DICOM Conformance Statement

LUMINOS Q.namix VB10E (and higher)

Product Name
LUMINOS Q.namix T
LUMINOS Q.namix R

November 2025

SIEMENS Healthineers

1 Overview

LUMINOS Q.namix is a multifunctional system that helps you achieve imaging excellence across fluoroscopy, radiography, and even specialized and complex exams. Unconventionally intuitive by design, this system enables streamlined workflows at low dose using simplified controls, seamlessly connected components, and built-in workflow guidance.

For acquired images it utilizes the DICOM “Digital X-Ray”, “Computed Radiography” and “X-Ray Radiofluoroscopic” Image Storage classes and “X-Ray Radiation Dose SR Storage” for automatically generated Dose Reports. LUMINOS Q.namix can also handle other DICOM image objects like “CT Image” or “MR Image” utilizing the DICOM “Query/Retrieve Service Class”. Workflow Management is supported by querying worklists and returning information about the procedure performed. Furthermore, the import from and export to DICOM USB media and printing to a DICOM printer is supported.

LUMINOS Q.namix conforms to the DICOM Standard and supports the network services as described in this chapter.

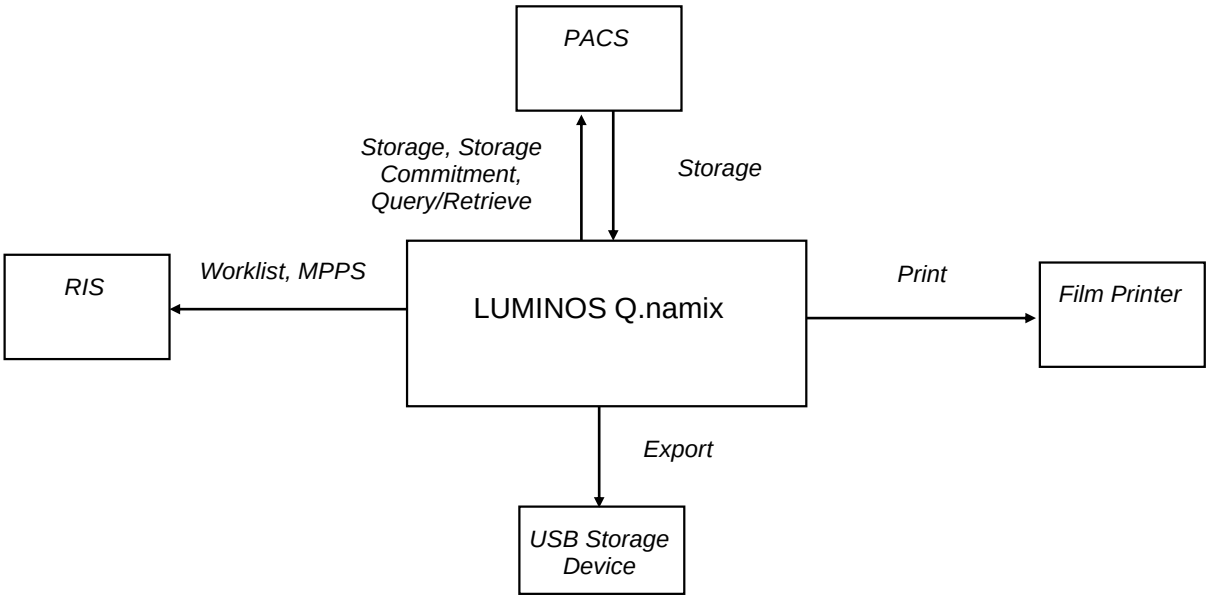

Figure 1.1-1: Overview of Implemented Services

1.1 Content and Transfer

Table 1.1-1 lists all Storage SOP Classes and the supported transfer mechanisms as well as the usage scenarios for those instances.

The “Transfer Syntax Set” column lists the sets of Transfer Syntaxes defined in Table 1.1-2 that are applicable to each SOP Class. The “DIMSE” and “Media Services” columns indicate the roles supported for each SOP Class.

The “Function” columns indicate how the instances are used by the system:

- Create: The system creates instances of the SOP Class.
- Display: The system displays the instances of the SOP Class to the user, either by displaying the SOP Instances natively or by applying instances of another suitable SOP Class to the image instances (e.g., a Presentation State or CAD SR).
- Process: The system processes the instances of the SOP Class to derive some further information that is made available to the user (e.g., a CAD processing algorithm, or a 3D Rendering).
- Archive: The system stores the instances of the SOP Class and makes them available again.

Table 1.1-1: Storage SOP Classes

SOP Classes		Transfer Syntax Set	DIMSE Services		Media Services			Function			
			SCU	SCP	FSC	FSU	FSR	Create	Display	Process	Archive
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	U	Y	Y	Y	Y	Y	Y	Y	Y	N
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	U	Y	Y	Y	Y	Y	Y	Y	Y	N
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	U	Y	Y	Y	Y	Y	Y	N	N	N
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	U	Y	Y	Y	Y	Y	Y	Y	Y	N
X-Ray Radiation Dose SR Storage[1]	1.2.840.10008.5.1.4.1.1.88.67	U	Y	Y	Y	Y	Y	Y	N	N	N
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	U	N	Y	N	N	Y	N	Y	N	N
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	U	N	Y	N	N	Y	N	Y	N	N
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	U	N	Y	N	N	Y	N	Y	N	N
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	U	N	Y	N	N	Y	N	Y	N	N
Ultrasound Multiframe Image Storage	1.2.840.10008.5.1.4.1.1.3.1	U	N	Y	N	N	Y	N	Y	N	N
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	U	N	Y	N	N	Y	N	Y	N	N
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	U	N	Y	N	N	Y	N	Y	N	N

[1] See Table 1.1-3.

Table 1.1-2: Supported Transfer Syntaxes

Transfer Syntax Set	Transfer Syntax Name	Transfer Syntax UID
Uncompressed Transfer Syntax Set (U)	Implicit VR Little Endian	1.2.840.10008.1.2
	Explicit VR Little Endian	1.2.840.10008.1.2.1
	Explicit VR Big Endian (Retired)	1.2.840.10008.1.2.2

1.1.1 Structured Reporting Root Template IDs

Table 1.1-3 lists all Template IDs (TID) of Root Templates that are supported by the system. The “Function” column indicates how the system uses the content of the DICOM SR:

- CREATE: The system creates instances using the specified TID.
- RENDER: The system displays the content of the SR, without using the data for any processing.
- EXTRACT_DATA: The system can extract structured data from the content and use the data for subsequent processing (e.g. reporting).
- OVERLAY: The system uses the information in the SR to display information directly on the images (e.g. Mammography CAD markers).
- ARCHIVE: The system stores instances for later retrieval.

The “SOP Class UID” column indicates which of the SR Storage SOP Classes are used to encode the information or to store it. If multiple SOP Classes are supported the “Condition” column describes the conditions for using the different SOP Classes.

Table 1.1-3: Supported Root SR Template IDs (TID)

Name	Root TID	Function	SOP Classes		Condition
Projection X-Ray Radiation Dose (TID 10001)	10001	CREATE	X-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67	

1.2 DIMSE Services

1.2.1 Verification

Table 1.2-1 lists support for the Verification SOP Class.

Table 1.2-1: Verification SOP Class

SOP Classes		Transfer Syntax		SCU	SCP
Verification SOP Class	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	Y	Y

1.2.2 Storage

For details on supported Storage SOP Classes see section 1.1.

1.2.3 Workflow Management

Table 1.2-2 lists all supported Workflow Management SOP Classes.

Table 1.2-2: Workflow Management SOP Classes

SOP Classes		Transfer Syntax		SCU	SCP
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	Implicit VR Little Endian	1.2.840.10008.1.2	Y	N
		Explicit VR Little Endian	1.2.840.10008.1.2.1	Y	N
		Explicit VR Big Endian (Retired)	1.2.840.10008.1.2.2	Y	N
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	Y	N
		Explicit VR Little Endian	1.2.840.10008.1.2.1	Y	N
		Explicit VR Big Endian (Retired)	1.2.840.10008.1.2.2	Y	N
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	Implicit VR Little Endian	1.2.840.10008.1.2	Y	N
		Explicit VR Little Endian	1.2.840.10008.1.2.1	Y	N
		Explicit VR Big Endian (Retired)	1.2.840.10008.1.2.2	Y	N

1.2.4 Query/Retrieve

Table 1.2-3 lists all supported Query/Retrieve SOP Classes.

Table 1.2-3: Query/Retrieve SOP Classes

SOP Classes		Transfer Syntax		DIMSE	
				SCU	SCP
Study Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	Y	N
		Explicit VR Little Endian	1.2.840.10008.1.2.1	Y	N
		Explicit VR Big Endian (Retired)	1.2.840.10008.1.2.2	Y	N
Study Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian	1.2.840.10008.1.2	Y	N
		Explicit VR Little Endian	1.2.840.10008.1.2.1	Y	N
		Explicit VR Big Endian (Retired)	1.2.840.10008.1.2.2	Y	N

1.2.5 Printing

Table 1.2-4 lists all supported Printing SOP Classes.

Table 1.2-4: Printing SOP Classes

SOP Classes	SOP Class UID	Transfer Syntax		SCU	SCP
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Implicit VR Little Endian	1.2.840.10008.1.2	Y	N
Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	Y	N
Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	Implicit VR Little Endian	1.2.840.10008.1.2.1	Y	N
Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4	Implicit VR Little Endian	1.2.840.10008.1.2	Y	N
Printer SOP Class	1.2.840.10008.5.1.1.16	Implicit VR Little Endian	1.2.840.10008.1.2	Y	N
Presentation LUT SOP Class	1.2.840.10008.5.1.1.23	Implicit VR Little Endian	1.2.840.10008.1.2	Y	N

1.3 Media Services

Table 1.3-1 lists all supported Media Application Profiles.

Table 1.3-1: Supported Media Application Profiles

Media Storage Application Profile	FSC	FSR	FSU
USB			
STD-GEN-USB-JPEG	Y	Y	Y

These Application Profiles are based on the Media Storage Service Class with the Interchange Option.

LUMINOS Q.namix provides Standard Conformance to the SOP Classes listed in Table 1.1-1 marked accordingly in main column „Media Services“.

1.4 De-Identification Profiles

De-Identification as described in DICOM PS3.15 is not supported. To protect PHI/PII a Data Minimization mechanism as described in Section 8.6 is implemented.

1.5 Specific Character Sets

Table 1.5-1: Supported Specific Character Sets

Defined Term	Code	Description
Single-Byte Character Sets without Code Extensions		
ISO_IR 6	ISO-646	Default Repertoire
ISO_IR 100	ISO-8859-1	Latin Alphabet No. 1 (West European)
ISO_IR 144[2]	ISO-8859-5	Cyrillic
Multi-Byte Character Sets without Code Extensions		
GB18030[3]	GB18030	GB18030-2000 (P.R China Norm GB18030)
ISO 2022 IR 13 ISO 2022 IR 87 ISO 2022 IR 159[4]	ISO IR 13 ISO IR 87 ISO IR 159	Japanese

[2] When Russian patient data input is configured.

[3] When Chinese patient data input is configured.

[4] When Japanese patient data input is configured.

2 Table of Contents

3 Introduction

3.1 Revision History

Revision	Date	Product Version(s)	Change
1.0	June 2025	VB10D	Initial Revision

3.2 Audience

This document is intended for the audience listed below. It is assumed that the reader has a working knowledge of the DICOM Standard.

The document structure was designed for easier access to relevant information for different user groups:

Clinical Users, who want to get an overview of the implemented interoperability features of the system can see section 4.

Personnel involved in Sales can use the information in Section 1 to assess the compatibility between different systems involved in a sales situation.

System Integrators can use information in Section 6 during system installation and also information from Section 5 for details regarding the implemented services.

Field Service Engineers can use the details from Section 5 and from Section 7 for troubleshooting.

Hospital IT staff focusing on security can use the details provided in Section 8 regarding implemented Security features.

Research Personnel may be interested in using information provided in Annex A or Annex B to get detailed imaging and measurement information.

3.3 Remarks

The scope of this DICOM Conformance Statement is to facilitate integration between LUMINOS Q.namix and other DICOM products. The Conformance Statement should be read and understood in conjunction with the DICOM Standard. DICOM by itself does not guarantee interoperability.

The Conformance Statement does, however, facilitate a first-level comparison for interoperability between different applications supporting compatible DICOM functionality.

This Conformance Statement should not replace validation with other DICOM equipment to ensure proper exchange of intended information. In fact, it is the user's responsibility to perform the following validation activities:

The comparison of Conformance Statements from LUMINOS Q.namix and other DICOM conformant equipment is the first step towards assessing interconnectivity and interoperability between those systems.

Test procedures should be defined and executed to validate the required level of interoperability with specific DICOM conformant equipment, as established by the healthcare facility.

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3.4 Terms and Definitions

The following list includes DICOM Terms, that are used throughout this conformance statement:

Abstract Syntax	The information agreed to be exchanged between applications, generally equivalent to a Service/Object Pair (SOP) Class. Examples: Verification SOP Class, Modality Worklist Information Model Find SOP Class, Computed Radiography Image Storage SOP Class.
Application Entity (AE)	A representation of the external behavior of an application process in terms of DICOM Network Services, Web Services and/or media exchange capabilities implemented in one or more roles. A single device may have multiple Application Entities.
Application Entity Title (AET)	The externally known name of an Application Entity, used to identify a DICOM application to other DICOM applications on the network.
Application Context	The specification of the type of communication used between Application Entities. Example: DICOM network protocol.
Association	A network communication channel set up between Application Entities.
Attribute	A unit of information in an object definition; a data element identified by a tag. The information may be a complex data structure (Sequence), itself composed of lower-level data elements. Examples: Patient ID (0010,0020), Accession Number (0008,0050), Photometric Interpretation (0028,0004), Procedure Code Sequence (0008,1032).
Information Object Definition (IOD)	The specified set of Attributes that comprise a type of data object; does not represent a specific instance of the data object, but rather a class of similar data objects that have the same properties. Examples: MR Image IOD, CT Image IOD, Print Job IOD. The Attributes within an IOD may be specified as Mandatory (Type 1), Required but possibly unknown (Type 2), or Optional (Type 3), and there may be conditions associated with the use of an Attribute (Types 1C and 2C).
Media Application Profile	The specification of DICOM information objects and encoding exchanged on removable media (e.g., CDs).
Module	A set of Attributes within an Information Object Definition that are logically related to each other. Example: Patient Module includes Patient's Name, Patient ID, Patient' Birth Date, and Patient's Sex.
Negotiation	First phase of Association establishment that allows Application Entities to agree on the types of data to be exchanged and how that data will be encoded.
Origin Server	Refers to the program that can originate authoritative responses to HTTP requests for a given Target Resource. The term "server" refers to any implementation that receives a web service request message from a user agent.
Presentation Context	The set of DICOM Network Services used over an Association, as negotiated between Application Entities; includes Abstract Syntaxes and Transfer Syntaxes.
Private SOP Class	A SOP Class that is not defined in the DICOM Standard but is published in an implementation's Conformance Statement.
Protocol Data Unit (PDU)	A packet (piece) of a DICOM message sent across the network. Devices must specify the maximum size packet they can receive for DICOM messages.
Security Profile	A set of mechanisms, such as encryption, user authentication, or digital signatures, used by an Application Entity to ensure confidentiality, integrity, and/or availability of exchanged DICOM data.
Service Class Provider (SCP)	Role of an Application Entity that provides a DICOM network service; typically, a server that performs operations requested by another Application Entity (Service Class User). Examples: Picture Archiving and Communication System (image storage SCP, and image query/retrieve SCP), Radiology Information System (modality worklist SCP).
Service Class User (SCU)	Role of an Application Entity that uses a DICOM Network Service; typically, a client. Examples: imaging modality (image storage SCU, and modality worklist SCU), imaging workstation (image query/retrieve SCU).
Service/Object Pair Class (SOP Class)	The specification of the network or media transfer (service) of a particular type of data (object); the fundamental unit of DICOM interoperability specification. Examples: Ultrasound Image Storage Service, Basic Grayscale Print Management.

Service/Object Pair Instance (SOP Instance)	An information object: a specific occurrence of information exchanged in a SOP Class. E.g., a specific X-ray image.
Specialized SOP Class	A SOP Class that is derived from the Standard that is specialized by additional type 1, 1C, 2, 2C, or 3 Attributes by enumeration of specific permitted Values for Attributes, or by enumeration of specific permitted Templates. The additional Attributes may either be drawn from the Data Dictionary in PS3.6 or may be Private Attributes.
Standard SOP Class	A SOP Class defined in the Standard, and that is implemented and used without any modifications.
Standard Extended SOP Class	A SOP Class that is defined in the standard, and that is extended by additional type 3 Attributes. The additional Attributes may either be drawn from the DICOM Data Dictionary in PS3.6 or may be Private Attributes.
Tag	A 32-bit identifier for a data element, represented as a pair of four-digit hexadecimal numbers, the "group" and the "element". If the "group" number is odd, the tag is for a private (manufacturer-specific) data element. Examples: (0010,0020) [Patient ID], (07FE,0010) [Pixel Data], (0019,0210) [private data element].
Transfer Syntax	The encoding used for exchange of DICOM information objects and messages. Examples: JPEG compressed (images), Little Endian Explicit Value Representation.
TLS-Secured Port	TCP port on which an implementation accepts TLS connections to exchange DICOM information.
Unique Identifier (UID)	A globally unique "dotted decimal" string that identifies a specific object or a class of objects; an ISO-8824 Object Identifier. Examples: Study Instance UID, SOP Class UID, SOP Instance UID.
User Agent	A client in a network protocol used in communications within a client–server distributed computing system. In particular, the Hypertext Transfer Protocol (HTTP) identifies the client software originating the request, using a user-agent header, even when the client is not operated by a user.
Value Representation (VR)	The format type of an individual DICOM data element, such as text, an integer, a person's name, or a code. DICOM information objects can be transmitted with either explicit identification of the type of each data element (Explicit VR), or without explicit identification (Implicit VR); with Implicit VR, the receiving application must use a DICOM data dictionary to look up the format of each data element.
Logging	Activity records, which are public and do not contain PHI and PII, just technical data to help to find out afterwards, what exactly happened or to the root cause of eventual issues. The logging cannot be switched off.
Tracing	A detailed, code level activity record, which can only be used for debugging purposes. Tracing is switched off by default. Switching the tracing on will affect the performance and a warning is going to be displayed on the GUI with the text “Nor for clinical use”.

3.5 Abbreviations

Abbreviations that are used in this DICOM Conformance Statement are listed here.

AE	Application Entity
AET	Application Entity Title
ASCII	American Standard Code for Information Interchange
CAD	Computer Aided Detection
CDA	Clinical Document Architecture
CID	Context Identifier
DCS	DICOM Conformance Statement
DHCP	Dynamic Host Configuration Protocol
DICOM	Digital Imaging and Communications in Medicine
DIS	DICOM Information System
ELE	Explicit VR Little Endian
FSC	File-Set Creator
FSR	File-Set Reader
FSU	File-Set Updater
GSDF	Grayscale Standard Display Function
IANA	Internet Assigned Numbers Authority
IHE	Integrating the Healthcare Enterprise
ILE	Implicit VR Little Endian
IOD	Information Object Definition
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
ISO	International Organization for Standardization
MPPS	Modality Performed Procedure Step
MWL	Modality Worklist
n.a.	not applicable
NEMA	National Electrical Manufacturers Association
NTP	Network Time Protocol
O	Optional Key Attribute
OID	Object Identifier
OS	Origin Server
PDU	Protocol Data Unit
PHI	Protected Health Information
PII	Personal Identifiable Information
PPS	Performed Procedure Step
R	Required Key Attribute
RIS	Radiology Information System
SCP	Service Class Provider
SCU	Service Class User
SOP	Service-Object Pair
SPS	Scheduled Procedure Step
SR	Structured Reporting
TCP/IP	Transmission Control Protocol/Internet Protocol
TFT	Thin Film Transistor (Display)
TID	Template Identifier

U	Unique Key Attribute
UA	User Agent
UI	User Interface
UID	Unique Identifier
UL	Upper Layer
UPS	Unified Procedure Step
UTF-8	Unicode Transformation Format-8
VR	Value Representation

3.6 References

NEMA PS3 / ISO 12052, Digital Imaging and Communications in Medicine (DICOM) Standard, National Electrical Manufacturers Association, Rosslyn, VA, USA
(available at http://www.dicomstandard.org/current)

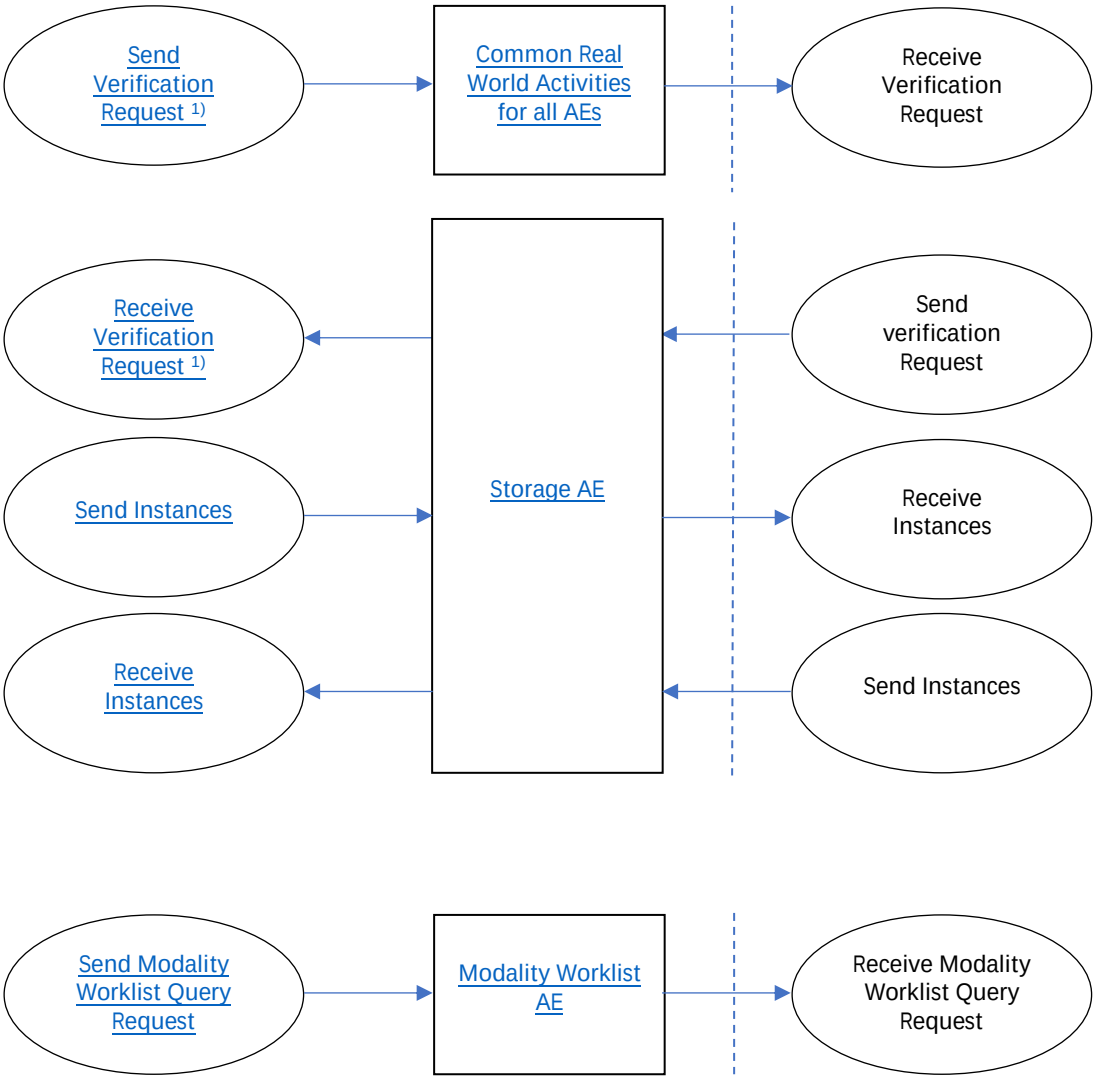
IHE Radiology Technical Framework
(available at https://www.ihe.net/Resources/technical_frameworks/#radiology)

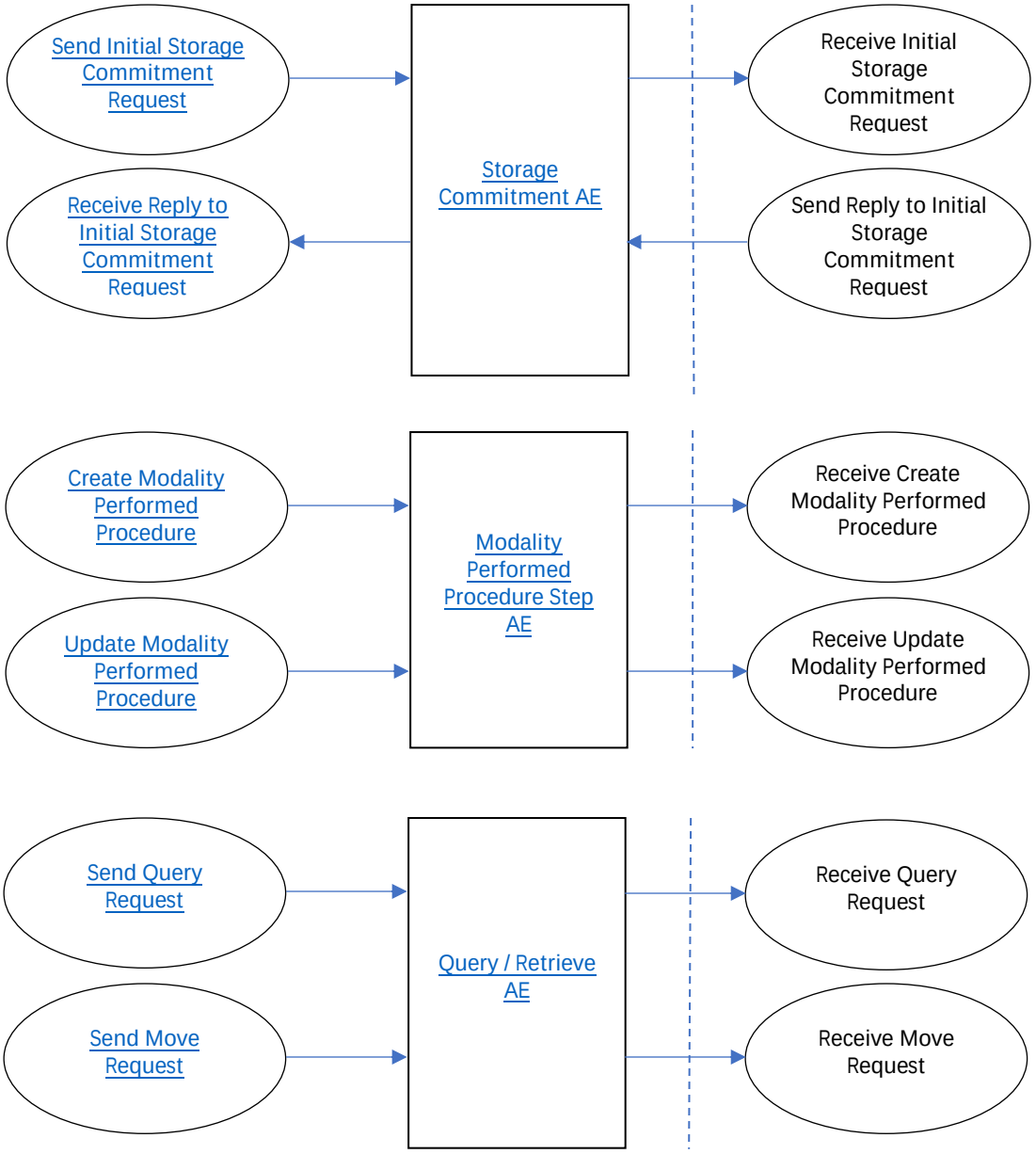
4 Implementation Model

LUMINOS Q.namix supports storing DICOM images to remote nodes like workstations or archiving systems. Using the Storage Commitment Service it can request safe keeping of previously stored instances from an archiving system. Additionally, LUMINOS Q.namix can query remote notes, retrieve, and store selected instances from that node. Using the Modality Worklist Service LUMINOS Q.namix can query a HIS/RIS for scheduled procedures. Performed Procedure Step status and other procedure data can be returned to the HIS/RIS using the Modality Performed Procedure Step (MPPS) Service. Furthermore, printing of grayscale images is supported. LUMINOS Q.namix also provides the functionality to Import or Export DICOM Instances from and to the File System.

4.1 Application Entities and Data Flow

The network and media interchange application model for LUMINOS Q.namix is shown in Figure 4.1-1.




Send Initial Storage Commitment Request
Receive Reply to Initial Storage Commitment Request
Storage Commitment AE
Receive Initial Storage Commitment Request
Send Reply to Initial Storage Commitment Request
Create Modality Performed Procedure
Update Modality Performed Procedure
Modality Performed Procedure Step AE
Receive Create Modality Performed Procedure
Receive Update Modality Performed Procedure
Send Query Request
Send Move Request
Query / Retrieve AE
Receive Query Request
Receive Move Request

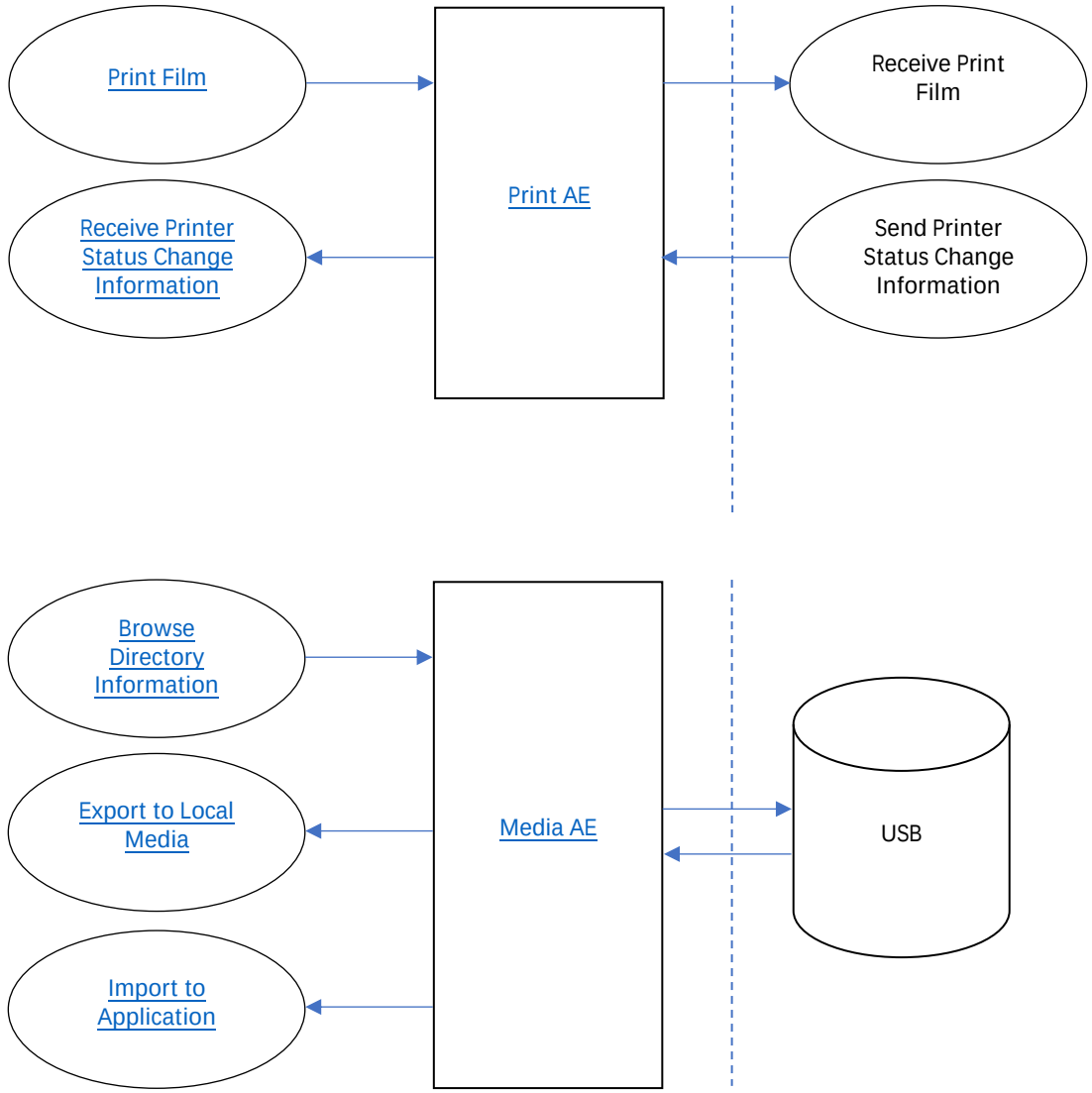


Figure 4.1-1: LUMINOS Q.namix Application Data Flow Diagram

[1)] The “Send Verification Request” Activity is supported by each AE using DIMSE services. The “Receive Verification Request” Activity is only supported by the Storage AE. For ease of documentation the “Send Verification Request” Activity is described once in chapter 4.1.1.

The SCU components of the Application Entity are invoked upon requests from the user interface or indirect by trigger from internal processes.

The SCP components of the Application Entities of LUMINOS Q.namix described in the following subsections operate as background server processes. They exist as soon as the system is powered up and wait for association requests. Upon accepting an association with a negotiated Presentation Context they start to receive and process the requests described in the following sections.

4.1.1 Functionality Common to all AE

LUMINOS Q.namix supports the Verification Service as an SCU. As an SCU, Verification can be activated from the Administrator Portal during system configuration by sending a C-ECHO-RQ for each configured AE.

4.1.2 Functional Definition of Storage AE

LUMINOS Q.namix SCU of the Storage AE is invoked directly by the user or by an auto-send trigger. The job consists of data describing the composite objects selected for Storage and the destination Application Entity Title. An association is negotiated with the destination Application Entity and the imaging data is transferred using the C-STORE-RQ.

The SCP of the Storage AE of LUMINOS Q.namix starts to receive the Composite Objects and imports them into the database after accepting an association with a negotiated Presentation Context only when a former C-MOVE request was triggered. The system responds to the Storage Request immediately after reception of the Data.

As an SCP of the Verification Service the Storage AE of LUMINOS Q.namix responds to incoming verification requests using the C-ECHO-RSP.

4.1.3 Functional Definition of Storage Commitment AE

If configured, LUMINOS Q.namix can serve as an SCU for the DICOM Storage Commitment Service. Upon successful completion of a Storage SCU job, the system uses the N-ACTION-RQ to request Storage Commitment from a remote DICOM Storage Commitment SCP. This can either be the same as the Storage destination or a different system depending on the system configuration. Storage Commitment Requests are sent after a configurable delay after storing the objects. LUMINOS Q.namix can receive the N-EVENT-REPORT-RQ on the same or a different association. In this case a reverse role negotiation takes place.

4.1.4 Functional Definition of Query/Retrieve AE

LUMINOS Q.namix supports DICOM Query/Retrieve as an SCU: The user can initiate a query to a remote node using the C-FIND-RQ. After matching the specified keys, the remote Query/Retrieve SCP uses the C-FIND-RSP to return the results of its search, which will be displayed to the user. Depending on user action LUMINOS Q.namix Query/Retrieve DICOM SCU sends a C-MOVE-RQ to initiate a C-STORE sub-operation on the SCP to start an instance transfer from remote Storage SCU (running on Query/Retrieve SCP) to the system's Storage SCP.

LUMINOS Q.namix leaves the Association for the C-MOVE-RQ from the SCU side open until all requested data has arrived.

LUMINOS Q.namix supports on SCU side only the Study Root Query Information Model supported. There is no support as SCP.

