DICOM Conformance Statement

SL Imaging

Version 2.1.5

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1 Conformance Statement Overview

The SL Imaging software (in this document named as SL Imaging Application) is a part of the SL Imaging Solution which is an accessory for the ZEISS slit lamps allowing the user to take images and videos for documentation purposes.
The SL Imaging Solution is a class I medical device according to European Regulation (EU) 2017/745.

The SL Imaging Application allows to:

- query modality worklist
- query patients
- acquire images and videos from connected slit lamp
- review acquired data
- archive acquired data
- delete acquired data
- merge and reassign acquired data between patients
- configure and verify local and remote AEs

This document is structured as suggested in the DICOM Standard (PS 3.2: Conformance).

Table 1-1 Network Services Supported

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Transfer		
Ophthalmic Photography 8 Bit Image Storage	Yes	No
Video Photographic Image Storage	Yes	No
Encapsulated PDF Storage	Yes	No
Workflow Management		
Verification	Yes	Yes
Storage Commitment Push Model SOP Class	Yes	No
Modality Worklist Information Model - FIND	Yes	No
Query / Retrieve		
Patient Root Query/Retrieve Information Model – FIND	Yes	No

The SOP Classes are categorized as follows:

Table 1-2 UID Values

UID Value	UID Name	Category
1.2.840.10008.1.1	Verification	Workflow Management
1.2.840.10008.1.20.1	Storage Commitment Push Model SOP Class	Workflow Management
1.2.840.10008.5.1.4.1.1.77.1.5.1	Ophthalmic Photography 8 Bit Image Storage	Transfer
1.2.840.10008.5.1.4.1.1.77.1.4.1	Video Photographic Image Storage	Transfer
1.2.840.10008.5.1.4.1.1.104.1	Encapsulated PDF Storage	Transfer
1.2.840.10008.5.1.4.1.2.1.1	Patient Root Query/Retrieve Information Model - FIND	Query/Retrieve

1.2.840.10008.5.1.4.31	Modality Worklist Information Model - FIND	Workflow Management

The SL Imaging Application does not support Media Interchange.

2 Table of Contents

3 Introduction

3.1 Revision History

Table 3-1 Revision History

Document Version	Date	Changes
01	2019-03-13	Initial revision
02	2023-05-22	Imported to DMS Added TLS security Added video export Reformatting and bugfixes

3.2 Audience

This document is written for the people that need to understand how the SL Imaging Application will integrate into their healthcare facility. This includes both those responsible for overall imaging network policy and architecture, as well as integrators who need to have a detailed understanding of the DICOM features of the product. This document contains some basic DICOM definitions so that any reader may understand how this product implements DICOM features. However, integrators are expected to fully understand all the DICOM terminology, how the tables in this document relate to the product's functionality, and how that functionality integrates with other devices that support compatible DICOM features.

3.3 Remarks

The scope of this DICOM Conformance Statement is to facilitate integration between the SL Imaging Application 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 is not supposed to replace validation with other DICOM equipment to ensure proper exchange of intended information. In fact, the user should be aware of the following important issues:

- The comparison of different Conformance Statements is just the first step towards assessing interconnectivity and interoperability between the product and other DICOM conformant equipment.
- Test procedures should be defined and executed to validate the required level of interoperability with specific compatible DICOM equipment, as established by the healthcare facility.

3.4 Definitions and Terms

Informal definitions are provided for the following terms used in this Conformance Statement.

The DICOM Standard is the authoritative source for formal definitions of these terms.

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)

An end point of a DICOM information exchange, including the DICOM network or media interface software; i.e., the software that sends or receives DICOM

information objects or messages. A single device may have multiple Application Entities.

Application Entity Title

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. The Attributes 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).

Examples: MR Image IOD, CT Image IOD, Print Job IOD.

Joint Photographic Experts Group (JPEG)

A set of standardized image compression techniques, available for use by DICOM applications.

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 Name, Patient ID, Patient Birth Date, and Patient 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.

Presentation Context

The set of DICOM network services used over an Association, as negotiated between Application Entities; includes Abstract Syntaxes and Transfer Syntaxes.

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.

Query Key

A input value for a query process. Query Keys denote the set of DICOM tags that are sent from the SCU to SCP and thus control the query result.

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 (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 (SOP) Instance

An information object; a specific occurrence of information exchanged in a SOP Class.

Examples: a specific x-ray image.

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.

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.

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.

3.5 Abbreviations

Table 3-2 Abbreviations Used in this Document

Abbreviation	Definition
ANAP	Attribute is not always present - applicable for type 3 attributes
AE	Application Entity
AET	Application Entity Title
APP	Application
AUTO	Automatically generated, cannot be modified by the operator
BRQ	Broad Query mode of Modality Worklist Query
CONFIG	Configurable parameter
CZM	Carl Zeiss Meditec
DEF	Default Value

