Table 99: General Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Manufacturer	0008,0070	LO	Philips Medical Systems	VNAP	AUTO	
Institution Name	0008,0080	LO		ANAP	CONFIG	
Institution Address	0008,0081	ST		ANAP	CONFIG	
Station Name	0008,1010	SH		ANAP	CONFIG	
Institutional Department Name	0008,1040	LO		ANAP	CONFIG	
Manufacturer's Model Name	0008,1090	LO	DigitalDiagnost	ANAP	AUTO	
Device Serial Number	0018,1000	LO		ANAP	CONFIG	
Software Version(s)	0018,1020	LO		ANAP	AUTO	
Spatial Resolution	0018,1050	DS		ANAP	AUTO	

Table 100: General Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Instance Number	0020,0013	IS		VNAP	AUTO	
Content Date	0008,0023	DA		ANAPCV	AUTO	
Content Time	0008,0033	TM		ANAPCV	AUTO	
Acquisition Date	0008,0022	DA		ANAP	AUTO	
Acquisition Time	0008,0032	TM		ANAP	AUTO	
Source Image Sequence	0008,2112	SQ		ANAP	AUTO	
Quality Control Image	0028,0300	CS		ALWAYS	AUTO	

Table 101: 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	OW/ OB		ALWAYS	AUTO	
Pixel Aspect Ratio	0028,0034	IS	1, 1	ANAPEV	AUTO	

Table 102: Contrast/Bolus Module

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

Table 103: 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 104: DX Anatomy Imaged Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Image Laterality	0020,0062	CS		VNAP	AUTO	
Anatomic Region Sequence	0008,2218	SQ		VNAP	AUTO	

Table 105: DX Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Image Type	0008,0008	CS	ORIGINAL, PRIMARY	ALWAYS	AUTO	
Patient Orientation	0020,0020	CS		ALWAYS	AUTO	
Samples per Pixel	0028,0002	US	1,	ALWAYS	AUTO	
Photometric Interpretation	0028,0004	CS	MONOCHROME2	ALWAYS	AUTO	
Bits Allocated	0028,0100	US	16	ALWAYS	AUTO	
Bits Stored	0028,0101	US	15, 12, 10	ALWAYS	CONFIG	When Parameter "Increase virtual depth for PACS" is enabled values are : 16,13,11
High Bit	0028,0102	US	14, 11, 9	ALWAYS	AUTO	When Parameter "Increase virtual depth for PACS" is enabled values are : 15,12,10
Pixel Representation	0028,0103	US	0	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	
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	
Window Center	0028,1050	DS	2047.0	ANAPEV	AUTO	
Window Width	0028,1051	DS	4095.0	ANAPEV	AUTO	
Acquisition Device Processing Description	0018,1400	LO		ANAP	AUTO	

Table 106: DX Detector Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
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		VNAP	AUTO	
Detector Type	0018,7004	CS		VNAP	AUTO	
Detector Mode	0018,7008	LT		VNAP	AUTO	
Date of Last Detector Calibration	0018,700C	DA		ANAP	AUTO	
Time of Last Detector Calibration	0018,700E	TM		ANAP	AUTO	
Detector Time Since Last Exposure	0018,7012	DS		VNAP	AUTO	
Detector Manufacturer Name	0018,702A	LO		VNAP	AUTO	
Detector Manufacturer's Model Name	0018,702B	LO		VNAP	AUTO	

Table 107: 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		ANAPEV	AUTO	
Collimator Right Vertical Edge	0018,1704	IS		ANAPEV	AUTO	
Collimator Upper Horizontal Edge	0018,1706	IS		ANAPEV	AUTO	
Collimator Lower Horizontal Edge	0018,1708	IS		ANAPEV	AUTO	
Center of Circular Collimator	0018,1710	IS		ANAPEV	AUTO	
Radius of Circular Collimator	0018,1712	IS		ANAPEV	AUTO	
Vertices of the Polygonal Collimator	0018,1720	IS		ANAPEV	AUTO	

Table 108: DX Positioning Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Positioner Type	0018,1508	CS		VNAP	AUTO	
Distance Source to Detector	0018,1110	DS		ANAP	AUTO	
Estimated Radiographic Magnification Factor	0018,1114	DS		ANAP	AUTO	
Positioner Primary Angle	0018,1510	DS		ANAP	AUTO	
Positioner Secondary Angle	0018,1511	DS		ANAP	AUTO	
View Position	0018,5101	CS		ANAP	AUTO	

Table 109: X-Ray Acquisition Dose 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	
X-ray Tube Current	0018,1151	IS		ANAP	AUTO	
Exposure	0018,1152	IS		ANAP	AUTO	
Exposure in uAs	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	
Filter Material	0018,7050	CS		ANAP	AUTO	
Exposure Control Mode	0018,7060	CS		ANAP	AUTO	
Exposure Time in uS	0018,8150	DS		ANAP	AUTO	
Entrance Dose	0040,0302	US		ANAP	AUTO	

Table 110: Overlay Plane Module

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

Table 111: Acquisition Context Module

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

Table 112: 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	1.2.840.10008.5.1.4.1.1.1. 1	ANAPEV	AUTO	
SOP Instance UID	0008,0018	UI		ANAPEV	AUTO	

8.1.1.5. Digital X-Ray Image Storage - For Proc. SOP

Table 113: IOD of Created Digital X-Ray Image Storage - For 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	DX Series Module	ALWAYS
Equipment	General Equipment Module	ALWAYS
Image	General Image Module	ALWAYS
Image	Image Pixel Module	ALWAYS
Image	Contrast/Bolus Module	CONDITIONAL
Image	Display Shutter Module	CONDITIONAL
Image	DX Anatomy Imaged Module	ALWAYS
Image	DX Image Module	ALWAYS
Image	DX Detector Module	ALWAYS
Image	X-Ray Collimator Module	CONDITIONAL
Image	DX Positioning Module	CONDITIONAL
Image	X-Ray Acquisition Dose Module	CONDITIONAL
Image	Overlay Plane Module	CONDITIONAL
Image	Acquisition Context Module	ALWAYS
Image	SOP Common Module	ALWAYS