4.1.5 Functional Definition of Modality Worklist AE

LUMINOS Q.namix Modality Worklist SCU issues DICOM Modality Worklist requests using C-FIND-RQs. The results in the C-FIND-RSPs are stored in internal database. The provided Patient and Procedure information is used for patient registration prior to starting an exam.

4.1.6 Functional Definition of Modality Performed Procedure Step AE

The LUMINOS Q.namix MPPS SCU uses the N-CREATE-RQ to inform an Information System that a procedure step is IN PROGRESS. This either happens after the first image of a Procedure Step was acquired or when the operator discontinues the Procedure Step.

The LUMINOS Q.namix MPPS SCU uses the N-SET-RQ to inform the Information System about the progress and finalization of the Procedure Step, using either a status of “IN PROGRESS”, “COMPLETED” or “DISCONTINUED”. It is configurable, if the Procedure Step is updated after the acquisition of each image. A status of “COMPLETED” or “DISCONTINUED” is sent when the examination workflow is explicitly closed or the operator explicitly discontinues the procedure step.

4.1.7 Functional Definition of Print AE

The SCU of the Print AE of LUMINOS Q.namix is invoked by the user interface to setup film-sheet layout and whenever an image is ready to be printed on film. The Print SCU will hold and maintain all data needed to compile a complete film-sheet from the data (images, layout, configuration) received. Whenever a film-sheet is ready to print, the related data is used to supply the Information to the SOP Classes of the Print Management Service Class. A queue is maintained to intermediately store several film-sheets in case of resource problems on printer. The SCU will only supply and require the mandatory SOP Classes of the Print Management Service Class.

4.1.8 Functional Definition of Media AE

The LUMINOS Q.namix Media AE provides the functionality to Import or Export DICOM Instances from and into the File System. During export, a DICOMDIR is generated. All SOP Classes marked accordingly in main column “Media Services” in Table 1.1-1 are supported for the Import/Export functionality.

Key features of the LUMINOS Q.namix Media AE are:

- providing browsing windows for Import from and Export to the File System
- creating a new File-set into the File System (Export to ...)
- importing SOP Instances from the medium onto local Storage
- writing the File-set’s DICOMDIR information into the file system

5 Service and Interoperability Description

5.1 Mapping of Services to Application Entities

Table 5.1-1 provides an overview of the Application Entities and the Services supported by each AE.

Table 5.1-1: Service to AE Mapping

Application Entity	Supported Services	Role				
		DIMSE		DICOM Media		
		SCU	SCP	FSC	FSU	FSR
Storage	Storage	Y	Y	*N/A*	*N/A*	*N/A*
Storage Commitment	Storage Commitment	Y	Y	*N/A*	*N/A*	*N/A*
Query/Retrieve	Query Retrieve	Y	N	*N/A*	*N/A*	*N/A*
Modality Worklist	Basic Worklist Management	Y	N	*N/A*	*N/A*	*N/A*
Modality Performed Procedure Step	Modality Performed Procedure Step	Y	N	*N/A*	*N/A*	*N/A*
Print	Print Management	Y	N	*N/A*	*N/A*	*N/A*
Media		*N/A*	*N/A*	Y	Y	Y

5.2 Supported DIMSE Services

5.2.1 Basic Worklist Management Service

5.2.1.1 SCU of the Modality Worklist Information Model – FIND SOP Class

As a Service Class User of the Modality Worklist Information Model – FIND SOP Class, LUMINOS Q.namix uses the C-FIND-RQ message to query the SCP. It supports the Query Keys listed in Table 5.2-1 which also enable “broad queries”.

In the “Matching Type” column, the following Values can be used:

- SINGLE_VALUE: SCU can request single Value matching on this Attribute.
- UID: SCU can request List of UID matching on this Attribute.
- WILDCARD: SCU can request Wildcard matching on this Attribute.
- RANGE: SCU can request Range matching on this Attribute.
- SEQUENCE: SCU can request sequence matching on this Attribute.
- UNIVERSAL: SCU can request Attribute as a return Value (universal matching).

In the “Query Value Source” column, the following Values can be used:

- FIXED: The query Value cannot be modified by the user or by configuration.
- GENERATED: The query Value is generated by the system (e.g. current date as the study date).
- CONFIG: The query Value is dependent on system configuration.
- USER: The query Value is entered by the user.
- SCANNED: The query Value is read from a barcode scanner or similar device.
- EMPTY: The query Value is left empty to indicate it is a return key only.

In the “Display on UI” column the following Values can be used:

- D: the return Value is displayed on the main UI by default.
- C: the return Value is displayed on the main UI if configured.
- N: the return Value is never displayed.

Table 5.2-1: Supported C-FIND Query Parameters for Modality Worklist - SCU

Attribute Name	Tag	Matching Type	Query Value Source	Value	Display on UI	Comments
Scheduled Procedure Step						
Schedule Procedure Step Sequence	(0040,0100)	SEQUENCE	N/A	N/A	Y	
>Modality	(0008,0060)	SINGLE_VALUE	CONFIG	Modality Code from configuration.	Y	It is possible to configure several modalities. If this is the case several C-FIND requests are sent and merge into the worklist.
>Scheduled Station AE Title	(0040,0001)	SINGLE_VALUE	CONFIG	Configured AE of Worklist SCU	N	
>Scheduled Procedure Step Start Date	(0040,0002)	SINGLE_VALUE RANGE	CONFIG	No Date +/- 24 hours +/- 12 hours Yesterday-Today Today	Y	Configurable in Service.
>Scheduled Procedure Step Start Time	(0040,0003)	SINGLE_VALUE RANGE	CONFIG	No Date +/- 24 hours +/- 12 hours Yesterday-Today Today	Y	Configurable in Service.
>Scheduled Performing Physician’s Name	(0040,0006)	UNIVERSAL	EMPTY		Y	Taken to prefill Performing Physician’s Name
>Scheduled Procedure Step Description	(0040,0007)	UNIVERSAL	EMPTY		Y	
>Scheduled Protocol Code Sequence	(0040,0008)	SEQUENCE	N/A	N/A	N	
>>Code Value	(0008,0100)	UNIVERSAL	EMPTY		N	
>>Coding Scheme Designator	(0008,0102)	UNIVERSAL	EMPTY		N	
>>Coding Scheme Version	(0008,0103)	UNIVERSAL	EMPTY		N	
>>Code Meaning	(0008,0104)	UNIVERSAL	EMPTY		N	
>Scheduled Procedure Step ID	(0040,0009)	UNIVERSAL	EMPTY		N	
>Scheduled Procedure Step Location	(0040,0011)	UNIVERSAL	EMPTY		N	
>Pre-Medication	(0040,0012)	UNIVERSAL	EMPTY		N	
>Scheduled Procedure Step Status	(0040,0020)	UNIVERSAL	EMPTY		N	
>Requested Contrast Agent	(0032,1070)	UNIVERSAL	EMPTY		N	
Requested Procedure						
Referenced Study Sequence	(0008,1110)	SEQUENCE	N/A		N	
>Referenced SOP Class UID	(0008,1150)	UNIVERSAL	EMPTY		N	
>Referenced SOP Instance UID	(0008,1155)	UNIVERSAL	EMPTY		N	

Attribute Name	Tag	Matching Type	Query Value Source	Value	Display on UI	Comments
Study Instance UID	(0020,000D)	UNIVERSAL	EMPTY		N	
Requested Procedure Description	(0032,1060)	UNIVERSAL	EMPTY		Y	
Requested Procedure Code Sequence	(0032,1064)	SEQUENCE	N/A		Y	
>>Code Value	(0008,0100)	UNIVERSAL	EMPTY		N	
>>Coding Scheme Designator	(0008,0102)	UNIVERSAL	EMPTY		N	
>>Coding Scheme Version	(0008,0103)	UNIVERSAL	EMPTY		N	
>>Code Meaning	(0008,0104)	UNIVERSAL	EMPTY		Y	
Requested Procedure ID	(0040,1001)	UNIVERSAL	EMPTY		Y	
Reason for the Requested Procedure	(0040,1002)	UNIVERSAL	EMPTY		N	
Requested Procedure Priority	(0040,1003)	UNIVERSAL	EMPTY		N	
Names of intended Recipients of Results	(0040,1010)	UNIVERSAL	EMPTY		N	
Requested Procedure Comments	(0040,1400)	UNIVERSAL	EMPTY		Y	
Imaging Service Request						
Accession Number	(0008,0050)	UNIVERSAL	EMPTY		Y	
Referring Physician's Name	(0008,0090)	UNIVERSAL	EMPTY		Y	
Requesting Physician	(0032,1032)	UNIVESAL	EMPTY		N	
Imaging Service Request Comments	(0040,2400)	UNIVERSAL	EMPTY		N	
Visit Identification						
Admission ID	(0038,0010)	UNIVERSAL	EMPTY		Y	
Issuer of Admission ID	(0038,0011)	UNIVERSAL	EMPTY		N	
Institution Name	(0008,0080)	UNIVERSAL	EMPTY		Y	
Institution Address	(0008,0081)	UNIVERSAL	EMPTY		Y	
Visit Status						
Current Patient Location	(0038,0300)	UNIVERSAL	EMPTY		Y	
Visit Admission						
Admitting Diagnoses Description	(0008,1080)	UNIVERSAL	EMPTY		Y	
Visit Relationship						
Referenced Patient Sequence	(0008,1120)	SEQUENCE	N/A		N	
>Referenced SOP Class UID	(0008,1150)	UNIVERSAL	EMPTY		N	
>Referenced SOP Instance UID	(0008,1155)	UNIVERSAL	EMPTY		N	
Patient Identification						
Patient's Name	(0010,0010)	UNIVERSAL	EMPTY		Y	
Patient ID	(0010,0020)	UNIVERSAL	EMPTY		Y	
Other Patient IDs	(0010,1000)	UNIVERSAL	EMPTY		Y	
Other Patient Names	(0010,1001)	UNIVERSAL	EMPTY		Y	
Patient Demographics						
Patient's Birth Date	(0010,0030)	UNIVERSAL	EMPTY		Y	
Patient's Sex	(0010,0040)	UNIVERSAL	EMPTY		Y	
Patient's Size	(0010,1020)	UNIVERSAL	EMPTY		Y	
Patient's Weight	(0010,1030)	UNIVERSAL	EMPTY		Y	
Patient's Address	(0010,1040)	UNIVERSAL	EMPTY		N	
Military Rank	(0010,1080)	UNIVERSAL	EMPTY		Y	

Attribute Name	Tag	Matching Type	Query Value Source	Value	Display on UI	Comments
Ethnic Group	(0010,2160)	UNIVERSAL	EMPTY		Y	
Patient Comments	(0010,4000)	UNIVERSAL	EMPTY		Y	
Confidentiality Constraint on Patient Data Description	(0040,3001)	UNIVERSAL	EMPTY		N	
Patient Medical						
Medical Alerts	(0010,2000)	UNIVERSAL	EMPTY		Y	
Allergies	(0010,2110)	UNIVERSAL	EMPTY		Y	
Pregnancy Status	(0010,21C0)	UNIVERSAL	EMPTY		Y	
Smoking Status	(0010,21A0)	UNIVERSAL	EMPTY		N	
Additional Patient History	(0010,21B0)	UNIVERSAL	EMPTY		N	
Last Menstrual Date	(0010,21D0)	UNIVERSAL	EMPTY		N	
Special Needs	(0038,0050)	UNIVERSAL	EMPTY		N	
Patient State	(0038,0500)	UNIVERSAL	EMPTY		N	

The User can cancel any running Query. In this case C-CANCEL-RQ will be sent to the SCP. The processing of the data, which are received in the respective Association is stopped. The Association is closed if a Confirmation for the Cancelling is received as C-FIND-RSP, Status Cancelled, or if the Confirmation does not arrive in the Transfer Inactivity Timeout (see Table 6.1-1).

An automatic Modality Worklist Query can be configured from the Administration Portal.

5.2.1.2 SCP of the Modality Worklist Information Model – FIND SOP Class

N/A

5.2.2 Modality Performed Procedure Step Service

5.2.2.1 SCU of the Modality Performed Procedure Step SOP Class

As a Service Class User of the Modality Performed Procedure Step SOP Class, LUMINOS Q.namix supports the Attributes listed in Table 5.2-2 in the N-CREATE-RQ and N-SET-RQ messages, if it creates the message.

In the “Source” column the following Values can be used:

- FIXED: the Value is pre-defined and cannot be modified.
- GENERATED: the Value is generated by the system.
- CONFIG: the Value is copied from system configuration.
- MWL: the Value is copied from modality worklist entry.
- USER: the Value is entered by the user.
- SCANNED: the Value is read from a barcode scanner or similar device.
- EMPTY: the Attribute is sent without Value.

Table 5.2-2: Supported N-CREATE and N-SET Attributes for Modality Performed Procedure Step - SCU

Attribute Name	Tag	Source	Value N-CREATE	Value N-SET	Comments
Specific Character Set	(0008,0005)	FIXED	Only set, if characters outside ISO-IR 6 are used.	Only set, if characters outside ISO-IR 6 are used.	
Performed Procedure Step Relationship					
Patient's Name	(0010,0010)	MWL USER	From RIS or entered by user.	Not contained.	

Attribute Name	Tag	Source	Value N-CREATE	Value N-SET	Comments
Patient ID	(0010,0020)	MWL USER	From RIS or entered by user.	Not contained.	
Patient's Birth Date	(0010,0030)	MWL USER	From RIS or entered by user.	Not contained.	
Patient's Sex	(0010,0040)	MWL USER	From RIS or entered by user.	Not contained.	
Other Patient Ids (Retired)	(0010,1000)	MWL USER	From RIS or entered by user.	Not contained.	
Patient's Address	(0010,1040)	MWL	From RIS or not contained.	Not contained.	
Referenced Patient Sequence	(0008,1120)	MWL EMPTY	From RIS or empty.	Not contained.	
Additional Patient History	(0010,21B0)	MWL	From RIS or not contained.	Not contained.	
Patient Comments	(0010,4000)	MWL USER	From RIS or entered by user.	Not contained.	
Scheduled Step Attributes Sequence	(0040,0270)	N/A	In case of RIS registered patient the information from Modality Worklist item is taken, otherwise (local registration) a single item is added that only contains the Study Instance UID. Other attributes are empty.	Not contained.	
>Study Instance UID	(0020,000D)	MWL GENERATED	From RIS or generated.	Not contained.	
>Referenced Study Sequence	(0008,1110)	MWL EMPTY	From RIS or empty.	Not contained.	
>>Referenced SOP Class UID	(0008,1150)	MWL	From RIS.	Not contained.	
>>Referenced SOP Instance UID	(0008,1155)	MWL	From RIS.	Not contained.	
>Accession Number	(0008,0050)	MWL USER EMPTY	From RIS, entered by user or empty.	Not contained.	
>Requested Procedure ID	(0040,1001)	MWL USER	From RIS or entered by user.	Not contained.	
>Requested Procedure Description	(0032,1060)	MWL USER	From RIS or entered by user.	Not contained.	
>Reason for the Requested Procedure	(0040,1002)	MWL EMPTY	From RIS or empty.	Not contained.	
>Reason for Requested Procedure Code Sequence	(0040,100A)	MWL EMPTY	From RIS or empty.	Not contained.	
>>Code Value	(0008,0100)	MWL	From RIS.	Not contained.	
>>Coding Scheme Designator		MWL	From RIS.	Not contained.	
>>Code Meaning		MWL	From RIS.	Not contained.	
>Scheduled Procedure Step ID	(0040,0009)	MWL EMPTY	From RIS or empty.	Not contained.	

Attribute Name	Tag	Source	Value N-CREATE	Value N-SET	Comments
>Scheduled Procedure Step Description	(0040,0007)	MWL EMPTY	From RIS or empty.	Not contained.	
>Scheduled Protocol Code Sequence	(0040,0008)	MWL EMPTY	From RIS or empty.	Not contained.	
>>Code Value	(0008,0100)	MWL	From RIS.	Not contained.	
>>Coding Scheme Designator	(0008,0102)	MWL	From RIS.	Not contained.	
>>Code Meaning	(0008,0104)	MWL	From RIS.	Not contained.	
Performed Procedure Step Information					
Performed Station AE Title	(0040,0241)	CONFIG	The configured AET of MPPS SCU.	Not contained.	
Performed Station Name	(0040,0242)	CONFIG	Hostname.	Not contained.	
Performed Location	(0040,0243)	EMPTY	Empty.	Not contained.	
Performed Procedure Step Start Date	(0040,0244)	GENERATED	Date when the first acquisition for the CP took place.	Not contained.	
Performed Procedure Step Start Time	(0040,0245)	GENERATED	Time when the first acquisition for the CP took place.	Not contained.	
Performed Procedure Step ID	(0040,0253)	GENERATED	Internally generated	Not contained.	
Performed Procedure Step End Date	(0040,0250)	GENERATED EMPTY	Empty.	The date the procedure step (exam for the CP) was closed. Only sent in final N-SET (COMPLETED or DISCONTINUED). Otherwise: Empty	
Performed Procedure Step End Time	(0040,0251)	GENERATED EMPTY	Empty.	The time the procedure step (exam for the CP) was closed. Only sent in final N-SET (COMPLETED or DISCONTINUED). Otherwise: Empty	
Performed Procedure Step Status	(0040,0252)	USER	IN PROGRESS	IN PROGRESS: if the CP is not yet finished COMPLETED: if at least one CP Step of the SPS was done and the examination workflow closed. DISCONTINUED: if the CP was cancelled	
Performed Procedure Step Description	(0040,0254)	CONFIG	CP name.	CP name.	
Performed Procedure Type Description	(0040,0255)	EMPTY	Empty	Empty	
Procedure Code Sequence	(0008,1032)	MWL EMPTY	From RIS or empty.	From RIS or empty.	
>Code Value	(0008,0100)	MWL	From RIS.	From RIS.	

Attribute Name	Tag	Source	Value N-CREATE	Value N-SET	Comments
>Coding Scheme Designator	(0008,0102)	MWL	From RIS.	From RIS.	
>Code Meaning	(0008,0104)	MWL	From RIS.	From RIS.	
Performed Procedure Step Discontinuation Reason Code Sequence	(0040,0281)	USER EMPTY	Empty.	Contains the reason the user selected in UI in case the PPS was cancelled. See CID 9300 “Procedure Discontinuation Reasons”.	
>Code Value	(0008,0100)	USER	N/A	Code Value from (0040,0281)	
>Coding Scheme Designator	(0008,0102)	USER	N/A	Coding Scheme Designator from (0040,0281)	
>Code Meaning	(0008,0104)	USER	N/A	Code Meaning from (0040,0281)	
Image Acquisition Results					
Modality	(0008,0060)	GENERATED	"RF" for Fluoro "CR" or "DX" for RAD	Not contained.	
Study ID	(0020,0010)	MWL EMPTY	Copy of the Requested Procedure ID in case of a RIS SPS, empty for local SPS.	Not contained.	
Performed Protocol Code Sequence	(0040,0260)	EMPTY	Empty.	Empty.	
>Code Value	(0008,0100)	MWL	N/A	From RIS.	
>Coding Scheme Designator	(0008,0102)	MWL	N/A	From RIS.	
>Code Meaning	(0008,0104)	MWL	N/A	From RIS.	
Performed Series Sequence	(0040,0340)	GENERATED	Empty	Contains the images series that were created for this PPS, even in case of rejection/deletion.	
>Retrieve AE Title	(0008,0054)	EMPTY	N/A	Empty	
>Series Description	(0008,103E)	CONFIG	N/A	Name of CP Step.	
>Performing Physician's Name	(0008,1050)	MWL USER	N/A	Performing Physician's Name either entered/changed by the user or taken from RIS Modality Worklist (Prefilled with "Scheduled Performing Physician's Name").	
>Operators' Name	(0008,1070)	USER	N/A	Value as entered during patient registration. Prefilled with login name of current user.	Can be multi-valued.
>Referenced Image Sequence	(0008,1140)	GENERATED	N/A	Contains all images that were acquired until the current point in time. This includes deleted/rejected images.	
>>Referenced SOP Class UID	(0008,1150)	FIXED	N/A	SOP Class UID (0008,0016) of the referenced image.	
>>Referenced SOP Instance UID	(0008,1155)	GENERATED	N/A	SOP Instance UID (0008,0018) of the referenced image	
>Protocol Name	(0018,1030)	CONFIG	N/A	Name of CP Step.	

Attribute Name	Tag	Source	Value N-CREATE	Value N-SET	Comments
>Series Instance UID	(0020,000E)	GENERATED	N/A	Internally generated.	
>Referenced Non-Image Composite SOP Instance Sequence	(0040,0220)	FIXED	N/A	Contains the RDSR that reports on all acquired images until the current point in time.	
Radiation Dose					
Anatomic Structure, Space or Region Sequence	(0008,2229)	USER EMPTY	Empty.	Please refer to EV (123014,DCM, "Target Region") in Dose Report.	
>Code Value	(0008,0100)	USER	N/A	Code Value from (0008,2229)	
>Coding Scheme Designator	(0008,0102)	USER	N/A	Coding Scheme Designator from (0008,2229)	
>Code Meaning	(0008,0104)	USER	N/A	Code Meaning from (0008,2229)	
Total Time of Fluoroscopy	(0040,0300)	GENERATED EMPTY	Empty	Total duration of X-Ray exposure during fluoroscopy in seconds (pedal time) during this Performed Procedure Step.	
Total Number of Exposures	(0040,0301)	GENERATED EMPTY	Empty.	Total number of exposures made during this Performed Procedure Step.	
Distance Source to Detector	(0018,1110)	EMPTY	Empty	Empty	
Distance Source to Entrance	(0040,0306)	EMPTY	Empty	Empty	
Entrance Dose in mGy	(0040,8302)	GENERATED	see N-SET	Entrance dose for this irradiation event (same as Skin Dose/Air Kerma/Dose at RP).	
Image and Fluoroscopy Area Dose Product	(0018,115E)	GENERATED EMPTY	Empty	The total area-dose-product for all images referenced in this procedure step (also in case of DISCONTINUED).	
Comments on Radiation Dose	(0040,0310)	GENERATED EMPTY	Empty	Formatted dose information. The following information is included: - Name of Clinical Protocol Step - DAP (in µGym² with 2 decimals) - kV (1 decimal) - mAs (2 decimals) - Filter Thickness in mm - EXI (no decimals) The information for all images referenced in this MPPS (also in case of DISCONTINUED).	
Exposure Dose Sequence	(0040,030E)	GENERATED EMPTY	Empty	One item for each acquisition / irradiation event.	
>KVP	(0018,0060)	GENERATED	N/A	Peak kilo voltage output of the X-Ray generator used.	

Attribute Name	Tag	Source	Value N-CREATE	Value N-SET	Comments
>Protocol Name	(0018,1030)	CONFIG	N/A	CP Step Name.	Standard Extension
>Distance Source to Detector	(0018,1110)	EMPTY	N/A	Empty.	Standard Extension
>Exposure Time	(0018,1150)	GENERATED	N/A	Duration of X-Ray exposure in msec.	
>Image and Fluoroscopy Area Dose Product	(0018,115E)	GENERATED	N/A	The area-dose-product for this exposure.	Standard Extension
>Filter Type	(0018,1160)	GENERATED	N/A	FLAT in case COPPER filter is used, otherwise NONE.	
>Relative X-Ray Exposure	(0018,1405)	GENERATED	N/A	Exposure Index (EXI)	Standard Extension
>Exposure Time in µs	(0018,8150)	GENERATED	N/A	Duration of X-Ray exposure in µsec.	Standard Extension
>X-Ray Tube Current in µA	(0018,8151)	GENERATED	N/A	X-Ray Tube Current in µA.	
>Entrance Dose in mGy	(0040,8302)	GENERATED	N/A	Entrance dose for this irradiation event. Same as skin dose/air kerma/Dose at RP.	Standard Extension
Billing and Material Management Codes					
Billing Procedure Step Sequence	(0040,0320)	EMPTY	Empty.	Empty.	
Film Consumption Sequence	(0040,0321)	GENERATED EMPTY	Empty.	One item for each film size printed for this PPS.	
>Number of Films	(2100,0170)	GENERATED EMPTY	N/A	Number of printed films for the PPS for the corresponding Film Size.	
>Film Size ID	(2010,0050)	CONFIG	N/A	Film Size Name	

LUMINOS Q.namix creates an MPPS instance when the first dose is applied for the procedure step of the patient and communicates the creation to the MPPS SCP.

To inform the MPPS SCP about the progress, the discontinuation or the completion of an MPPS instance, an update is performed. It is configurable for the user how the update is performed:

• Automatic (status “COMPLETED” is sent after a patient gets closed)

• Manual with MPPS Dialog (“COMPLETED”, “IN PROGRESS” or “DISCONTINUED” can be selected.)

After a state of “COMPLETED” or “DISCONTINUED”, LUMINOS Q.namix will no longer allow updates on the related MPPS Instance.

LUMINOS Q.namix supports creation of “unscheduled cases” by allowing MPPS Instances to be communicated for locally registered Patients. This is configurable in Service.

5.2.2.2 SCP of the Modality Performed Procedure Step SOP Class

N/A

5.2.3 Storage Service

5.2.3.1 SCU of the Storage SOP Classes

As a Service Class User of the Storage Service Class, LUMINOS Q.namix uses the C-STORE-RQ message to request storage of DICOM objects by a remote SCP. See section 1.1 in the Overview for the list of supported SOP Classes.

For details regarding the content of SOP Instances that are created by the system, see Annex A, which describes the underlying IOD of the supported SOP Classes.

5.2.3.1.1 Proposed Presentation Contexts

LUMINOS Q.namix will propose Presentation Contexts as shown in Table 5.2-3.

Table 5.2-3: Proposed Presentation Contexts

Abstract Syntax		Transfer Syntax		Ext. Neg.
Name	UID	Name List	UID List	
Computed Radiography Image	1.2.840.10008.5.1.4.1.1.1	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	None
Digital X-Ray Image – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	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	None
Digital X-Ray Image – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	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	None
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67	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	None
X-Ray Radiofluoroscopic Image	1.2.840.10008.5.1.4.1.1.12.2	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	None

The DICOM images created by LUMINOS Q.namix conform to the DICOM CR, XRF or DX IOD definitions. Private elements are contained in the objects. The IODs will be a Standard Extended Image Storage SOP Classes.

The DICOM Dose Structured Report created by LUMINOS Q.namix conforms to the X-Ray Radiation Dose SR IOD definitions. Private elements are contained in the objects.

Image Laterality (0020,0062) and Patient Orientation (0020,0020) might not be included in images sent in DX IOD.

By default, every RAD, Fluoro or DFR Image is stored in a separate series. However it is configurable for RAD images to store all images of the same study into the same DICOM series. The same is configurable for DFR Single images.

Automatic sending of all images can be configured. For RAD and DFR images it is possible to auto-send them directly after acquisition. For all image types and the DICOM SR Dose Report it is configurable to auto-send them after the examination was closed.

Imported DICOM images cannot be exported again.

5.2.3.2 Transcoding of Transfer Syntaxes

N/A

5.2.3.3 SCP of the Storage SOP Classes

As a Service Class Provider of the Storage Service Class, LUMINOS Q.namix receives the C-STORE-RQ message from remote SCUs. See section 1.1 in the Overview for the list of supported SOP Classes.

The Storage SCP component of LUMINOS Q.namix is operating as background server process. It is running when the system is triggered to import images and waits then for Storage association requests. Upon accepting an association with a negotiated Presentation Context it starts to receive the Composite Image Objects and imports them to local database.

Verification requests will be processed and responded by the Storage SCP.

5.2.3.3.1 Accepted Presentation Contexts

Receiving is possible whenever an import request (C-MOVE) is sent to a remote destination. If it is active, the receiver process will accept an association, will receive images transmitted on that association and will store the images on disk in the own data base if the conformance check is performed successfully.

LUMINOS Q.namix is designed for retrieving images that were acquired by the system itself.

LUMINOS Q.namix will accept Presentation Contexts as shown in Table 5.2-4.

Table 5.2-4: Accepted Presentation Contexts

Abstract Syntax		Transfer Syntax		Ext. Neg.
Name	UID	Name List	UID List	
Computed Radiography Image	1.2.840.10008.5.1.4.1.1.1	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	None
Digital X-Ray Image – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	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	None
Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7	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	None
X-Ray Radiofluoroscopic Image	1.2.840.10008.5.1.4.1.1.12.2	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	None
X-Ray Angiographic Image	1.2.840.10008.5.1.4.1.1.12.1	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	None
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	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	None
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	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	None
Ultrasound Multiframe Image Storage	1.2.840.10008.5.1.4.1.1.3.1	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	None
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	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	None
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Implicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2	None

Abstract Syntax		Transfer Syntax		Ext. Neg.
		Explicit VR Little Endian	1.2.840.10008.1.2.1	
Verification	1.2.840.10008.1.1	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	None

Generally, all Presentation Contexts are accepted if they contain at least one suitable Transfer Syntax. All other Presentation Contexts are rejected.

Explicit Little Endian Transfer Syntax will be preferred over the implicit Default Transfer Syntax.

LUMINOS Q.namix will remove any Private Attributes not known to the application.

5.2.3.3.2 Details of Conformance

LUMINOS Q.namix conforms to the Full Storage Class at Level 1. In the event of a successful C-STORE operation, the image has successfully been written on disk.

LUMINOS Q.namix returns the status Success upon successful operation otherwise one of the following status codes is returned and the association is aborted:

• Refused (A700): This error status indicates a lack of Resources (e.g. not enough disk space) on the LUMINOS Q.namix.

• Error (A900 or C000): An error occurred while processing the image that makes it impossible to proceed. The image will not be stored and the association aborted.

If an image instance is received that is identified by a SOP Instance UID that is already used by an Instance stored in database then the actual received image will be refused. The existing Instance is not superseded.

There are limitations for the import, display and processing of imported images that are described in chapter 7.2.1.5.2.

5.2.3.4 Attribute Coercion

N/A

5.2.4 Storage Commitment Service

5.2.4.1 SCU of the Storage Commitment SOP Class

As a Service Class User of the Storage Commitment SOP Class, LUMINOS Q.namix uses the N-ACTION-RQ message to request storage commitment from a remote SCP for all previously stored instances of SOP Classes listed in Table 5.2-5. In turn, it receives N-EVENT-REPORT-RQ messages from the SCP indicating success or failure of the request.

Table 5.2-5: SOP Classes supported for Storage Commitment

SOP Class Name	SOP Class UID
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2

The Storage Commitment Request will be sent out after the successful Storage Request, to ensure that the remote node properly indexes received instances. The Storage Commitment Request will be sent on a different association than the Storage Request.

Storage Commitment is possible to different configured network nodes. Each Storage SCP can have its own Storage Commitment Server associated.

In case of failure the user must repeat the transfer of images to the Archive destination. Another Storage Commitment will be performed after sending is completed successfully. A number for retries for failed commit requests and a Storage Commitment timeout can be configured.

After a successful Storage Commitment the corresponding image are marked in the user interface and the user can delete them.

LUMINOS Q.namix accepts incoming N-EVENT-REPORT-RQ as SCU, if they do not arrive on the same association as the N-ACTION-RQ within a timeout (see Table 6.2-4).

5.2.4.1.1 Proposed Presentation Contexts

LUMINOS Q.namix will propose Presentation Contexts as shown in Table 5.2-3.

Table 5.2-6: Proposed Presentation Contexts

Abstract Syntax		Transfer Syntax		Ext. Neg.
Name	UID	Name List	UID List	
Storage Commitment Push Model	1.2.840.10008.1.20.1	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	None

5.2.4.2 SCP of the Storage Commitment SOP Class

N/A

5.2.5 Query/Retrieve Service

5.2.5.1 SCU of the Study Root Q/R Information Model – FIND SOP Class

As a Service Class User of the Study Root Q/R - Information Model - FIND SOP Class, LUMINOS Q.namix uses the C-FIND-RQ message and supports the Query Keys listed in Table 5.2-7 for hierarchical queries.

If the data received with the C-FIND-RSP does not specify a Specific Character Set (SCS), it is interpreted according to the default SCS set for LUMINOS Q.namix. If the data received does specify an SCS in the header, it is interpreted accordingly.

In the “Matching Type” column the following Values can be used:

- SINGLE: SCU can request Single Value matching on this Attribute.
- MULTIPLE: SCU can request multiple search values on this Attribute.
- UID: SCU can request List of UID matching on this Attribute.
- WILDCARD: SCU can request Wildcard matching on this Attribute.
- RANGE: SCU can request Range matching on this Attribute.
- SEQUENCE: SCU can request Sequence matching on this Attribute.
- UNIVERSAL: SCU can request Attribute as a return Value (universal matching).

In the “Query Value Source” column the following Values can be used:

- FIXED: The query Value cannot be modified by the user or by configuration.
- GENERATED: The query Value is generated by the system (e.g. current date as the study date).
- CONFIG: The query Value is dependent on system configuration.
- USER: The query Value is entered by the user.
- SCANNED: The query Value is read from a barcode scanner or similar device.

- EMPTY: The query Value is left empty to indicate it is a return key only.

In the “Display on UI” column the following Values can be used:

- D: the return Value is displayed on the main UI by default.
- C: the return Value is displayed on the main UI if configured.
- N: the return Value is never displayed.

Table 5.2-7: Supported C-FIND Query Keys for Study Root Q/R Model - SCU

Attribute Name	Tag	Matching Type	Query Value Source	Value	Display on UI	Comments
Study Level						
Patient’s Name	(0010,0010)	WILDCARD	USER		D	If input is provided, then an * is added to the end of the search string.
Patient ID	(0010,0020)	SINGLE	USER		N	
Patient’s Birth Date	(0010,0030)	SINGLE	USER		D	
Patient’s Sex	(0010,0040)	UNIVERSAL	EMPTY		D	
Other Patient IDs	(0010,1000)	UNIVERSAL	EMPTY		N	
Military Rank	(0010,1080)	UNIVERSAL	EMPTY		N	
Accession Number	(0008,0050)	SINGLE	USER		D	
Study ID	(0020,0010)	SINGLE	USER		N	
Study Instance UID	(0020,000D)	UNIVERSAL	EMPTY		N	
Study Date	(0008,0020)	RANGE, SINGLE	USER		D	
Study Time	(0008,0030)	RANGE, SINGLE	USER		D	Only used together with the Study Date.
Referring Physician’s Name	(0008,0090)	SINGLE	USER		D	
Study Description	(0008,1030)	UNIVERSAL	EMPTY		D	
Number of Study related Instances	(0020,1208)	UNIVERSAL	EMPTY		N	
Number of Study Related Series	(0020,1206)	UNIVERSAL	EMPTY		N	
Series Level						
Series Date	(0008,0021)	UNIVERSAL	EMPTY		D	
Series Time	(0008,0031)	UNIVERSAL	EMPTY		D	
Modality	(0008,0060)	UNIVERSAL	EMPTY		D	
Institution Name	(0008,0080)	UNIVERSAL	EMPTY		D	
Body Part Examined	(0018,0015)	UNIVERSAL	EMPTY		D	
Series Description	(0008,103E)	UNIVERSAL	EMPTY		D	
Series Instance UID	(0020,000E)	UNIVERSAL	EMPTY		N	
Series Number	(0020,0011)	UNIVERSAL	EMPTY		D	
Number of Series related Instances	(0020,1209)	UNIVERSAL	EMPTY		N	

LUMINOS Q.namix requests the remote query/retrieve SCP to perform a search (C-FIND) and match to the keys specified in the request to display the results in the user interface. If the defined limit of Query results is reached, the LUMINOS Q.namix will cancel the running query and discard any further incoming query result responses. Queries can be operated in parallel to one running import (C-MOVE) activity.

5.2.5.1.1 Proposed Presentation Contexts

LUMINOS Q.namix will propose Presentation Contexts as shown in Table 5.2-8.