DICOM	Digital Imaging and Communications in Medicine
ELE	Explicit Little Endian
ILE	Implicit Little Endian
IM	Information Model
IOD	Information Object Definition
JPG-1	JPEG Coding Process 1 transfer syntax; JPEG Baseline; ISO 10918-1
MWL	Modality Worklist
MPEG4-HL4.1	MPEG4 AVC/H.264 High Profile / Level 4.1
OD	Oculus Dexter, the right eye
OS	Oculus Sinister, the left eye
OU	Oculus Uterque, both eyes
PBQ	Patient Based Query mode of Modality Worklist Query
PL	Pick list
PLD	Pick list item details
PRQ	Patient Root Query
RNG	Range of values
SCP	Service Class Provider
SCU	Service Class User
SEL	Selection from a list of values
SL	Slit lamp
SOP	Service Object Pair, union of a specific DICOM service and related IOD.
SRQ	Study Root Query
TCP/IP	Transmission Control Protocol / Internet Protocol
UID	Unique Identifier
USER	User input
VNAP	Value not always present (attribute sent zero length if no value is present) - applicable for type 2 and 2C attributes

3.6 References

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

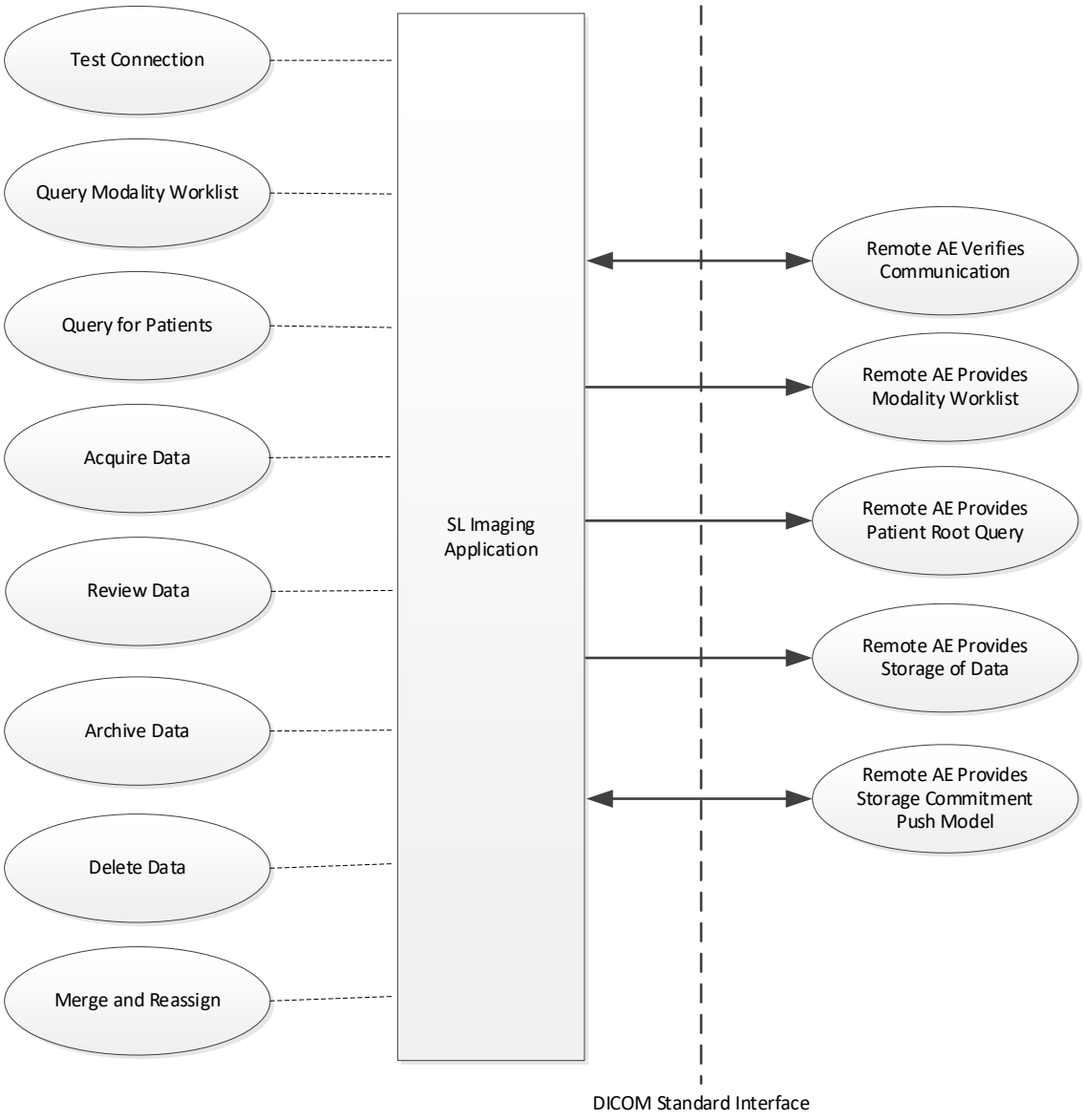
Integrating the Healthcare Enterprise (IHE) EYECARE Technical Framework, rev 4.0, 2016 (available free at http://www.ihe.net/Technical_Framework/index.cfm).

4 Networking

4.1 Implementation Model

4.1.1 Application Data Flow

Figure 4-1 SL Imaging Application as Acquisition Modality - Functional Overview



4.1.2 Functional Definition of AEs

4.1.2.1 Functional Definition of SL Imaging Application

The SL Imaging software (in this document named as SL Imaging Application) is a part of the SL

Imaging Solution which is an accessory for the ZEISS slit lamps allowing the user to take images and

videos for documentation purposes.