Table 114: 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	
Issuer of Patient ID	0010,0021	LO		ANAP	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	

Table 115: General Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Study Instance UID	0020,000D	UI		ALWAYS	MPPS/ AUTO	
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 ID	0020,0010	SH		ALWAYS	MPPS/ AUTO	
Study Description	0008,1030	LO		ANAP	MWL/ USER	
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	
Procedure Code Sequence	0008,1032	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 116: 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	
Patient's Weight	0010,1030	DS		ANAP	MWL/ USER	
Additional Patient History	0010,21B0	LT		ANAP	MWL/ USER	

Table 117: General Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Series Instance UID	0020,000E	UI		ALWAYS	MPPS/ AUTO	
Series Number	0020,0011	IS		VNAP	MPPS/ AUTO	
Laterality	0020,0060	CS		ANAPCV	CONFIG	
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	MPPS/ USER	
Protocol Name	0018,1030	LO		ANAP	MWL/ USER	
Performed Procedure Step Start Date	0040,0244	DA		ANAP	MPPS/ AUTO	
Performed Procedure Step Start Time	0040,0245	TM		ANAP	MPPS/ AUTO	
Performed Procedure Step ID	0040,0253	SH		ANAP	MPPS/ AUTO	
Performed Procedure Step Description	0040,0254	LO		ANAP	MPPS/ AUTO	
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	
Request Attributes Sequence	0040,0275	SQ		ANAP	MWL	
>Scheduled Procedure Step ID	0040,0009	SH		ANAPEV	MWL	
>Requested Procedure ID	0040,1001	SH		ANAPEV	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	

Table 118: DX Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Modality	0008,0060	CS	DX	ALWAYS	CONFIG	
Presentation Intent Type	0008,0068	CS	FOR PROCESSING	ALWAYS	AUTO	
Referenced Performed Procedure Step Sequence	0008,1111	SQ		ANAPEV	AUTO	
>Referenced SOP Class UID	0008,1150	UI		ANAPEV	AUTO	
>Referenced SOP Instance UID	0008,1155	UI	1.2.840.10008.3.1.2.3.3	ANAPEV	AUTO	

Table 119: 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	DigitalDiagnost	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 120: General Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Instance Number	0020,0013	IS		VNAP	AUTO	
Content Date	0008,0023	DA		ALWAYS	AUTO	
Content Time	0008,0033	TM		ALWAYS	AUTO	
Acquisition Date	0008,0022	DA		ALWAYS	AUTO	

Acquisition Time	0008,0032	TM		ALWAYS	AUTO	
Source Image Sequence	0008,2112	SQ		ANAP	AUTO	
Quality Control Image	0028,0300	CS		ALWAYS	AUTO	

Table 121: 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	OW/ OB		ALWAYS	AUTO	
Pixel Aspect Ratio	0028,0034	IS	1, 1	ANAPEV	AUTO	

Table 122: Contrast/Bolus Module

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

Table 123: 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 124: DX Anatomy Imaged Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Image Laterality	0020,0062	CS		VNAP	AUTO	
Anatomic Region Sequence	0008,2218	SQ		VNAP	AUTO	

Table 125: DX Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Image Type	0008,0008	CS	ORIGINAL, PRIMARY	ALWAYS	AUTO	
Patient Orientation	0020,0020	CS		ALWAYS	AUTO	
Samples per Pixel	0028,0002	US		ALWAYS	AUTO	
Photometric Interpretation	0028,0004	CS	MONOCHROME1	ALWAYS	AUTO	
Bits Allocated	0028,0100	US	16	ALWAYS	AUTO	
Bits Stored	0028,0101	US	15, 12, 10	ALWAYS	CONFIG	When Parameter "Increase virtual depth for PACS" is enabled values are : 16,13,11
High Bit	0028,0102	US	14, 11, 9	ALWAYS	AUTO	When Parameter "Increase virtual depth for PACS" is enabled values are : 15,12,10
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	
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	0	ALWAYS	AUTO	
Presentation LUT Shape	2050,0020	CS	INVERSE	ALWAYS	AUTO	
Window Center	0028,1050	DS	2047.0	ANAPEV	AUTO	
Window Width	0028,1051	DS	4095.0	ANAPEV	AUTO	
Acquisition Device Processing Description	0018,1400	LO		ANAP	AUTO	

Table 126: DX Detector Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
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		VNAP	AUTO	
Detector Type	0018,7004	CS		VNAP	AUTO	
Detector Mode	0018,7008	LT		VNAP	AUTO	
Date of Last Detector Calibration	0018,700C	DA		ANAP	AUTO	
Time of Last Detector Calibration	0018,700E	TM		ANAP	AUTO	
Detector Time Since Last Exposure	0018,7012	DS		VNAP	AUTO	
Detector Manufacturer Name	0018,702A	LO		VNAP	AUTO	
Detector Manufacturer's Model Name	0018,702B	LO		VNAP	AUTO	
Time of Last Detector Calibration	0018,700E	TM		ANAP	AUTO	

Table 127: 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		ANAPEV	AUTO	
Collimator Right Vertical Edge	0018,1704	IS		ANAPEV	AUTO	
Collimator Upper Horizontal Edge	0018,1706	IS		ANAPEV	AUTO	
Collimator Lower Horizontal Edge	0018,1708	IS		ANAPEV	AUTO	
Center of Circular Collimator	0018,1710	IS		ANAPEV	AUTO	
Radius of Circular Collimator	0018,1712	IS		ANAPEV	AUTO	
Vertices of the Polygonal Collimator	0018,1720	IS		ANAPEV	AUTO	