Table 5.2-8: Proposed Presentation Contexts

Abstract Syntax		Transfer Syntax		Ext. Neg.
Name	UID	Name List	UID List	
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	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	None

5.2.5.2 SCU of the Patient Root Q/R Information Model – FIND SOP Class

N/A

5.2.5.3 SCU of the Patient/Study Only Q/R Information Model – FIND SOP Class

N/A

5.2.5.4 SCU of the Study Root Q/R Information Model – MOVE SOP Class

Depending on user action (Import) LUMINOS Q.namix sends a C-MOVE DIMSE service to initiate a C-STORE sub-operation on the SCP to start an image transfer from remote Storage SCU (running on Query/Retrieve SCP) to the LUMINOS Q.namix Storage SCP. The user has the possibility to cancel a running import by an “Import Cancel” function. LUMINOS Q.namix will perform only one running import operation at a time.

LUMINOS Q.namix allows the retrieval multiple entries. Query and Retrieve is possible on Study or Series level. Querying and Retrieving on Image Level is not supported.

5.2.5.4.1 Proposed Presentation Contexts

LUMINOS Q.namix will propose Presentation Contexts as shown in Table 5.2-9.

Table 5.2-9: Proposed Presentation Contexts

Abstract Syntax		Transfer Syntax		Ext. Neg.
Name	UID	Name List	UID List	
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	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	None

5.2.5.5 SCU of the Patient Root Q/R Information Model – MOVE SOP Class

N/A

5.2.5.6 SCU of the Patient/Study Only Q/R Information Model – MOVE SOP Class

N/A

5.2.5.7 SCP of the Study Root Q/R Information Model – FIND SOP Class

N/A

5.2.5.8 SCP of the Patient/Study Only Query Information Model - FIND SOP Class

N/A

5.2.5.9 SCP of the Study Root Q/R Information Model – MOVE SOP Class

N/A

5.2.5.10 SCP of the Patient Root Q/R - Information Model – MOVE SOP Class

N/A

5.2.5.11 SCP of the Patient/Study Q/R - Information Model – MOVE SOP Class

N/A

5.2.6 Print Management Service

LUMINOS Q.namix invokes print management DIMSE services to transfer images from the local AE to the remote SCP AE to print images with defined layout on a selected network-based DICOM hardcopy printer.

Please note, that LUMINOS Q.namix does not support printing DICOM images to usual printers on plain paper.

5.2.6.1 SCU of the Basic Grayscale Print Management Meta SOP Class

LUMINOS Q.namix provides Standard Conformance to the DICOM Print Management Meta SOP Classes listed in Table 5.2-10.

Table 5.2-10: Basic Grayscale Print Management Meta SOP Class

SOP Class Name	SOP Class UID
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9

The application uses a setting platform to define the properties of the connected DICOM Print SCP, e.g.:

- maximum number of print copies: 9
- supported film sizes of the connected DICOM Print SCP
- supported film formats of the DICOM Print SCP

The printing is only suspended in the case of a failure return status of the Print SCP.

The Basic Grayscale Print Management Meta SOP Class is composed of the mandatory SOP Classes listed in Table 5.2-11.

Table 5.2-11: Basic Grayscale Print Management Meta SOP Classes - SCU

SOP Class Name	SOP Class UID
Basic Film Session SOP Class	1.2.840.10008.5.1.1.1

SOP Class Name	SOP Class UID
Basic Film Box SOP Class	1.2.840.10008.5.1.1.2
Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4
Printer SOP Class	1.2.840.10008.5.1.1.16

5.2.6.1.1 Basic Film Session SOP Class

The Basic Film Session describes all the user-defined parameters, which are common for all the films of a film session. The Basic Film Session refers to one or more Basic Film Boxes that are printed on one hardcopy printer.

Table 5.2-12 lists the supported DIMSE Services for the Basic Film Session SOP Class:

Table 5.2-12: Services for the Basic Film Session SOP Class - SCU

DIMSE Service Element	Purpose
N-CREATE	Create the film session
N-DELETE	Delete the film session

Table 5.2-13 lists the supported N-CREATE Attributes for Basic Film Session:

Table 5.2-13: Supported N-CREATE Attributes for the Basic Film Session SOP Class - SCU

Attribute Name	Tag	Values	Comment
Number of Copies	(2000,0010)	1-9	Set by user.
Print Priority	(2000,0020)	LOW MED HIGH	Taken from printer configuration.
Medium Type	(2000,0030)	BLUE FILM CLEAR FILM PAPER	Taken from printer configuration.

The Affected SOP Instance UID received with N-CREATE-RSP message will be kept internally and used for later requests (e.g. N-DELETE-RQ) on the Basic Film Session.

The N-DELETE-RQ on the Basic Film Session SOP Class is used to remove the complete Basic Film Session SOP Instance hierarchy.

Table 5.2-14 lists the supported N-DELETE Attributes for Basic Film Session:

Table 5.2-14: Supported N-DELETE Attributes for the Basic Film Session SOP Class - SCU

Attribute Name	Tag	Values	Default
Message ID	(0000,0110)		
Requested SOP Class UID	(0000,1001)	1.2.840.10008.5.1.1.1	
Requested SOP Instance UID	(0000,1001)		

5.2.6.1.2 Basic Film Box SOP Class

The Basic Film Box describes all user-defined parameters of one film of the film session including presentation parameters, which are common for all images on a given film sheet.

The Basic Film Box refers to one or more Image Boxes.

Table 5.2-15 lists the supported DIMSE Services for the Basic Film Box SOP Class:

Table 5.2-15: Supported Services for the Basic Film Box SOP Classes

DIMSE Service Element	Purpose
N-CREATE	Create the film Box in a previously created film session
N-ACTION	Print the Film Box
N-DELETE	Delete the Film Box

Table 5.2-16 lists the supported N-CREATE Attributes for Basic Film Box. The actual values for each attribute depend on DICOM printer configuration within the LUMINOS Q.namix DICOM Print Management SCU:

Table 5.2-16: Supported N-CREATE Attributes for the Basic Film Box SOP Class - SCU

Attribute Name	Tag	Values	Default
Image Display Format	(2010,0010)	STANDARD\1,1	STANDARD\1,1
Film Orientation	(2010,0040)	PORTRAIT LANDSCAPE	Camera configuration.
Film Size ID	(2010,0050)	8INX10IN, 10INX12IN, 10INX14IN, 11INX14IN, 14INX14IN, 14INX17IN, 24CMX24CM, 24CMX30CM, A3, A4, A5, Letter, Legal	Camera configuration.
Magnification Type	(2010,0060)	REPLICATE BILINEAR CUBIC NONE	Camera configuration.
Border Density	(2010,0100)	BLACK WHITE	Camera configuration.
Minimum Density	(2010,0120)	Camera configuration.	Camera configuration.
Maximum Density	(2010,0130)	Camera configuration.	Camera configuration.
Ref. Film Session Seq.	(2010,0500)		
>Ref. SOP Class UID	(0008,1150)	1.2.840.10008.5.1.1.1	
>Ref. SOP Instance UID	(0008,1155)	UID of created File Session	
Ref. Presentation LUT Seq. [1)]	(2050,0500)		
>Ref. SOP Class UID	(0008,1150)	1.2.840.10008.5.1.1.23	
>Ref. SOP Instance UID	(0008,1155)	UID of created Presentation LUT	

[1)] Required if Presentation LUT is present

LUMINOS Q.namix always uses Page Mode printing, the Image Display format used is “STANDARD\1,1”.

The N-CREATE-RSP message from the Print SCP includes the Referenced Image Box Sequence with SOP Class/Instance UID pairs which will be kept internally to be further used for the subsequent Basic Image Box SOP Class N-SET-RQ messages.

When all Image Boxes (including parameters) for the film-sheet have been set, the LUMINOS Q.namix print manager will issue an N-ACTION-RQ message with the SOP Instance UID of the Basic Film Box and the Action Type ID of 1.

Table 5.2-17 lists the supported N-ACTION Attributes for Basic Film Box SOP Class:

Table 5.2-17: Supported N-ACTION Attributes for the Basic Film Box SOP Class - SCU

Attribute Name	Tag	Value	Default
Message ID	(0000,0110)		

Attribute Name	Tag	Value	Default
Requested SOP Class UID	(0000,1001)	1.2.840.10008.5.1.1.2	
Requested SOP Instance UID	(0000,1001)	SOP Instance UID of the Film Box	
Action Type ID	(0000,1008)	1 (Print)	

Table 5.2-18 lists the supported N-DELETE Attributes for Basic Film Box Class:

Table 5.2-18: Supported N-DELETE Attributes for the Basic Film Box SOP Class - SCU

Attribute Name	Tag	Value	Default
Message ID	(0000,0110)		
Requested SOP Class UID	(0000,1001)	1.2.840.10008.5.1.1.2	
Requested SOP Instance UID	(0000,1001)	SOP Instance UID of the Film Box	

5.2.6.1.3 Basic Grayscale Image Box SOP Class

The Basic Grayscale Image Box is the presentation of an image and image related data in the image area of a film. The Basic Image Box describes the presentation parameters and image pixel data, which apply to a single image of a sheet of film.

Table 5.2-19 lists the supported DIMSE Service for the Basic Grayscale Image Box SOP Class:

Table 5.2-19: Services for the Basic Grayscale Image Box SOP Class

DIMSE Service Element	Purpose
N-SET	Set Image Attributes for a previously created film box

Table 5.2-20 lists the supported N-SET Attributes for Basic Grayscale Image Box:

Table 5.2-20: Supported N-SET Attributes for the Basic Grayscale Image Box SOP Class -SCU

Attribute Name	Tag	Values
Image Box Position	(2020,0010)	1
Basic Grayscale Image Sequence	(2020,0110)	
>Samples per Pixel	(0028,0002)	1
>Photometric Interpretation	(0028,0004)	MONOCHROME2
>Rows	(0028,0010)	
>Columns	(0028,0011)	
>Pixel Aspect Ratio	(0028,0034)	
>Bits Allocated	(0028,0100)	8
>Bits Stored	(0028,0101)	8
>High Bit	(0028,0102)	7
>Pixel Representation	(0028,0103)	0
>Pixel Data	(7FE0,0010)	

5.2.6.1.4 Printer SOP Class

The Printer SOP Class provides the possibility to monitor the status of the hardcopy printer in a synchronous and in an asynchronous way.

When used synchronously the LUMINOS Q.namix Print SCU uses the N-GET-RQ to request information about the printer status.

Table 5.2-21 lists the supported DIMSE Services for the Printer SOP Class:

Table 5.2-21: Services for the Printer SOP Class

DIMSE Service Element	Purpose
N-EVENT-REPORT	Report the printer status in an asynchronous way
N-GET	Explicit request to find out the printer status.

Before the N-CREATE messages are sent to set up the Basic Film Session, an N-GET message is sent to the DICOM Printer so request its status.

Receiving the N-EVENT-REPORT-RQ from a printer LUMINOS Q.namix is asynchronously informed about changes of the printer status.

All incoming N-EVENT-REPORT-RQ are handled and analyzed during the Printing process.

Table 5.2-22 summarizes the behavior of the SCU when receiving Event Types within the N-EVENT-REPORT.

Table 5.2-22: Printer SOP Class N-EVENT-REPORT Behavior

Event Type Name	Event Type ID	Behavior
Normal	1	
Warning	2	
Failure	3	If a Print job is running, it will be cancelled.

Table 5.2-23 lists the supported N-GET attributes for Printer SOP Class:

Table 5.2-23: Supported N-GET Attributes for the Printer SOP Class - SCU

Attribute Name	Tag	Behavior
Printer Status	(2110,0010)	NORMAL WARNING FAILURE
Printer Status Info	(2110,0020)	

5.2.6.2 SCU of the Basic Color Print Management Meta SOP Class

N/A

5.2.6.3 SCU of the Basic Annotation Box SOP Class

N/A

5.2.6.4 SCU of the Print Job SOP Class

N/A

5.2.6.5 SCU of the Presentation LUT SOP Class

The objective of the Presentation LUT is to realize image hardcopy printing tailored for specific modalities, applications and user preferences.

The output of the Presentation LUT is Presentation Values (P-Values). P-Values are approximately related to human perceptual response. They are intended to facilitate common input for hardcopy. P-Values are intended to be independent of the specific class or characteristics of the hardcopy device.

Table 5.2-24 lists the supported DIMSE Services for the Presentation LUT SOP Class:

Table 5.2-24: Services for the Presentation LUT SOP Class - SCU

DIMSE Service Element	Purpose
N-CREATE	Create the Presentation LUT Instance
N-DELETE	Delete the Presentation LUT Instance

Table 5.2-25 lists the supported N-CREATE Attributes for Presentation LUT:

Table 5.2-25: Supported N-CREATE Attributes for the Presentation LUT SOP Class-SCU

Attribute Name	Tag	Values	Default
Presentation LUT Shape	(2050,0020)	IDENTITY	

The affected SOP Instance UID received with N-CREATE-RSP message will be kept internally and is used for later requests on the Basic Film Box (N-CREATE-RQ) and on the Presentation LUT (N-DELETE-RQ).

Table 5.2-26 lists the supported N-DELETE Attributes for Presentation LUT

Table 5.2-26: Supported N-DELETE Attributes for the Presentation LUT SOP Class - SCU

Attribute Name	Tag	Value	Default
Message ID	(0000,0110)		
Requested SOP Class UID	(0000,1001)	1.2.840.10008.5.1.1.23	
Requested SOP Instance UID	(0000,1001)	UID of the Presentation LUT	

5.2.7 Acquisition Workflow

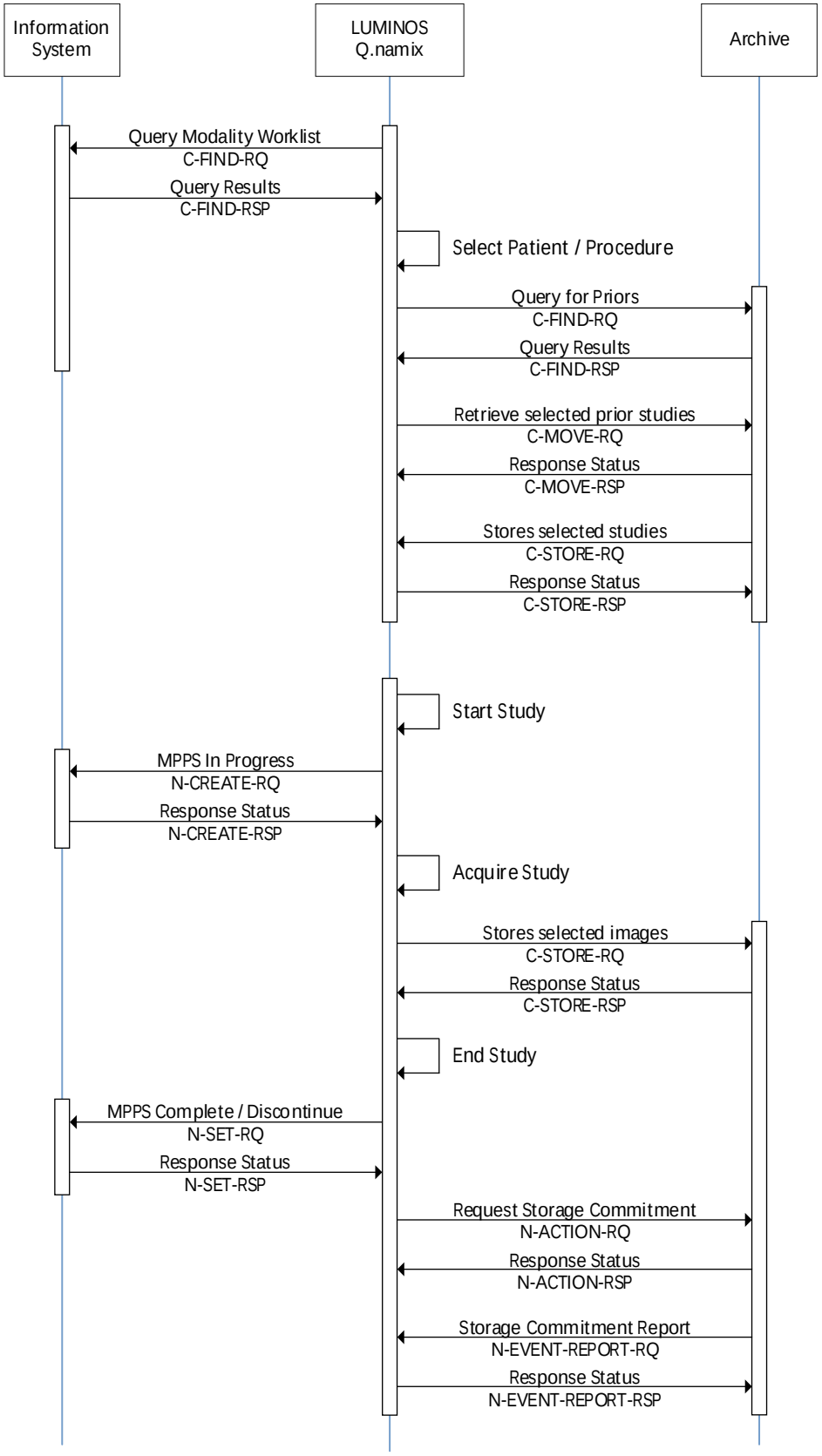


Figure 5.2-1: Sequence of Real-World Activities– Acquisition Workflow

5.2.8 Printing Workflow

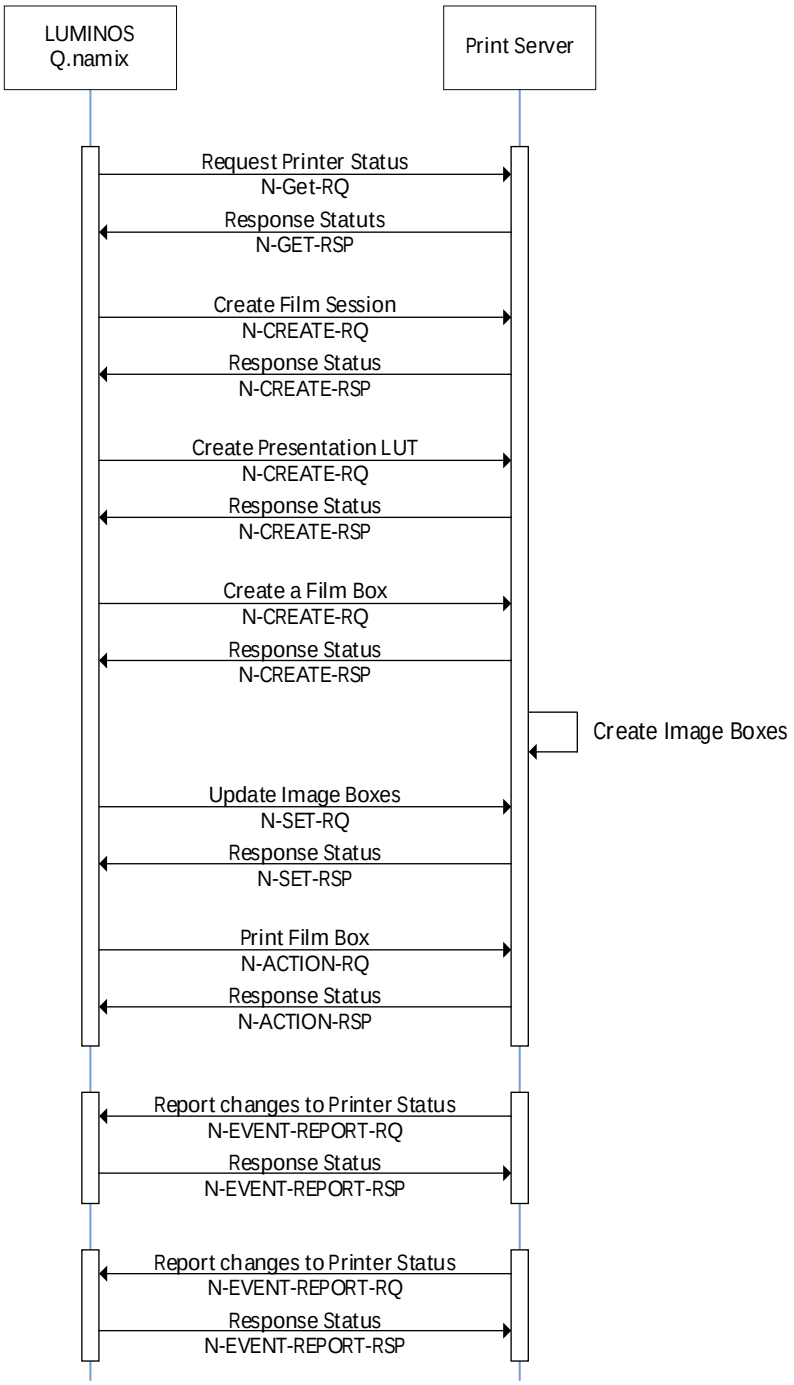


Figure 5.2-2: Real-World Activities for Storage AE

5.3 Media Service

5.3.1 File Set Creator (FSC)

LUMINOS Q.namix supports creating the Basic Directory IOD as a File Set Creator as defined in Annex A.3, Basic Directory IOD.

For a list of supported Media Application Profiles, see chapter 1.3 in the Overview.

For a list of supported SOP Classes, see section 1.1 in the Overview.

LUMINOS Q.namix provides following options for a data export to a physical medium:

1. If a DICOM Viewer should be written on the medium or not.
2. Data Minimization options: If selected the exported data will be minimized as described in chapter 8.6.

5.3.1.1 Media Profile Selection Mechanism

There is no selection mechanism as LUMINOS Q.namix only supports a single Media Storage Application Profile. It always selects STD-GEN-USB-JPEG by default.

5.3.1.2 Augmented Application Profiles

N/A

5.3.2 File Set Reader (FSR)

LUMINOS Q.namix supports the Media Application Profiles listed in chapter 1.3 in the Overview.

For a list of supported SOP Classes, see section 1.1 in the Overview.

To display or process DICOM Instances contained on the Media refer to Table 1.1-1.

5.3.3 File Set Updater (FSU)

LUMINOS Q.namix does also support the update of previously created Basic Directory IODs.

For a list of supported Media Application Profiles, chapter 1.3 in the Overview.

For a list of supported SOP Classes, see section 1.1 in the Overview.

The FSU role will update new SOP Instances only to media with pre-existing File-sets conforming to the Application Profiles supported.

5.4 Cross Service Considerations

This section describes Interactions between the implementation of different DICOM Services in this product. Details internal to an individual service are addressed in previous Service Sections.

Note: The DICOM Standard typically does not define cross-service requirements. Therefore, this section provides implementation descriptions and not strictly DICOM Conformance.

5.4.1 Autosend

LUMINOS Q.namix provides a possibility to configure Autosend rules.

An Autosend rule allows to automatically forward DICOM Instances to one or more Remote DICOM Nodes according to their image type.

Such a rule can be applied immediately (after acquisition) or when the examination is closed.

5.4.2 Correction and re-arrangement

The user has the possibility to perform corrections on the DICOM Data stored in the System. If after such an operation the data leaves the system (via Export or Send), the corrections are applied to the exported data.

In case of Patient Merge and Correction no UIDs are changed, therefore it is advised to delete any corrected or rearranged objects from the PACS before attempting to archive them again, to ensure that the PACS system can store them successfully.

5.5 Specific Character Sets

For Specific Character Sets in addition to the default character repertoire, refer to Section 1.5 for the Values for Specific Character Set (0008,0005).

All Specific Character Sets (SCS) listed in Section 1.5 are supported for incoming Data. When creating new Instances, the system will use the default SCS (or SCS List) configured on the machine.

LUMINOS Q.namix does not support Conversion or Mapping to Non-Default Specific Character Sets.

6 Configuration

Throughout all subsections the following Values can be used in the “Configurable” column:

- USER: The parameter is configurable by the user.
- SERVICE: The parameter is configurable by service personnel.
- FIXED: The parameter is not configurable (it has a fixed Value). The Value is required for the configuration of the remote system.
- N/A: The parameter is not applicable for the local or the remote system.

LUMINOS Q.namix does not limit the number of the configurable Remote Nodes. This applies to all the DIMSE Services. The communication capability is only limited by the Operation System.

6.1 General Configuration Parameters

Table 6.1-1 lists general configuration parameters applicable across all supported DICOM Services.

Table 6.1-1: General Configuration Parameters

Parameter	Configurable	Default Value	Comments
General Parameters			
TCP/IP Settings			
TCPIP_SEND_BUFFER_SIZE	FIXED	131400	131400 Bytes
TCPIP_RECEIVE_BUFFER_SIZE	FIXED	131400	131400 Bytes
TCPIP_DISABLE_NAGLE	FIXED	No	No
Maximum PDU size	FIXED	64234	64234 Bytes
DICOM Services Parameters			
Maximum number of simultaneous Associations accepted	SERVICE	12	Please find the data in the respective chapters describing the Service.
Specific Character Set	USER	ISO IR 100	
ARTIM_TIMEOUT	FIXED	60 seconds	Number of seconds to use as a timeout waiting for association request or waiting for the peer to shut down an association.
ASSOC_REPLY_TIMEOUT	FIXED	60 seconds	The number of seconds to wait for reply to associate request.
RELEASE_TIMEOUT	FIXED	60 seconds	The number of seconds to wait for reply to associate release.
WRITE_TIMEOUT	FIXED	60 seconds	The number of seconds to wait for a network write to be accepted.
CONNECT_TIMEOUT	FIXED	15 seconds	The number of seconds to wait for a network connect to be accepted.
INACTIVITY_TIMEOUT	FIXED	60 seconds	The number of seconds to wait for data between TCP/IP packets.
Timeout for waiting for a response message from remote node			
Storage SCU	FIXED	30 s for single frame 600 s for multi-frame	Timeout waiting for C-STORE response
Query / Retrieve	FIXED	600 s	Timeout waiting for C-FIND response
Print	FIXED	25 s	Timeout waiting for N-CREATE and N-SET response
Other	FIXED	25 s	Timeout waiting for all other responses

6.2 Configuration of DIMSE Services

The tables in the following subsections show the configuration parameters required for DIMSE Services.

6.2.1 AE Titles

AE Titles shall be unique within the hospital. A common way to achieve that is to use the hostname as part of the AE Titles. The string can be up to 16 characters and must not contain any extended characters. Only 7-bit ASCII characters (excluding Control Characters) are allowed according to the DICOM Standard.

6.2.2 Local Application Entity

LUMINOS Q.namix allows to configure AE Titles for local Application Entities. Default delivery is that all services are using different AE titles and the listening services port number is 104 for unencrypted and 2762 for encrypted communication. These port numbers cannot be changed. In case the connected systems cannot handle this default, the customer service engineer is able to configure for each service the same AE title.

After configuration change a restart is needed.

6.2.3 Remote Application Entities

All remote nodes can be configured in the Administration UI.

After configuration change a restart is needed.

6.2.3.1 Remote Association Initiators

All relevant remote applications that may setup DICOM associations towards LUMINOS Q.namix need to be configured in LUMINOS Q.namix, before the association can be established. This behavior is configurable, but it is recommended, not to change this behavior.

The mapping of external AE Titles to TCP/IP addresses and ports is configurable and initially set at the time of installation by Service Personnel. Changes can later also be performed by the local system administrator. The Application Entity Titles and supported transfer syntaxes need to be known for configuration.

6.2.3.2 Remote Association Acceptors

For remote applications that shall be able to accept DICOM associations from LUMINOS Q.namix the following information needs to be available:

- Application Entity Title,
- Host Name / IP address (IPv4 or IPv6) on which the remote application service runs,
- Port number on which the remote application accepts association requests,
- If the communication should be encrypted (yes/no).

The remote system will be indicated in the UI of LUMINOS Q.namix with a logical name, that is also entered when configuring the node in the Administration UI.

6.2.4 Basic Worklist Management Service Configuration

Table 6.2-1 lists Worklist Service configuration parameters:

Table 6.2-1: Worklist Service Parameters

Local Configuration Parameters – Worklist			
Parameter	Configurable	Default Value	Comments

Own AET	SERVICE	FLC_WK_SCU_S and FLC_WK_SCU	FLC_WK_SCU_S for encrypted communication.
Hostname	FIXED		Machine name
IP Address	FIXED		Machine IP Address
Active Worklist Server	SERVICE	None	A Remote Node can be selected from the list of Remote Nodes, which do have configured a Worklist AE as SCP.
RIS Timer	SERVICE	10 Minutes	Query Interval. “0” means, that no query will be initiated (off).
Query by AET	SERVICE	NO	YES/NO
Query Waiting Time	SERVICE	60	Time-out waiting for a response from the worklist provider.
Max Query Match	SERVICE	50	Maximum number of worklist items before the query is cancelled.
Time Range	SERVICE	Today	<no date> Today Yesterday-Today +/- 24 Hours +/- 12 Hours
Modalities to query	SERVICE	<empty>	CR,XA,DX,RF and Other (freely configurable modality code)
Remote Configuration Parameters – Worklist			
Parameter	Configurable	Default Value	Comments
Alias	SERVICE		
DICOM AET	SERVICE		
Hostname	SERVICE		
IP Address	SERVICE		IPv4 or IPv6
Port	SERVICE		Value range: 1 – 65536
Encrypted connection	SERVICE	NO	YES/NO
No default character set in query	SERVICE	NO	Indicates if the Specific Character Set attribute (0008,0005) taken from local language configuration is taken or not.

6.2.5 Modality Performed Procedure Step Service Configuration

Table 6.2-2 lists Modality Performed Procedure Step Service configuration parameters:

Table 6.2-2: MPPS Service Parameters

Local Configuration Parameters – MPPS			
Parameter	Configurable	Default Value	Comments
Own AET	SERVICE	FLC_WK_SCU_S and FLC_WK_SCU	FLC_WK_SCU_S for encrypted communication.
Hostname	FIXED		Machine name
IP Address	FIXED		Machine IP Address
Active MPPS Server	SERVICE	None	A Remote Node can be selected from the list of Remote Nodes, which do have configured an MPPS AE as SCP.
Auto MPPS after Series	SERVICE	NO	Indicates if a progress N-SET message is sent after each acquisition.

Send MPPS for locally registered patients	SERVICE	NO	Indicates if a MPPS messages are also sent for local patients.
Remote Configuration Parameters – MPPS			
Parameter	Configurable	Default Value	Comments
Alias	SERVICE		
DICOM AET	SERVICE		
Hostname	SERVICE		
IP Address	SERVICE		IPv4 or IPv6
Port	SERVICE		Value range: 1 – 65536
Encrypted connection	SERVICE	NO	YES/NO

6.2.6 Storage Service Configuration

Table 6.2-3 lists Storage Service configuration parameters:

Table 6.2-3: Storage Service Parameters

Local Configuration Parameters – Storage			
Parameter	Configurable	Default Value	Comments
Own AET	SERVICE	FLC_STORE_SCU_S and FLC_STORE_SCU	FLC_STORE_SCU_S for encrypted communication.
Hostname	FIXED		Machine name
IP Address	FIXED		Machine IP Address
Modality for RAD images	SERVICE	CR	Possibilities are - “DX” - “CR”
Pixel data in 12 bit?	SERVICE	no	Possibilities are - “yes”: 12 Bit - “no”: 16 Bit
Display Shutter	SERVICE	Use “Display Shutter” attributes	Possibilities are - Burn in shutter - Use “Display Shutter” attributes
Include Pixel Spacing for uncalibrated images	SERVICE	NO	YES/NO
Data Model RAD	SERVICE	Export each RAD image of the same study in a new DICOM series	Alternative: Export each RAD image of the same study in the same DICOM series
Data Model XRF	SERVICE	Export each DFR Single image of the same study in a new DICOM series	Alternative: Export each DFR Single image of the same study in the same DICOM series
LIH/Snapshot on separate series	SERVICE	NO	YES/NO
Remote Configuration Parameters – Storage			
Parameter	Configurable	Default Value	Comments
Alias	SERVICE		
DICOM AET	SERVICE		
Hostname	SERVICE		
IP Address	SERVICE		IPv4 or IPv6
Port	SERVICE		Value range: 1 – 65536
Encrypted connection	SERVICE	NO	YES/NO

Archive	SERIVICE	NO	Indicates if this storage node acts as an “archive” (images are marked as “archived” after they were successful sent).
StCServer	SERIVICE	NO	A Remote Node can be selected from the list of Remote Nodes, which do have configured an Storage Commitment AE as SCP. If the node is also an archive the images are only marked as “archived” if in addition to the storing (C-STORE) the Storage Commitment was also successful.

6.2.7 Storage Commitment Service Configuration

Table 6.2-4 lists Storage Commitment Service configuration parameters:

Table 6.2-4: Storage Commitment Service Parameters

Local Configuration Parameters – Storage Commitment			
Parameter	Configurable	Default Value	Comments
Own AET	SERVICE	FLC_STC_SCU_S and FLC_STC_SCU	FLC_STC_SCU_S for encrypted communication.
Hostname	FIXED		Machine name
IP Address	FIXED		Machine IP Address
Waiting Time	SERVICE	1 hour	Waiting time until the Storage Commitment Transaction is considered as failed when no successful N-EVENT-REPORT is sent.
Number of Retries	SERVICE	0	
Remote Configuration Parameters – Storage Commitment			
Parameter	Configurable	Default Value	Comments
Alias	SERVICE		
DICOM AET	SERVICE		
Hostname	SERVICE		
IP Address	SERVICE		IPv4 or IPv6
Port	SERVICE		Value range: 1 – 65536
Encrypted connection	SERVICE	NO	YES/NO
Timeout for result in same association	SERVICE	0	Timeout in seconds to wait for an N-EVENT-REPORT on the original association (where the N-ACTION-RQ is sent) before the association is closed.

6.2.8 Query/Retrieve Service Configuration

Table 6.2-5 lists Query/Retrieve Service configuration parameters:

Table 6.2-5: Query/Retrieve Service Parameters

Local Configuration Parameters – Query/Retrieve			
Parameter	Configurable	Default Value	Comments

Own AET	SERVICE	FLC_QR_SCU_S and FLC_QR_SCU	FLC_QR_SCU_S for encrypted communication.
Hostname	FIXED		Machine name
IP Address	FIXED		Machine IP Address
Remote Configuration Parameters – Query/Retrieve			
Parameter	Configurable	Default Value	Comments
Alias	SERVICE		
DICOM AET	SERVICE		
Hostname	SERVICE		
IP Address	SERVICE		IPv4 or IPv6
Port	SERVICE		Value range: 1 – 65536
Encrypted connection	SERVICE	NO	YES/NO

6.2.9 Print Management Service Configuration

Table 6.2-6 lists Print Management Service configuration parameters:

Table 6.2-6: Print Management Service Parameters

Local Configuration Parameters – Print			
Parameter	Configurable	Default Value	Comments
Own AET	SERVICE	FLC_PRINT_SCU_S and FLC_PRINT_SCU	FLC_PRINT_SCU_S for encrypted communication.
Hostname	FIXED		Machine name
IP Address	FIXED		Machine IP Address
Retry delay	SERVICE	5	Maximum 5 retries
Remote Configuration Parameters – Print			
Parameter	Configurable	Default Value	Comments
Alias	SERVICE		
DICOM AET	SERVICE		
Hostname	SERVICE		
IP Address	SERVICE		IPv4 or IPv6
Port	SERVICE		Value range: 1 – 65536
Encrypted connection	SERVICE	NO	YES/NO
Camera Driver	SERVICE	DRYPIX_3000	Available camera drivers: DRYPIX_3000, DRYPIX_4000, DRYPIX_7000, DRYPRO_752, DRYPRO_771, DRYPRO_793, DRYPRO_832, DRYPRO_873, DRYSTAR_3000, DRYSTAR_5300, DRYSTAR_5302, DRYSTAR_5500, DRYSTAR_5503, DRYSTAR_AXYS, DRYVIEW_5700, DRYVIEW_5800, DRYVIEW_5850, DRYVIEW_5950, DRYVIEW_6800, DRYVIEW_6850, DRYVIEW_8100, DRYVIEW_8150, DRYVIEW_8200, DRYVIEW_8700, DRYVIEW_8900, FM_DLP, HORIZON, Layout, PaperPrinter, UPDF_500, UPDF_550, UPDF_750, X01

Use Presentation LUT	SERVICE	NO	

The application uses printer drivers for the definition of the properties of the connected DICOM Printer like

- supported film sizes
- supported film formats
- size of pixel matrix of the printable area

These parameters are fixed and cannot be configured.