The SL Imaging Application allows to:

- query modality worklist
- query patients
- acquire images and videos from connected slit lamp
- review acquired data
- archive acquired data
- delete acquired data
- merge and reassign acquired data between patients
- configure and verify local and remote AEs

The SL Imaging Application implements a Service Class User (SCU) for the following DICOM Services:

- Verification
- Modality Worklist Information Model – FIND
- Patient Root Query/Retrieve Information Model – FIND
- Ophthalmic Photography 8 Bit Image Storage
- Video Photographic Image Storage
- Encapsulated PDF Storage
- Storage Commitment Push Model

The SL Imaging Application implements a Service Class Provider (SCP) for the following DICOM Services:

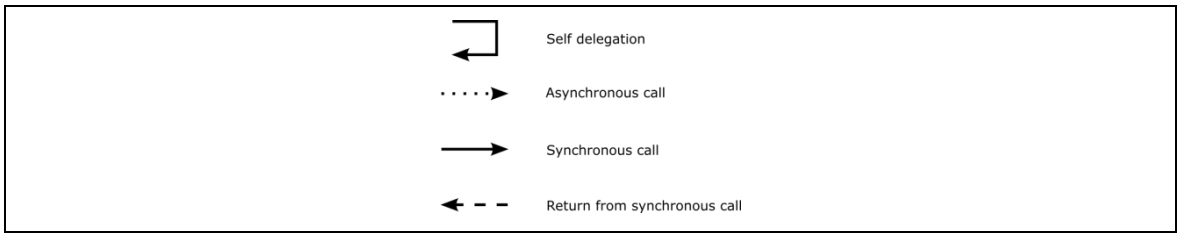
- Verification

All DICOM functionalities have been integrated into the application user interface and will not require any manual invoking of DICOM specific user interface.

The SL Imaging Application Software logs extensive information about the DICOM operations to its log file.

4.1.3 Sequencing of Real-World Activities

To realize the real world activities, the different entities work together. The sequence diagrams shall depict the intended workflow.



The diagrams use slightly modified UML symbols. The asynchronous call is not depicted as suggested in UML. Some objects do have more than one dashed line. It symbolizes more than one thread.

4.1.3.1 Acquisition Modality Activities

Test Connection

When configuring the local and remote DICOM AEs the operator can test and verify the configured connections for correctness. The operator can invoke this by

pressing the “Test connection” button. The application presents the test results to the operator with meaningful status icons for each configured connection.

Query Modality Worklist

When the patient arrives at the SL Imaging Application, the operator queries the worklist. The user can invoke this by simply selecting the “Today” Tab in the main view which lists:

- All patients scheduled for this instrument based on the configuration of the Today’s Modality Worklist Query (see Table 4-36 Configuration Parameters)
- All patients that were selected in the advanced search during this session
- All patients that were examined today on the system.

For more specific worklist queries the “Scheduled Patients” tab on the “Advanced” screen can be used.

In either way the operator can select a patient from the result list to proceed with selecting an appropriate Requested Procedure and Scheduled Procedure Step for data acquisition.

This activity generates a Scheduled Case where all information described in Table 8-43 Attribute Mapping will be copied into the storage SOP instance.

Query for Patients

When the patient arrives at the SL Imaging Application, the operator can search patients stored at a remote AE. This can be done by using the “Quick Search” in the main screen or by using the “All Patients” tab from the “Advanced” screen for a more detailed search. Any matching results will be listed in patient list.

The operator can then select the patient for data acquisition.

This activity generates an unscheduled case.

Acquire Data

When a patient or worklist item is selected the operator can start the acquisition of images and videos of the patient’s eye. The Application Software allows the user to review the acquired data before permanently saving the acquisition result.

This activity creates images and videos locally.

Review Data

After acquisition of data the operator can review and edit the acquired data. This can be done in a customizable grid view by selecting previously acquired data and drag it into the review portion of the software application.

During this activity the operator can manipulate previously acquired data by means of image editing and visual and textual annotations. The application software allows the user to save this edited data locally.

Archive Data

This activity can be triggered by the operator when selecting “DICOM Export” from the “Review” screen. During this activity the Application Software automatically creates an evidence report for the currently selected images and videos and transfers the selected images, videos and the evidence report to the configured Storage Provider.

After a configurable amount of time, the Application Software asks the configured Storage Commitment Provider to take over responsibility on data persistence for the data previously transferred by the “Archive data” activity. When storage is committed the operator is allowed to enable removal of this data from the modality. This will typically be done as part of the shutdown routine.

Delete Data

This activity removes selected data from the AE. It can be invoked manually by the operator for single data instances or a series of data instances or complete patient data. The operator can invoke this activity from either the "Patient" or the “Review” screen by pressing the "Delete" button shown for a specific acquisition or report, a group of acquisitions and reports or even a complete patient.

Deletion of data does not depend on the archive status of the selected data. Thus, the operator must ensure in advance that data has been successfully archived before invoking this activity.

Deletion of data does not remove any data from the configured Storage AE but only from the local data storage.

Merge and Reassign

This activity is not available in this version.