Table 128: DX Positioning Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Positioner Type	0018,1508	CS		VNAP	AUTO	
Distance Source to Detector	0018,1110	DS		ANAP	AUTO	
Estimated Radiographic Magnification Factor	0018,1114	DS		ANAP	AUTO	
Positioner Primary Angle	0018,1510	DS		ANAP	AUTO	
Positioner Secondary Angle	0018,1511	DS		ANAP	AUTO	
View Position	0018,5101	CS		ANAP	AUTO	

Table 129: X-Ray Acquisition Dose 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	
X-ray Tube Current	0018,1151	IS		ANAP	AUTO	
Exposure	0018,1152	IS		ANAP	AUTO	
Exposure in uAs	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	
Filter Material	0018,7050	CS		ANAP	AUTO	
Exposure Control Mode	0018,7060	CS		ANAP	AUTO	
Exposure Time in uS	0018,8150	DS		ANAP	AUTO	
Entrance Dose	0040,0302	US		ANAP	AUTO	

Table 130: Overlay Plane Module

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

Table 131: Acquisition Context Module

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

Table 132: 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	1.2.840.10008.5.1.4.1.1.1.1	ANAPEV	AUTO	
SOP Instance UID	0008,0018	UI		ANAPEV	AUTO	

8.1.1.6. X-Ray Radiation Dose SR SOP Class

Table 133: IOD of Created X-Ray Radiation Dose SR SOP Instances

Information Entity	Module	Presence Of Module
Patient	Patient Module	ALWAYS
Study	General Study Module	ALWAYS
Study	Patient Study Module	ALWAYS
Series	SR Document Series Module	ALWAYS
Equipment	General Equipment Module	ALWAYS
Equipment	Enhanced General Equipment Module	ALWAYS
Document	SR Document General Module	ALWAYS
	SR Document Content Module	ALWAYS

Document			SOP Common Module	ALWAYS
			Extended Dicom and Private attributes (Ref section 8.5.1.5)	ALWAYS

Table 134: 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		VNAP	MWL, USER	
Patient's Birth Date	0010,0030	DA		VNAP	MWL, USER	
Patient's Sex	0010,0040	CS		VNAP	MWL, USER	
Other Patient IDs	0010,1000	LO		ANAPCV	MWL	
Ethnic Group	0010,2160	SH		ANAPCV	MWL	
Patient Comments	0010,4000	LT		ANAPCV	MWL, USER	

Table 135: General Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Study Instance UID	0020,000D	UI		ALWAYS	AUTO	
Study Date	0008,0020	DA		VNAP	AUTO	
Study Time	0008,0030	TM		VNAP	AUTO	
Accession Number	0008,0050	SH		VNAP	MWL, USER	
Referring Physician's Name	0008,0090	PN		VNAP	MWL	
Study ID	0020,0010	SH		VNAP	MWL	
Study Description	0008,1030	LO		ANAPCV	AUTO/ 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	
Procedure Code Sequence	0008,1032	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 136: Patient Study Module

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

Table 137: SR Document Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Series Date	0008,0021	DA		ANAPCV	AUTO	
Series Time	0008,0031	TM		ANAPCV	AUTO	
Modality	0008,0060	CS		ALWAYS	FIXED	
Series Description	0008,103E	LO		ANAPCV	CONFIG	
Referenced Performed Procedure Step Sequence	0008,1111	SQ		VNAP	COPY	
>Referenced SOP Class UID	0008,1150	UI		ALWAYS	AUTO	
>Referenced SOP Instance UID	0008,1155	UI		ALWAYS	AUTO	
Series Instance UID	0020,000E	UI		ALWAYS	AUTO	
Series Number	0020,0011	IS		ALWAYS	FIXED	

Table 138: General Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Institution Name	0008,0080	LO		ANAPCV	AUTO	
Station Name	0008,1010	SH		ANAPCV	CONFIG	

Table 139: Enhanced General Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Manufacturer	0008,0070	LO	Philips Medical Systems	VNAP	AUTO	Philips Medical Systems
Manufacturer's Model Name	0008,1090	LO		ANAPCV	AUTO	
Device Serial Number	0018,1000	LO		ANAPCV	AUTO	
Software Version(s)	0018,1020	LO		ANAPCV	AUTO	

Table 140: SR Document General Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Content Date	0008,0023	DA		ALWAYS	AUTO	
Content Time	0008,0033	TM		ALWAYS	AUTO	
Completion Flag	0040,A491	CS	COMPLETE	ALWAYS	FIXED	
Completion Flag Description	0040,A492	LO		ANAPCV	FIXED	Complete X-Ray Radiation Dose Structured Report"
Verification Flag	0040,A493	CS	UNVERIFIED	ALWAYS	FIXED	UNVERIFIED

Table 141: SR Document Content Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Value Type	0040,A040	CS	CONTAINER	ALWAYS	FIXED	
Concept Name Code Sequence	0040,A043	SQ		ANAP	AUTO	
>Code Value	0008,0100	SH	113701	ALWAYS	FIXED	113701
>Coding Scheme Designator	0008,0102	SH	DCM	ALWAYS	FIXED	DCM
>Code Meaning	0008,0104	LO	X-ray radiation Dose Report	ALWAYS	FIXED	X-ray radiation Dose Report
Concept Code Sequence	0040,A168	SQ		ALWAYS	AUTO	
>Code Value	0008,0100	SH	113704	ALWAYS	FIXED	
>Coding Scheme Designator	0008,0102	SH	DCM	ALWAYS	FIXED	
>Code Meaning	0008,0104	LO	Projection X-Ray	ALWAYS	FIXED	
Continuity Of Content	0040,A050	CS	SEPARATE	ALWAYS	FIXED	
Content Template Sequence	0040,A504	SQ		ALWAYS	AUTO	
>Mapping Resource	0008,0105	CS	DCMR	ALWAYS	FIXED	
>Template Identifier	0040,DB00	CS	TID 10001	ALWAYS	FIXED	
Content Sequence	0040,A730	SQ		ANAP	AUTO	
>Relationship Type	0040,A010	CS	HAS CONCEPT MOD	ALWAYS	FIXED	