6.3 Configuration of DICOM Web Services

N/A

6.4 Configuration of Media Storage Service

N/A

6.5 Configuration of Real Time Video Service

N/A

7 Network and Media Communication Details

7.1 General

The cross interaction between the AEs is depicted in the diagrams below.

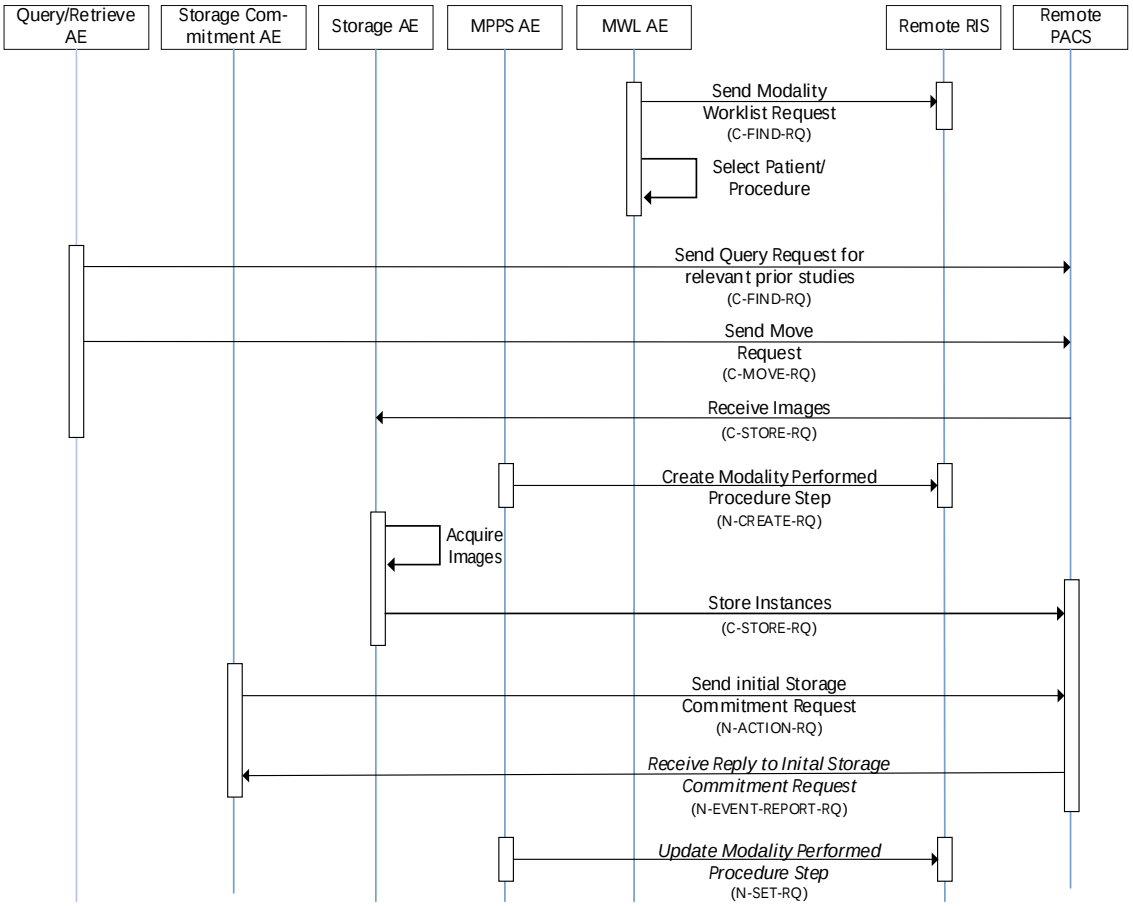


Figure 7.1-1: Real-World Activity and Cross AE interaction

7.1.1 Physical Network Interface

LUMINOS Q.namix provides DICOM 3.0 TCP/IP network communication support as defined in Part 8 of the DICOM Standard. The network communication is independent from the physical medium over which TCP/IP executes; it inherits this from the Windows OS system upon which it executes.

7.1.2 IPv4 and IPv6 Support

IPv4 and IPv6 are supported. Regarding IPv6 please note, that the complete networking infrastructure in the hospital (firewalls, DNS-Servers, ...) must support IPv6 to get a functioning communication.

7.1.3 General Association Parameters

Table 7.1-1 lists Association parameters applicable to all AEs on the system.

Table 7.1-1: General Association Parameters

Type	Name	Value
Networking Services	DICOM Application Context Name	1.2.840.10008.3.1.1.1
	Implementation Class UID	1.3.12.2.1107.5.3.4
	Implementation Version Name	Siemens_FLC_80
	Default PDU Size	64 kB
	Maximum PDU Length	64234
	Maximum number of simultaneous Associations as Association Initiator	1
	Maximum number of simultaneous Associations as Association Acceptor	1
Media Services	File Meta Information Version	0001
	Implementation Class UID	1.3.12.2.1107.5.3.4
	Implementation Version Name	Siemens_FLC_80

7.1.4 Common Real-World Activities

Since all AEs support the Verification SOP Class as SCU, a single description is provided in this section.

Furthermore, a brief description about the common aspects of the Association Acceptance Policies is presented.

The following sub-sections describe Real World Activities that are supported by all AEs defined in Section 7.2. The Sequencing of these common Real-World Activities is shown in Figure 7.1-2.

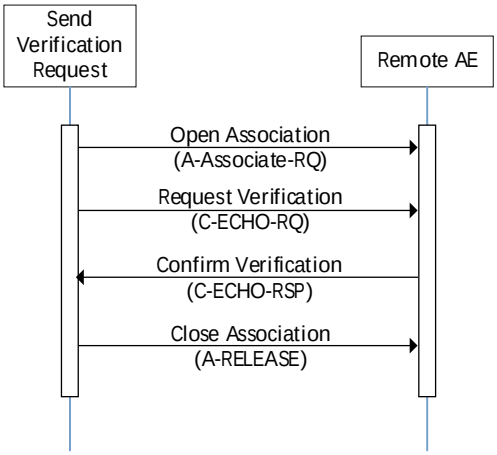


Figure 7.1-2:Common Real-World Activities

7.1.4.1.1 Association Initiation Policy

Based on the security settings for the Local DICOM Node and the configured Remote DICOM Nodes, a secure or an unsecure communication channel will be initialized. The connection request will be sent using this channel.

7.1.4.1.2 Real-World Activity “Send Verification Request”

LUMINOS Q.namix serves as an SCU of the Verification Service Class. A C-ECHO-RQ is initiated by the Administration Portal whenever "Verification" is requested. If an association to a remote Application Entity is successfully established, Verification with the configured AET is requested via the open association. The C-ECHO-RSP from the remote Application can only indicate a Success-status, according to the DICOM Standard. Thus, on receiving a C-ECHO-RSP in the limits of the Transfer Inactivity Timeout (see Table 6.1-1) from the configured AET, the Verification is regarded as successful.

7.1.4.1.3 Association Acceptance Policy

7.1.4.1.3.1 Based on the calling AE Title

LUMINOS Q.namix accepts Association Requests from known calling AE Titles and rejects Association Requests coming from unknown AE Titles (A-ASSOCIATE-RJ, Result: permanent, Source: 1, Reason/Diag.: 3 - calling-AE-title-not-recognized).

7.1.4.1.3.2 Based on the security settings for the Local and Remote DICOM Nodes

The user can impose via configuration secure and encrypted communication. This can affect only one Remote Node, which means, only the communication with the AE Title belonging to the respective Remote Node must be secure and encrypted.

If the Remote Node tries to open an unsecure and unencrypted network connection, the connection will be rejected. In this case no DICOM Messages are going to be exchanged.

The user can also impose via configuration that LUMINOS Q.namix only accepts secure connections. In this case every unsecure and unencrypted connection attempt will be rejected before any DICOM Message can be sent.

In this case only Association Requests from known Calling AE Titles are accepted.

7.2 Specifications

This section outlines the specifications for each of the Application Entities that are part of LUMINOS Q.namix.

7.2.1 Storage Application Entity

7.2.1.1 Sequencing of Real-World Activities for Storage AE

Figure 7.2- shows the Sequencing of the Real-World Activities for the Storage AE.

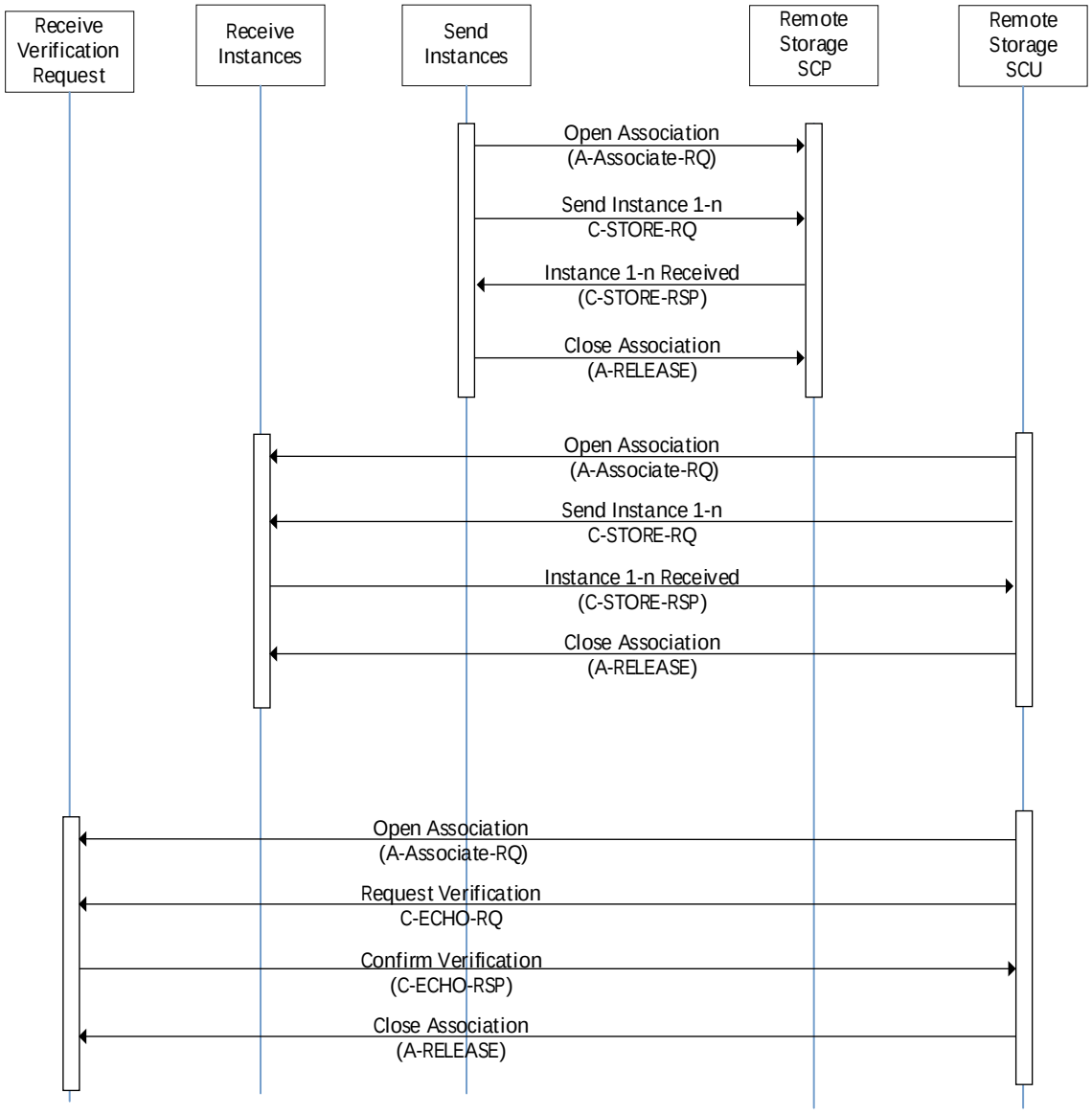


Figure 7.2-1: Real-World Activities for Storage AE

As a SCU, LUMINOS Q.namix starts sending the selected instances after the association has been accepted. After all instances are sent, LUMINOS Q.namix closes the association.

As a SCP, LUMINOS Q.namix starts receiving instances in the negotiated transfer syntax, after the association has been accepted.

7.2.1.2 Association Parameters of Storage AE

Association parameters are common to all AEs and documented in Table 7.1-1.

7.2.1.3 Transfer Syntax Selection Policies

LUMINOS Q.namix supports the Implicit VR Little Endian, the Explicit VR Little Endian and Explicit VR Big Endian Transfer Syntaxes.

Any proposed presentation context including one of these transfer syntaxes will be accepted. Any proposed presentation context that does not include one of these transfer syntaxes will be rejected.

Explicit Little Endian Transfer Syntax is preferred over the implicit Default Transfer Syntax. Little Endian is preferred over Big Endian Transfer Syntax.

7.2.1.4 Association Initiation

If a job with network destination gets active in the job list LUMINOS Q.namix attempts to initiate a new association for DIMSE C-STORE service operations.

7.2.1.4.1 Real-World Activity “Send Instances”

The Storage SCU is triggered by the transfer job queue (User Send, Autosend). An association request is sent to the Remote Storage SCP. If an association to a remote Application Entity could be successfully established, each marked image one after another is sent via the open association. If the C-STORE response from the remote node contains a status other than Success or Warning, the association is aborted. The related job is switched to a failed state. It can be restarted any time by user interaction. An automatic retry can be configured in the Administration UI.

Processing of images of a send job and sending of processed images is done in parallel. That means, as soon as the first image of a job is processed an association is initiated and the sending of the processed image is started.

An established association is closed as soon as no processed image is available to be sent.

Due to different speeds of sending and processing LUMINOS Q.namix might initiate more than one association for each send job!

LUMINOS Q.namix supports sending different kind of original and derived images and related object. These types of images are described annex A.1.

7.2.1.4.2 Extended Negotiation

N/A

7.2.1.4.3 Role Negotiation

N/A

7.2.1.5 Association Acceptance

This section details the Association policies of the Application Entity when it is acceptor for an Association.

The Storage SCP component of LUMINOS Q.namix is operating as background server process. It is running when the system is triggered to import images and waits then for Storage association requests. Upon accepting an association with a negotiated Presentation Context it starts to receive the Composite Image Objects and imports them to local database.

Verification requests will be processed and responded by the Storage SCP.

7.2.1.5.1 Real-World Activity “Receive Verification Request”

LUMINOS Q.namix serves as an SCP of the Verification Service Class. If the Verification SCP accepts an association, it will respond to C-ECHO-RQ. If the Called AE Title does not match any pre-configured AE Title the association will be rejected.

The C-ECHO-RSP always indicates, as required in the DICOM Standard, a successful operation.

7.2.1.5.2 Real-World Activity “Receive Instances”

LUMINOS Q.namix accepts pixel data with unsigned integer and 8 or 16 bits allocated and further restrictions as listed in Table 7.2-1.

Table 7.2-1: Restrictions for imported images

Attribute Name	Tag	Values
Samples per Pixel	(0028,0002)	1
Photometric Interpretation	(0028,0004)	“MONOCHROME2” “RGB”
Pixel Aspect Ratio	(0028,0034)	Only 1:1 supported
Pixel Representation	0028,0103)	0
Bits Allocated	(0028,0100)	8, 16
Bits Stored	(0028,0101)	8, 10, 12, 16
High Bit	(0028,0102)	7, 9, 11, 15

Furthermore, following restrictions are valid:

• For VOI LUT, only the linear LUT (Window Center/Width) and not the VOI LUT Sequence is supported.

• Display of overlay planes is not supported.

• No manipulations except windowing are allowed on imported images.

• Multiframe objects with identical image type are expected to be separated in series level.

LUMINOS Q.namix removes all Private Attributes not known to the application

7.2.1.5.3 Extended Negotiation

N/A

7.2.2 Storage Commitment Application Entity

7.2.2.1 Sequencing of Real-World Activities for Storage Commitment AE

Figure 7.2-2 shows the Sequencing of the Real-World Activities for the Storage Commitment AE when the N-EVENT-REPORT is sent in a second association.

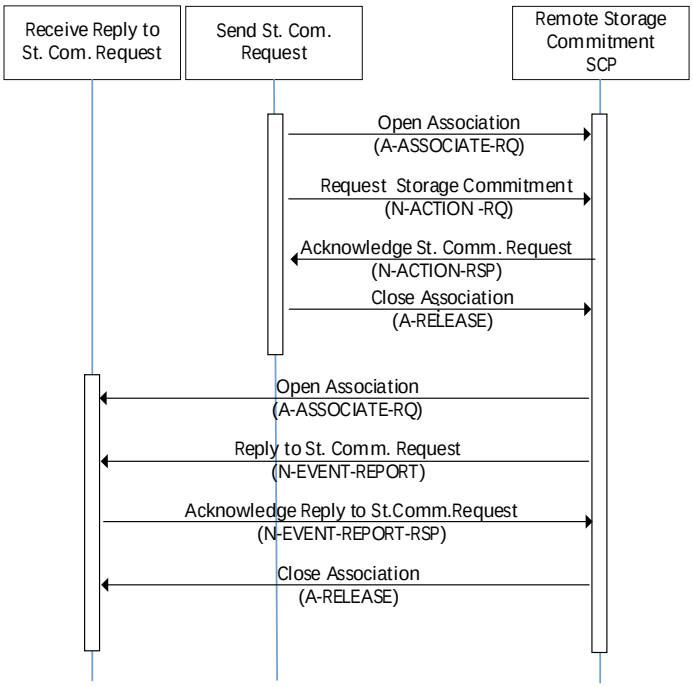


Figure 7.2-2: Real-World Activities for Storage Commitment AE – different association

Figure 7.2-3 shows the Sequencing of the Real-World Activities for the Storage Commitment AE when the N-EVENT-REPORT is sent in the same association.

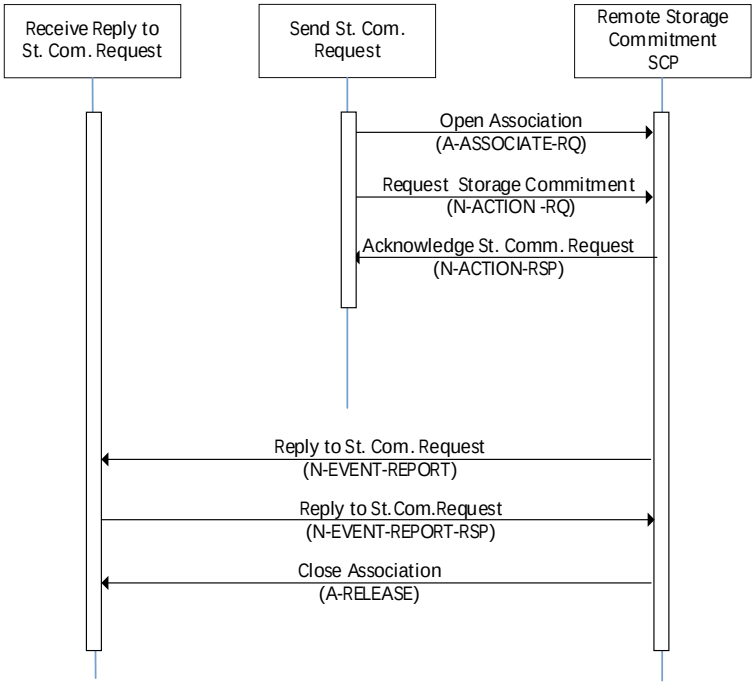


Figure 7.2-3: Real-World Activities for Storage Commitment AE – same association

The Storage Commitment trigger is automatically derived from the successful completion of a Send operation for DICOM nodes configured as Archive (PACS).

LUMINOS Q.namix will generate a Storage Commitment Identifier in the N-ACTION-RQ with references to all Instances of a selected study. The request is then sent over a single association. LUMINOS Q.namix will wait for status responses to

the Storage Commitment Request. If the Provider accepts the Storage Commitment with Success status, the generated Transaction UID, together with study identification data and a timestamp, is kept in a Pending Request Queue. The association is then closed. Multiple Storage Commitment Requests can be hold in the Pending Request Queue.

It is configurable how long LUMINOS Q.namix waits for the N-EVENT-REPORT-RQ on the initial association (where the N-ACTION-RQ is sent). See Table 6.2-4 in chapter 6.2.7.

Otherwise, the Remote Storage Commitment SCP must open a new Association to send the request.

7.2.2.2 Association Parameters of Storage Commitment AE

Association parameters are common to all AEs and documented in Table 7.1-1.

7.2.2.3 Association Initiation

Whenever a Store Request to a Storage SCP with associated Storage Commitment SCP is completed in the job queue, a Storage Commitment Identifier is generated for the same scope of Instances as transferred through the successful Storage Request. The identifier is then sent with the N-ACTION service to the Storage Commitment SCP. The association will wait up to 10 seconds (configurable) for responses after the Storage Commitment Provider accepted the request.

The number of retries for failed commit requests and a Storage Commitment timeout can configured in myExam Cockpit.

7.2.2.3.1 Real-World Activity “Send Initial Storage Commitment Request”

LUMINOS Q.namix serves as an SCU of the Storage Commitment Service Class. After successful transfer of DICOM Instances to a configured Archive node, LUMINOS Q.namix initiates a confirmation request (N-ACTION-RQ). Storage Commitment is supported for all Storage SOP Classes listed in Table 1.1-1.

7.2.2.3.2 Extended Negotiation

There is no extended negotiation for Storage Commitment Push Model SOP Class.

7.2.2.3.3 Role Negotiation

N/A

7.2.2.4 Association Acceptance

This section details the Association policies of the Application Entity when it is acceptor for an Association.

7.2.2.4.1 Real-World Activity “Receive Reply to Initial Storage Commitment Request”

LUMINOS Q.namix attempts to accept a new association for DIMSE N-EVENT-REPORT service operations.

There is a configurable expiration timeout for the Transaction UID. By default, the Transaction UID expires after 60 minutes. See Table 6.2-4 in chapter 6.2.7.

Also LUMINOS Q.namix can be configured (see Table 6.2-4) to wait for the N-EVENT-REPORT on the same association the N-ACTION-RQ was sent.

LUMINOS Q.namix awaits Storage commitment Notifications directly after startup. For any incoming Notification it will be checked, if the related Transaction UID is still part of the Pending Request Queue. If not the related Notification trigger is rejected with an “Unable to process” error. The related study was then already set to “commit failed” because of the timeout. If the Notification is valid, the Notification Identifier is evaluated and the related Instances are marked with the related status. The over-all Commit Status of the study is derived from propagation of the States of all instances included by a study.

In case of failure the user must repeat the transfer of images to the Archive destination. Another Storage Commitment will be performed after sending is completed successfully.

7.2.2.4.2 Extended Negotiation

There is no extended negotiation for Storage Commitment Push Model SOP Class.

7.2.2.4.3 Transfer Syntax Selection Policies

See also chapter 7.2.1.3.

7.2.2.4.4 Role Negotiation

LUMINOS Q.namix supports the reverse role negotiation. It accepts incoming N-EVENT-REPORT-RQ as SCU, if they do not arrive on the same association as the N-ACTION-RQ.

7.2.3 Query/Retrieve Application Entity

7.2.3.1 Sequencing of Real-World Activities for Query/Retrieve AE

Figure 7.2-4 shows the Sequencing of the Real-World Activities for the Query/Retrieve AE.

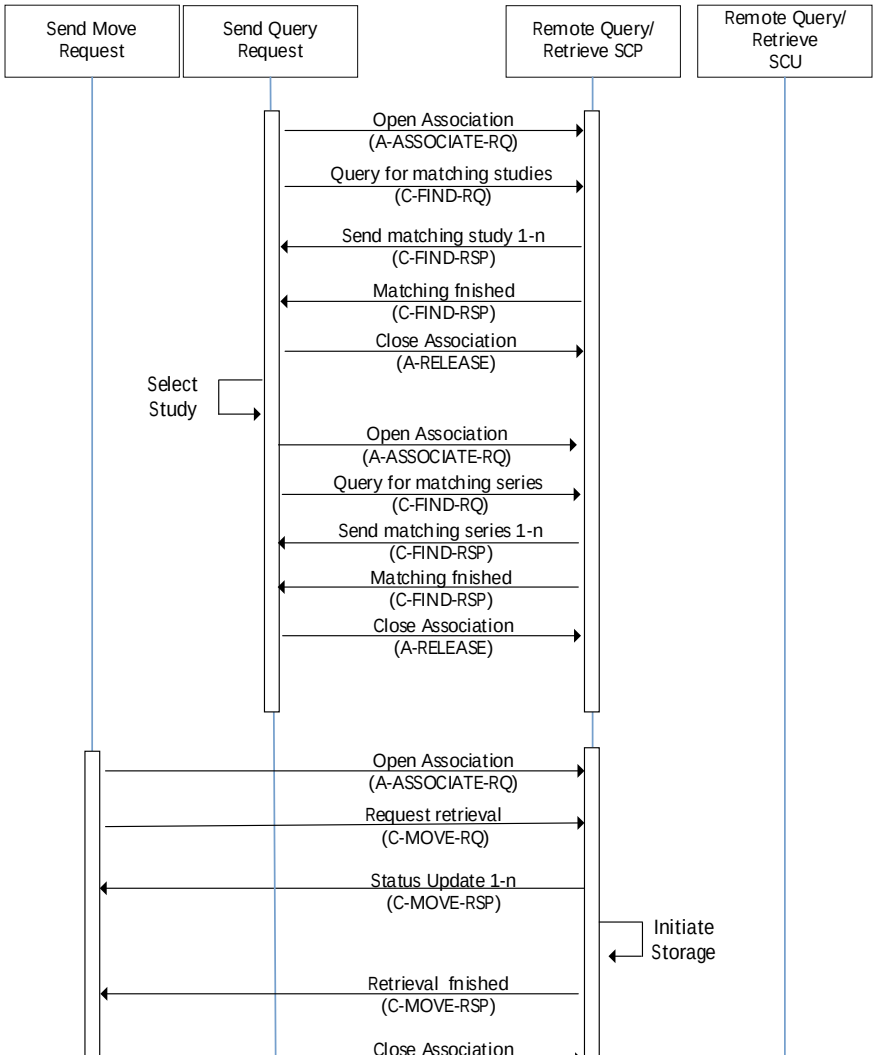


Figure 7.2-4: Real-World Activities for Query/Retrieve AE

LUMINOS Q.namix provides a standard GUI for Query/Retrieve. In the first step the Remote Node must be selected. The Studies found based on the search criteria entered by the user will be listed. If the user chooses a study, each one of its series will be also listed. The user can select a study or a series to retrieve. Selecting a series will retrieve its study too. Navigation to Image-Level is not supported.

Receiving the Instances via C-STORE is performed by the Storage Application Entity (see section 7.2.1.5).

7.2.3.2 Association Parameters of Query/Retrieve AE

Association parameters are common to all AEs and documented in Table 7.1-1.

7.2.3.3 Association Initiation

This section details the Association policies of the Query/Retrieve Application Entity when it is initiating an Association.

The user can specify the query filters in the Query/Retrieve (Import) GUI. After selecting the Q/R node and initiating the query the association is opened using the negotiated FIND Study Root Query/Retrieve Information Model. Afterwards the C-FIND-RQ including query keys on study level as provided by the user is sent. The matches from C-FIND response are then displayed on the GUI. When selecting a study LUMINOS Q.namix will issue C-FIND-RQ to retrieve the series data of the selected study in a new association and display the results in the GUI.

After the system finalized all queries, the user makes his selection for retrieval. LUMINOS Q.namix opens another association and issues the C-MOVE-RQ. After receiving a final status code, the association is closed.

In case of error, the list is built up to the point where the error occurred. The user is informed about incomplete processing of the query results.

7.2.3.3.1 Real-World Activity “Send Query Request”

LUMINOS Q.namix serves as an SCU for the SOP Class Study Root Q/R Information Model – FIND SOP Class.

Using the attributes specified by the user as Query Keys (in accordance with the query model) the Query SCU initiates a C-FIND-RQ and displays the responses to the user.

7.2.3.3.2 Extended Negotiation

Extended Negotiation to request “relational query” is not supported.

7.2.3.3.3 Role Negotiation

N/A

7.2.3.3.4 Real-World Activity “Send Move Request”

LUMINOS Q.namix serves as an SCU for the SOP Class Study Root Q/R Information Model – FIND SOP Class to retrieve imaging objects.

7.2.3.3.5 Extended Negotiation

Extended Negotiation is not supported by the Application Entity for the Real-World Activity “Send Move Request”.

7.2.3.3.6 Role Negotiation

N/A

7.2.3.4 Association Acceptance

N/A

7.2.4 Modality Worklist Application Entity

7.2.4.1 Sequencing of Real-World Activities for Modality Worklist AE

Figure 7.2-5 shows the Sequencing of the Real-World Activities for the Modality Worklist AE.

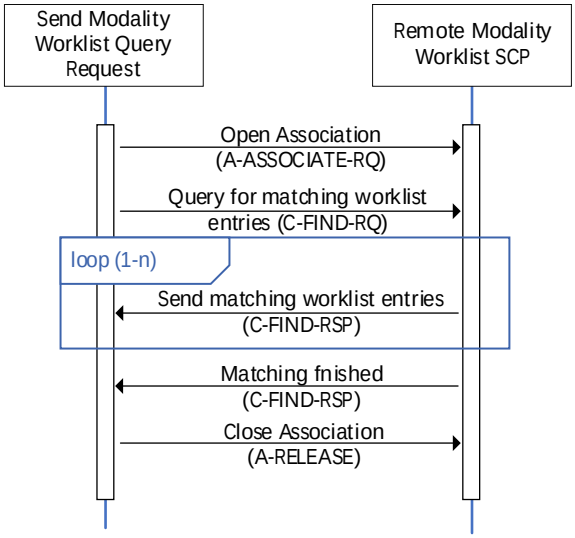


Figure 7.2-5: Real-World Activities for Modality Worklist AE

7.2.4.2 Association Parameters of Modality Worklist AE

Association parameters are common to all AEs and documented in Table 7.1-1.

7.2.4.3 Association Initiation

The request for a Worklist Update is initiated either by user interaction (pressing the button “Worklist Update”) or automatically at configurable time intervals.

LUMINOS Q.namix will build an Identifier for the C-FIND request, will initiate an association to send the request and will wait for the worklist responses. After retrieval of all responses, LUMINOS Q.namix will access the local database to add or update patient demographic data. To protect the system from overflow, LUMINOS Q.namix will limit the number of processed Worklist responses to a configurable maximum.

In Table 5.2-1 the supported and configurable attributes for the C-FIND request are described.

If any other SCP response status than “Success” or “Pending” is received, a message “update failed” will appear on the user interface.

The incoming worklist response items are counted and the query processing is canceled if the configurable limit of items (maximum 999) is reached. All worklist data from previous queries will be deleted when new data is received.

7.2.4.3.1 Real-World Activity “Send Modality Worklist Request”

LUMINOS Q.namix initiates a Modality Worklist query either in regular configurable time intervals or when triggered manually by the user.

7.2.4.3.2 Extended Negotiation

N/A

7.2.5 Modality Performed Procedure Step Application Entity

7.2.5.1 Sequencing of Real-World Activities for Modality Performed Procedure Step AE

Figure 7.2-6 shows the Sequencing of the Real-World Activities for the Modality Performed Procedure Step AE.

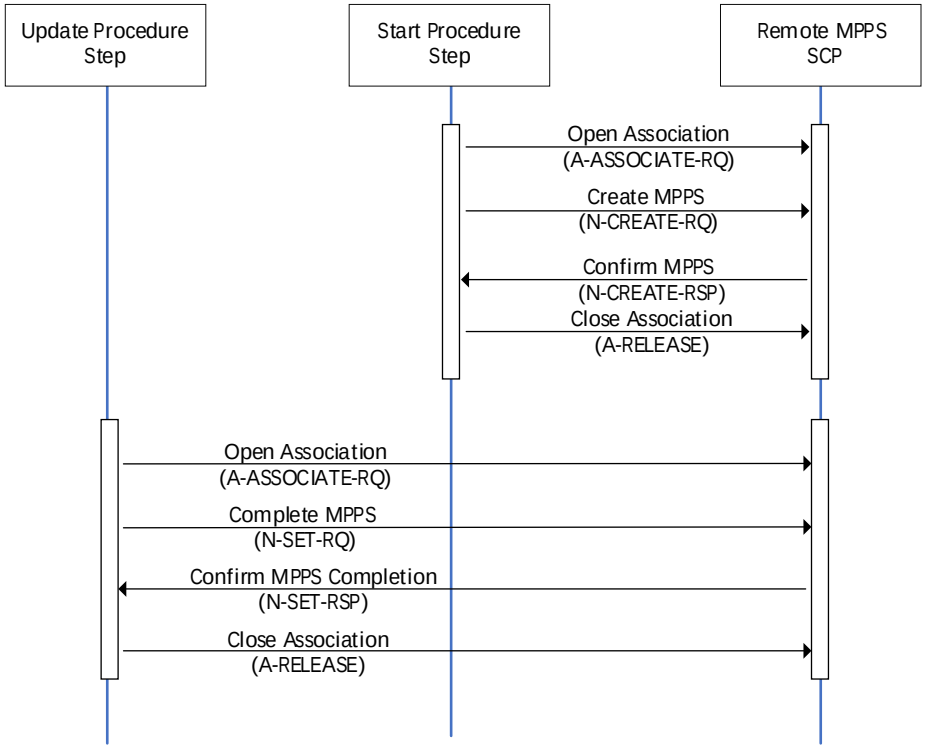


Figure 7.2-6: Real-World Activities for Modality Performed Procedure Step AE

7.2.5.2 Association Parameters of Modality Performed Procedure Step AE

Association parameters are common to all AEs and documented in Table 7.1-1.

7.2.5.3 Association Initiation

With the 1st Dose applied LUMINOS Q.namix will create an MPPS Instance and communicate it to the MPPS SCP.

To inform the MPPS SCP about the progress or the completion of an MPPS instance, an update can be performed. It is configurable for the user how the update is performed:

• Automatic (status “COMPLETED” is sent after a patient gets inactive)

• Automatic with MPPS Dialog (“COMPLETED”, “IN PROGRESS” or “DISCONTINUED” can be selected. Dialog is displayed after a patient gets inactive)

• Manual with MPPS Dialog (“COMPLETED”, “IN PROGRESS” or “DISCONTINUED” can be selected.)

After a state of “COMPLETED” or “DISCONTINUED”, LUMINOS Q.namix will no longer allow updates on the related MPPS Instance.

LUMINOS Q.namix supports creation of “unscheduled cases” by allowing MPPS Instances to be communicated for locally registered Patients. This is configurable in Service.

Further updates on the MPPS data can either be done interactively from the related MPPS user interface or will automatically be performed if configured by the user.

7.2.5.3.1 Real-World Activity “Start Procedure Step”

LUMINOS Q.namix serves as an SCU of the Modality Performed Procedure Step Service Class. An N-CREATE-RQ is sent when the first radiation was released for a procedure step. LUMINOS Q.namix can also discontinue a procedure step without radiation on user request.

7.2.5.3.2 Real-World Activity “Update Procedure Step”

If a procedure step was created as described in chapter 7.2.5.3.1 LUMINOS Q.namix will send a final N-SET-RQ when the examination is closed. It is also possible to configure MPPS in a way that after each acquisition the MPPS object is update with an N-SET message.