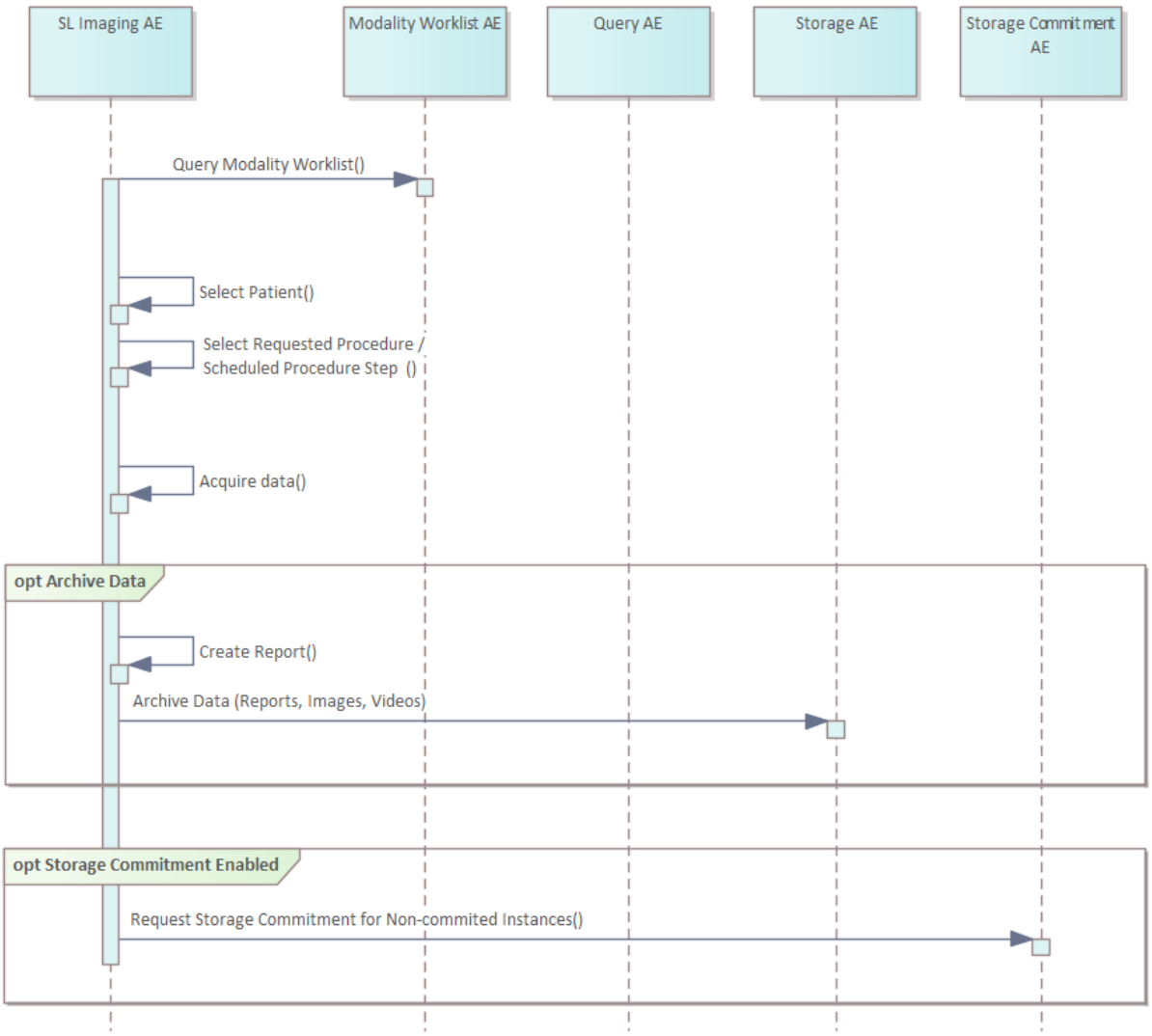
4.1.3.2 Scheduled case with Acquisition Modality

The normal case is that the patient arrives at the front desk. There could be two possibilities at this point:

- The examination can be scheduled for the instrument.
- The examination was scheduled in advance.

In either case all patient and study related information is available at the day the examination takes place. On the SL Imaging Application these patients appear in the “Todays” list in the main screen. This information is used to take the examination.