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
>Value Type	0040,A040	CS	CODE	ALWAYS	FIXED	
>Concept Name Code Sequence	0040,A043	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	

Table 142: SOP Common Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Specific Character Set	0008,0005	CS		ANAP	COPY	
Instance Creation Date	0008,0012	DA		ANAPCV	AUTO	
Instance Creation Time	0008,0013	TM		ANAPCV	AUTO	
SOP Class UID	0008,0016	UI	1.2.840.10008.5.1.4.1.1.88.67	ALWAYS	FIXED	1.2.840.10008.5.1.4.1.1.88.67
SOP Instance UID	0008,0018	UI		ALWAYS	AUTO	
Instance Number	0020,0013	IS		ANAPCV	AUTO	

8.1.2. Usage of Attributes from Received IOD

The DigitalDiagnost R3.1 has only an export side. The modality cannot read/view images from a CD or by import.

8.1.3. Attribute Mapping

Table 143: Attribute Mapping during Modality Workflow

Name	BWLM Tag	MPPS Create Tag	MPPS Set Tag	Image IOD Tag
Accession Number	0008,0050	0008,0050	-	0008,0050
Modality	-	0008,0060	-	0008,0060
Referring Physician's Name	0008,0090	-	-	0008,0090
Operators' Name	-	-	0008,1070	0008,1070
Referenced Study Sequence	0008,1110	0008,1110	-	0008,1110
Referenced Image Sequence	-	-	(0008,1140)	-
> Referenced SOP Class UID SOP Class UID	-	-	0008,1150	0008,0016
> Referenced SOP Instance UID SOP Instance UID	-	-	0008,1155	0008,0018
Patient's Name	0010,0010	0010,0010	-	0010,0010
Patient ID	0010,0020	0010,0020	-	0010,0020
Issuer of Patient ID	0010,0021	0010,0021	-	0010,0021
Patient's Birth Date	0010,0030	0010,0030	-	0010,0030
Patient's Sex	0010,0040	0010,0040	-	0010,0040
Other Patient IDs	0010,1000	0010,1000	-	0010,1000
Medical Alerts	0010,2000	-	-	0010,2000
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	-	-	0018,1030	0018,1030
Study Instance UID	0020,000D	0020,000D	-	0020,000D
Series Instance UID			0020,000E	0020,000E

Name	BWLM Tag	MPPS Create Tag	MPPS Set Tag	Image IOD Tag
Study ID	-	0020,0010	-	0020,0010
Requesting Service	0032,1033	-	-	0032,1033
Requested Procedure Description	0032,1060	0032,1060	-	-
Requested Procedure Code Sequence[3]	0032,1064	0008,1032	0008,1032	0008,1032
Performed Procedure Code Sequence				
Special Needs	0038,0050	-	-	0038,0050
Patient State	0038,0500	-	-	0038,0500
Scheduled Procedure Step Description[4]	0040,0007	0040,0007	-	0040,0007
Performed Procedure Step Description		0040,0254	-	0040,0254
Scheduled Protocol Code Sequence[4]	0040,0008	0040,0260	0040,0260	0040,0008
Performed Protocol Code Sequence				0040,0260
Scheduled Procedure Step ID	0040,0009	0040,0009	-	0040,0009
Performed Procedure Step Start Date	-	0040,0244	-	0040,0244
Performed Procedure Step Start Time	-	0040,0245	-	0040,0245
Performed Procedure Step ID	-	0040,0253	-	0040,0253
Requested Procedure ID	0040,1001	0040,1001	-	0040,1001

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

8.1.4. Coerced/Modified fields

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
DigitalDiagnost R3.1 can optionally create and store, upon completion of the study, a
DICOM X-Ray Radiation DOSE SR object.

X-RAY RADIATION DOSE SR IOD TEMPLATES
The templates that comprise the X-Ray Radiation Dose SR are interconnected as
indicated in the figure below:
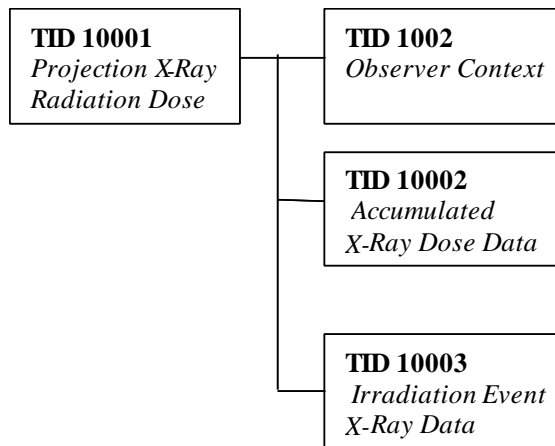
Figure 15: X-Ray Radiation Dose SR IOD Template Structure

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

Table 144: Used Templates for X-Ray Radiation Dose Reporting

Template Name	Template ID
Projection X-Ray Radiation Dose	TID 10001
Accumulated X-Ray Dose	TID 10002
Irradiation Event X-Ray Data	TID 10003
Accumulated Projection X-Ray Dose	TID 10004
Observer Context	TID 1002
Device Observer Identifying Attributes	TID 1004

8.3.2.1.1. TID 10001 Projection X-Ray Radiation Dose

Table 145: Projection X-Ray Radiation Dose

NL	Relation with Parent	Concept Name	VT	VM	Presence of Value	Value
		X-Ray Radiation Dose Report		1	ALWAYS	
>	HAS CONCEPT MOD	Procedure reported	CODE	1	ALWAYS	Projection X-Ray
>>	HAS CONCEPT MOD	Has Intent	CODE	1	ALWAYS	Combined Diagnostic and Therapeutic Procedure
>		DTID (1002) Observer Context		1	ALWAYS	
>	HAS OBS CONTEXT	Scope of Accumulation	CODE	1	ALWAYS	Performed Procedure Step
>>	HAS PROPERTIES	DCID (10001) UID Types	UIDREF	1	ALWAYS	Performed Procedure Step SOP Instance UID
>	CONTAINS	DTID (10002) Accumulated X-Ray Dose	INCLUDE	1	ALWAYS	
>	CONTAINS	DTID (10003) Irradiation Event X-Ray Data	INCLUDE	1-n	ALWAYS	