7.2.5.3.3 Transfer Syntax Selection Policies

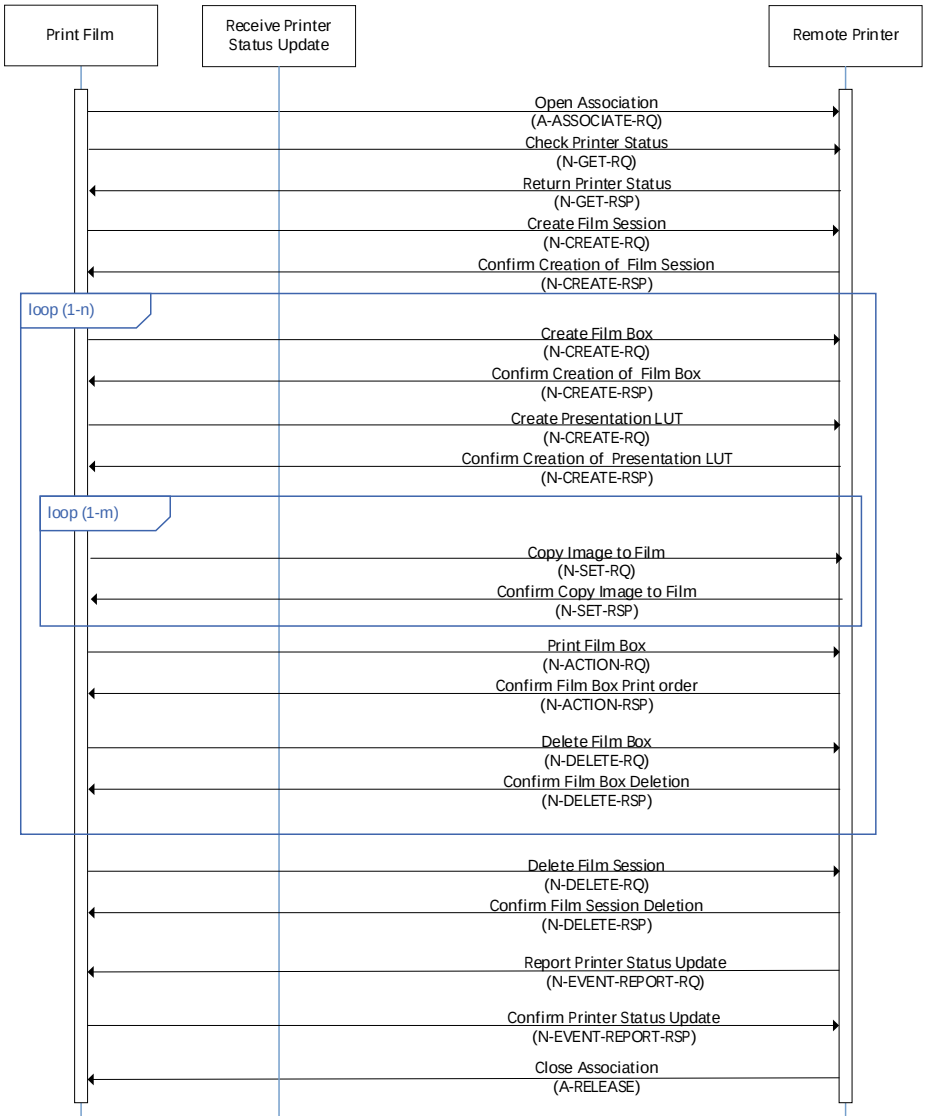
See chapter 7.2.1.3.

7.2.6 Print Application Entity

7.2.6.1 Sequencing of Real-World Activities for Print AE

Figure 7.2-7 shows the Sequencing of the Real-World Activities for the Print AE.

Figure 7.2-7: Real-World Activities for Print AE



LUMINOS Q.namix starts the Print Film activity after checking the Printer Status using the N-GET-RQ of the Printer SOP Class. If the printer is alive, a film session will be created using the N-CREATE-RQ of the Basic Film Session SOP Class. Within the created film session all necessary films will be created using the N-CREATE-RQ of the Basic Film Box SOP Class. Afterwards all images will be copied to the film using the N-SET-RQ of the Basic Grayscale Image Box. It is possible to set a Presentation LUT for each Film using the N-CREATE-RQ of the Presentation LUT SOP Class. After the print job has been finished, all film boxes and the film session will be deleted using the N-DELETE-RQ of the respective SOP Class.

Furthermore LUMINOS Q.namix can asynchronously receive N-EVENT-REPORT- RQs of the Printer SOP Class to get updates about the printer status.

7.2.6.2 Association Parameters of Print AE

Association parameters are common to all AEs and documented in Table 7.1-1.

7.2.6.3 Association Initiation

The “Print Film” can be invoked by the user interface whenever an image is ready to be printed on film.

The Print SCU will hold and maintain all data needed to compile a complete film-sheet from the data (images, layout, configuration) received. Whenever a film-sheet is ready to print, the related data is used to supply the information to the SOP Classes of the Basic Grayscale Print Management Meta SOP Class. A queue is maintained to intermediately store up to 10 film-sheets in case of resource problems on printer. The SCU will only supply and require the mandatory SOP Classes of the Basic Grayscale Print Management Meta SOP Class.

Whenever a film is completely set up, either automatically or by command, the job is prepared for processing. As soon as the queue is ready for processing the job, it is activated and encoded according the processing data. The related Print application will initiate an association to the print destination and process the printing of the related information.

Whenever a film-sheet is prepared by the user, it is forwarded to the Printer Job queue. As soon as the associated Printer device is available the job is activated and association is set up.

The film sheet is set up with the related Film Session and Film Box services. The images are internally processed and then sent as image boxes as needed. Status is controlled by awaiting any N-EVENT message all through the transfer until the last image or film-sheet is sent.

If the response from the remote application contains a status other than “Success” or “Warning” the association is aborted. It can be restarted any time by user interaction. An automatic retry can be configured by a CSE. LUMINOS Q.namix displays all warning and failure messages in the DICOM Film job list and writes them also into a log file.

The printing is only suspended in the case of a failure return status of the Print SCP.

7.2.6.3.1 Real-World Activity “Print Film”

Whenever a film-sheet is prepared by the user, it is forwarded to the Printer Job queue. As soon as the associated Printer device is available the job is activated, and an association is established.

After the film sheet is internally processed, converted to a STANDARD\1,1 layout and the page image is sent to the printer, the status is controlled by awaiting any N-EVENT-REPORT message throughout the transfer until the last image or film-sheet is sent.

When all Image Boxes (including parameters) for the film-sheets have been set, the LUMINOS Q.namix print manager will issue an N-ACTION-RQ message with the SOP Instance UID of the Basic Film Box and the Action Type ID of 1.

If the response from the remote application contains a status other than Success or Warning the printing is stopped and the job status is set to Aborted.

7.2.6.4 Association Acceptance

N/A

7.2.7 Media Storage Application Entity

7.2.7.1 Sequencing of Real-World Activities

Figure 7.2-8 shows the Sequencing of the Real-World Activities for the Media Storage AE.

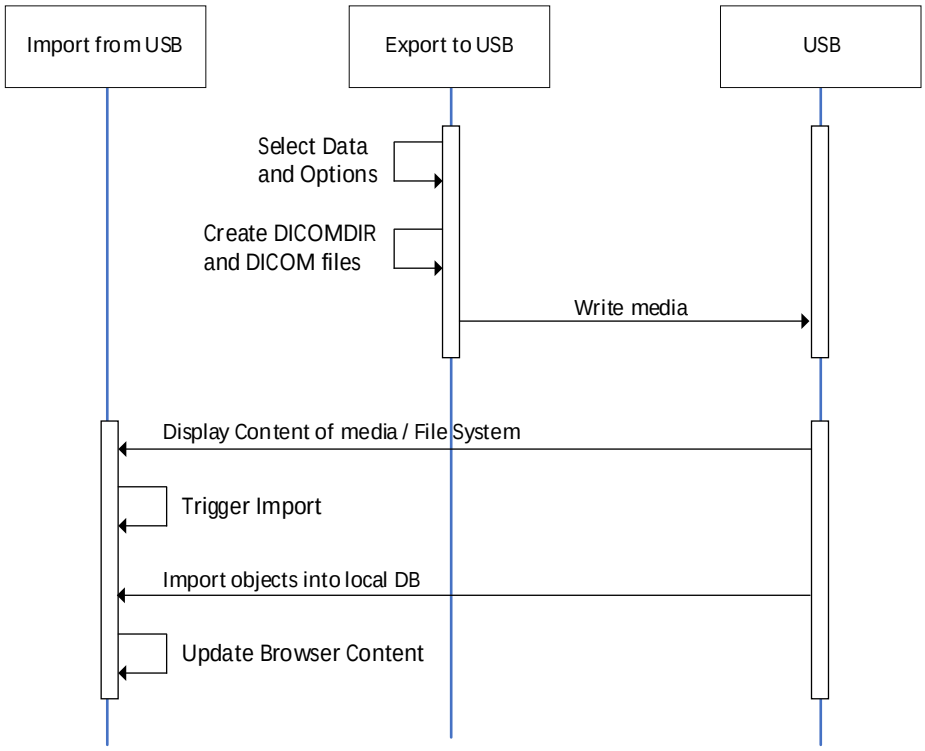


Figure 7.2-8: Real-World Activities for Media Storage AE

As a FSC, LUMINOS Q.namix first creates a DICOMDIR from the selected data on the local hard disk. After that the data is copied to the target device.

Compressed Transfer Syntaxes are not supported by the DICOM Offline Storage application neither as FSR/FSC or FSU.

7.2.7.2 Media Interchange

7.2.7.2.1 Real-World Activity “Browse Directory Information”

LUMINOS Q.namix acts as FSR using the interchange option when requested to read the media directory.

LUMINOS Q.namix will read the DICOMDIR and insert those directory entries valid for the application profiles supported into a local database. The database can then be used for browsing media contents.

During operation no “Attribute Value Precedence” is applied to the SOP Instances. Detached Patient Management is not supported.

7.2.7.2.2 Real-World Activity “Import into Application”

LUMINOS Q.namix acts as FSR using the interchange option when requested to read SOP Instances from the medium into the application.

The SOP Instance selected from the media directory will be copied into the local storage. Only SOP Instances, that are valid for the application profile supported, can be retrieved from media storage. This is because the Browse Directory Information will filter all SOP Instances not matching the Application profiles supported.

During operation no “Attribute Value Precedence” is applied to the SOP Instances. Detached Patient Management is not supported.

For media conforming to the STD-GEN-USB-JPEG profile the SOP classes listed in Table 1.1-1 are supported.

7.2.7.2.3 Real-World Activity “Export to local Archive Media”

LUMINOS Q.namix acts as FSU or FSC using the interchange option when requested to copy SOP Instances from the local storage to local Archive Medium.

LUMINOS Q.namix will receive a list of marked SOP Instances to be copied to the local archive medium. According to the state of the medium inserted (new medium, Medium with DICOM file-set) the validity of the SOP Instances according to the applicable profile is checked. Only valid SOP Instances are accepted.

The user can choose the IOD format of the instances (CR or DX for RAD images).

For media conforming to the STD-GEN-USB-JPEG profile the SOP classes listed in Table 1.1-1 are supported.

7.3 Status Codes

The following sections describe the Status Codes supported by the system for each implemented service as well as the reason for issuing specific Status codes respectively the associated behavior when receiving it.

7.3.1 General AE Communication and Failure Behavior and Handling

7.3.1.1 Communication Failure Behavior as Association Initiator

Table 7.3-1 describes behavior of the AE when a communication failure occurs when it initiated an Association.

Table 7.3-1: DICOM Communication Failure Behavior as Association Initiator

Failure	Failure Behavior
Timeout	The command is marked as failed. The reason is logged and reported to the user.
Association aborted	The command is marked as failed. The reason is logged and reported to the user.
Network Disconnect	The command is marked as failed. The reason is logged and reported to the user.

7.3.1.2 Communication Failure Handling as Association Acceptor

Table 7.3-2 describes how the AE responds when it receives an Association request that leads to failure in communication.

Table 7.3-2: DICOM Communication Failure Handling as Association Acceptor

Exception	Failure response
Failure during processing of Association request	The command is marked as failed. The reason is logged.
Unrecognized Called AE	AE responds with A-ASSOCIATE reject (Calling AE title not recognize, Reason Code 03) It is possible to configure LUMINOS Q.namix in such a way, that all AE Titles are accepted. Is this mode set, the association requests of all AE Titles are accepted.
Exceed limit for number of connections supported	AE responds with A-ASSOCIATE reject (Temporary congestion, Reason Code 01)

7.3.2 DIMSE Services

7.3.2.1 Basic Worklist Management Service

7.3.2.1.1 SCU of the Modality Worklist Information Model Find SOP Class - C-FIND

Table 7.3-3 lists the Status Codes that the SCU of the Modality Worklist Information Model Find SOP Class supports for the C-FIND message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-3: Status Codes for C-FIND of the Modality Worklist Information Model SOP Class - SCU

Status Class	Further Meaning	Status Code	Behavior
Success	Matching is complete - No final identifier is supplied	0000	The success is reported.
Failure	Refused: Out of Resources	A700	The issue is logged, the user is notified, and the association is closed.
	Error: Identifier does not match SOP Class	A900	
	Error: Unable to process	C000-CFFF	
Cancel	Matching terminated due to cancel	FE00	The association is closed.

Status Class	Further Meaning	Status Code	Behavior
Pending	Matches are continuing - Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys.	FF00	The receiver waits for further data.
Pending	Matches are continuing - Warning that one or more Optional Keys were not supported for existence for this Identifier (no optional key support)	FF01	
Any other status code, not mentioned above.			The issue is logged, the user is notified, and the association is closed.

7.3.2.2 Modality Performed Procedure Step Service

7.3.2.2.1 SCU of the Modality Performed Procedure Step SOP Class - N-CREATE

Table 7.3-4 lists the Status Codes that the SCU of the Modality Performed Procedure Step SOP Class supports for the N-CREATE message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-4: Status Codes for N-CREATE of the Modality Performed Procedure Step SOP Class - SCU

Status Class	Further Meaning	Status Code	Behavior
Success	Success	0000	Failed MPPS messages are logged in a central log file. There is no retry mechanism.
Warning	Attribute Value Out of Range	0116	
	Attribute List Error	0107	
Failure	No Such Attribute	0105	
	Invalid Attribute Value	0106	
	Processing Failure	0110	
	Duplicate SOP Instance	0111	
	Attribute Value Out of Range	0116	
	Invalid Object Instance	0117	
	No Such SOP Class	0118	
	Missing Attribute	0120	
	Missing Attribute Value	0121	
	Refused: Not Authorized	0124	
	Duplicate Invocation	0210	
	Unrecognized Operation	0211	
	Mistyped Argument	0212	
	Resource Limitation	0213	
Any other Status Code not mentioned above			

7.3.2.2.2 SCU of the Modality Performed Procedure Step SOP Class - N-SET

Table 7.3-5 lists the Status Codes that the SCU of the Modality Performed Procedure Step SOP Class supports for the N-SET message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-5: Status Codes for N-SET of the Modality Performed Procedure Step SOP Class - SCU

Status Class	Further Meaning	Status Code	Behavior
Success	Success	0000	Failed MPPS messages are logged in a central log file. There is no retry mechanism.
Warning	Attribute Value Out of Range	0116	
	Attribute List Error	0107	
Failure	No Such Attribute	0105	
	Invalid Attribute Value	0106	
	Processing Failure - Performed Procedure Step Object may no longer be updated	0110	
	Processing Failure	0110	
	Attribute Value Out of Range	0116	
	Invalid Object Instance	0117	
	No Such SOP Class	0118	
	Class-Instance Conflict	0119	
	Missing Attribute Value	0121	
	Refused: Not Authorized	0124	
	Duplicate Invocation	0210	
	Unrecognized Operation	0211	
	Mistyped Argument	0212	
	Resource Limitation	0213	
Any other Status Code not mentioned above.			

7.3.2.3 Storage Service

7.3.2.3.1 SCU of the Storage SOP Classes - C-STORE

Table 7.3-6 lists the Status Codes that the SCU of the Storage SOP Class supports for the C-STORE message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-6: Status Codes C-STORE for the Storage SOP Classes - SCU

Status Class	Further Meaning	Status Code	Behavior
Success	Success	0000	The success is reported.
Warning	Coercion of Data Elements	B000	The issue is logged, and the user gets notified about the Status.
	Data Set does not match SOP Class	B007	
	Elements Discarded	B006	
	Attribute list error	107	
	Attribute value out of range	116	
Failure	SOP Class not supported	0112	
	Invalid Object Instance	0117	
	Duplicate Invocation	0210	
	Unrecognized Operation	0211	

Status Class	Further Meaning	Status Code	Behavior
	Mistyped Argument	0212	
	Not authorized	0214	
	Out of Resources	A700-A7FF	
	Data Set does not match SOP Class	A900-A9FF	
	Cannot Understand	C000-CFFF	
	Processing failure	110	
	Duplicate instance	111	
	Invalid Data Set	122	
Any other Status Code not mentioned above			

7.3.2.3.2 SCP of the Storage SOP Classes - C-STORE

Table 7.3-7 lists the Status Codes that the SCP of the Storage SOP Classes supports for the C-STORE message and defines conditions in which the listed Status Codes are sent.

Table 7.3-7: Status Codes C-STORE of the Storage SOP Classes - SCP

Status Class	Further Meaning	Status Codes	Related Fields	Condition (and Comments on Related fields)
Success	Success	0000		Image received correctly. The success is reported.
Error	Out-of-resource	A700		This error status indicates a lack of Resources (e.g. not enough disk space) on the LUMINOS Q.namix modality.
	Data set does not match SOP Class	A9xx		An error occurred while processing the image that makes it impossible to proceed. The image will not be stored and the association aborted. If an image instance is received that is identified by a SOP Instance UID that is already used by an Instance stored in database then the actual received image will be refused. The existing Instance is not superseded.
	Unable to process	Cxxx		

7.3.2.4 Storage Commitment Service

7.3.2.4.1 SCU of the Storage Commitment Push Model SOP Class - N-ACTION

Table 7.3-8 lists the Status Codes that the SCU of the Storage Commitment Push Model SOP Class supports for the N-ACTION message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-8: Status Codes for N-ACTION of the Storage Commitment Push Model SOP Class - SCU

Status Class	Further Meaning	Status Code	Behavior
Success		0000	The success is reported.
Failure	Processing failure	0110	The instance the error was reported for, will not be considered as completely archived and mark accordingly as “Archive failed”.
	No such SOP Instance	0112	
	No such argument	0114	
	Invalid argument Value	0115	
	Invalid Object instance	0117	
	No such SOP Class	0118	
	Class-instance conflict	0119	
	No such action	0123	
	Refused: Not Authorized	0124	
	Duplicate invocation	0210	
	Unrecognized operation	0211	
	Mistyped argument	0212	
	Resource limitation	0213	
Any other status code not mentioned above			

7.3.2.5 Query/Retrieve Service

7.3.2.5.1 SCU of the Query/Retrieve FIND SOP Classes - C-FIND

Table 7.3-9 lists the Status Codes that the SCU of any of the Query/Retrieve FIND SOP Class supports for the C-FIND message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-9: Status Codes C-FIND for Query/Retrieve FIND SOP Classes - SCU

Status Class	Further Meaning	Status Code	Behavior
Success	Matching is complete - No final identifier is supplied	0000	The success is reported, and the association is closed.
Failure	Refused: Out of Resources	A700	The error code is logged.
	Error: Identifier does not match SOP Class	A900	
	Error: Unable to process	C000-CFFF	
	SOP Class Not Supported	0122	
Cancel	Matching terminated due to cancel	FE00	The association is closed. The error code is logged.
Pending	Matches are continuing - Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys.	FF00	Pending state of the transaction is indicated to the user.
	Matches are continuing - Warning that one or more Optional Keys were not supported for existence for this Identifier	FF01	
Any other status code not mentioned above			In case of any other status code received, the error code is logged.

7.3.2.5.2 SCU of the Query/Retrieve MOVE SOP Classes – C-MOVE

Table 7.3-10 lists the Status Codes that the SCU of any of the Query/Retrieve MOVE SOP Class supports for the C-MOVE message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-10: Status Codes C-MOVE for Query/Retrieve MOVE SOP Classes – SCU

Status Class	Further Meaning	Status Codes	Related Fields	Behavior
Success	Sub-operations Complete – No Failures	0000	(0000,1020) (0000,1021) (0000,1022) (0000,1023)	The success is reported.
Warning	Sub-operations Complete – One or more Failures	B000	(0000,1020) (0000,1022) (0000,1023)	The issue is logged.
Failed	Out of Resources – Unable to calculate number of matches	A701	(0000,0902)	The issue is logged.
	Out of Resources – Unable to perform sub-operations	A702	(0000,1020) (0000,1021) (0000,1022) (0000,1023)	
	Move Destination unknown	A801	(0000,0902)	
	Identifier does not match SOP Class	A900	(0000,0901) (0000,0902)	
	Unable to process	Cxxx	(0000,0901) (0000,0902)	
Cancel	Sub-operations terminated due to Cancel Indication	FE00	(0000,1020) (0000,1021) (0000,1022) (0000,1023)	The association is terminated.
Pending	Sub-operations are continuing	FF00	(0000,1020) (0000,1021) (0000,1022) (0000,1023)	No error is reported.
Any other status code not mentioned above				The issue is logged.

7.3.2.6 Print Management Service

The DIMSE Codes received in the responses for Print Management related N-CREATE, N-SET and N-DELETE are all handled in the same way. They are forwarded to the user if:

- the DIMSE Code points to a failure or
- the DIMSE Code points to a warning.

Every DIMSE Code received in the response to an N-ACTION message is forwarded to the user.

The DICOM Module does not handle any of the DIMSE Codes.

7.3.2.6.1 SCU of the Basic Film Session SOP Class - N-CREATE

Table 7.3-11 lists the Status Codes that the SCU of the Basic Film Session SOP Class supports for the N-CREATE message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-11: Status Codes for N-CREATE of the Basic Film Session SOP Class - SCU

Status Class	Further Meaning	Status Code	Behavior
Success	Film box belonging to the film session is accepted for printing	0000	Print job continues.
Warning	Attribute List Error	0107	Print job continues, warning is logged.
	Attribute Value Out of Range	0116	
	Memory allocation not supported	B600	
	Film session printing is not supported	B601	
	Film box does not contain image box (empty page)	B602	
Failure	No Such Attribute	0105	In case of any failure occurred, the printing is suspended, and the user is going to be notified.
	Invalid Attribute Value	0106	
	Processing Failure	0110	
	Duplicate SOP Instance	0111	
	Invalid Object Instance	0117	
	No Such SOP Class	0118	
	Missing Attribute	0120	
	Missing Attribute Value	0121	
	Refused: Not Authorized	0124	
	Duplicate Invocation	0210	
	Unrecognized Operation	0211	
	Mistyped Argument	0212	
	Resource Limitation	0213	
	Film session SOP instances hierarchy does not contain film box SOP instances	C600	
	Unable to create print job, print queue is full	C601	
	Image size is larger than images box size	C603	
Any other Status Code not mentioned above			

7.3.2.6.2 SCU of the Basic Film Session SOP Class - N-DELETE

Table 7.3-12 lists the Status Codes that the SCU of the Basic Film Session SOP Class supports for the N-DELETE message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-12: Status Codes for N-DELETE of the Basic Film Session SOP Class - SCU

Status class	Further Meaning	Status Code	Behavior
Success	Success	0000	
Failure	Processing Failure	0110	
	Invalid Object Instance	0117	
	No Such SOP Class	0118	
	Class Instance Conflict	0119	
	Refused: Not Authorized	0124	
	Duplicate Invocation	0210	
	Unrecognized Operation	0211	
	Mistyped Argument	0212	
	Resource Limitation	0213	
Any other Status Code not mentioned above			

7.3.2.6.3 SCU of the Basic Film Box SOP Class - N-CREATE

Table 7.3-11 lists the Status Codes that the SCU of the Basic Film Box SOP Class supports for the N-CREATE message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-13: Status Codes for N-CREATE of the Basic Film Box SOP Class - SCU

Status Class	Further Meaning	Status Code	Behavior
Success	Film accepted for printing	0000	Print job continues.
Warning	Attribute List Error	0107	
	Attribute Value Out of Range	0116	
	Film box does not contain image box (empty page)	B603	Print job continues and warning is logged.
	Requested Min Density or Max Density outside of printer's operating range. The printer will use its respective minimum or maximum density value instead.	B605	
Failure	No Such Attribute	0105	Print job is marked as failed and the reason is logged.
	Invalid Attribute Value	0106	
	Processing Failure	0110	
	Duplicate SOP Instance	0111	
	Invalid Object Instance	0117	
	No Such SOP Class	0118	
	Missing Attribute	0120	
	Missing Attribute Value	0121	
	Refused: Not Authorized	0124	
	Duplicate Invocation	0210	
	Unrecognized Operation	0211	
	Mistyped Argument	0212	
	Resource Limitation	0213	

Status Class	Further Meaning	Status Code	Behavior
	Unable to create print job, print queue is full	C601	
	Image size is larger than images box size	C603	
	There is an existing Film Box that has not been printed and N-ACTION at the Film Session level is not supported. A new Film Box will not be created when a previous Film Box has not been printed.	C616	
Any other Status Code not mentioned above			

7.3.2.6.4 SCU of the Basic Film Box SOP Class - N-DELETE

Table 7.3-14 lists the Status Codes that the SCU of the Basic Film Box SOP Class supports for the N-DELETE message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-14: Status Codes for N-DELETE of the Basic Film Box SOP Class - SCU

Status class	Further Meaning	Status Code	Behavior
Success	Success	0000	
Failure	Processing Failure	0110	
	Invalid Object Instance	0117	
	No Such SOP Class	0118	
	Class Instance Conflict	0119	
	Refused: Not Authorized	0124	
	Duplicate Invocation	0210	
	Unrecognized Operation	0211	
	Mistyped Argument	0212	
	Resource Limitation	0213	
Any other Status Code not mentioned above			

7.3.2.6.5 SCU of the Basic Film Box SOP Class - N-ACTION

Table 7.3-15 lists the Status Codes that the SCU of the Basic Film Box SOP Class supports for the N-ACTION message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-15: Status Codes for N-ACTION of the Basic Film Box SOP Class - SCU

Status Class	Further Meaning	Status Code	Behavior
Success	Success	0000	Print job continues.
Warning	Film Box SOP Instance hierarchy does not contain Image Box SOP Instances (empty page)	B603	Print job continues and warning is logged.
	Image size is larger than Image Box size. The image has been demagnified.	B604	
	Image size is larger than Image Box size. The image has been cropped to fit.	B609	
	Image size or Combined Print Image Size is larger than Image Box size. The image or combined Print Image has been decimated to fit.	B60A	
Failure	Processing failure	0110	

Status Class	Further Meaning	Status Code	Behavior
	No such SOP Instance	0112	
	No Such Argument	0114	
	Invalid argument Value	0115	
	Invalid Object Instance	0117	
	No Such SOP Class	0118	
	Class-Instance Conflict	0119	
	No Such Action	0123	
	Refused: Not Authorized	0124	
	Duplicate Invocation	0210	
	Unrecognized Operation	0211	
	Mistyped Argument	0212	
	Resource Limitation	0213	
	Unable to create Print Job SOP Instance; print queue is full.	C602	Print job is marked as failed and the reason is logged.
	Image size is larger than Image Box size.	C603	
	Combined Print Image Size is larger than Image Box size.	C613	
Any other Status Code not mentioned above			

7.3.2.6.6 SCU of the Basic Grayscale Image Box SOP Class - N-SET

Table 7.3-16 lists the Status Codes that the SCU of the Basic Grayscale Image Box SOP Class supports for the N-SET message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-16: Status Codes for N-SET of the Grayscale Image Box SOP Class - SCU

Status Class	Further Meaning	Status Code	Behavior
Success	Success	0000	Print job continues.
Warning	Image size is larger than Image Box size. The image has been demagnified.	B604	Print job continues and the reason is logged.
	Requested Min Density or Max Density outside of printer's operating range. The printer will use its respective minimum or maximum density value instead.	B605	
	Image size is larger than Image Box size. The image has been cropped to fit.	B609	
	Image size or Combined Print Image Size is larger than Image Box size. The image or combined Print Image has been decimated to fit.	B60A	
Failure	No Such Attribute	0105	
	Invalid Attribute Value	0106	
	Processing Failure	0110	
	Duplicate SOP Instance	0111	
	Invalid Object Instance	0117	
	No Such SOP Class	0118	
	Class Instance Conflict	0119	
	Missing Attribute	0120	
	Missing Attribute Value	0121	
	Refused: Not Authorized	0124	
	Duplicate Invocation	0210	
	Unrecognized Operation	0211	
	Mistyped Argument	0212	
	Resource Limitation	0213	
	Image size is larger than Image Box size.	C603	Print job is marked as failed and the reason is logged.
	Insufficient memory in printer to store the image.	C605	
	Combined Print Image Size is larger than Image Box size.	C613	
Any other Status Code not mentioned above			

7.3.2.6.7 SCU of the Printer SOP Class - N-GET

Table 7.3-17 lists the Status Codes that the SCU of the Printer SOP Class supports for the N-GET message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-17: Status Codes for N-GET of the Printer SOP Class - SCU

Status Class	Further Meaning	Status Code	Behavior
Success	Success	0000	
Warning	Attribute List Error	0107	

Status Class	Further Meaning	Status Code	Behavior
Failure	Processing Failure	0110	
	No Such SOP Instance	0112	
	Invalid Object Instance	0117	
	No Such SOP Class	0118	
	Class-Instance Conflict	0119	
	Refused: Not Authorized	0124	
	Duplicate Invocation	0210	
	Unrecognized Operation	0211	
	Mistyped Argument	0212	
	Resource Limitation	0213	
Any other Status Code not mentioned above			

7.3.2.6.8 SCU of the Presentation LUT SOP Class - N-CREATE

Table 7.3-18 lists the Status Codes that the SCU of the Presentation LUT SOP Class supports for the N-CREATE message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-18: Status Codes N-CREATE of the Presentation LUT SOP Class - SCU

Status Class	Further Meaning	Status Code	Behavior
Success	Success	0000	Print job continues.
Warning	Attribute List Error	0107	
	Attribute Value Out of Range	0116	
	Requested Min Density or Max Density outside of printer's operating range. The printer will use its respective minimum or maximum density value instead.	B605	Print job continues and the reason is logged.
Failure	No Such Attribute	0105	
	Invalid Attribute Value	0106	
	Processing Failure	0110	
	Duplicate SOP Instance	0111	
	Invalid Object Instance	0117	
	No Such SOP Class	0118	
	Missing Attribute	0120	
	Missing Attribute Value	0121	
	Refused: Not Authorized	0124	
	Duplicate Invocation	0210	
	Unrecognized Operation	0211	
	Mistyped Argument	0212	
	Resource Limitation	0213	
Any other Status Code not mentioned above			

7.3.2.6.9 SCU of the Presentation LUT SOP Class - N-DELETE

Table 7.3-19 lists the Status Codes that the SCU of the Presentation LUT SOP Class supports for the N-DELETE message and defines the application behavior when encountering the listed Status Codes.

Table 7.3-19: Status Codes for N-DELETE of the Presentation LUT SOP Class - SCU

Status class	Further Meaning	Status Code	Behavior
Success	Success	0000	
Failure	Processing Failure	0110	
	Invalid Object Instance	0117	
	No Such SOP Class	0118	
	Class Instance Conflict	0119	
	Refused: Not Authorized	0124	
	Duplicate Invocation	0210	
	Unrecognized Operation	0211	
	Mistyped Argument	0212	
	Resource Limitation	0213	
Any other Status Code not mentioned above			

8 Security

8.1 Introduction

The security section describes security features implemented by LUMINOS Q.namix. It includes description of non-DICOM network protocols, information to configure firewalls and application whitelists, list of supported DICOM security profiles as well as Web Security features. Additionally, secured media storage, VPN, etc. are also specified in this security section.

8.2 External Network Requirements

Table 8.2-1 describes additional non-DICOM network protocols that are used by LUMINOS Q.namix.

Table 8.2-1: External Network Requirements

Profile	Actor	Transaction	Protocol Used	RFCs	Security Support	Reference
Basic Time Synchronization	NTP Server	Maintain Time	NTP	RFC5905	N	C.1.1
	NTP Client	Maintain Time	NTP	RFC5905	N	C.1.1
Basic Network Address Management	DHCP Client	Find and Use DHCP Server	DHCP	RFC2131; RFC2132; RFC2563	Y	C.1.2
		Maintain Lease	DHCP	RFC2131; RFC2132	Y	C.1.2
	DNS Client	Resolve Hostname	DNS	RFC1035; RFC2181;	Y	C.1.2

Please do note, that the supported profiles (DHCP, DNS and LDAP) are all supported using the APIs of the Operation System.

8.3 TCP Port Configuration

See section 6 Configuration for information on DICOM and other protocol Port usage. This section contains helpful information for product administrators to configure firewall, application whitelist, etc.

Firewall rules (inbound and outbound) for the standard DICOM ports 104 and 2762 for secure communication are set up automatically on installation.

8.4 DICOM Security Profiles Support

8.4.1 Secure Use and User Identity Profiles

N/A

8.4.2 Secure Transport Connection Profiles

Table 8.4-1 describes the Secure Transport Connection Profiles supported by the product. Accepted cipher suites are described in the section listed in the “Reference” column.

Table 8.4-1: Secure Transport Connection Profiles

Profile	Secured AE	Sender	Receiver	Reference
BCP 195 RFC 8996, 9325 TLS Secure Transport Connection	ALL *	Y	Y	C.2.3

* The secured communication is configurable for the Local DICOM Remote node and every Remote DICOM Node separately.

Please do note, that in case a secure connection is established, the Operation System does not provide any technical possibility to actively select or specify in any way a certain Cipher Suite. Since LUMINOS Q.namix is always provided together with the Operation System Microsoft Windows, the selection of the Cipher Suite happens automatically, based on the TLS Version used.

Hint: LUMINOS Q.namix supports TLS 1.2 but not TLS 1.3. As requested by the profile TLS 1.1 and TLS 1.0 are not supported anymore.

8.4.3 Media Storage Security Profiles

N/A

8.4.4 Attribute Confidentiality Profiles

De-Identification, as specified in the DICOM Standard, is not supported by LUMINOS Q.namix. As an alternative LUMINOS Q.namix provides a Data Minimization feature, which can only be used in Media Export operations.

Data Minimization is described in chapter 8.6.

Tags, that are not mentioned in the configuration for the Data Minimization will be ignored.

8.4.5 Digital Signature Profiles

N/A

8.4.6 Additional DICOM Security Profiles

N/A

8.5 Other Security Features

8.5.1 Associtation Level Security

N/A

8.5.2 Application Level Security

User must login with own password.

For configuration and Maintenance, Service Technician must login with a separate password or a service key.

8.6 Data Minimization

LUMINOS Q.namix application can minimize the data exported to Media.

Attributes listed in Table 8.6-1 will be affected by the data minimization. Attributes not listed in the table are not PII / PHI relevant and will not be affected by the data minimization.

Table 8.6-1 lists the attributes affected by minimization.

Table 8.6-1: Data Minimization

DICOM Tag	Attribute Name	Value
(0008,0050)	Accession Number	"000"
(0008,0080)	Institution Name	“”
(0008,0081)	Institution Address	“”

DICOM Tag	Attribute Name	Value
(0008,0090)	Referring Physician	“”
(0008,1050)	Performing Physician	“”
(0008,1070)	Operator's Name	“”
(0008,1080)	Admitting Diagnostic Description	“”
(0010,0010)	Patient Name	"Anonymous^Anonymous"
(0010,0020)	Patient ID	New generated unique ID
(0010,0030)	Date of Birth	"Birthyear0101"
(0010,1040)	Patients Address	“”
(0010,1000)	Other Patient IDs	“”
(0010,1001)	Other Patient Names	“”
(0010,1080)	Military Rank	“”
(0010,21B0)	Additional Patient History	“”
(0010,2160)	Ethnic Group	“”
(0010,4000)	Patient Comments	“”
(0020,0010)	Study ID	“”
(0032,1032)	Requesting Physician	“”
(0040,0275)	Request Attribute Sequence	Empty
(0040,1010)	Intented Recipients of Results	“”
(0040,3001)	Confidentiality Constraint on Patient Data Description	“”

Annex A Information Object Definitions (IODs)

This section provides the detailed content for all the SOP Instances natively created by LUMINOS Q.namix (all SOP Classes that are marked in the “Created” column in Table 1.1-1). Details on Attribute coercion are defined in Section 5.2.3.2.