Figure 4-2 Scheduled Case



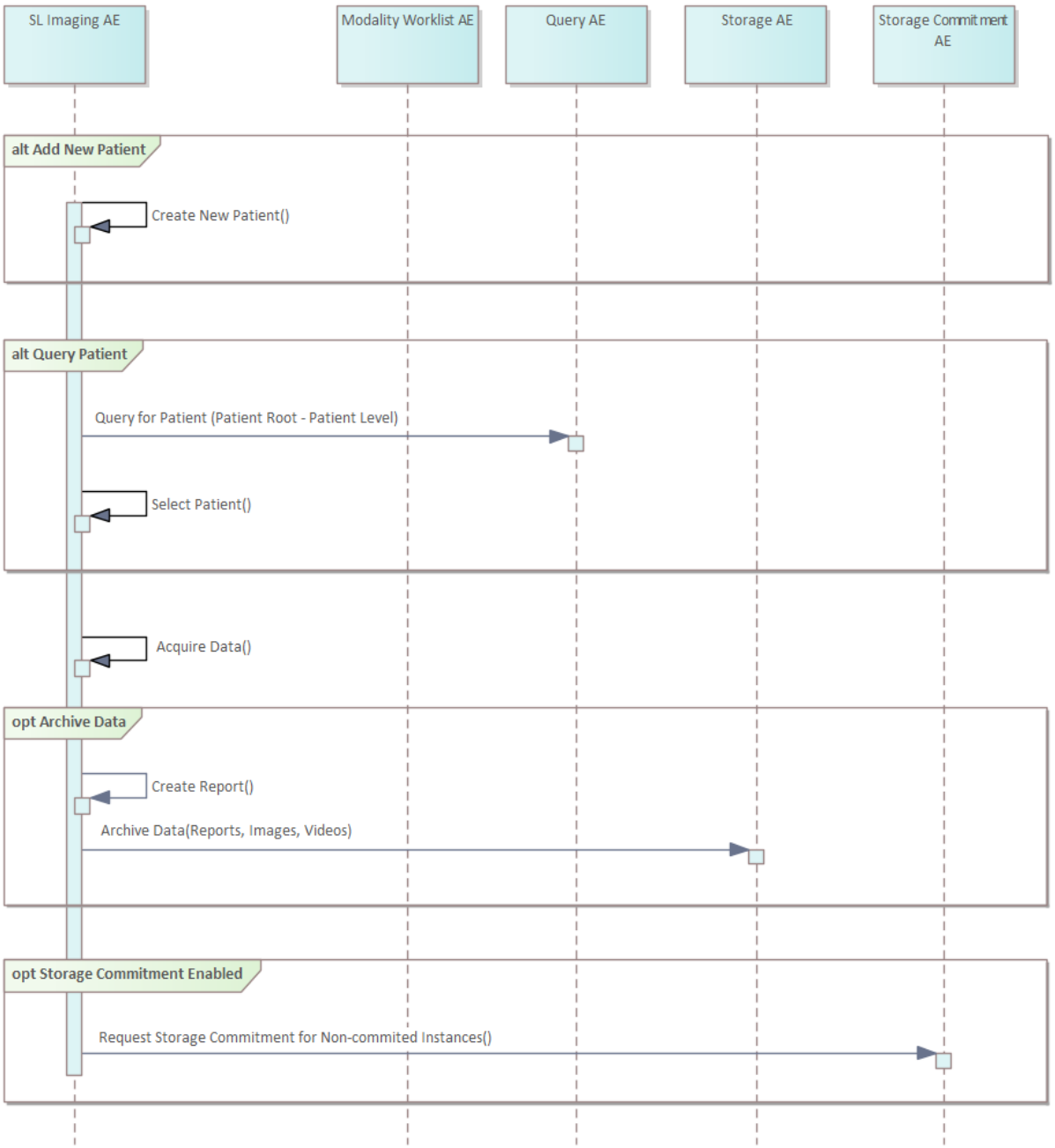
4.1.3.3 Unscheduled case

In the unscheduled case the patient arrives immediately at the SL Imaging Application, so that the patient was not registered at the front desk or the software does not support DICOM modality worklist. Thus the examination is not scheduled in the Modality Worklist. Patient demographics and study

specific information has to be generated at the instrument itself. The situation is akin to the case if the Modality Worklist AE could not be reached due to network issues.

Patient demographics can be queried from the Query Service Class Provider. However, this should be considered as an exceptional way to obtain patient demographics.

Figure 4-3 Unscheduled Case



4.2 AE Specifications

4.2.1 SL Imaging AE Specification

4.2.1.1 SOP Classes

Table 4-1 SOP Classes for SL Imaging AE

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	Yes	Yes
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	Yes	No
Ophthalmic Photography 8 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	Yes	No
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1	Yes	No
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Yes	No
Patient Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	Yes	No
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Yes	No

4.2.1.2 Associations Policies

4.2.1.2.1 General

The DICOM standard Application Context Name for DICOM 3.0 is always proposed:

Table 4-2 DICOM Application Context

Application Context Name	1.2.840.10008.3.1.1.1

4.2.1.2.2 Number of Associations

Table 4-3 Number of Associations as an Association Initiator for SL Imaging AE

Maximum number of simultaneous associations in total	50
Simultaneous associations for Verification	Up to 5 (one per different remote AE)
Simultaneous association for Storage	1
Simultaneous association for Storage Commitment	1
Simultaneous associations for Modality Worklist – FIND, depending on whether search criteria are changed while a previous query is still active (no response yet)	1
Simultaneous associations for Query/Retrieve – FIND, depending on whether search criteria are changed while a previous query is still active (no response yet)	4

Table 4-4 Number of Associations as an Association Acceptor for SL Imaging AE

Maximum number of simultaneous associations	50

4.2.1.2.3 Asynchronous Nature

SL Imaging Application does not support asynchronous communication (multiple outstanding transactions over a single Association).

4.2.1.2.4 Implementation Identifying Information

Table 4-5 DICOM Implementation Class and Version

Implementation Class UID	1.2.276.0.75.2.5.20
Implementation Version Name	NIM-3.1.0

4.2.1.3 Association Initiation Policy

4.2.1.3.1 Activity – Test Connection

4.2.1.3.1.1 Description and Sequencing of Activities

This activity is available during the DICOM configuration phase and during system startup.