>	CONTAINS	Source of Dose Information	CODE	1	ALWAYS	Automated Data Collection
>	CONTAINS	Comment	TEXT	1	CONDITIONAL	X-Ray Radiation Dose Structured Report related to the Performed Procedure Step

8.3.2.1.2. TID 10002 Accumulated X-Ray Dose

Table 146: Accumulated X-Ray Dose

NL	Relation with Parent	Concept Name	VT	VM	Presence of Value	Value
>	CONTAINS, CONTINUOUS	Accumulated X-Ray Dose Data	CONTAINER	1	ALWAYS	
>>	HAS CONCEPT MOD	Acquisition Plane	CODE	1	ALWAYS	Single Plane
>>	CONTAINS	DTID (10004) Accumulated Projection X-Ray Dose	CONTAINER	1	ALWAYS	

8.3.2.1.3.   TID 10003 Irradiation Event X-Ray Data

Table 147: Irradiation Event X-Ray Data

NL	Relation with Parent	Concept Name	VT	VM	Presence of Value	Value
>	CONTAINS, CONTINUOUS	Irradiation Event X-Ray Data	CONTAINER	1	ALWAYS	
>>	HAS CONCEPT MOD	Acquisition Plane	CODE	1	ALWAYS	Single Plane
>>	CONTAINS	DateTime Started	DATETIME	1	ALWAYS	
>>	CONTAINS	Irradiation Event Type	CODE	1	ALWAYS	Fluoroscopy
>>	CONTAINS	Acquisition Protocol	TEXT	1	CONDITIONAL	Digital Exposure
>>	CONTAINS	Anatomical structure	CODE	1	ALWAYS	PA
>>	CONTAINS	Reference Point Definition	CODE	1	ALWAYS	15cm from Isocenter toward Source
>>	CONTAINS	Irradiation Event UID	UIDREF	1	ALWAYS	
>>	CONTAINS	Dose Area Product	NUM	1	ALWAYS	Dose area product (Gy.m2)
>>	CONTAINS	Dose (RP)	NUM	1	ALWAYS	Gy
>>	CONTAINS	KVP	NUM	1-n	CONDITIONAL	kV
>>	CONTAINS	X-Ray Tube Current	NUM	1-n	CONDITIONAL	mA
>>	CONTAINS	Exposure	NUM	1-n	CONDITIONAL	uAs
>>	CONTAINS	Irradiation Duration	NUM	1	CONDITIONAL	Seconds
>>	CONTAINS	Distance Source to Reference Point	NUM	1	CONDITIONAL	
>>	CONTAINS	Target Region	CODE	1	CONDITIONAL	
>	CONTAINS	DCID (10008) Dose Related Distance Measurements	INCLUDE	2	ALWAYS	Fill in fixed values for: - Distance source to detector - Distance source to Isocenter - Distance source to Reference Point
>>	CONTAINS	Anode Target Material	CODE	1	CONDITIONAL	Tungsten or Tungsten compound
>	CONTAINS	X-Ray Filters	CONTAINER	1-n	CONDITIONAL	
>>	CONTAINS	X-Ray Filter Type	CODE	1	CONDITIONAL	
>>	CONTAINS	X-Ray Filter Material	CODE	1	CONDITIONAL	
>>	CONTAINS	X-Ray Filter Thickness Minimum	NUM	1	CONDITIONAL	
>>	CONTAINS	X-Ray Filter Thickness Maximum	NUM	1	CONDITIONAL	
>	CONTAINS	Comment	TEXT	1	ALWAYS	X-Ray Radiation Dose Structured Report related to the Performed Procedure Step
>	CONTAINS	Source of Dose Information	CODE	1	ALWAYS	Automated Data Collection

8.3.2.1.4. TID 10004 Accumulated Projection X-Ray Dose

Table 148: Accumulated Projection X-Ray Dose

NL	Relation with Parent	Concept Name	VT	VM	Presence of Value	Value
>>	CONTAINS	Dose Area Product Total	NUM	1	ALWAYS	Gym2
>>	CONTAINS	Dose (RP) Total	NUM	1	ALWAYS	Gy
>>	CONTAINS	Acquisition Dose Area Product Total	NUM	1	ALWAYS	Gy.m2
>>	CONTAINS	Acquisition Dose (RP) Total	NUM	1	ALWAYS	Gy
>>	CONTAINS	Total Acquisition Time	NUM	1	ALWAYS	Time in seconds
>>	CONTAINS	Total Number of Radiographic Frames	NUM	1	CONDITIONAL	no units
>>	CONTAINS	Reference Point Definition	CODE	1	ALWAYS	15cm from Isocenter toward Source

8.3.2.1.5. TID 1002 Observer Context

Table 149: Observer Context

NL	Relation with Parent	Concept Name	VT	VM	Presence of Value	Value
>	HAS OBS CONTEXT	Observer Type	CODE	1	CONDITIONAL	Device
	HAS OBS CONTEXT	DTID (1004) Device observer identifying attributes		1	ALWAYS	