There are different image types existing (see chapter A.1) that can be exported in one of the supported formats from Table 1.1-1. RAD images can be exported in an unprocessed format (“Digital X-Ray Image Storage - For Processing”) or in a format convenient for reading (“Digital X-Ray Image Storage - For Presentation”). The processed images can also be exported in CR format (Computed Radiography Image Storage) if configured. Fluoro and DFR images can only be exported in a “processed” format (“X-Ray Radiofluoroscopic Image Storage”). In addition to that, Dose Reports are created for each examination (X-Ray Radiation Dose SR Storage).

Throughout the tables listed in Annex A the following codes are used for the “Source” and “Presence” columns.

In the “Source” column, the following Values can be used:

- FIXED: The Value is pre-defined and cannot be modified.
- GENERATED: The Value is generated by the system.
- CONFIG: The Value is copied from system configuration.
- MWL: The Value is copied from Modality Worklist entry.
- QUERY: The Value is determined by performing a query of any of the supported Query/Retrieve Services.
- USER: The Value is entered by the user.
- SCANNED: The Value is read from a barcode scanner or similar device.
- EMPTY: The Attribute is sent without Value.
- SRC_INSTANCE: The Value is copied from previously created/received SOP Instances.

The “Presence” columns reflect the usage of the Module, Functional Group Macro, Attributes, or Value in the LUMINOS Q.namix Implementation and is not necessarily the same as defined in the DICOM Standard. For the “Presence” column the following Values can be used:

- ALWAYS: the module, functional group macro, Attributes or Value is always present.
- NEVER: the module, functional group macro, attribute or value is never present.
- CONDITION: the presence of the module, functional group macro, Attributes or Value is dependent on a condition. The condition must be listed in the “Conditions” column.
- SRC_COPY: The presence of the Attributes and Values depends on the availability of these in the source instances, which are used for copying this information.
- EMPTY: The Attribute is present but without a Value (zero length).

A.1 Supported Image Types

LUMINOS Q.namix supports the Image Types (0008,0008) listed in Table A.1-2.

Table A.1-2: Supported Image Types

Short Name	Shortcut[5]	Image Type Value	Modality Code	Export Format	Comments
RAD	RAD	ORIGINAL\PRIMARY\\RAD	CR or DX[6]	CR (see A.6) DX (see A.4 and A.5)	RAD image
Rad Confirm Loop	RAD CF	ORIGINAL\PRIMARY\SINGLE PLANE\FLUORO\RCLOOP	RF	XRF (see A.7)	Positioning loop of RAD Confirm acquisition
RadConfirm LIH	RAD CF LIH	ORIGINAL\PRIMARY\SINGLE PLANE\FLUORO\RCLIH	RF	XRF (see A.7)	“Last Image Hold” of positioning loop of RAD Confirm acquisition
Store Monitor RAD	SM RAD	DERIVED\SECONDARY\\STORE MONITOR	CR,DX	CR (see A.6) DX (see A.4 and A.5)	Copied image
Store Monitor DFR	SM DFR	DERIVED\SECONDARY\SINGLE PLANE\STORE MONITOR	RF	XRF (see A.7)	Copied image
Store Monitor Fluoro	SM Loop	DERIVED\SECONDARY\SINGLE PLANE\STORE MONITOR\LIH	RF	XRF (see A.7)	Copied Image
DFR Single	DFR	ORIGINAL\PRIMARY\SINGLE PLANE	RF	XRF (see A.7)	DFR Single multi-frame with a single frame
DFR Series	DFR	ORIGINAL\PRIMARY\SINGLE PLANE	RF	XRF (see A.7)	DFR Series multi-frame
Fluoro Loop	Loop	ORIGINAL\PRIMARY\SINGLE PLANE\FLUORO\LOOP	RF	XRF (see A.7)	Fluoro Loop
Fluoro LIH	LIH	ORIGINAL\PRIMARY\SINGLE PLANE\FLUORO\LIH	RF	XRF (see A.7)	Fluoro “Last Image Hold”
Snapshot	SNS	ORIGINAL\PRIMARY\SINGLE PLANE\FLUORO\SNAPSHOT	RF	XRF (see A.7)	Snapshot single frame image generated during Fluoro
Ortho projections	Ortho Series	ORIGINAL\PRIMARY\\ORTHO\TILTING	CR or DX[6]	XRF (see A.7)	Original projections from Ortho acquisition
Ortho composed	OCMP	DERIVED\SECONDARY\\<algorithm>\<method>	CR or DX[6]	CR (see A.6) DX (see A.4 and A.5)	Composed Ortho image with algorithm from { "SPINE", "LLD_ORTHO", "LLD_ORTHO_ONELEG" } and method from { "IMAGE_BASED", "GEOMETRIC_BASED" }
Dose Report	Dose Report	N/A	SR	SR (see A.8)	

[5] As displayed in UI
[6] According to the configuration

A.2 Information shared across multiple IODs

A.2.1 Common Modules

All SOP Instances generated by the system use the common modules listed in this chapter or a subset of them, as defined in the IOD specific subsections below.

A.2.1.1 Patient Module

Table A.2.1-1: Patient Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Patient's Name	(0010,0010)	MWL USER GENERATED	ALWAYS	ALWAYS	Name of patient.	
Patient ID	(0010,0020)	MWL USER GENERATED	ALWAYS	ALWAYS	ID of patient.	
Patient's Birth Date	(0010,0030)	MWL USER GENERATED	ALWAYS	ALWAYS	Birth date of patient.	
Patient's Sex	(0010,0040)	MWL USER GENERATED	ALWAYS	ALWAYS	M: male F: female O: other	
Other Patient Ids	(0010,1000)	MWL USER	CONDITION	CONDITION	Other identification numbers or codes used to identify the patient.	Depending on the availability of the data in the MWL or if entered by the user.
Other Patient Names	(0010,1001)	MWL USER	CONDITION	CONDITION	Other names used to identify the Patient.	Depending on the availability of the data in the MWL or if entered by the user.
Ethnic Group	(0010,2160)	MWL USER	CONDITION	CONDITION	Ethnic group of the Patient.	Depending on the availability of the data in the MWL or if entered by the user.
Patient Comments	(0010,4000)	MWL USER	CONDITION	CONDITION	User-defined additional information about the Patient.	Depending on the availability of the data in the MWL or if entered by the user.

In case of an Emergency Patient, the data of the Patient are generated. This can be changed later, after the Patient was identified.

A.2.1.2 General Study Module

Table A.2.1-2: General Study Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Study Instance UID	(0020,000D)	MWL GENERATED	ALWAYS	ALWAYS	Study Instance UID from Modality Worklist in case of RIS registered studies, otherwise locally generated.	
Study Date	(0008,0020)	GENERATED	ALWAYS	ALWAYS	Taken from Modality Worklist, if available. Date of first image	

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
					acquisition in case of locally registered study.	
Study Time	(0008,0030)	GENERATED	ALWAYS	ALWAYS	Taken from Modality Worklist, if available. Time of first image acquisition in case of locally registered study.	
Referring Physician's Name	(0008,0090)	MWL USER	ALWAYS	CONDITION	Taken from Modality Worklist or entered by the user.	Depending on the availability of the data in the MWL or if entered by the user.
Study ID	(0020,0010)	MWL	ALWAYS	CONDITION	Requested Procedure ID (0040,1001) from Modality Worklist.	Depending on the availability of the data in the MWL.
Accession Number	(0008,0050)	MWL USER	ALWAYS	CONDITION	Taken from Modality Worklist or entered by the user.	Depending on the availability of the data in the MWL or if entered by the user.
Study Description	(0008,1030)	MWL GENERATED	ALWAYS	ALWAYS	Contains the "Displayed Text" from the attribute that was used for RIS matching. Concatenated in case of several CPs. If not available (e.g. local registration): Concatenation of the CP names.	
Referenced Study Sequence	(0008,1110)	MWL EMPTY	ALWAYS	CONDITION	Copy from Modality Worklist.	Empty in case of locally registered study.
Procedure Code Sequence	(0008,1032)	MWL EMPTY	ALWAYS	CONDITION	In scheduled case (from Modality Worklist): - Copy from Requested Procedure Code SQ (0032,1064) in case the performed procedure was the planned procedure	Empty in case of locally registered study.

A.2.1.3 Patient Study Module

Table A.2.1-3: Patient Study Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Admitting Diagnoses Description	(0008,1080)	MWL	CONDITION	CONDITION	Description of the admitting diagnosis (diagnoses).	Depending on the availability of the data in the MWL or if entered by the user.
Patient's Age	(0010,1010)	MWL USER GENERATED	ALWAYS	ALWAYS	Age of the patient when the examination is executed.	
Patient's Size	(0010,1020)	MWL USER	ALWAYS	ALWAYS	Size of the patient in meters when the examination is executed.	
Patient's Weight	(0010,1030)	MWL USER	ALWAYS	ALWAYS	Weight of the patient in kilograms when the examination is executed.	

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Medical Alerts	(0010,2000)	MWL USER	CONDITION	CONDITION	Conditions to which medical staff should be alerted (e.g., contagious condition, drug allergies, etc.).	Depending on the availability of the data in the MWL or if entered by the user.
Allergies	(0010,2110)	MWL USER	CONDITION	CONDITION	Description of prior reaction to contrast agents, or other patient allergies or ad-verse reactions.	Depending on the availability of the data in the MWL or if entered by the user.
Smoking Status	(0010,21A0)	MWL	CONDITION	CONDITION	Indicates whether Patient smokes.	Only if available in worklist.
Additional Patient History	(0010,21B0)	MWL	CONDITION	CONDITION	Taken from Modality Worklist.	Only if available in worklist.
Pregnancy Status	(0010,21C0)	MWL USER	CONDITION	CONDITION	0001: "not pregnant" 0002: "possibly pregnant" 0003: "definitely pregnant" 0004: "unknown"	Depending on the availability of the data in the MWL or if entered by the user.
Last Menstrual Date	(0010,21D0)	MWL	CONDITION	CONDITION	Date of onset of last menstrual period.	Only if available in worklist.
Admission ID	(0038,0010)	MWL USER	CONDITION	CONDITION	Identifier of the Visit as assigned by the healthcare provider.	Depending on the availability of the data in the MWL or if entered by the user.
Patient State	(0038,0500)	MWL	CONDITION	CONDITION	Description of Patient state (comatose, disoriented, vision impaired, etc.).	Only if available in worklist.

A.2.1.4 General Series Module

Table A.2.1-4: General Series Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Modality	(0008,0060)	FIXED	ALWAYS	ALWAYS	"DX" for DX images "CR" for CR images "RF" for XRF images "SR" for DICOM Dose Report	
Series Instance UID	(0020,000E)	GENERATED	ALWAYS	ALWAYS	RAD images and DFR Single images are stored by default in separate series (but this is configurable). RAD images for an ORTHO series are stored in separate CR/DX objects in the same series. Each composed image is stored in a separate series. Unprocessed images and processed images are stored in different series.	
Series Number	(0020,0011)	GENERATED	ALWAYS	ALWAYS	For each series of a study a running number is generated starting with 1 (for images) and 10000 (for Dose Reports). For each new study the counter is reset to 1 resp. 10000.	

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Laterality	(0020,0060)	USER	CONDITION	CONDITION	Can be "R", "L".	Only available if entered by user. Zero length if not available. Not sent when • Laterality is “both” or “unpaired” • “Series Model” configuration is used
Series Date	(0008,0021)	GENERATED	ALWAYS	ALWAYS	Date, when the first object in this series was created	
Series Time	(0008,0031)	GENERATED	ALWAYS	ALWAYS	Time, when the first object in this series was created	
Performing Physician's Name	(0008,1050)	MWL USER	ALWAYS	ALWAYS	Pre-filled with “Scheduled Performing Physician’s Name” from Modality Worklist. Can be overwritten by the user.	
Protocol Name	(0018,1030)	USER GENERATED	ALWAYS	ALWAYS	Name of CP Step.	
Series Description	(0008,103E)	USER GENERATED	ALWAYS	ALWAYS	Name of CP Step. For Fluoro name of kV curve.	
Operators' Name	(0008,1070)	USER GENERATED	ALWAYS	ALWAYS	Value as entered during patient registration. Pre-filled with login name of current user.	
Referenced Performed Procedure Step Sequence	(0008,1111)	GENERATED	ALWAYS	ALWAYS	Reference to the MPPS object.	
Body Part Examined	(0018,0015)	GENERATED	ALWAYS	ALWAYS	The Body Model / CP defines organs that are mapped to DICOM Body Parts as follows: Skull => SKULL, Jaw => JAW, C-Spine => CSPINE, T-Spine => TSPINE, L-Spine => LSPINE, S-Spine => SSPINE, Knee => KNEE, Ankle => ANKLE, Foot => FOOT, Leg => LEG, Chest => CHEST, Abdomen => AB-DOMEN, Shoulder => SHOULDER, Clavicle => CLAVICLE, Elbow => ELBOW, Hand => HAND, Pelvis => PELVIS, Hip => HIP, Fore-arm => FOREARM, Humerus => HUMER-US, Tibia => TIBIA, Femur => FEMUR, VertebralColumn => VERTEBRALCOLUMN	
Patient Position	(0018,5100)	USER	ALWAYS	CONDITION	Patient position descriptor relative to the equipment.	Only if entered by the user.
Request Attributes Sequence	(0040,0275)	MWL EMPTY	ALWAYS	CONDITION	Collects information taken from Modality Worklist.	Empty in case of locally registered patient.
>Requested Procedure ID	(0040,1001)	MWL USER	CONDITION	CONDITION	The Requested Procedure ID from main worklist request.	Not contained in case of

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
>Study Instance UID	(0020,000D)	MWL	CONDITION	CONDITION	The Study Instance UID from worklist request.	locally registered patient.
>Requested Procedure Description	(0032,1060)	MWL	CONDITION	CONDITION	The Requested Procedure Description from worklist request.	
>Reason for the Requested Procedure	(0040,1002)	MWL	CONDITION	CONDITION	The Reason for the Requested Procedure from worklist request.	
>Scheduled Procedure Step ID	(0040,0009)	MWL	CONDITION	CONDITION	The Scheduled Procedure Step ID from worklist request (contained in Scheduled Procedure Step Sequence).	
>Scheduled Procedure Step Description	(0040,0007)	MWL	CONDITION	CONDITION	The Scheduled Procedure Description from worklist request (contained in Scheduled Procedure Step Sequence).	
>Scheduled Protocol Code Sequence	(0040,0008)	MWL	CONDITION	CONDITION	The Scheduled Procedure Protocol Code Sequence from worklist request (contained in Scheduled Procedure Step Sequence).	
Performed Procedure Step ID	(0040,0253)	GENERATED	ALWAYS	ALWAYS	Internally generated. The PPSID of the MPPS instance to which this series is related.	
Performed Procedure Step Start Date	(0040,0244)	GENERATED	ALWAYS	ALWAYS	Study Date	
Performed Procedure Step Start Time	(0040,0245)	GENERATED	ALWAYS	ALWAYS	Study Time	
Performed Procedure Step Description	(0040,0254)	GENERATED	ALWAYS	ALWAYS	CP Name	

A.2.1.5 General Equipment Module

Table A.2.1-5: General Equipment Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Manufacturer	(0008,0070)	FIXED	ALWAYS	ALWAYS	“Siemens Healthineers”	
Institution Name	(0008,0080)	MWL CONFIG	ALWAYS	ALWAYS	Institution Name from Modality Worklist request or if not available: Institution Name from local configuration.	
Institution Address	(0008,0081)	EMPTY	ALWAYS	EMPTY	Empty.	
Station Name	(0008,1010)	CONFIG	ALWAYS	ALWAYS	Hostname	
Institutional Department Name	(0008,1040)	CONFIG	ALWAYS	ALWAYS	Institution Department Name from local configuration.	

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Manufacturer's Model Name	(0008,1090)	FIXED	ALWAYS	ALWAYS	“LUMINOS Q.namix T” or “LUMINOS Q.namix R”	
Device Serial Number	(0018,1000)	FIXED	ALWAYS	ALWAYS	The serial number of the device.	
Software Versions	(0018,1020)	CONFIG	ALWAYS	ALWAYS		

A.2.1.6 General Acquisition

Table A.2.1-6: General Acquisition Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Acquisition Date	(0008,0022)	N/A	N/A	N/A	See General Image Module	
Acquisition Time	(0008,0032)	N/A	N/A	N/A	See General Image Module	
Irradiation Event UID	(0008,3010)	N/A	N/A	N/A	See General Image Module	
Acquisition Number	(0020,0012)	N/A	N/A	N/A	See General Image Module	

A.2.1.7 General Image Module

Table A.2.1-7: General Image Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Instance Number	(0020,0013)	GENERATED	ALWAYS	ALWAYS	Current number of the image in creation order within a series, e.g. 1,2,3... Next series again starts with 1.	
Content Date	(0008,0023)	GENERATED	ALWAYS	ALWAYS	Date, when the pixel data or content was created.	
Content Time	(0008,0033)	GENERATED	ALWAYS	ALWAYS	Time, when the pixel data or content was created.	
Image Type	(0008,0008)	GENERATED	ALWAYS	ALWAYS	See Table A.1-2.	
Anatomic Region Sequence	(0008,2218)	CONFIG USER	ALWAYS	ALWAYS	Skull => (89546000,SCT,"Skull") Jaw => (661005,SCT,"Jaw Region") C-Spine => (122494005,SCT,"Cervical spine") T-Spine => (122495006,SCT,"Thoracic spine") L-Spine => (122496007,SCT,"Lumbar spine") S-Spine => (54735007,SCT,"Sacrum") Knee => (72696002,SCT,"Knee") Ankle => (70258002,SCT,"Ankle joint") Foot => (56459004,SCT,"Foot") Chest => (51185008,SCT,"Chest") Abdomen => (113345001,SCT,"Abdomen") Shoulder => (16982005,SCT,"Shoulder") Clavicle => (51299004,SCT,"Clavicle") Elbow => (16953009,SCT,"Elbow joint") Hand => (85562004,SCT,"Hand") Pelvis => (12921003,SCT,"Pelvis")	

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
					Hip => (29836001,SCT,"Hip joint") Forearm => (14975008,SCT,"Forearm") Humerus => (85050009,SCT,"Humerus") Tibia => (12611008,SCT,"Tibia") Femur => (71341001,SCT,"Femur") VertebralColumn => (110517009,SCT, "Vertebral column and cranium") Leg => (416631005,SCT, "Pelvis and lower extremities")	
Acquisition Number	(0020,0012)	GENERATED	ALWAYS	ALWAYS	Running number of the acquisition event for the active patient starting with 1. Absent for Ortho composed images.	
Acquisition Date	(0008,0022)	GENERATED	ALWAYS	ALWAYS	Date, when the image was acquired Absent for Ortho composed images.	
Acquisition Time	(0008,0032)	GENERATED	ALWAYS	ALWAYS	Time, when the image was acquired Absent for Ortho composed images.	
Irradiation Event UID	(0008,3010)	GENERATED	ALWAYS	ALWAYS	For the acquisition of each RAD image an "Irradiation Event UID" is generated and stored in the DICOM header of that image (both: unprocessed + processed). For ORTHO each original image gets an own "Irradiation Event UID". The composed image contains all "Irradiation Event UIDs" of the original images referenced (VM=1-n). In case of flavor change the reprocessed images all have the same Irradiation UID as they belong to the same Irradiation Event, but they all have a different SOPINUID.	
Burned In Annotation	(0028,0301)	FIXED	ALWAYS	ALWAYS	„NO“.	
Lossy Image Compression	(0028,2110)	GENERATED	CONDITIO N	CONDITIO N	“00”	
Presentation LUT Shape	(2050,0020)	GENERATED	ALWAYS	ALWAYS	„IDENTITY“ as Photometric Interpretation is always „MONOCHROME2“	

A.2.1.8 Image Pixel Module

Table A.2.1-8: Image Pixel Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Samples per Pixel	(0028,0002)	FIXED	ALWAYS	ALWAYS	1	
Photometric Interpretation	(0028,0004)	FIXED	ALWAYS	ALWAYS	“MONOCHROME2”	
Rows	(0028,0010)	GENERATED	ALWAYS	ALWAYS	Number of Rows	
Columns	(0028,0011)	GENERATED	ALWAYS	ALWAYS	Number of Columns	
Bits Allocated	(0028,0100)	FIXED	ALWAYS	ALWAYS	16	
Bits Stored	(0028,0101)	CONFIG	ALWAYS	ALWAYS	Globally configurable: 12 or 16.	
High Bit	(0028,0102)	GENERATED	ALWAYS	ALWAYS	Depends on “Bits Stored”: 11 or 15	
Pixel Representation	(0028,0103)	FIXED	ALWAYS	ALWAYS	0	

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Pixel Data	(7FE0,0010)	GENERATED	ALWAYS	ALWAYS	A data stream of the pixel samples that comprise the Image.	

A.2.1.9 Contrast/Bolus Module

Table A.2.1-9: Contrast/Bolus Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Contrast/Bolus Agent	(0018,0010)	USER	ALWAYS	CONDITION	User entered value for Contrast/Bolus Agent.	Empty if not entered by user.

A.2.1.10 Display Shutter Module

Table A.2.1-10: Display Shutter Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Shutter Shape	(0018,1600)	FIXED	CONDITION	CONDITION	RECTANGULAR	Depends on configuration.
Shutter Left Vertical Edge	(0018,1602)	GENERATED USER	CONDITION	CONDITION	From acquisition (AutoShutter) or Post Processing (user).	Depends on configuration.
Shutter Right Vertical Edge	(0018,1604)	GENERATED USER	CONDITION	CONDITION	See above.	Depends on configuration.
Shutter Upper Horizontal Edge	(0018,1606)	GENERATED USER	CONDITION	CONDITION	See above.	Depends on configuration.
Shutter Lower Horizontal Edge	(0018,1608)	GENERATED USER	CONDITION	CONDITION	See above.	Depends on configuration.

A.2.1.11 DX Detector Module

Table A.2.1-11: DX Detector Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Sensitivity	(0018,6000)	CONFIG	ALWAYS	ALWAYS	Dose Level from configuration.	
Detector Type	(0018,7004)	FIXED	ALWAYS	ALWAYS	“SCINTILLATOR”	
Detector Description	(0018,7006)	FIXED	ALWAYS	ALWAYS	Serial Number of detector.	
Detector ID	(0018,700A)	FIXED	ALWAYS	ALWAYS	Serial Number of detector.	
Date of Last Detector Calibration	(0018,700C)	GENERATED	ALWAYS	CONDITION	The date on which the detector used to acquire this image as identified in Detector ID (0018,700A) was last calibrated.	Empty if not calibrated.
Time of Last Detector Calibration	(0018,700E)	GENERATED	ALWAYS	CONDITION	The time at which the detector used to acquire this image as identified in Detector ID (0018,700A) was last calibrated.	Empty if not calibrated.
Detector Conditions	(0018,7000)	GENERATED	ALWAYS	ALWAYS	Set to “NO” if user was notified about possible image quality compromise (e.g. because detector temperature is out of	

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Nominal Flag					range, not calibrated, calibration expired), otherwise "YES"	
Detector Temperature	(0018,7001)	GENERATED	ALWAYS	ALWAYS	Detector temperature during exposure in degrees Celsius.	
Exposure Index	(0018,1411)	GENERATED	CONDITION	CONDITION	Measure of the detector response to radiation in the relevant image region of an image acquired with a digital x-ray imaging system as defined in IEC 62494-1.	Only for RAD images. Empty for Ortho composed images.
Target Exposure Index	(0018,1412)	CONFIG	CONDITION	CONDITION	Target Exposure Index as defined in IEC 62494-1. For 1-pt-technique: 100 * dose_level (from CP Step) For other techniques: value from corresponding 1-pt-technique variant.	Only for RAD images. Empty for Ortho composed images.
Deviation Index	(0018,1413)	GENERATED CONFIG	CONDITION	CONDITION	DI = 10 * log10(EI/TEI) Exposure Index (EI) and Target Exposure Index (TEI)	Only for RAD images. Only written for processed images. Empty for Ortho composed images.
Field of View Shape	(0018,1147)	FIXED	ALWAYS	ALWAYS	RECTANGLE	
Field of View Dimension(s)	(0018,1149)	GENERATED	ALWAYS	ALWAYS	Dimensions in mm of the Field of View, that is the image pixels stored in Pixel Data (7FE0,0010). Row dimension followed by column.	
Field of View Origin	(0018,7030)	GENERATED	ALWAYS	ALWAYS	Offset of the TLHC (top left-hand corner) of a rectangle circumscribing the Field of View, that is the image pixels stored in Pixel Data (7FE0,0010), before rotation or flipping, from the TLHC of the physical detector area measured in physical detector pixels as a row offset followed by a column offset.	
Field of View Rotation	(0018,7032)	GENERATED	ALWAYS	ALWAYS	Clockwise rotation in degrees of Field of View, that is the image pixels stored in Pixel Data (7FE0,0010), relative to the physical detector. Enumerated Values: 0,90,180,270	
Field of View Horizontal Flip	(0018,7034)	GENERATED	ALWAYS	ALWAYS	Whether or not a horizontal flip has been applied to the Field of View, that is the image pixels stored in Pixel Data (7FE0,0010), after rotation relative to the physical detector as described in Field of View Rotation (0018,7032). Enumerated Values: YES,NO	
Imager Pixel Spacing	(0018,1164)	GENERATED	ALWAYS	ALWAYS	Physical distance measured at the front plane of the detector housing between the center of each image pixel specified by a numeric pair - row spacing value (delimiter) column spacing value in mm.	
Pixel Spacing	(0028,0030)	USER CONFIG	CONDITION	CONDITION	Physical distance in the patient between the center of each pixel in mm. Differs from Imager Pixel Spacing in case of calibration (geometric or fiducial).	In case the image was not calibrated it depends on the

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
					For geometric calibration: Pixel spacing(0028, 0030) = Image pixel spacing * (SOD / SID)	configuration, if the Pixel Spacing is the same as Imager Pixel Spacing or completely absent.

A.2.1.12 VOI LUT Module

Table A.2.1-12: VOI LUT Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Window Center	(0028,1050)	GENERATED USER	ALWAYS	ALWAYS	Window Center value after last user adjustments or original value from auto window.	
Window Width	(0028,1051)	GENERATED USER	ALWAYS	ALWAYS	Window Width value after last user adjustments or original value from auto window.	

A.2.1.13 SOP Common Module

Table A.2.1-13: SOP Common Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
SOP Class UID	(0008,0016)	FIXED	ALWAYS	ALWAYS	1.2.840.10008.5.1.4.1.1.1.1 for "Digital X-Ray Image Storage - For Presentation" 1.2.840.10008.5.1.4.1.1.1.1.1 for "Digital X-Ray Image Storage - For Processing" 1.2.840.10008.5.1.4.1.1.1 for "Computed Radiography Image Storage" 1.2.840.10008.5.1.4.1.1.12.2 for "X-Ray Radiofluoroscopic Image Storage" 1.2.840.10008.5.1.4.1.1.88.67 for "X-Ray Radiation Dose SR"	
SOP Instance UID	(0008,0018)	GENERATED	ALWAYS	ALWAYS	Unique UID for the SOP Instance. Based on Root UID. LUMINOS Q.namix P: 1.3.12.2.1107.5.3.65 LUMINOS Q.namix R: 1.3.12.2.1107.5.3.66	
Specific Character Set	(0008,0005)	CONFIG	ALWAYS	ALWAYS	Contains the Character Set string for the local language.	
Instance Creation Date	(0008,0012)	GENERATED	ALWAYS	ALWAYS	Date, when the instance was created.	
Instance Creation Time	(0008,0013)	GENERATED	ALWAYS	ALWAYS	Time, when the instance was created.	

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Instance Creator UID	(0008,0014)	FIXED	ALWAYS	ALWAYS	Device UID.	
Instance Number	(0020,0013)	GENERATED	ALWAYS	ALWAYS	See General Image Module.	

A.2.2 Common Functional Group Macros

N.A.

A.2.3 Common Private Modules

The tables below list private Attributes that are used in multiple IODs generated by the system. For documentation convenience and readability, they are organized in modules, although the concept of modules does not exist in the standard for private Attributes.

A.2.3.1 Private Module “UIS Common”

Table A.2.3-1: Private Module “UIS Common”

Attribute Name	Tag	VR	VM	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Private Creator	(0015,00xx)	LO	1	GENERATED	ALWAYS	ALWAYS	“UIS_COMMON”	
Clinical Protocol Name	(0015,xx10)	LO	1	USER	ALWAYS	ALWAYS	The name of the Clinical Protocol.	
Clinical Protocol Step Name	(0015,xx11)	LO	1	USER	ALWAYS	ALWAYS	The name of the Clinical Protocol Step.	
Acquisition Type	(0015,xx16)	LO	1	USER	ALWAYS	ALWAYS	Can be: „Table“ „Wall Stand“ „Free Exposure“	
Ortho Direction	(0015,xx30)	LO	1	USER	CONDITION	CONDITION	Ortho direction: „HEAD2FEET“/“FEET2HEAD“	Only set for Ortho acquisitions.
Ortho Composing	(0015,xx31)	CS	1	GENERATED	CONDITION	CONDITION	„AUTO“: Auto „MANUAL“: Manual	Only set for Ortho acquisitions.
Ortho Transition Mode	(0015,xx32)	CS	1	USER	CONDITION	CONDITION	BLENDE CUT	Only set for Ortho acquisitions.
Ortho Step Distance	(0015,xx33)	US	1	GENERATED	CONDITION	CONDITION	Distance to previous ortho step in 0.1 mm (from upper edge to upper edge of previous image in series). Value equals to 0 in the first image of the Ortho series (Instance Number =1).	Only set for Ortho acquisitions.
Ortho Algorithm	(0015,xx34)	LO	1	USER	CONDITION	CONDITION	"SPINE", "LLD_ORTHO", "LLD_ORTHO_ONELEG" or "IMAGE_BASED" in ortho projection and composed images.	Only set for Ortho acquisitions.

A.2.3.2 Private Module “SIEMENS_FLCOMPACT_VA01A_PROC”

Table A.2.3-2: Private Module “SIEMENS_FLCOMPACT_VA01A_PROC”

Attribute Name	Tag	VR	VM	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Private Creator	(0017,00xx)	LO	1	GENERATED	ALWAYS	ALWAYS	“SIEMENS_FLCOMPACT_VA01A_PROC”	.
Blackening Correction	(0017,xx0A)	SS	1	GENERATED	ALWAYS	ALWAYS	0	
Dose Level	(0017,xx0B)	SS	1	GENERATED	ALWAYS	ALWAYS	Used dose level.	
SDM	(0017,xx0C)	SS	1	GENERATED	ALWAYS	ALWAYS	Indicates which measuring fields were used.	
Acquisition Filter	(0017,xx0F)	LO	1	GENERATED	ALWAYS	ALWAYS	Indicates if and which filter was used.	
Skin Dose	(0017,xx10)	SS	1	GENERATED	ALWAYS	ALWAYS		
Focus	(0017,xx11)	SS	1	GENERATED	ALWAYS	ALWAYS		
Bone Level Black White	(0017,xx16)	US	1	GENERATED	ALWAYS	ALWAYS		
Contrast Native	(0017,xx17)	US	1	GENERATED	ALWAYS	ALWAYS		
Brightness Native	(0017,xx18)	US	1	GENERATED	ALWAYS	ALWAYS		
ShutterX	(0017,xx19)	US	1	GENERATED	ALWAYS	ALWAYS		
ShutterY	(0017,xx1A)	US	1	GENERATED	ALWAYS	ALWAYS		
FlipH	(0017,xx1B)	US	1	GENERATED	ALWAYS	ALWAYS		
FlipV	(0017,xx1C)	US	1	GENERATED	ALWAYS	ALWAYS		
Zoom	(0017,xx1E)	US	1	GENERATED	ALWAYS	ALWAYS		
PanX	(0017,xx1F)	SS	1	GENERATED	ALWAYS	ALWAYS		
PanY	(0017,xx20)	SS	1	GENERATED	ALWAYS	ALWAYS		
Series Number	(0017,xx48)	SS	1	GENERATED	ALWAYS	ALWAYS		
Label	(0017,xx49)	SS	1	GENERATED	ALWAYS	ALWAYS		
Label Position	(0017,xx4A)	SS	1	GENERATED	ALWAYS	ALWAYS		
Single Series Flag	(0017,xx4D)	SS	1	GENERATED	ALWAYS	ALWAYS		
Flc Series Date	(0017,xx4E)	LO	1	GENERATED	ALWAYS	ALWAYS		
Flc Series Time	(0017,xx4F)	LO	1	GENERATED	ALWAYS	ALWAYS		
Image Type	(0017,xx50)	SS	1	GENERATED	ALWAYS	ALWAYS		
Bone Level Black White Acq.	(0017,xx66)	US	1	GENERATED	ALWAYS	ALWAYS		
Contrast Native Acq.	(0017,xx67)	US	1	GENERATED	ALWAYS	ALWAYS		
Brightness Native Acq.	(0017,xx68)	US	1	GENERATED	ALWAYS	ALWAYS		
Shutter X Acq.	(0017,xx8E)	US	1	GENERATED	ALWAYS	ALWAYS		
Shutter Y Acq.	(0017,xx8F)	US	1	GENERATED	ALWAYS	ALWAYS		
FlcDconfigFlipV	(0017,xx90)	US	1	GENERATED	ALWAYS	ALWAYS		
FlcDconfigFlipH	(0017,xx91)	US	1	GENERATED	ALWAYS	ALWAYS		
FlcDconfigRotation	(0017,xx92)	US	1	GENERATED	ALWAYS	ALWAYS		

Attribute Name	Tag	VR	VM	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
FlcDconfigOrientation	(0017,xx93)	US	1	GENERATED	ALWAYS	ALWAYS		
Laterality	(0017,xxA0)	US	1	GENERATED	ALWAYS	ALWAYS		
Label1 Flag	(0017,xxA1)	US	1	GENERATED	ALWAYS	ALWAYS		
Position Label 1	(0017,xxA2)	LO	1	GENERATED	ALWAYS	ALWAYS		
System Type	(0017,xxAA)	US	1	GENERATED	ALWAYS	ALWAYS		
FlcOrthoTechnique	(0017,xxAB)	US	1	GENERATED	ALWAYS	ALWAYS		
Detector Calibration Temperature	(0017,xxB0)	DS	1	GENERATED	ALWAYS	ALWAYS		
Anatomic Measurement	(0017,xxC1)	US	1	GENERATED	ALWAYS	ALWAYS		
DataModel	(0017,xxC2)	US	1	GENERATED	ALWAYS	ALWAYS		
“Name for RIS”	(0017,xxC4)	LO	1	GENERATED	ALWAYS	ALWAYS		
IsRejected	(0017,xxCA)	US	1	USER	CONDITION	CONDITION	0 (not rejected) 1 (rejected)	Only in case the image was rejected, otherwise empty.
RejectReason	0017,xxCB)	LO	1	USER	CONDITION	CONDITION	The reason for rejection entered by the user.	
RejectUser	0017,xxCC)	LO	1	USER	CONDITION	CONDITION	The operator who rejected the image.	
RejectDateTime	0017,xxCD)	DT	1	USER	CONDITION	CONDITION	The date and time, when the image was rejected.	