DICOM configuration:

After completing the configuration of the local DICOM Application Entity and the remote DICOM Application Entities the user shall manually trigger the test of the application level communication between the local Application Entity and its peer DICOM Application Entities. During one test call, all peer DICOM Application Entities are contacted.

System startup:

During startup the SL Imaging Application initiates the DICOM Verification between the local Application Entity and its peer DICOM Application Entities automatically.

In the association request the SL Imaging Application proposes not only Verification SOP Class, but also all other SOP Classes as supported by the instrument's DICOM interface.

The association is established when the peer DICOM entity accepts the verification related presentation context. In a sub-sequent step a C-ECHO message is exchanged.

The results of the “Verify Communication” activity are displayed in the “Remote Application Entities” configuration section for each separately configured DICOM service. E. g. for a Storage Provider not only the Verification information is evaluated, but also the acceptance of the proposed presentation context comprising the respective Storage SOP Classes. In case one of the Storage SOP Classes is not supported by the remote Application Entity, the status of the Storage Service will change to “partly online” and SOP Instances of this particular Storage SOP Class will no longer be included in subsequent storage operations.

4.2.1.3.1.2 Proposed Presentation Contexts

Following presentation contexts are offered for each initiated association. During this activity the Application Software uses only

- **Verification with Transfer Syntax ILE as SCU**

Table 4-6 Proposed Presentation Contexts for Activity Verify Communication

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID 1.2.840.10008. ...**	**Name List**	**UID List 1.2.840.10008. ...**		
Verification	1.1	ILE	1.2	BOTH	None
Storage Commitment Push Model	1.20.1	ILE	1.2	SCU	None
Ophthalmic Photography 8 Bit Image Storage	5.1.4.1.1.77.1.5.1	JPG-1	1.2.4.50	SCU	None
Video Photographic Image Storage	5.1.4.1.1.77.1.4.1	MPEG4-HL4.1	1.2.4.102	SCU	None
Encapsulated PDF Storage	5.1.4.1.1.104.1	ILE	1.2	SCU	None
		ELE	1.2.1	SCU	None

Patient Root Query/Retrieve IM – FIND	5.1.4.1.2.1.1	ILE	1.2	SCU	See Note[1]
Modality Worklist IM – FIND	5.1.4.31	ILE	1.2	SCU	None

Note[1]: C-FIND extended negotiation is offered. Relational-query support is required by the SCP.

Table 4-7 Extended Negotiation as a SCU

SOP Class Name	SOP Class UID	Extended Negotiation
Patient Root Query/Retrieve IM – FIND	1.2.840.10008.5.1.4.1.2.1.1	See Note[1]

Note[1]: Extended negotiation for relational-queries is offered. Relational-query support by the SCP is required for successful Patient Root Queries issued by the SL Imaging AE.

4.2.1.3.1.3 SOP Specific Conformance for Verification SOP Class

The SL Imaging Application provides standard conformance.

4.2.1.3.2 Activity – Query Modality Worklist

The worklist contains scheduling information for patients. Query Modality Worklist is used to search for the right scheduling information for this instrument. An operator has two options to perform this activity.

4.2.1.3.2.1 Description and Sequencing of Activities

Option "Today's Patients Query"

In this case, the Application Software performs a query with predefined query keys. The applied query keys are:

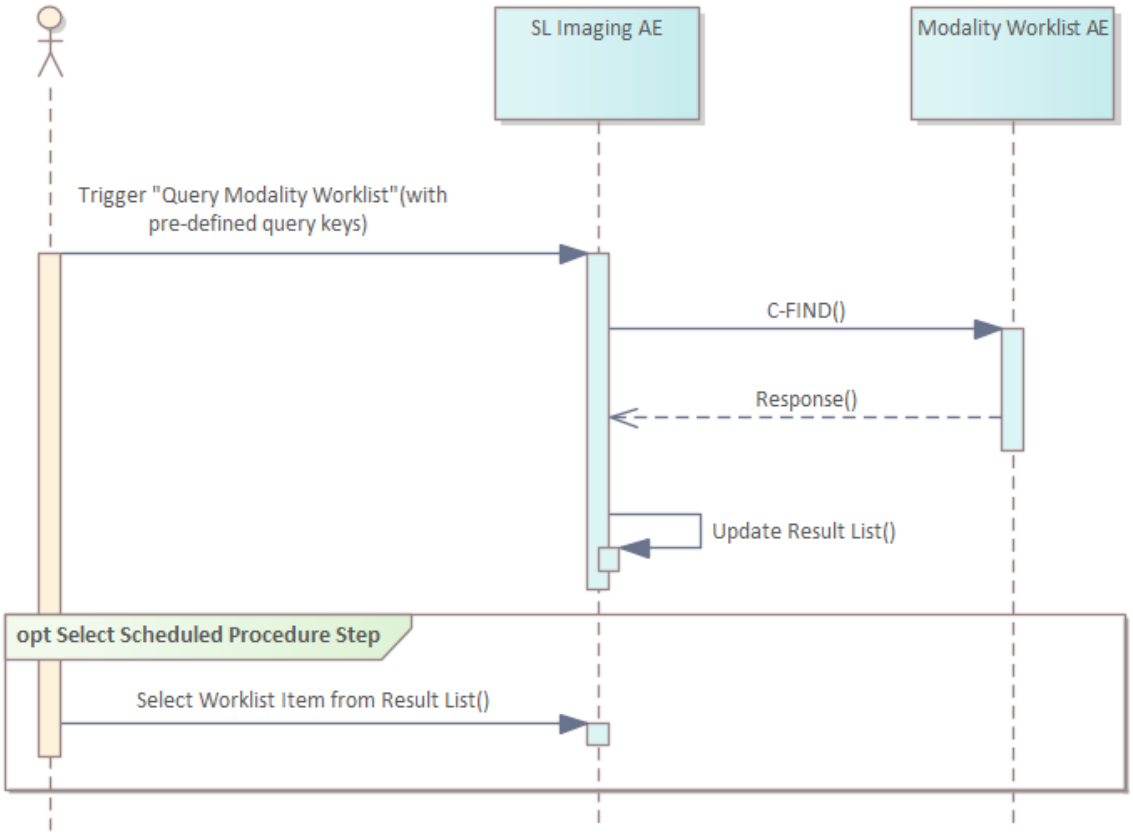
Table 4-8 Modality Worklist Query for Today's Patients