8.3.2.1.6. TID 1004 Device Observer Identifying Attributes

Table 150: Device Observer Identifying Attributes

NL	Relation with Parent	Concept Name	VT	VM	Presence of Value	Value
>	HAS OBS CONTEXT	Device Observer UID	UIDREF	1	ALWAYS	963334911392
>	HAS OBS CONTEXT	Device Observer Name	TEXT	1	CONDITIONAL	Station Name (0008,1010): Eleva
>	HAS OBS CONTEXT	Device Observer Manufacturer	TEXT	1	CONDITIONAL	Manufacturer (0008,0070): Philips Medical Systems
>	HAS OBS CONTEXT	Device Observer Model Name	TEXT	1	CONDITIONAL	Manufacturer's Model Name (0008,1090): Philips Eleva
>	HAS OBS CONTEXT	Device Observer Serial Number	TEXT	1	CONDITIONAL	Device Serial Number (0018,1000): 963334911392
>	HAS OBS CONTEXT	Scope of Accumulation	CODE	1	ALWAYS	
>>	HAS PROPERTIES	Performed Procedure Step SOP Instance UID	UIDREF	1	ALWAYS	

8.4.   Grayscale Image consistency

The monitor of DigitalDiagnost R3.1 system can be calibrated according Grayscale Display Function Standard.

The pixel values exported and printed should be interpreted as P-Value. If the export destination or the printer does not support GSDF, DigitalDiagnost R3.1 provides calibration tools to adapt to this device to afford grayscale image consistency. The calibration takes into account ambient luminance and lightbox luminance.

8.5.   Standard Extended/Specialized/Private SOPs

Table 151: List of Extended/Specialized/Private created SOP Instance

SOP Class Name	SOP Class UID
Computed Radiography Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.1
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7
Digital X-Ray Image Storage - For Pres. SOP	1.2.840.10008.5.1.4.1.1.1.1
Digital X-Ray Image Storage - For Proc. SOP	1.2.840.10008.5.1.4.1.1.1.1.1
X-Ray Radiation Dose SR SOP Class	1.2.840.10008.5.1.4.1.1.88.67

8.5.1. Standard Extended/Specialized/Private SOP Instance

The Storage SOP classes are extended to create a standard extended SOP class by addition of standard and private attributes to the created SOP Instances.

8.5.1.1. Computed Radiography Image Storage SOP Class

Table 152: Addition of standard and private attributes for Computed Radiography Image Storage SOP Class

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Irradiation Event UID	0008,3010	UI		ANAPCV	AUTO	
Medical Alerts	0010,2000	LO		VNAP	MWL/ USER	
Allergies	0010,2110	LO		VNAP	MWL/ USER	
Pregnancy Status	0010,21C0	US		VNAP	MWL/ USER	
Image and Fluoroscopy Area Dose Product	0018,115E	DS		VNAP	AUTO	
Grid	0018,1166	CS		VNAP	AUTO	
Filter Material	0018,7050	CS		VNAP	AUTO	
Pixel Spacing	0028,0030	DS		ALWAYS	AUTO	
Requesting Physician	0032,1032	PN		VNAP	MWL/ USER	
Requesting Service	0032,1033	LO		VNAP	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	MPPS/ AUTO	

Performed Procedure Step End Date	0040,0250	DA		VNAP	MPPS/ AUTO	
Performed Procedure Step End Time	0040,0251	TM		VNAP	MPPS/ AUTO	
Performed Procedure Step Status	0040,0252	CS		VNAP	MPPS/ AUTO	
Total Number of Exposures	0040,0301	US		VNAP	AUTO	
Requested Procedure ID	0040,1001	SH		VNAP	MWL/ USER	
Reason for the Requested Procedure	0040,1002	LO		VNAP	MWL/ USER	
Requested Procedure Priority	0040,1003	SH		VNAP	MWL/ USER	
Patient Transport Arrangements	0040,1004	LO		VNAP	MWL/ USER	
Names of Intended Recipients of Results	0040,1010	PN		VNAP	MWL/ USER	
Requested Procedure Comments	0040,1400	LT		VNAP	MWL/ USER	
Reason for the Imaging Service Request (RETIRED)	0040,2001	LO		VNAP	MWL	
Issue Date of Imaging Service Request	0040,2004	DA		VNAP	MWL/ USER	
Imaging Service Request Comments	0040,2400	LT		VNAP	MWL/ USER	
Requested Procedure Code Sequence	0032,1064	SQ		VNAP	MWL	
Exposure Dose Sequence	0040,030E	SQ		VNAP	AUTO	
Film Consumption Sequence	0040,0321	SQ		VNAP	AUTO	

8.5.1.2. Secondary Capture Image Storage SOP Class

Table 153: Addition of standard and private attributes for Secondary Capture Image Storage SOP Class

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Irradiation Event UID	0008,3010	UI		ANAPCV	AUTO	
Medical Alerts	0010,2000	LO		VNAP	MWL/ USER	
Allergies	0010,2110	LO		VNAP	MWL/ USER	
Pregnancy Status	0010,21C0	US		VNAP	MWL/U SER	
KVP	0018,0060	DS		ANAP	AUTO	
Exposure Time	0018,1150	IS		ANAP	AUTO	
Exposure	0018,1152	IS		ANAP	AUTO	
Exposure in uAs	0018,1153	IS		ANAP	AUTO	
Radiation Setting	0018,1155	CS		VNAP	AUTO	
Image and Fluoroscopy Area Dose Product	0018,115E	DS		VNAP	AUTO	
Filter Material	0018,7050	CS		VNAP	AUTO	
Imager Pixel Spacing	0018,1164	DS		VNAP	AUTO	
Acquisition Device Processing Description	0018,1400	LO		VNAP	AUTO	
Relative X-ray Exposure	0018,1405	IS		VNAP	AUTO	
View Position	0018,5101	CS		VNAP	AUTO	
Pixel Spacing	0028,0030	DS		ALWAYS	AUTO	
Requesting Physician	0032,1032	PN		VNAP	MWL/U SER	
Requesting Service	0032,1033	LO		VNAP	MWL/U SER	