A.2.3.3 Private Module “Thorax/Multix FD Lab Settings”

Table A.2.3-3: Private Module “Thorax/Multix FD Lab Settings”

Attribute Name	Tag	VR	VM	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Private Creator	(0019,00xx)	LO	1	GENERATED	ALWAYS	ALWAYS	“Thorax/Multix FD Lab Settings”	
Table Object Distance	(0019,xx06)	FD	1	GENERATED	ALWAYS	ALWAYS		
Table Detector Distance	(0019,xx07)	FD	1	GENERATED	ALWAYS	ALWAYS		
Ortho Step Distance	(0019,xx08)	US	1-n	GENERATED	ALWAYS	ALWAYS		
Asymmetric Collimation	(0019,xx09)	LO	1	GENERATED	ALWAYS	ALWAYS		

A.2.3.4 Private Module “Image Presentation”

Table A.2.3-4: Private Module “Image Presentation”

Attribute Name	Tag	VR	VM	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Private Creator	(0019,00xx)	LO	1	GENERATED	ALWAYS	ALWAYS	“UIS_IMAGE_PRESENTATION”	
CP Step Horizontal Flip	(0019,xx43)	CS	1	CONFIG	CONDITION	CONDITION	Horizontal Flip from CP Step. Enumerated Values: 1 (YES, 0 (NO)	
CP Step Vertical Flip	(0019,xx44)	CS	1	CONFIG	CONDITION	CONDITION	Vertical Flip from CP Step. Enumerated Values: 1 (YES, 0 (NO)	
CP Step Rotation Angle	(0019,xx45)	DS	1	CONFIG	CONDITION	CONDITION	Rotation Angle in degrees from CP Step.	

A.2.3.5 Private Module “Thorax/Multix FD Post Processing”

Table A.2.3-5: Private Module “Thorax/Multix FD Post Processing”

Attribute Name	Tag	VR	VM	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Private Creator	(0021,00xx)	LO	1	GENERATED	CONDITION	CONDITION	“Thorax/Multix FD Post Processing”	
Auto Window Flag	(0021,xx08)	US	1	GENERATED	ALWAYS	ALWAYS		
Auto Window Center	(0021,xx09)	SL	1	GENERATED	ALWAYS	ALWAYS		
Auto Window Width	(0021,xx0A)	SL	1	GENERATED	ALWAYS	ALWAYS		
Internal Value	(0021,xx13)	US	1	GENERATED	ALWAYS	ALWAYS		
System Type	(0021,xx17)	LO	1	GENERATED	ALWAYS	ALWAYS		
Detector Type	(0021,xx18)	LO	1	GENERATED	ALWAYS	ALWAYS		
Anatomic Sort Number	(0021,xx30)	SH	1	GENERATED	ALWAYS	ALWAYS		
Acquisition Sort Number	(0021,xx31)	SH	1	GENERATED	ALWAYS	ALWAYS		

A.2.3.6 Private Module “Image Processing”

Table A.2.3-6: Private Module “Image Processing”

Attribute Name	Tag	VR	VM	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Private Creator	(0021,00xx)	LO	1	GENERATED	CONDITION	CONDITION	“UIS_IQ_IP”	
Readable CIPT and Flavor Information	(0021,xx14)	LT	1	GENERATED	ALWAYS	ALWAYS	Contains the following information about CIPT and Flavors:	

Attribute Name	Tag	VR	VM	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
							CIPT, Flavor, Version, UI Parameters with UI Parameter as B (Brightness), C (Contrast), Small Structures (S), Medium Structures (M), Dynamic (D), Noise Reduction (N)	

A.2.3.7 Private Module “Siemens: Thorax/Multix FD Raw Image Settings”

Table A.2.3-7: Private Module “Siemens: Thorax/Multix FD Raw Image Settings”

Attribute Name	Tag	VR	VM	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Private Creator	(0025,00xx)	LO	1	GENERATED	CONDITION	CONDITION	“Siemens: Thorax/Multix FD Raw Image Settings”	
Internal Value	(0025,xx10)	LT	1	GENERATED	ALWAYS	ALWAYS		
Ortho Subsampling	(0025,xx19)	US	1	GENERATED	ALWAYS	ALWAYS		
Image Crop Upper Left	(0025,xx1A)	US	2	GENERATED	ALWAYS	ALWAYS		
Image Crop Upper Right	(0025,xx1B)	US	2	GENERATED	ALWAYS	ALWAYS		
Image Crop Lower Left	(0025,xx1C)	US	2	GENERATED	ALWAYS	ALWAYS		
Image Crop Lower Right	(0025,xx1D)	US	2	GENERATED	ALWAYS	ALWAYS		
Manual Cropping	(0025,xx30)	US	1	GENERATED	ALWAYS	ALWAYS		
Physical EXI	(0025,xx36)	DS	1	GENERATED	ALWAYS	ALWAYS		
Clinical EXI	(0025,xx37)	DS	1	GENERATED	ALWAYS	ALWAYS		

A.3 Basic Directory IOD

Table A.3-1: IOD of created Basic Directory SOP Class Instances

IE	Module	Reference	Presence of Module
File-set Identification	File-set Identification Module	Table A.3.1-3	ALWAYS
Directory Information	Directory Information Module	Table A.3.1-2	ALWAYS

A.3.1 Basic Directory IOD Specific Modules

Table A.3.1-2: Directory Information Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value
Offset of the First Directory Record of the Root Directory Entity	(0004,1200)	GENERATED	ALWAYS	ALWAYS	
Offset of the Last Directory Record of the Root Directory Entity	(0004,1202)	GENERATED	ALWAYS	ALWAYS	
File-set Consistency Flag	(0004,1212)	GENERATED	ALWAYS	ALWAYS	0000h
Directory Record Sequence	(0004,1220)	GENERATED	ALWAYS	ALWAYS	
>Offset of the Next Directory Record	(0004,1400)	GENERATED	ALWAYS	ALWAYS	
>Record In-use Flag	(0004,1410)	GENERATED	ALWAYS	ALWAYS	FFFFh
>Offset of Referenced Lower-Level Directory Entity	(0004,1420)	GENERATED	ALWAYS	ALWAYS	
>Directory Record Type	(0004,1430)	GENERATED	ALWAYS	ALWAYS	PATIENT
>Specific Character Set	(0008,0005)	CONFIG	ALWAYS	ALWAYS	
>Patient's Name	(0010,0010)	GENERATED	ALWYS	ALWAYS	
>Patient ID	(0010,0020)	GENERATED	ALWAYS	ALWAYS	
>Patient's Birth Date	(0010,0030)	GENERATED	ALWAYS	ALWAYS	
>Patient's Sex	(0010,0040)	GENERATED	ALWAYS	ALWAYS	
>Directory Record Type	(0004,1430)	GENERATED	ALWAYS	ALWAYS	STUDY
>Specific Character Set	(0008,0005)	CONFIG	ALWAYS	ALWAYS	
>Study Date	(0008,0020)	GENERATED	ALWYS	ALWAYS	
>Study Time	(0008,0030)	GENERATED	ALWAYS	ALWAYS	
>Accession Number	(0008,0050)	GENERATED	ALWAYS	ALWAYS	
>Study Description	(0008,1030)	GENERATED	ALWAYS	ALWAYS	
>Study Instance UID	(0020,000D)	GENERATED	ALWAYS	ALWAYS	
>Study ID	(0020,0010)	GENERATED	CONDITION	CONDITION	If available.
>Directory Record Type	(0004,1430)	GENERATED	ALWAYS	ALWAYS	SERIES
>Specific Character Set	(0008,0005)	CONFIG	ALWAYS	ALWAYS	
>Series Date	(0008,0021)	GENERATED	ALWAYS	ALWAYS	
>Series Time	(0008,0031)	GENERATED	ALWAYS	ALWAYS	
>Modality	(0008,0060)	GENERATED	ALWAYS	ALWAYS	
>Institution Name	(0008,0080)	GENERATED	ALWAYS	CONDITION	If available.
>Institution Address	(0008,0081)	GENERATED	ALWAYS	CONDITION	If available.
>Series Description	(0008,103E)	GENERATED	ALWAYS	ALWAYS	

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value
>Performing Physician	(0008,1050)	GENERATED	ALWAYS	CONDITION	If available.
>Series Instance UID	(0020,000E)	GENERATED	ALWAYS	ALWAYS	
>Series Number	(0020,0011)	GENERATED	ALWAYS	ALWAYS	
>Directory Record Type	(0004,1430)	GENERATED	ALWAYS	ALWAYS	IMAGE
>Referenced File ID in File	(0004,1500)	GENERATED	ALWAYS	ALWAYS	Filename and path,
>Referenced SOP Class UID in File	(0004,1510)	GENERATED	ALWAYS	ALWAYS	
>Referenced SOP Instance UID in File	(0004,1511)	GENERATED	ALWAYS	ALWAYS	
>Referenced Transfer Syntax UID in File	(0004,1512)	GENERATED	ALWAYS	ALWAYS	
>Specific Character Set	(0008,0005)	CONFIG	ALWAYS	ALWAYS	
>Image Type	(0008,0008)	GENERATED	ALWAYS	ALWAYS	
>Instance Number	(0020,0013)	GENERATED	ALWAYS	ALWAYS	
>Number of Frames	(0028,0008)	GENERATED	ALWAYS	ALWAYS	
>Icon Image Sequence	(0088,0200)	GENERATED	ALWAYS	ALWAYS	
>>Samples per Pixel	(0028,0002)	GENERATED	ALWAYS	ALWAYS	1
>>Photometric Interpretation	(0028,0004)	FIXED	ALWAYS	ALWAYS	MONOCHROME2
>>Rows	(0028,0010)	GENERATED	ALWAYS	ALWAYS	128
>>Columns	(0028,0011)	GENERATED	ALWAYS	ALWAYS	128
>>Bits Allocated	(0028,0100)	GENERATED	ALWAYS	ALWAYS	8
>>Bits Stored	(0028,0101)	GENERATED	ALWAYS	ALWAYS	8
>>High Bit	(0028,0102)	GENERATED	ALWAYS	ALWAYS	7
>>Pixel Representation	(0028,0103)	GENERATED	ALWAYS	ALWAYS	0000H
>>Pixel Data	(7FE0,0010)	GENERATED	ALWAYS	ALWAYS	Icon Image
>Directory Record Type	(0004,1430)	GENERATED	ALWAYS	ALWAYS	SR DOCUMENT
>Referenced File ID in File	(0004,1500)	GENERATED	ALWAYS	ALWAYS	Filename and path,
>Referenced SOP Class UID in File	(0004,1510)	GENERATED	ALWAYS	ALWAYS	
>Referenced SOP Instance UID in File	(0004,1511)	GENERATED	ALWAYS	ALWAYS	
>Referenced Transfer Syntax UID in File	(0004,1512)	GENERATED	ALWAYS	ALWAYS	
>Specific Character Set	(0008,0005)	CONFIG	ALWAYS	ALWAYS	
>Content Date	(0008,0023)	GENERATED	ALWAYS	ALWAYS	
>Content Time	(0008,0033)	GENERATED	ALWAYS	ALWAYS	
>Instance Number	(0020,0013)	GENERATED	ALWAYS	ALWAYS	
>Concept Name Code Sequence	(0040,A043)	FIXED	ALWAYS	ALWAYS	
>Completion Flag	(0040,A491)	FIXED	ALWAYS	ALWAYS	“COMPLETE”
>Verification Flag	(0040,A493)	FIXED	ALWAYS	ALWAYS	“UNVERIFIED”
>Content Sequence	(0040,A730)	FIXED	ALWAYS	ALWAYS	
>>Relationship Type	(0040,A010)	FIXED	ALWAYS	ALWAYS	“HAS CONCEPT MOD”
>>Value Type	(0040,A040)	FIXED	ALWAYS	ALWAYS	“CODE”
>>Concept Name Code Sequence	(0040,A043)	FIXED	ALWAYS	ALWAYS	(“121058”, “DCM”, “Procedure reported”)
>>Concept Code Sequence	(0040,A168)	FIXED	ALWAYS	ALWAYS	(“113704”, “DCM”, “Projection X-Ray”)

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value
>>Content Sequence	(0040,A730)	FIXED	ALWAYS	ALWAYS	
>>>Relationship Type	(0040,A010)	FIXED	ALWAYS	ALWAYS	“HAS CONCEPT MOD”
>>>Value Type	(0040,A040)	FIXED	ALWAYS	ALWAYS	“CODE”
>>>Concept Name Code Sequence	(0040,A043)	FIXED	ALWAYS	ALWAYS	“G-C0E8”,”SRT”,”Has Intent”
>>>Concept Code Sequence	(0040,A168)	FIXED	ALWAYS	ALWAYS	(“R-408C3”, “SRT”, “Diagnostic Intent”)

Table A.3.1-3: File-set Identification Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value
File-set ID	(0004,1130)	GENERATED	ALWAYS	ALWAYS	Volume label of media

A.4 Digital X-Ray Image Storage IOD - For Presentation

Table A.4-1defines the structure of Digital X-Ray Image Storage IOD - For Presentation.

Table A.4-1: IOD of created Digital X-Ray Image Storage SOP Class Instances

IE	Module Name	Presence (Module)	Condition	Reference
Patient	Patient	ALWAYS	N/A	Table A.2.1-1
Study	General Study	ALWAYS	N/A	Table A.2.1-2
	Patient Study	ALWAYS	N/A	Table A.2.1-3
Series	General Series	ALWAYS	N/A	Table A.2.1-4
	DX Series	ALWAYS	N/A	Table A.4.1-2
Equipment	General Equipment	ALWAYS	N/A	Table A.2.1-5
Acquisition	General Acquisition	ALWAYS	N/A	Table A.2.1-6
Image	General Image	ALWAYS	N/A	Table A.2.1-7
	Image Pixel	ALWAYS	N/A	Table A.2.1-8
	Contrast/Bolus	CONDITION	If entered by user.	Table A.2.1-9
	DX Anatomy Imaged	ALWAYS	N/A	Table A.4.1-3
	DX Image	ALWAYS	N/A	Table A.4.1-4
	DX Detector	ALWAYS	N/A	Table A.2.1-11
	X-Ray Collimator	NEVER	N/A	
	DX Positioning	CONDITION	If entered by user.	Table A.4.1-5
	X-Ray Acquisition Dose	ALWAYS	N/A	Table A.4.1-6
	X-Ray Generation	ALWAYS	N/A	Table A.4.1-7
	X-Ray Filtration	ALWAYS	N/A	Table A.4.1-8
	X-Ray Grid	ALWAYS	N/A	Table A.4.1-9
	Overlay Plane	NEVER	N/A	N/A
	VOI LUT	ALWAYS	N/A	Table A.2.1-12
	Acquisition Context	ALWAYS	N/A	Table A.4.1-10
	SOP Common	ALWAYS	N/A	Table A.2.1-13
	Common Instance Reference	NEVER	N/A	
Private	UIS Common	ALWAYS	N/A	Table A.2.3-1
	SIEMENS_FLCOMPACT_VA01A _PROC	ALWAYS	N/A	Table A.2.3-2
	Image Presentation	ALWAYS	N/A	Table A.2.3-4
	Thorax/Multix FD Post Processing	ALWAYS	N/A	Table A.2.3-5
	Image Processing	ALWAYS	N/A	Table A.2.3-6
	Siemens: Thorax/Multix FD Raw Image Settings	ALWAYS	N/A	Table A.2.3-7

A.4.1 Digital X-Ray Image Storage IOD - For Presentation Specific Modules

The tables in this chapter list Modules and Attributes specific for Digital X-Ray Image Storage IOD - For Presentation.

A.4.1.1 DX Series Module

Table A.4.1-2: DX Series Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Modality	(0008,0060)	FIXED	ALWAYS	ALWAYS	"DX"	
Referenced Performed Procedure Step Sequence	(0008,1111)	GENERATED	ALWAYS	ALWAYS	Reference to the MPPS object.	
Presentation Intent Type	(0008,0068)	GENERATED	ALWAYS	ALWAYS	"FOR PRESENTATION" for processed images. "FOR PROCESSING" for unprocessed images.	

A.4.1.2 DX Anatomy Imaged Module

Table A.4.1-3: DX Anatomy Imaged Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Image Laterality	(0020,0062)	USER	ALWAYS	CONDITION	Laterality of (possibly paired) body part: R,L,U,B	Only available if entered by user.
Anatomic Region Sequence	(0008,2218)	CONFIG USER	ALWAYS	ALWAYS	See Table A.2.1-7	
>Code Value	(0008,0100)	CONFIG USER	ALWAYS	ALWAYS	See above	
>Coding Scheme Designator	(0008,0102)	CONFIG USER	ALWAYS	ALWAYS	See above	
>Code Meaning	(0008,0104)	CONFIG USER	ALWAYS	ALWAYS	See above	

A.4.1.3 DX Image Module

Table A.4.1-4: DX Image Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Image Type	(0008,0008)	CONFIG USER	ALWAYS	ALWAYS	See Table A.1-2.	
Samples per Pixel	(0028,0002)	GENERATED	ALWAYS	ALWAYS	1	
Photometric Interpretation	(0028,0004)	FIXED	ALWAYS	ALWAYS	"MONOCHROME2"	
Bits Allocated	(0028,0100)	GENERATED	ALWAYS	ALWAYS	16	
Bits Stored	(0028,0101)	GENERATED	ALWAYS	ALWAYS	Globally configurable: 12 or 16.	
High Bit	(0028,0102)	GENERATED	ALWAYS	ALWAYS	Depends on "Bits Stored": 11 or 15	
Pixel Representation	(0028,0103)	GENERATED	ALWAYS	ALWAYS	0	
Pixel Intensity Relationship	(0028,1040)	GENERATED	ALWAYS	ALWAYS	"LIN" for unprocessed images "DISP" for processed images	

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Pixel Intensity Relationship Sign	(0028,1041)	USER	ALWAYS	ALWAYS	“-1” for “Bones White” “1” for “Bones Black”	
Rescale Intercept	(0028,1052)	FIXED	ALWAYS	ALWAYS	0	
Rescale Slope	(0028,1053)	FIXED	ALWAYS	ALWAYS	1	
Rescale Type	(0028,1054)	FIXED	ALWAYS	ALWAYS	US	
Presentation LUT Shape	(2050,0020)	FIXED	ALWAYS	ALWAYS	“IDENTITY”	
Lossy Image Compression	(0028,2110)	GENERATED	CONDITION	ALWAYS	“00”	
Burned In Annotation	(0028,0301)	FIXED	ALWAYS	ALWAYS	“NO”	
Window Center	(0028,1050)	USER GENERATED	ALWAYS	ALWAYS	Window Center value after last user adjustments or original value from auto window.	
Window Width	(0028,1051)	USER GENERATED	ALWAYS	ALWAYS	Window Width value after last user adjustments or original value from auto window.	

A.4.1.4 DX Positioning Module

Table A.4.1-5: DX Positioning Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Patient Position	(0018,5100)	USER	ALWAYS	CONDITION	Patient position descriptor relative to the equipment.	Only if entered by the user.
View Position	(0018,5101)	USER CONFIG	ALWAYS	ALWAYS	Possible values: Empty, "AP", "PA", "LAT", "OBLIQUE", "DP", "DV", "RL", "LL", "RLD", "LLD", "RAO", "LAO"	
View Code Sequence	(0054,0220)	USER CONFIG	ALWAYS	CONDITION	Can be entered by the user. Baseline CID 4010 “DX View”. Empty if not defined. Possible values: (399348003,SCT,"antero-posterior") (272479007,SCT,"postero-anterior") (399067008,SCT,"lateral") (399182000,SCT,"oblique") (399335002,SCT,"dorsoplantar") (441672003,SCT,"Dorso-ventral") (399135007,SCT,"left anterior oblique") (399356000,SCT,"right anterior oblique") (399198007,SCT,"right lateral") (399173006,SCT,"left lateral") (102535000,SCT,"right lateral decubitus") (102536004,SCT,"left lateral decubitus")	Can be left empty by configuration or user.
>Code Value	(0008,0100)	USER	CONDITION	CONDITION	See above	

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
>Coding Scheme Designator	(0008,0102)	USER	CONDITION	CONDITION	See above	
>Code Meaning	(0008,0104)	USER	CONDITION	CONDITION	See above	
Distance Source to Patient	(0018,1111)	USER CONFIG	CONDITION	CONDITION	Distance in mm from source to center of field of view- Also known as SOD (Source Object Distance).	Only set in case it is entered by the user or preconfigured, otherwise empty.
Distance Source to Detector	(0018,1110)	USER GENERATED	CONDITION	CONDITION	Distance in mm from source to detector center.Also known as SID (Source Imager Distance).	Always set except for free acquisitions where it must be entered by the user, otherwise empty.
Estimated Radiographic Magnification Factor	(0018,1114)	USER	ALWAYS	CONDITION	Ratio of Source Image Receptor Distance (SID) over Source Object Distance (SOD).	Only set in case it is entered by the user or preconfigured, otherwise empty.
Positioner Type	(0018,1508)	FIXED	ALWAYS	ALWAYS	COLUMN	
Table Type	(0018,113A)	GENERATED	CONDITION	CONDITION	Angle of table plane in degrees relative to horizontal plane [Gravity plane]. Positive values indicate that the head of the table is upward.	Absent in case table was not used.

A.4.1.5 X-Ray Acquisition Dose Module

Table A.4.1-6: X-Ray Acquisition Dose Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
KVP	(0018,0060)	GENERATED	CONDITION	ALWAYS	Peak kilo voltage output of the X-Ray generator used.	Absent for Ortho composed images.
X-Ray Tube Current	(0018,1151)	GENERATED	CONDITION	ALWAYS	X-Ray Tube Current in mA	
X-Ray Tube Current in µA	(0018,8151)	GENERATED	CONDITION	ALWAYS	X-Ray Tube Current in µA.	
Exposure Time	(0018,1150)	GENERATED	CONDITION	ALWAYS	Duration of X-Ray exposure in ms.	
Exposure Time in µS	(0018,8150)	GENERATED	CONDITION	ALWAYS	Duration of X-Ray exposure in µs.	
Exposure	(0018,1152)	GENERATED	CONDITION	ALWAYS	The exposure expressed in mAs.	
Exposure in µAs	(0018,1153)	GENERATED	CONDITION	ALWAYS	The exposure expressed in µAs.	
Distance Source to Detector	(0018,1110)	USER GENERATED	CONDITION	ALWAYS	See DX Positioning.	
Distance Source to Patient	(0018,1111)	USER	CONDITION	ALWAYS	See DX Positioning.	

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Image and Fluoroscopy Area Dose Product	(0018,115E)	GENERATED	CONDITION	CONDITION	DAP in dGy cm² in case a DAP chamber is present, otherwise empty.	Absent for Ortho composed images.
Relative X-Ray Exposure	(0018,1405)	GENERATED	CONDITION	ALWAYS	Physical EXI.	Absent for Ortho composed images.
Entrance Dose	(0040,0302)	GENERATED	ALWAYS	ALWAYS	Entrance dose for this irradiation event. Same as skin dose/air kerma/Dose at RP.	
Entrance Dose in mGy	(0040,8302)	GENERATED	ALWAYS	ALWAYS	Entrance dose for this irradiation event. Same as skin dose/air kerma/Dose at RP.	
Anode Target Material	(0018,1191)	FIXED	ALWAYS	ALWAYS	TUNGSTEN	
Filter Type	(0018,1160)	USER CONFIG	ALWAYS	ALWAYS	"NONE" (if no filter was used) or "FLAT" (if filter was used)	
Filter Material	(0018,7050)	USER	CONDITION	ALWAYS	COPPER or absent	absent if no copper filter used
Filter Thickness Minimum	(0018,7052)	USER	CONDITION	ALWAYS	0.1 0.2 0.3	Only if filter was used, otherwise absent.
Filter Thickness Maximum	(0018,7054)	USER	CONDITION	ALWAYS	0.1 0.2 0.3	Only if filter was used, otherwise absent.
Exposure Index	(0018,1411)	GENERATED	ALWAYS	ALWAYS	See A.2.1.11.	
Target Exposure Index	(0018,1412)	GENERATED CONFIG	ALWAYS	ALWAYS	See A.2.1.11.	
Deviation Index	(0018,1413)	GENERATED	ALWAYS	ALWAYS	See A.2.1.11.	

A.4.1.6 X-Ray Generation Module

Table A.4.1-7: X-Ray Generation Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
KVP	(0018,0060)	GENERATED	CONDITION	ALWAYS	See X-Ray Acquisition Dose.	
X-Ray Tube Current	(0018,1151)	GENERATED	CONDITION	ALWAYS	See X-Ray Acquisition Dose.	
X-Ray Tube Current in µA	(0018,8151)	GENERATED	CONDITION	ALWAYS	See X-Ray Acquisition Dose.	
Exposure Time	(0018,1150)	GENERATED	CONDITION	ALWAYS	See X-Ray Acquisition Dose.	
Exposure Time in µS	(0018,8150)	GENERATED	CONDITION	ALWAYS	See X-Ray Acquisition Dose.	
Exposure	(0018,1152)	GENERATED	CONDITION	ALWAYS	See X-Ray Acquisition Dose.	
Exposure in µAs	(0018,1153)	GENERATED	CONDITION	ALWAYS	See X-Ray Acquisition Dose.	
Exposure Control Mode	(0018,7060)	GENERATED	ALWAYS	ALWAYS	AUTOMATIC for 1-pt-technique MANUAL for 2-pt and 3-pt technique	

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Exposure Control Mode Description	(0018,7062)	GENERATED	ALWAYS	ALWAYS	Used technique ("1-pt","2-pt","3-pt"). For 1-pt-technique additional information about AEC chambers from AKTMESSF.	
Focal Spot(s)	(0018,1190)	USER CONFIG	ALWAYS	ALWAYS	Focal spot size in mm Small focus: 0.6 mm Big focus: 1.0 mm	

A.4.1.7 X-Ray Filtration Module

Table A.4.1-8: X-Ray Filtration Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Filter Type	(0018,1160)	USER CONFIG	ALWAYS	ALWAYS	See X-Ray Acquisition Dose.	

A.4.1.8 X-Ray Grid Module

Table A.4.1-9: X-Ray Grid Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Grid	(0018,1166)	USER	ALWAYS	ALWAYS	“FOCUSED” in case of focused grid. “UNKNOWN” in case this is not known (mobile detector). “UNIVERSAL” in case the universal grid was used. “NONE”, if no grid was inserted/used.	
Grid Focal Distance	(0018,704C)	GENERATED	CONDITION	ALWAYS	Focal distance in mm of a FOCUSED grid.	Absent if no focused grid was used.

A.4.1.9 Acquisition Context Module

Table A.4.1-10: Acquisition Context Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Acquisition Context Sequence	(0040,0555)	EMPTY	ALWAYS	EMPTY	Empty.	

A.5 Digital X-Ray Image Storage IOD – For Processing

LUMINOS Q.namix can also export or send RAD images in “FOR PROCESSING” format. The images differ to the images in “FOR PRESENTATION” format in the attributes listed in Table A.5-11.

Table A.5-11: Differences between “FOR PROCESSING” and “FOR PRESENTATION” images

Attribute Name	Tag	Processed Images “FOR PRESENTATION”	Unprocessed images “FOR PROCESSING”
SOP Class UID	(0008,0016)	1.2.840.10008.5.1.4.1.1.1.1	1.2.840.10008.5.1.4.1.1.1.1.1
SOP Instance UID	(0008,0018)	Generated value.	Generated value.
Series Time	(0008,0031)	Generated value.	Generated value.
Content Time	(0008,0033)	Generated value.	Generated value.
Presentation Intent Type	(0008,0068)	"FOR PRESENTATION"	"FOR PROCESSING"
Series Description	(0008,103E)	Name of CP Step.	Name of CP Step. Additionally contains the string “RAW”.
Series Instance UID	(0020,000E)	Generated value.	Generated value.
Series Number	(0020,0011)	Generated value.	Generated value.
Bits Allocated	(0028,0100)	As configured.	16
Bits Stored	(0020,0101)	As configured.	16
High Bit	(0028,0102)	As configured.	15
Window Center	(0028,1050)	Present	Absent
Window Width	(0028,1051)	Present	Absent
Presentation LUT Shape	(2010,0020)	"IDENTITY"	Absent
Pixel Data	(7FE0,0010)	Pixel Data of processed image	Pixel Data of unprocessed image

A.6 Computed Radiography Image Storage IOD

Table A.6-1 defines the structure of Computed Radiography Image Storage IOD.

Table A.6-1: IOD of created Computed Radiography Image Storage SOP Class Instances

IE	Module Name	Presence (Module)	Condition	Reference
Patient	Patient	ALWAYS		Table A.2.1-1
Study	General Study	ALWAYS		Table A.2.1-2
	Patient Study	ALWAYS		Table A.2.1-3
Series	General Series	ALWAYS		Table A.2.1-4
	CR Series	ALWAYS		Table A.6.1-2
Equipment	General Equipment	ALWAYS		Table A.2.1-5
Acquisition	General Acquisition	ALWAYS		Table A.2.1-6
Image	General Image	ALWAYS		Table A.2.1-7
	Image Pixel	ALWAYS		Table A.2.1-8
	Contrast/Bolus	CONDITION	If entered by the user.	Table A.2.1-9
	CR Image	ALWAYS		Table A.6.1-3
	Overlay Plane	NEVER		
	Modality LUT	NEVER		
	VOI LUT	ALWAYS		Table A.2.1-12
	SOP Common	ALWAYS		Table A.2.1-13
	Common Instance Reference	NEVER		
Private	UIS Common	ALWAYS	N/A	Table A.2.3-1
	SIEMENS_FLCOMPACT_VA01A_PROC	ALWAYS	N/A	Table A.2.3-2
	Image Presentation	ALWAYS	N/A	Table A.2.3-4
	Thorax/Multix FD Post Processing	ALWAYS	N/A	Table A.2.3-5
	Image Processing	ALWAYS	N/A	Table A.2.3-6
	Siemens: Thorax/Multix FD Raw Image Settings	ALWAYS	N/A	Table A.2.3-7

A.6.1 Computed Radiography Image Storage IOD Specific Modules

The tables in this chapter list Modules and Attributes specific for Computed Radiography Image Storage IOD.

A.6.1.1 CR Series Module

Table A.6.1-2: CR Series Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Body Part Examined	(0018,0015)	GENERATED	ALWAYS	ALWAYS	See General Series Module.	
View Position	(0018,5101)	USER CONFIG	ALWAYS	ALWAYS	See General Series Module.	
Filter Type	(0018,1160)	USER CONFIG	ALWAYS	ALWAYS	See X-Ray Acquisition Dose.	
Focal Spot(s)	(0018,1190)	N/A	N/A	N/A	See X-Ray Generation.	

A.6.1.2 CR Image Module

Table A.6.1-3: CR Image Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Photometric Interpretation	(0028,0004)	N/A	N/A	N/A	See Image Pixel Module.	
KVP	(0018,0060)	N/A	N/A	N/A	See X-Ray Acquisition Dose.	
Distance Source to Detector	(0018,1110)	N/A	N/A	N/A	See X-Ray Acquisition Dose.	
Distance Source to Patient	(0018,1111)	N/A	N/A	N/A	See X-Ray Acquisition Dose.	
Exposure Time	(0018,1150)	N/A	N/A	N/A	See X-Ray Acquisition Dose.	
X-Ray Tube Current	(0018,1151)	N/A	N/A	N/A	See X-Ray Acquisition Dose.	
Exposure	(0018,1152)	N/A	N/A	N/A	See X-Ray Acquisition Dose.	
Exposure in µAs	(0018,1153)	N/A	N/A	N/A	See X-Ray Acquisition Dose.	
Imager Pixel Spacing	(0018,1164)	N/A	N/A	N/A	See DX Detector Module.	
Pixel Spacing	(0028,0030)	N/A	N/A	N/A	See DX Detector Module.	
Relative X-Ray Exposure	(0018,1405)	N/A	N/A	N/A	See X-Ray Acquisition Dose.	
Anatomic Region Sequence	(0008,2218)	N/A	N/A	N/A	See DX Anatomy Imaged.	
Exposure Index	(0018,1411)	N/A	N/A	N/A	See DX Detector Module.	
Target Exposure Index	(0018,1412)	N/A	N/A	N/A	See DX Detector Module.	
Deviation Index	(0018,1413)	N/A	N/A	N/A	See DX Detector Module.	

A.7 X-Ray Radiofluoroscopic Image Storage IOD

Table A.7-1 defines the structure of X-Ray Radiofluoroscopic Image Storage IOD.

Table A.7-1: IOD of created X-Ray Radiofluoroscopic Image Storage SOP Class Instances

IE	Module Name	Presence (Module)	Condition	Reference
Patient	Patient	ALWAYS		Table A.2.1-1
Study	General Study	ALWAYS		Table A.2.1-2
	Patient Study	ALWAYS		Table A.2.1-3
Series	General Series	ALWAYS		Table A.2.1-4
Equipment	General Equipment	ALWAYS		Table A.2.1-5
Image	General Image	ALWAYS		Table A.2.1-7
	General Acquisition	ALWAYS		Table A.2.1-6
	Image Pixel	ALWAYS		Table A.2.1-8
	Contrast/Bolus	CONDITION	If entered by the user.	Table A.2.1-9
	Cine	CONDITION	In case of multi-frame.	Table A.7.1-2
	Multiframe	CONDITION	In case of multi-frame.	Table A.7.1-3
	Frame Pointer	CONDITION	In case of multi-frame.	Table A.7.1-4
	Mask	NEVER		N/A
	Display Shutter	CONDITION	It is configurable in service if “Display Shutter” attributes are used and written into the images or if the shutter is “burned” into the pixel data.	Table A.2.1-10
	X-Ray Image	ALWAYS		Table A.7.1-5
	X-Ray Acquisition	ALWAYS		Table A.7.1-6
	X-Ray Collimator	NEVER		
	X-Ray Table	ALWAYS		Table A.7.1-7
	XRF Positioner	ALWAYS		Table A.7.1-8
	DX Detector	ALWAYS		Table A.2.1-11
	Overlay Plane	NEVER		
	Multi-frame Overlay	NEVER		
	Modality LUT	NEVER		
	VOI LUT	ALWAYS		Table A.2.1-12
	SOP Common	ALWAYS		Table A.2.1-13
	Common Instance Reference	NEVER		
Private	UIS Common	ALWAYS	N/A	Table A.2.3-1
	SIEMENS_FLCOMPACT_VA01A_PROC	ALWAYS	N/A	Table A.2.3-2
	Image Presentation	ALWAYS	N/A	Table A.2.3-4
	Thorax/Multix FD Post Processing	ALWAYS	N/A	Table A.2.3-5
	Image Processing	ALWAYS	N/A	Table A.2.3-6

A.7.1 X-Ray Radiofluoroscopic Image Storage IOD Specific Modules

The tables in this chapter list Modules and Attributes specific for X-Ray Radiofluoroscopic Image Storage IOD.

A.7.1.1 Cine Module

Table A.7.1-2: Cine Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Cine Rate	(0008,0040)	USER CONFIG	ALWAYS	ALWAYS	Last value for number of frames per second.	
Recommended Display Frame Rate	(0008,2144)	GENERATED	ALWAYS	ALWAYS	Same as Cine Rate.	
Frame Time	(0018,1063)	USER CONFIG	ALWAYS	ALWAYS	Nominal time (in msec) per individual frame. 0 in case only one frame is present.	

A.7.1.2 Multiframe Module

Table A.7.1-3: Multiframe Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Number of Frames	(0028,0008)	GENERATED	CONDITION	ALWAYS	Number of frames.	Absent for single frame objects.
Frame Increment Pointer	(0028,0009)	GENERATED	CONDITION	ALWAYS	"(0018,1063)" in case of a multi-frame.	

A.7.1.3 Frame Pointer Module

Table A.7.1-4: Frame Pointer Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Representative Frame Number	(0028,6010)	GENERATED	CONDITION	ALWAYS	Last frame of a Fluoro loop and middle frame for DFR Series.	Absent for single frame objects.