Tag	Attribute Name	Description
(0040,0100)	Scheduled Procedure Step Sequence	
>(0040,0001)	Scheduled Station Application Entity Title	Default: AE Title as configured for the SL Imaging Application. See Note[1]
>(0040,0002)	Scheduled procedure Step Start Date	Default: Today's Date See Note[1]
>(0008,0060)	Modality	Default: empty See Note[1]

Note[1]: In the DICOM Settings the default values of these three query keys for Today's Patients Modality Worklist Query can get modified. See Table 4-36 Configuration Parameters for details.

All matching worklist items are presented to the operator in the "Today" list and the application keeps all item data needed for further processing. The operator can select one item from that list, choose the appropriate Requested Procedure/Scheduled Procedure Step and start the examination of the patient to acquire measurement data. Once a measurement/acquisition has been completed, all work item data is persisted along with the instance in the local database.

Figure 4-4 Today's Patients Query



Trigger "Query Modality Worklist"

The default query can either be manually triggered by simply pressing the refresh button in the header of the "Today" list, or it can be triggered automatically in a configurable time interval to keep the "Today" List up to date. For automatic refresh the settings option "Automatic MWL Update" has to be switched on (see Table 4-36 Configuration Parameters).

Select Scheduled Procedure Step

The worklist item planned next according to its Scheduled Procedure Step Start Date and Time will be pre-selected. The operator can choose to either start the scan acquisition directly or choose another worklist item from the Today's list before continuing with the acquisition. Alternatively he has the option to unselect any of the worklist items and perform an unscheduled acquisition.

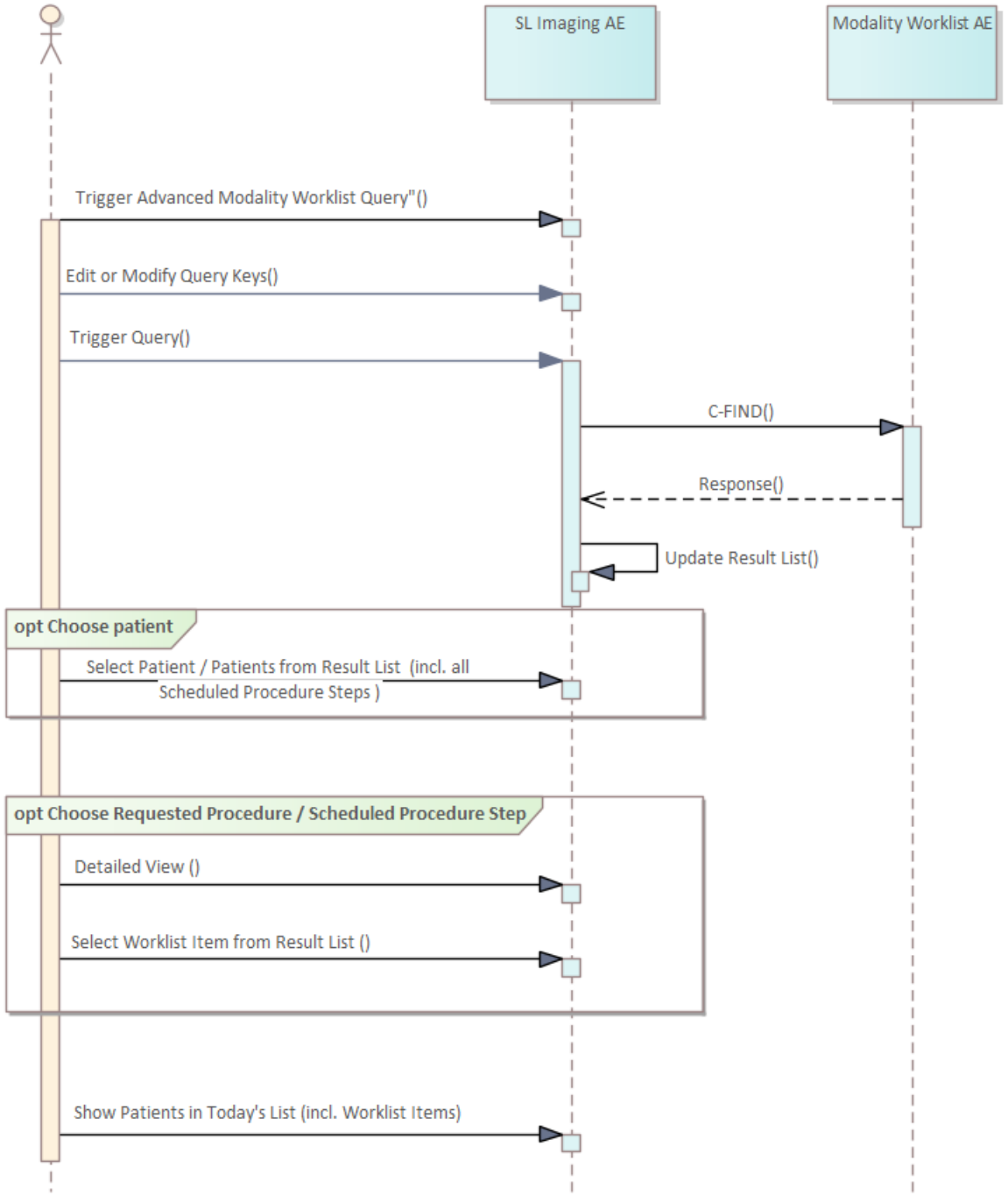
Option "Interactive query"