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 Procedure Step End Date	0040,0250	DA		VNAP	MPPS/AUTO	
Performed Procedure Step End Time	0040,0251	TM		VNAP	MPPS/AUTO	
Total Number of Exposures	0040,0301	US		VNAP	AUTO	
Entrance Dose	0040,0302	US		VNAP	AUTO	
Requested Procedure ID	0040,1001	SH		VNAP	MWL/USER	
Reason for the Requested Procedure	0040,1002	LO		VNAP	MWL/USER	
Requested Procedure Priority	0040,1003	SH		VNAP	MWL/USER	
Patient Transport Arrangements	0040,1004	LO		VNAP	MWL/USER	
Names of Intended Recipients of Results	0040,1010	PN		VNAP	AUTO	
Requested Procedure Comments	0040,1400	LT		VNAP	MWL	
Reason for the Imaging Service Request (RETIRED)	0040,2001	LO		VNAP	MWL	
Issue Date of Imaging Service Request	0040,2004	DA		VNAP	MWL/USER	
Imaging Service Request Comments	0040,2400	LT		VNAP	MWL/USER	
Requested Procedure Code Sequence	0032,1064	SQ		VNAP	MWL	
Exposure Dose Sequence	0040,030E	SQ		VNAP	AUTO	
Film Consumption Sequence	0040,0321	SQ		VNAP	AUTO	

8.5.1.3. Digital X-Ray Image Storage - For Pres. SOP

Table 154: Addition of standard and private attributes for Digital X-Ray Image Storage - For Pres. SOP

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Irradiation Event UID	0008,3010	UI		ANAPCV	AUTO	
Medical Alerts	0010,2000	LO		VNAP	MWL/USER	
Allergies	0010,2110	LO		VNAP	MWL/USER	
Pregnancy Status	0010,21C0	US		VNAP	MWL/USER	
Detector ID	0018,700A	SH		ANAPCV	AUTO	
Detector Manufacturer Name	0018,702A	LO		ANAPCV	AUTO	
Detector Manufacturer Model Name	0018,702B	LO		ANAPCV	AUTO	
Pixel Spacing	0028,0030	DS		ALWAYS	AUTO	
Requesting Physician	0032,1032	PN		VNAP	MWL/USER	
Requesting Service	0032,1033	LO		VNAP	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/U SER	
Performed Station AE Title	0040,0241	AE		VNAP	MPPS/A UTO	
Performed Procedure Step End Date	0040,0250	DA		VNAP	MPPS/A UTO	
Performed Procedure Step End Time	0040,0251	TM		VNAP	MPPS/A UTO	
Performed Procedure Step Status	0040,0252	CS		VNAP	MPPS/A UTO	
Total Number of Exposures	0040,0301	US		VNAP	AUTO	
Organ Dose	0040,0316	DS		VNAP	AUTO	
Requested Procedure ID	0040,1001	SH		VNAP	MWL/ AUTO	
Reason for the Requested Procedure	0040,1002	LO		VNAP	MWL/ USER	
Requested Procedure Priority	0040,1003	SH		VNAP	MWL	
Patient Transport Arrangements	0040,1004	LO		VNAP	MWL/ USER	
Names of Intended Recipients of Results	0040,1010	PN		VNAP	AUTO	
Requested Procedure Comments	0040,1400	LT		VNAP	MWL	
Reason for the Imaging Service Request (RETIRED)	0040,2001	LO		VNAP	MWL	
Issue Date of Imaging Service Request	0040,2004	DA		VNAP	MWL/ USER	
Imaging Service Request Comments	0040,2400	LT		VNAP	MWL/U SER	
Requested Procedure Code Sequence	0032,1064	SQ		VNAP	MWL	
Exposure Dose Sequence	0040,030E	SQ		VNAP	AUTO	
Film Consumption Sequence	0040,0321	SQ		VNAP	AUTO	

8.5.1.4. Digital X-Ray Image Storage - For Proc. SOP

Table 155: Addition of standard and private attributes for Digital X-Ray Image Storage - For Proc. SOP

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Irradiation Event UID	0008,3010	UI		ANAPCV	AUTO	
Medical Alerts	0010,2000	LO		VNAP	MWL/U SER	
Allergies	0010,2110	LO		VNAP	MWL/U SER	
Pregnancy Status	0010,21C0	US		VNAP	MWL/U SER	
Detector ID	0018,700A	SH		ANAPCV	AUTO	
Detector Manufacturer Name	0018,702A	LO		ANAPCV	AUTO	
Detector Manufacturer Model Name	0018,702B	LO		ANAPCV	AUTO	
Pixel Spacing	0028,0030	DS		ALWAYS	AUTO	
Requesting Physician	0032,1032	PN		VNAP	MWL/U SER	
Requesting Service	0032,1033	LO		VNAP	MWL/U SER	
Requested Procedure Description	0032,1060	LO		VNAP	MWL/U SER	
Special Needs	0038,0050	LO		VNAP	MWL/U SER	
Patient State	0038,0500	LO		VNAP	MWL/U SER	

Performed Station AE Title	0040,0241	AE		VNAP	MPPS/AUTO	
Performed Procedure Step End Date	0040,0250	DA		VNAP	MPPS/AUTO	
Performed Procedure Step End Time	0040,0251	TM		VNAP	MPPS/AUTO	
Performed Procedure Step Status	0040,0252	CS		VNAP	MPPS/AUTO	
Total Number of Exposures	0040,0301	US		VNAP	AUTO	
Organ Dose	0040,0316	DS		VNAP	AUTO	
Requested Procedure ID	0040,1001	SH		VNAP	MWL/AUTO	
Reason for the Requested Procedure	0040,1002	LO		VNAP	MWL	
Requested Procedure Priority	0040,1003	SH		VNAP	MWL	
Patient Transport Arrangements	0040,1004	LO		VNAP	MWL/USER	
Names of Intended Recipients of Results	0040,1010	PN		VNAP	AUTO	
Requested Procedure Comments	0040,1400	LT		VNAP	MWL	
Reason for the Imaging Service Request (RETIRED)	0040,2001	LO		VNAP	MWL	
Issue Date of Imaging Service Request	0040,2004	DA		VNAP	MWL/USER	
Imaging Service Request Comments	0040,2400	LT		VNAP	MWL/USER	
Requested Procedure Code Sequence	0032,1064	SQ		VNAP	MWL	
Exposure Dose Sequence	0040,030E	SQ		VNAP	AUTO	
Film Consumption Sequence	0040,0321	SQ		VNAP	AUTO	