A.7.1.4 X-Ray Image Module

Table A.7.1-5: X-Ray Image Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Frame Increment Pointer	(0028,0009)	GENERATED	CONDITION	ALWAYS	"(0018,1063)" in case of a multi-frame.	Absent for single frame objects.
Lossy Image Compression	(0028,2110)	GENERATED	ALWAYS	ALWAYS	“00”	
Image Type	(0008,0008)	GENERATED	ALWAYS	ALWAYS	See Table A.1-2.	
Pixel Intensity Relationship	(0028,1040)	GENERATED	ALWAYS	ALWAYS	See Table A.4.1-4	
Samples per Pixel	(0028,0002)	FIXED	ALWAYS	ALWAYS	1	
Photometric Interpretation	(0028,0004)	FIXED	ALWAYS	ALWAYS	See Table A.2.1-8	
Bits Allocated	(0028,0100)	FIXED	ALWAYS	ALWAYS	See Table A.2.1-8	
Bits Stored	(0028,0101)	FIXED	ALWAYS	ALWAYS	See Table A.2.1-8	

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
High Bit	(0028,0102)	FIXED	ALWAYS	ALWAYS	See Table A.2.1-8	
Pixel Representation	(0028,0103)	FIXED	ALWAYS	ALWAYS	See Table A.2.1-8	
Anatomic Region Sequence	(0008,2218)	CONFIG USER	ALWAYS	ALWAYS	See Table A.2.1-7	

A.7.1.5 X-Ray Acquisition Module

Table A.7.1-6: X-Ray Acquisition Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
KVP	(0018,0060)	GENERATED	CONDITION	ALWAYS	See Table A.4.1-6	
Radiation Setting	(0018,1155)	GENERATED	ALWAYS	ALWAYS	"SC" for Fluoro "GR" for RAD and DFR Single/Series	
X-Ray Tube Current	(0018,1151)	GENERATED	CONDITION	ALWAYS	See Table A.4.1-6	
X-Ray Tube Current in µA	(0018,8151)	GENERATED	CONDITION	ALWAYS	See Table A.4.1-6	
Exposure Time	(0018,1150)	GENERATED	CONDITION	ALWAYS	See Table A.4.1-6	
Exposure Time in µS	(0018,8150)	GENERATED	CONDITION	ALWAYS	See Table A.4.1-6	
Exposure	(0018,1152)	GENERATED	CONDITION	ALWAYS	See Table A.4.1-6	
Exposure in µAs	(0018,1153)	GENERATED	CONDITION	ALWAYS	See Table A.4.1-6	
Grid	(0018,1166)	USER	ALWAYS	ALWAYS	See Table A.4.1-9	
Average Pulse Width	(0018,1154)	GENERATED	CONDITION	ALWAYS		
Radiation Mode	(0018,115A)	GENERATED	ALWAYS	ALWAYS	“PULSED”	
Field of View Shape	(0018,1147)	FIXED	ALWAYS	ALWAYS	See Table A.2.1-11	
Field of View Dimension(s)	(0018,1149)	GENERATED	ALWAYS	ALWAYS	See Table A.2.1-11	
Imager Pixel Spacing	(0018,1164)	GENERATED	ALWAYS	ALWAYS	See Table A.2.1-11	
Focal Spot(s)	(0018,1190)	USER CONFIG	ALWAYS	ALWAYS	See Table A.4.1-7	
Image and Fluoroscopy Area Dose Product	(0018,115E)	GENERATED	CONDITION	ALWAYS	See Table A.4.1-6	
Pixel Spacing	(0028,0030)	USER CONFIG	CONDITION	CONDITION	See Table A.2.1-11	

A.7.1.6 X-Ray Table Module

Table A.7.1-7: X-Ray Table Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Table Motion	(0018,1134)	FIXED	ALWAYS	ALWAYS	“STATIC”	

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Table Angle	(0018,1138)	USER	ALWAYS	ALWAYS	Angle of table plane in degrees relative to horizontal plane [Gravity plane]. Positive values indicate that the head of the table is upwards.	

A.7.1.7 XRF Positioner Module

Table A.7.1-8: XRF Positioner Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Distance Source to Detector	(0018,1110)	USER GENERATED	CONDITION	ALWAYS	See DX Positioning.	
Distance Source to Patient	(0018,1111)	USER	CONDITION	ALWAYS	See DX Positioning.	
Estimated Radiographic Magnification Factor	(0018,1114)	USER	ALWAYS	CONDITION	See DX Positioning.	
Column Angulation	(0018,1450)	USER	ALWAYS	ALWAYS	Angle of the X-Ray beam in degree relative to an orthogonal axis to the detector plane. Positive values indicate that the tilt is towards the head of the table.	

A.8 X-Ray Radiation Dose SR Storage IOD

Table A.8-1 defines the structure of X-Ray Radiation Dose SR Storage IOD.

Table A.8-1: X-Ray Radiation Dose SR Storage IOD

IE	Module Name	Presence (Module)	Condition	Reference
Patient	Patient	ALWAYS		Table A.2.1-1
Study	General Study	ALWAYS		Table A.2.1-2
	Patient Study	ALWAYS		Table A.2.1-3
Series	SR Document Series	ALWAYS		Table A.8.1-2
Equipment	General Equipment Module	ALWAYS		Table A.2.1-5
	Enhance General Equipment	ALWAYS		Table A.8.1-3
SR Document	SR Document General	ALWAYS		Table A.8.1-4
	SR Document Content	ALWAYS		Table A.8.1-5
	SOP Common Module	ALWAYS		Table A.2.1-13

A.8.1 X-Ray Radiation Dose SR Storage IOD Specific Modules

The tables in this chapter list Modules and Attributes specific for X-Ray Radiation Dose SR Storage IOD.

A.8.1.1 SR Document Series

Table A.8.1-2: SR Document Series Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Modality	(0008,0060)	FIXED	ALWAYS	ALWAYS	“SR”	
Series Instances UID	(0020,000E)	GENERATED	ALWAYS	ALWAYS	The Dose Report is stored in a separate series. There is one Dose Report per Procedure Step.	
Series Number	(0020,0011)	GENERATED	ALWAYS	ALWAYS	For each Dose Report there is an increasing number (starting with 10000)	
Series Date	(0008,0021)	GENERATED	ALWAYS	ALWAYS	Date, when the SR was created for the first time	
Series Time	(0008,0031)	GENERATED	ALWAYS	ALWAYS	Time, when the SR was created for the first time	
Protocol Name	(0018,1030)	GENERATED	ALWAYS	ALWAYS	Name of CP.	
Series Description	(0008,103E)	GENERATED	ALWAYS	ALWAYS	“Radiation Dose Information”.	
Referenced Performed Procedure Step Sequence	(0008,1111)	GENERATED	ALWAYS	ALWAYS	Reference to the MPPS object.	
>Referenced SOP Class UID	(0008,1150)	GENERATED	ALWAYS	ALWAYS	„1.2.840.10008.3.1.2.3.3“	
>Referenced SOP Instance UID	(0008,1155)	GENERATED	ALWAYS	ALWAYS	SOP Instance UID of the referenced MPPS object.	

A.8.1.2 Enhanced General Equipment Module

Table A.8.1-3: Enhanced General Equipment Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Manufacturer	(0008,0070)	N/A	N/A	N/A	N/A	See General Equipment Module.
Manufacturer's Model Name	(0008,1090)	N/A	N/A	N/A	N/A	See General Equipment Module.
Device Serial Number	(0018,1000)	N/A	N/A	N/A	N/A	See General Equipment Module.
Software Versions	(0018,1020)	N/A	N/A	N/A	N/A	See General Equipment Module.

A.8.1.3 SR Document General Module

Table A.8.1-4: SR Document General Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Instance Number	(0020,0013)	FIXED	ALWAYS	ALWAYS	1	
Completion Flag	(0040,A491)	FIXED	ALWAYS	ALWAYS	COMPLETE	
Verification Flag	(0040,A493)	FIXED	ALWAYS	ALWAYS	UNVERIFIED	
Content Date	(0008,0023)	GENERATED	ALWAYS	ALWAYS	Date, when the content was created.	
Content Time	(0008,0033)	GENERATED	ALWAYS	ALWAYS	Time, when the content was created.	
Referenced Request Sequence	(0040,A370)	GENERATED	CONDITION	ALWAYS	See below.	Filled in case of RIS procedure. Absent for locally registered procedure.
>Accession Number	(0008,0050)	MWL	ALWAYS	ALWAYS	The Accession Number of the RIS procedure.	
>Study Instance UID	(0020,000D)	MWL GENERATED	ALWAYS	ALWAYS	The Study Instance UID of the RIS procedure.	
>Referenced Study Sequence	(0008,1110)	GENERATED	ALWAYS	EMPTY	See below.	
>>Referenced SOP Class UID	(0008,1150)	FIXED	ALWAYS	ALWAYS	"1.2.840.10008.3.1.2.3.1"	
>>Referenced SOP Instance UID	(0008,1155)	MWL	ALWAYS	ALWAYS	The Study Instance UID of the RIS procedure.	
>Placer Order Number/ Imaging Service Request	(0040,2016)	MWL	ALWAYS	CONDITION	The Placer Order Number of the RIS procedure.	Depending on the availability of the data in the MWL.
>Filler Order Number / Imaging Service Request Attribute	(0040,2017)	MWL	ALWAYS	CONDITION	The Filler Order Number of the RIS procedure.	Depending on the availability of the data in the MWL.
>Requested Procedure ID	(0040,1001)	MWL USER	ALWAYS	CONDITION	The Requested Procedure ID of the RIS procedure.	Depending on the availability of the data in the MWL.
>Requested Procedure Description	(0032,1060)	MWL USER	ALWAYS	ALWAYS	The Requested Procedure Description of the RIS procedure.	
>Requested Procedure Code Sequence	(0032,1064)	MWL	CONDITION	CONDITION	The Requested Procedure Code of the.	Depending on the availability of the data in the MWL.

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
>Reason for the Requested Procedure	(0040,1002)	MWL	CONDITION	CONDITION	The Reason for the Requested Procedure of the RIS procedure.	Depending on the availability of the data in the MWL.
Performed Procedure Code Sequence	(0040,A372)	EMPTY	ALWAYS	EMPTY	Empty.	
Current Requested Procedure Evidence Sequence	(0040,A375)	GENERATED	ALWAYS	ALWAYS	Contains all images that were created during this procedure step.	
>Study Instance UID	(0020,000D)	MWL GENERATED	ALWAYS	ALWAYS	The Study Instance UID of the Dose Report and images.	
>Referenced Series Sequence	(0008,1115)	GENERATED	ALWAYS	ALWAYS	All series of this study including the unprocessed images.	
>>Series Instance UID	(0020,000E)	GENERATED	ALWAYS	ALWAYS	The Series Instance UID of the corresponding series.	
>>Referenced SOP Sequence	(0008,1199)	GENERATED	ALWAYS	ALWAYS	The Referenced SOP Sequence.	
>>>Referenced SOP Class UID	(0008,1150)	GENERATED	ALWAYS	ALWAYS	SOP Class UID of the referenced image.	
>>>Referenced SOP Instance UID	(0008,1155)	GENERATED	ALWAYS	ALWAYS	SOP Instance UID of the referenced image.	

A.8.1.4 SR Document Content Module

Table A.8.1-5: SR Document Content Module

Attribute Name	Tag	Source	Presence of Attribute	Presence of Value	Value	Conditions Comments
Value Type	(0040,A040)	FIXED	ALWAYS	ALWAYS	"CONTAINER"	
Concept Name Code Sequence	(0040,A043)	FIXED	ALWAYS	ALWAYS	EV (113701, DCM, "X-Ray Radiation Dose Report")	
Continuity of Content	(0040,A050)	FIXED	ALWAYS	ALWAYS	"SEPARATE"	
Content Template Sequence	(0040,A504)	FIXED	ALWAYS	ALWAYS	N/A	
>Mapping Resource	(0008,0105)	FIXED	ALWAYS	ALWAYS	"DCMR"	
>Template Identifier	(0040,DB00)	FIXED	ALWAYS	ALWAYS	"10001"	
Content Sequence	(0040,A730)	GENERATED	ALWAYS	ALWAYS	See A.8.1-6	

A.8.1.5 X-Ray Radiation Dose SR IOD Templates

Table A.8.1-6: X-Ray Radiation Dose SR IOD Templates

TID Name	TID	Comments
Projection X-Ray Radiation Dose	10001	See B.1
Accumulated X-Ray Dose	10002	See B.2
Irradiation Event X-Ray Data	10003	See B.3

Annex B Structured Report Content Encoding

LUMINOS Q.namix creates X-Ray Radiation Dose SRs implementing TID 10001 Projection X-Ray Radiation Dose as indicated in Figure B-9.

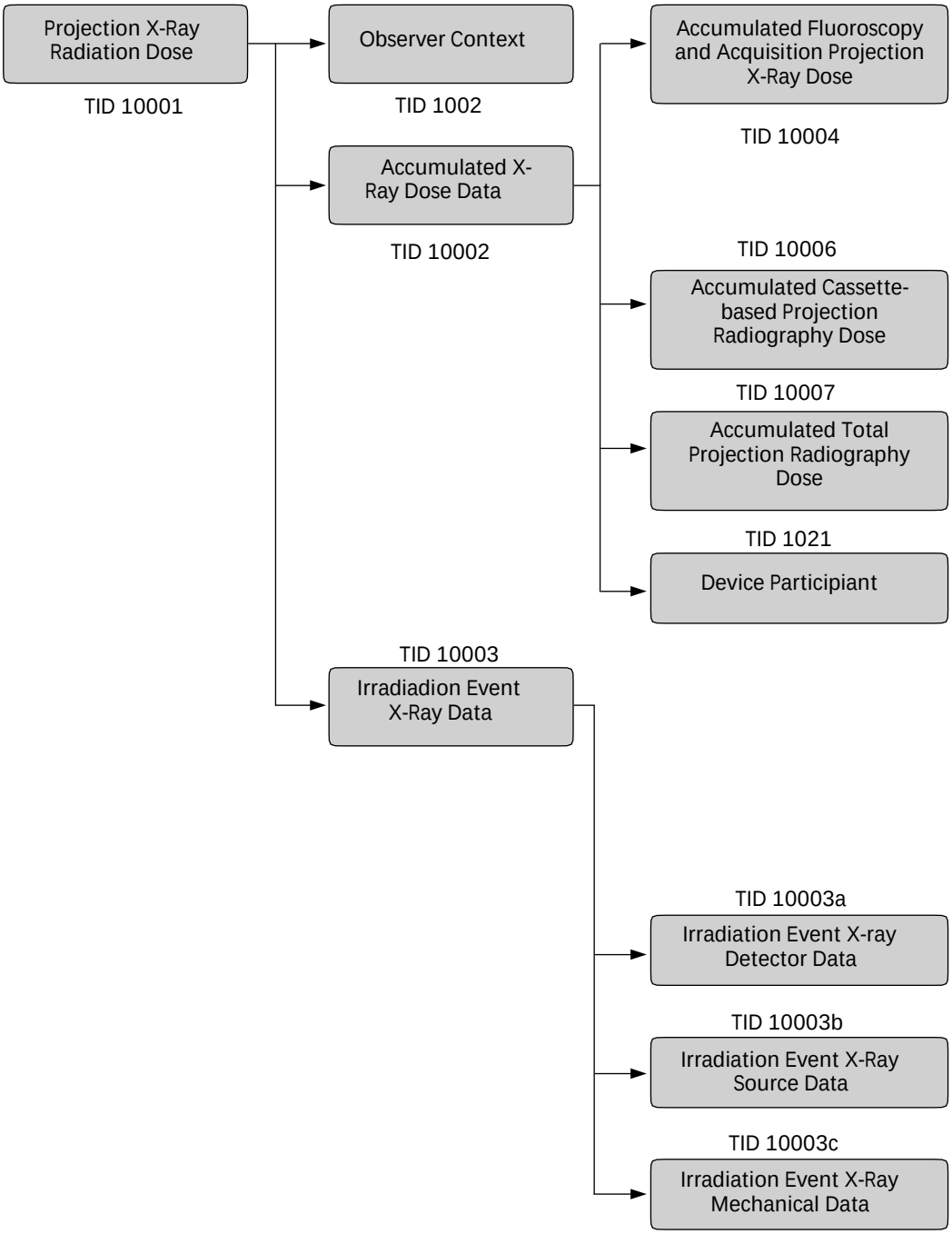


Figure B-9: X-Ray Radiation Dose SR IOD Template Structure

Throughout the tables listed in Annex B the following codes are used for the “Source” and “Presence of Content Item” columns.

In the “Source” column, the following Values can be used:

- FIXED: The Value is pre-defined and cannot be modified.
- GENERATED: The Value is generated by the system.
- CONFIG: The Value is copied from system configuration.
- MWL: The Value is copied from Modality Worklist entry.
- QUERY: The Value is determined by performing a query of any of the supported Query/Retrieve Services.
- USER: The Value is entered by the user.
- SCANNED: The Value is read from a barcode scanner or similar device.
- EMPTY: The Attribute is sent without Value.
- SRC_INSTANCE: The Value is copied from previously created/received SOP Instances.

In the “Presence of Content Item” the following Values can be used:

- ALWAYS: the module, functional group macro, Attributes or Value is always present.
- CONDITION: the presence of the module, functional group macro, Attributes or Value is dependent on a condition. The condition must be listed in the “Comments” column.
- SRC_COPY: The presence of the Attributes and Values depends on the availability of these in the source instances, which are used for copying this information.
- EMPTY: The Attribute is present but without a Value (zero length).

B.1 Projection X-Ray Radiation Dose (TID 10001)

Table B.1-1: Projection X-Ray Radiation Dose (TID 10001)

NL	Rel with Parent	VT	Concept Name	Source	Presence of Content Item	Values	TID	Comments
		CONTAINER	EV (113701,DCM,”X-Ray Radiation Dose Report”)”	GENERATED	ALWAYS	N/A	10001	Root node
>	HAS CONCEPT MOD	CODE	EV (121058,DCM, ”Procedure reported”)	GENERATED	ALWAYS	DT (113704, DCM, “Projection X-Ray”)	10001	
>>	HAS CONCEPT MOD	CODE	EV (363703001, SCT, "Has Intent")	GENERATED	ALWAYS	EV (261004008, SCT, "Diagnostic Intent")	10001	
>	HAS OBS CONTEXT	CODE	EV (121005,DCM, ”Observer Type”)	GENERATED	ALWAYS	EV (121007,DCM, “Device”)	1002	
>	HAS OBS CONTEXT	UIDREF	EV (121012,DCM, “Device Observer UID”)	GENERATED	ALWAYS	Device product UID	1002	
>	HAS OBS CONTEXT	TEXT	EV (121013,DCM, “Device Observer Name”)	CONFIG	ALWAYS	Value from Station Name (0008,1010) in Table A.2.1-5.	1002	
>	HAS OBS CONTEXT	TEXT	EV (121014,DCM, “Device Observer Manufacturer”)	GENERATED	ALWAYS	See Manufacturer (0008,0070) in Table A.2.1-5.	1002	
>	HAS OBS CONTEXT	TEXT	EV (121015,DCM, “Device Observer Model Name”)	GENERATED	ALWAYS	See Manufacturer's Model Name (0008,1090) in Table A.2.1-5.	1002	
>	HAS OBS CONTEXT	TEXT	EV (121016,DCM, “Device Observer Serial Number”)	CONFIG	ALWAYS	See Device Serial Number (0018,1000) in Table A.2.1-5.	1002	
>	HAS OBS CONTEXT	CODE	EV (121005,DCM, "Observer Type")	USER	CONDITION	EV (121006,DCM, “Person”)	1002	

NL	Rel with Parent	VT	Concept Name	Source	Presence of Content Item	Values	TID	Comments
>	HAS OBS CONTEXT	PNAME	EV (121008,DCM, "Person Observer Name")	USER	CONDITION	Same as Operator's Name	1002	If Operator was entered.
>	HAS OBS CONTEXT	TEXT	EV (121009,DCM, "Person Observer's Organization Name")	CONFIG	CONDITION	Value from Institution Name (0008,0080)	1002	
>	HAS OBS CONTEXT	CODE	EV (121011,DCM, "Person Observer's Role in this Procedure")	FIXED	CONDITION	EV (113851,DCM, “Irradiation Administering”)	1002	
>	HAS OBS CONTEXT	CODE	EV (113705,DCM, "Scope of Accumulation")	GENERATED	ALWAYS	EV (113970, DCM, ”Procedure Step To This Point")	10001	
>>	HAS PROPERTIES	UIDREF	EV (121126,DCM, "Performed Procedure Step SOP Instance UID")	GENERATED	ALWAYS	Performed Procedure Step SOP Instance UID	10001	
>	CONTAINS	INCLUDE	DTID 10002 “Accumulated X-Ray Dose”	N/A	ALWAYS	See Accumulated X-Ray Dose (TID 10002).	10001	
>	CONTAINS	INCLUDE	DTID 10003 “Irradiation Event X-Ray Data”	N/A	ALWAYS	For each Irradiation Event. See Irradiation Event X-Ray Data (TID 10003).	10001	
>	CONTAINS	TEXT	EV (121106, DCM, “Comment”)	GENERATED	ALWAYS	Formatted dose information. See “Comments on Radiation Dose” (0040,0310) in Table 5.2-2 .	10001	
>	CONTAINS	CODE	EV (113854, DCM, "Source of Dose Information")	FIXED	ALWAYS	EV("15869005",SCT," Dosimeter")	10001	

B.2 Accumulated X-Ray Dose (TID 10002)

Table B.2-2: Accumulated X-Ray Dose (TID 10002)

NL	Rel with Parent	VT	Concept Name	Source	Presence of Content Item	Values	TID	Comments
		CONTAINER	EV (113702, DCM, „Accumulated X-Ray Dose Data“)	GENERATED	ALWAYS	N/A	10002	Root Node
>	HAS CONCEPT MOD	CODE	EV (113764, DCM, „Acquisition Plane“)	FIXED	ALWAYS	EV (113622, DCM, ”Single Plane”)	10002	
>	CONTAINS	CONTAINER	EV (122505, DCM, “Calibration”)	USER	CONDITION	User entered calibration data from configuration.	10002	Separate configuration for each available tube. Only available if entered by user.
>>	HAS CONCEPT MOD	CODE	EV (113794, DCM, “Dose Measurement Device”)	FIXED	ALWAYS	EV ("15869005",SCT,"Dosimeter")	10002	
>>	CONTAINS	DATETIME	EV (113723, DCM, “Calibration DateTime”)	USER	ALWAYS	User entered date of calibration procedure.	10002	
>>	CONTAINS	NUM	EV (122322, DCM, “Calibration Factor”)	USER	ALWAYS	User entered calibration factor.	10002	
>>	CONTAINS	NUM	EV (113763, DCM, “Calibration Uncertainty”)	USER	ALWAYS	User entered calibration uncertainty in percent.	10002	
>>	CONTAINS	TEXT	EV (113724, DCM, “Calibration Responsible Party”)	USER	ALWAYS	User entered text for calibration responsible party.	10002	
>>	CONTAINS	TEXT	EV (113720, DCM, “Calibration Protocol”)	USER	ALWAYS	User entered text for calibration protocol.	10002	
>	CONTAINS	NUM	EV (113722, DCM, “Dose Area Product Total”)	GENERATED	ALWAYS	Accumulated dose area product from acquisitions.	10002	
>	CONTAINS	NUM	EV (113725, DCM, “Dose (RP) Total”)	GENERATED	ALWAYS	Accumulated entrance dose from acquisitions.	10002	
>	CONTAINS	NUM	EV (113737, DCM, “Distance Source to Reference Point”)	GENERATED	ALWAYS	Distance to the Reference Point (RP) defined according to IEC 60601-2-43 or equipment defined.	10002	
>	CONTAINS	NUM	EV (113731, DCM, “Total Number of Radiographic Frames”)	GENERATED	ALWAYS	Accumulated count of exposure pulses (single or multi-frame encoded) created from irradiation events performed with high dose (acquisition).	10002	

NL	Rel with Parent	VT	Concept Name	Source	Presence of Content Item	Values	TID	Comments
>	CONTAINS	NUM	EV (113726, DCM, “Fluoro Dose Area Product Total”)	GENERATED	ALWAYS	Accumulated dose area product from FLUORO only.	10002	
>	CONTAINS	NUM	EV (113728, DCM, “Fluoro Dose (RP) Total”)	GENERATED	ALWAYS	Accumulated entrance dose from FLUORO only.	10002	
>	CONTAINS	NUM	EV (113730, DCM, “Total Fluoro Time”)	GENERATED	ALWAYS	The time the FLUORO switch was pressed.	10002	
>	CONTAINS	NUM	EV (113727, DCM, “Acquisition Dose Area Product Total”)	GENERATED	ALWAYS	Accumulated dose area product from acquisition only.	10002	
>	CONTAINS	NUM	EV (113729, DCM, “Acquisition Dose (RP) Total”)	GENERATED	ALWAYS	Accumulated entrance dose from acquisitions.	10002	
>	CONTAINS	CODE	EV (113780, DCM, “Reference Point Definition“)	FIXED	ALWAYS	EV (113984,DCM, “At Surface of patient”)	10002	
>	CONTAINS	NUM	EV (113855, DCM, “Total Acquisition Time”)	GENERATED	ALWAYS	Total accumulated acquisition clock time in the scope of the including report (sum of the Irradiation Duration values for accumulated acquisition irradiation events).	10002	

B.3 Irradiation Event X-Ray Data (TID 10003)

Table B.3-3: Irradiation Event X-Ray Data (TID 10003)

NL	Rel with Parent	VT	Concept Name	Source	Presence of Content Item	Values	TID	Comments
		CONTAINER	EV (113706, DCM, ”Irradiation Event X-Ray Data”)	GENERATED	ALWAYS	N/A	10003	Root item
>	HAS CONCEPT MOD	CODE	EV (113764, DCM, “Acquisition Plane”)	FIXED	ALWAYS	EV (113662, DCM, “Single Plane”)	10003	
>	CONTAINS	UIDREF	EV (113769, DCM, “Irradiation Event UID”)	GENERATED	ALWAYS	Value from Irradiation Event UID (0008,3010).	10003	
>	CONTAINS	TEXT	EV (113605, DCM, „Irradiation Event Label“)	GENERATED	ALWAYS	The label for this Irradiation event. An increasing number starting with 1.	10003	
>	CONTAINS	DATE-TIME	DT (111526, DC“, „DateTime Started“)	GENERATED	ALWAYS	Date/Time the irradiation event started.	10003	

NL	Rel with Parent	VT	Concept Name	Source	Presence of Content Item	Values	TID	Comments
>	CONTAINS	CODE	EV (113721, DCM, “Irradiation Event Type”)	USER	ALWAYS	EV (113611, DCM, ”Stationary Acquisition”) or EV (P5-06000,SRT,"Fluoroscopy")	10003	
>	CONTAINS	TEXT	EV (125203, DCM, “Acquisition Protocol”)	USER	ALWAYS	Name of used CP Step	10003	
>	CONTAINS	CODE	EV (111031, DCM, „Image View“)	USER	CONDITION	Can be entered by the user. Baseline CID 4010 “DX View”. Possible values: EV (399348003,SCT,"antero-posterior") EV (272479007,SCT,"postero-anterior") EV (399182000,SCT,"oblique") EV (399067008,SCT,"lateral")	10003	If entered by the user.
>	CONTAINS	CODE	EV (113745, DCM, „Patient Table Relationship“)	USER	CONDITION	Can be entered by the user. The following values are possible: EV(102540008,SCT,"headfirst") EV (102541007,SCT,"feet-first")	10003	
>	CONTAINS	CODE	EV (113743, DCM, "Patient Orientation")	USER	CONDITION	Can be entered by the user. The following values are possible: EV(102538003,SCT,"recumbent") for table acquisitions EV (C86043,NCIt,"erect") for wall acquisitions	10003	
>>	HAS CONCEPT MOD	CODE	EV (113744, DCM, „Patient Orientation Modifier“)	USER	CONDITION	Can be entered by the user. The following values are possible: EV (10904000,SCT,"standing") for wall acquisitions EV (1240000,SCT,"prone") for Patient Position "HFP", "FFP" EV (40199007,SCT,"supine") for Patient Position "HFS","FFS" EV (102535000,SCT,"right lateral decubitus") for Patient Position "HFDR","FFDR" EV (102536004,SCT,"left lateral decubitus") for Patient Position "HFDL","FFDL"	10003	
>	CONTAINS	CODE	EV (123014, DCM, "Target Region")	USER	ALWAYS	See “Anatomic Region Sequence” in Table A.2.1-7.	10003	
>>	HAS CONCEPT MOD	CODE	EV (272741003, SCT, "Laterality")	USER	CONDITION	Can be entered by the user. Absent if not defined Possible values: R => EV(24028007,SCT,”Right”) L=> EV(7771000,SCT,”Left”) U=> EV not contained B=> EV(51440002,SCT,”Bilateral”)	10003	Only available if entered by user.
>	CONTAINS	NUM	EV (122130, DCM, “Dose Area Product”)	GENERATED	ALWAYS	Dose Area Product (in Gy.m2) for this irradiation event.	10003	

NL	Rel with Parent	VT	Concept Name	Source	Presence of Content Item	Values	TID	Comments
>	CONTAINS	CODE or TEXT	EV (113780, DCM, "Reference Point Definition")	FIXED	ALWAYS	EV (113863,DCM,"30cm above table") for LUMINOS Q.namix R EV (113862,DCM,"1cm above table") for LUMINOS Q.namix T	10003	
>	CONTAINS	TEXT	EV (121106, DCM, "Comment")	GENERATED	ALWAYS	Formatted dose information. Same as "Comment" in "Projection X-Ray Radiation Dose" but only for a single irradiation.	10003	
>	CONTAINS	NUM	EV (113845, DCM, “Exposure Index”)	GENERATED	CONDITION	See „Exposure Index“ in Table A.2.1-11	10003A	
>	CONTAINS	NUM	EV (113846, DCM, “Target Exposure Index”)	CONFIG	CONDITION	See „Target Exposure Index“ in Table A.2.1-11	10003A	
>	CONTAINS	NUM	EV (113847, DCM, “Deviation Index”)	GENERATED CONFIG	CONDITION	See „Deviation Index“ in Table A.2.1-11	10003A	
>	CONTAINS	CODE	EV (113876, DCM, "Device Role in Procedure")	FIXED	ALWAYS	EV (113859, DCM, "Irradiating Device")	1021	
>>	HAS PROPERTIES	TEXT	EV (113878, DCM, "Device Manufacturer")	FIXED	ALWAYS	See Manufacturer (0008,0070) in Table A.2.1-5.	1021	
>>	HAS PROPERTIES	TEXT	EV (113879, DCM, "Device Model Name")	FIXED	ALWAYS	See Manufacturer's Model Name (0008,1090) in Table A.2.1-5.	1021	
>>	HAS PROPERTIES	TEXT	EV (113880, DCM, "Device Serial Number")	CONFIG	ALWAYS	See Device Serial Number (0018,1000) in Table A.2.1-5.	1021	
>>	HAS PROPERTIES	UIDREF	EV (121012, DCM, "Device Observer UID")	GENERATED	ALWAYS	Device/Product UID	1021	
>	CONTAINS	IMAGE	EV (113795, DCM, “Acquired Image”)	GENERATED	ALWAYS	Reference to the image.	10003A	
>	CONTAINS	NUM	EV (113738, DCM, “Dose (RP)”	GENERATED	ALWAYS	Entrance Dose in Gy for this irradiation event.	10003B	
>	CONTAINS	CODE	EV (113732, DCM, “Fluoro Mode”)	GENERATED	CONDITION	EV (113631,DCM, ”Pulsed”)	10003B	Only for Fluoro.
>	CONTAINS	NUM	EV (113791, DCM, “Pulse Rate”)	GENERATED	CONDITION	FLUORO frame rate.	10003B	
>	CONTAINS	NUM	EV (113768, DCM, “Number of Pulses”)	GENERATED	ALWAYS	Number of Pulses.	10003B	
>	CONTAINS	NUM	EV (113793, DCM, “Pulse Width”)	GENERATED	ALWAYS	Average X-Ray pulse width in ms	10003B	

NL	Rel with Parent	VT	Concept Name	Source	Presence of Content Item	Values	TID	Comments
>	CONTAINS	NUM	EV (113742, DCM, "Irradiation Duration")	GENERATED	ALWAYS	Irradiation Duration in sec	10003B	
>	CONTAINS	NUM	EV (113733, DCM, “KVP”)	GENERATED	ALWAYS	KV	10003B	
>	CONTAINS	NUM	EV (113734, DCM, “X-Ray Tube Current”)	GENERATED	ALWAYS	X-Ray tube current in mA	10003B	
>	CONTAINS	NUM	EV (113824, DCM, “Exposure Time”)	GENERATED	ALWAYS	Exposure Time in ms	10003B	
>	CONTAINS	NUM	EV (113736, DCM, “Exposure”)	GENERATED	ALWAYS	µAs	10003B	
>	CONTAINS	NUM	EV (113766, DCM, "Focal Spot Size")	GENERATED	ALWAYS	Focal spot size in mm.	10003B	
>	CONTAINS	CONTAINER	EV (113771, DCM, “X-Ray Filters”)	GENERATED	ALWAYS	N.a.	10003B	
>>	CONTAINS	CODE	EV (113772, DCM, “X-Ray Filter Type”)	GENERATED	ALWAYS	EV (111609,DCM,”No Filter”) in case no copper filter was inserted, otherwise EV (113650,DCM,”Strip filter”)	10003B	
>>	CONTAINS	CODE	EV (113757, DCM, “X-Ray Filter Material”)	GENERATED	CONDITION	EV (C-127F9,SRT, ”Copper or Copper compound")	10003B	If copper filter was used.
>>	CONTAINS	NUM	EV (113758, DCM, “X-Ray Filter Thickness Minimum”)	GENERATED	CONDITION	Thickness of copper filter. 0 in case no filter was used.	10003B	
>>	CONTAINS	NUM	EV (113773, DCM, “X-Ray Filter Thickness Maximum”)	GENERATED	CONDITION	Thickness of copper filter. 0 in case no filter was used.	10003B	
>	CONTAINS	NUM	EV (113790, DCM, "Collimated Field Area")	GENERATED	ALWAYS	Collimated field area at image receptor.	10003B	
>	CONTAINS	NUM	EV (113788, DCM, "Collimated Field Height")	GENERATED	ALWAYS	Distance between the collimator blades in pixel column direction as projected at the detector plane.	10003B	
>	CONTAINS	NUM	EV (113789, DCM, "Collimated Field Width")	GENERATED	ALWAYS	Distance between the collimator blades in pixel row direction as projected at the detector plane.	10003B	
>	CONTAINS	NUM	EV (113750, DCM“, "Distance Source to Detector")	GENERATED	CONDITION	Distance in mm from source to detector center. Also known as SID (Source Image Distance).	10003C	Only set in case it is known, otherwise not contained.

Annex C Security Details

This section provides additional details about security features that are formally described in Section 8.

C.1 External Network Requirement Details

C.1.1 Basic Time Synchronization

LUMINOS Q.namix acts as an NTP Client in the Maintain Time Transaction.

C.1.2 Basic Network Address Management

The Network API of the Operation System is responsible for the discovery of the DHCP Server. LUMINOS Q.namix is operable in a DHCP environment but must be equipped with a fixed IP address.

C.1.3 Application Configuration Management

N/A

C.1.4 DNS Service Discovery

The DNS Service is discovered based on the Network API and the Network Settings of the Operation System.

The DNS Service accessed via the Operation System is used for resolving host names to IP Addresses (for example during the configuration of a Remote Node).

C.2 DICOM Security Profile Details

C.2.1 Online Electronic Storage Secure Use

Remote Access is restricted on User Level. This is done on the Operation System level.

C.2.2 Audit Trail Messages

N/A

C.2.3 Secure Transport Connection Details

LUMINOS Q.namix uses the default Cipher Suite selected automatically by the Operation System, which does not permit to specify a certain Cipher Suite to be used. For further details please refer to https://learn.microsoft.com/en-us/windows/win32/secauthn/tls-cipher-suites-in-windows-10-v1903 and https://learn.microsoft.com/en-us/dotnet/core/extensions/sslstream-best-practices.

C.2.4 Attribute Confidentiality Details

De-Identification is not supported in LUMINOS Q.namix. As an alternative the Data Minimization Feature is provided.

C.2.5 Digital Signature Details

N/A

C.2.6 Additional DICOM Security Profile Details

N/A

Annex D Mapping of Attributes

D.1 Mapping between Modality Worklist, Instances and MPPS

How attributes are mapped between Modality Worklist, Instances and MPPS is described in the corresponding tables in 5.2.2 and Annex A.

Annex E Code Set Usage

N/A

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