8.5.1.5. X-Ray Radiation Dose SR SOP Class

Table 156: Addition of standard and private attributes for X-Ray Radiation Dose SR Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Performing Physician's Name	0008,1050	PN		ANAPCV	MWL/ AUTO/ USER	
Medical Alerts	0010,2000	LO		ANAPCV	MWL/ AUTO/ USER	
Allergies	0010,2110	LO		ANAPCV	MWL/ AUTO/ USER	
Pregnancy Status	0010,21C0	US		ANAPCV	MWL/ AUTO/ USER	
Image and Fluoroscopy Area Dose Product	0018,115E	DS		ANAPCV	MWL/ AUTO/ USER	
Requesting Physician	0032,1032	PN		ANAPCV	MWL/ AUTO/ USER	
Requesting Service	0032,1033	LO		ANAPCV	MWL/ AUTO/ USER	
Requested Procedure Description	0032,1060	LO		ANAPCV	MWL/ AUTO/ USER	

Special Needs	0038,0050	LO		ANAPCV	MWL/ AUTO/ USER	
Patient State	0038,0500	LO		ANAPCV	MWL/ AUTO/ USER	
Performed Station AE Title	0040,0241	AE		ANAPCV	MWL/ AUTO/ USER	
Performed Procedure Step Start Date	0040,0244	DA		ANAPCV	MWL/ AUTO/ USER	
Performed Procedure Step Start Time	0040,0245	TM		ANAPCV	MWL/ AUTO/ USER	
Performed Procedure End Date	0040,0250	DA		ANAPCV	MWL/ AUTO/ USER	
Performed Procedure End Time	0040,0251	TM		ANAPCV	MWL/ AUTO/ USER	
Performed Procedure Step Status	0040,0252	CS		ANAPCV	MWL/ AUTO/ USER	
Performed Procedure Step ID	0040,0253	SH		ANAPCV	MWL/ AUTO/ USER	
Performed Procedure Step Description	0040,0254	LO		ANAPCV	MWL/ AUTO/ USER	
Performed Protocol Code Sequence	0040,0260	SQ		ANAP	MWL/ AUTO/ USER	
>Code Value	0008,0100	SH		ALWAYS	MWL/ AUTO/ USER	
>Coding Scheme Designator	0008,0102	SH		ALWAYS	MWL/ AUTO/ USER	
>Code Meaning	0008,0104	LO		ALWAYS	MWL/ AUTO/ USER	
Total Time of Fluoroscopy	0040,0300	US		ANAPCV	MWL/ AUTO/ USER	
Total Number of Exposures	0040,0301	US		ANAPCV	MWL/ AUTO/ USER	
Entrance Dose	0040,0302	US		ANAPCV	MWL/ AUTO/ USER	
Exposure Dose Sequence	0040,030E	SQ		ANAPCV	MWL/ AUTO/ USER	
Organ Dose	0040,0316	DS		ANAPCV	MWL/ AUTO/ USER	
Film Consumption Sequence	0040,0321	SQ		ANAPCV	MWL/ AUTO/ USER	
Requested Procedure ID	0040,1001	LO		VNAP	MWL/ AUTO/ USER	
Reason for the Requested Procedure	0040,1002	LO		VNAP	MWL/ AUTO/ USER	
Requested Procedure Priority	0040,1003	SH		VNAP	MWL/ AUTO/ USER	

Patient Transport Arrangements	0040,1004	LO		VNAP	MWL/ AUTO/ USER	
Names of Intended Recipients of Results	0040,1010	PN		VNAP	MWL/ AUTO/ USER	
Requested Procedure Comments	0040,1400	LT		ANAPCV	MWL/ AUTO/ USER	
Reason for the Imaging Service Request (retired)	0040,2001	LO		ANAPCV	MWL/ AUTO/ USER	
Issue Date of Imaging Service Request	0040,2004	DA		ANAPCV	MWL/ AUTO/ USER	
Imaging Service Request Comments	0040,2400	LT		ANAPCV	MWL/ AUTO/ USER	
UID	0040,A124	UI		ANAPCV	MWL/ AUTO/ USER	
Referenced Request Sequence	0040,A370	SQ		ANAPCV	MWL/ AUTO/ USER	
>Accession Number	0008,0050	SH		ANAPCV	MWL/ AUTO/ USER	
>Referenced Study Sequence	0008,1110	SQ		ANAPCV	MWL/ AUTO/ USER	
>Study Instance UID	0020,000D	UI		ANAPCV	MWL/ AUTO/ USER	
>Requested Procedure Description	0032,1060	LO		ANAPCV	MWL/ AUTO/ USER	
>Requested Procedure ID	0040,1001	SH		ANAPCV	MWL/ AUTO/ USER	
>Placer Order Number / Imaging Service Request	0040,2016	LO		ANAPCV	MWL/ AUTO/ USER	
>Filler Order Number / Imaging Service Request	0040,2017	LO		ANAPCV	MWL/ AUTO/ USER	
Performed Procedure Code Sequence	0040,A372	SQ		ANAPCV	MWL/ AUTO/ USER	
>Code Value	0008,0100	SH		ALWAYS	MWL/ AUTO/ USER	
>Coding Scheme Designator	0008,0102	SH		ALWAYS	MWL/ AUTO/ USER	
>Code Meaning	0008,0104	LO		ALWAYS	MWL/ AUTO/ USER	

8.6.   Private Transfer Syntaxes

Not applicable.