The query keys of the "Interactive query" can be modified by the operator. To modify the query key the operator has to open the "Advanced" screen and use the tab "Scheduled Patients". This screen will provide all available search fields for the Modality Worklist search.

The operator can select the patient itself after the Modality Worklist search. In this case the patient will be added to the Today's Patients list with all Requested Procedures and Scheduled Procedure Steps planned for this patient.

Alternatively the operator can display the Modality Worklist Details for a selected patient. In the Details screen the operator can select a Requested Procedure or Scheduled Procedure Step and add the patient including the selected Requested Procedure / Scheduled Procedure Step information.

Figure 4-5 Interactive Query



Trigger "Query Modality Worklist"

The activity "Query Modality Worklist" can be triggered by the operator at any time if no other activity is in progress. To invoke the query the operator has to use the "Scheduled Patients" tab from the "Advanced" search screen. It is meaningful to perform the query when the patient arrives at the modality. Then the worklist contains latest information.

Edit or modify query keys

The Modality Worklist query offers a GUI for interactive query. The "Scheduled Station AE Title" is prefilled with the AE title configured for the Today's Modality Worklist Query (see Table 4-36 Configuration Parameters) and the "Scheduled date" is predefined with "All" (all dates). All predefined values can be changed. The operator can change or fill in search criteria in the shown dialog. For instance, the incomplete patient name or the patient ID can be used.

Trigger query

The operator triggers the search after he filled in search criteria. The Application Software sends a DICOM C-FIND request, which contains the search criteria. The Application Software waits for the response from the partner Application Entity. Application Software will accept up to a configurable number of matches. The Application Software checks whether the number of received worklist items overstepped the configurable limit. If the number of received worklist items overstepped the limit, then the Application Software sends a C-CANCEL-RQ, then an A-RELEASE-RQ to the service provider and a message is displayed. Despite this warning, the operator gets results in the result-list.

After receiving the response, the pick-list is updated. The result-list provides the most important information for a quick overview (see section 4.2.1.3.2.3 for the supported set of tags).

The operator can start over, redefine query keys and trigger the query again. This can be performed as often as required, until he or she finds the correct worklist item.

Select patient from result list

The operator can select a patient in the pick-list. The selected patient becomes subject for a detailed view and can be imported into the Application Software with all planned Requested Procedures and Scheduled Procedure Steps associated.

Detailed view

A detailed view allows a closer look at the currently selected patient. Thus the operator can see the Requested Procedures and the Scheduled Procedure Steps planned for the selected patient.

Select Requested Procedure

In the detailed view the operator has the option to select a dedicated Requested Procedure with all associated Scheduled Procedure Steps by clicking on the Select button of the highlighted Requested Procedure.

Select Scheduled Procedure Step

By selecting a single Scheduled Procedure Step in the detailed view the operator also has the possibility to selectively transfer this dedicated Scheduled Procedure Step to the main screen by clicking the Select button behind the highlighted Scheduled Procedure Step. Only this Modality Worklist Item will then be imported into the instrument’s application for subsequent scan acquisition.

Show worklist item from result list

The operator can take over the selected item (Patient, Requested Procedure and Scheduled Procedure Step) at any time. Once the patient is selected for examination, all worklist items of that patient which have been transferred from advanced view will be listed in the Today’s patient area. The worklist item planned next according to its Scheduled Procedure Step Start Date and Time will be pre-selected. The operator can choose to either start the scan acquisition directly or choose another worklist item from the Today’s list before continuing with the acquisition. Alternatively he has the option to unselect any of the worklist items and perform an unscheduled acquisition.

4.2.1.3.2.2 Proposed Presentation Contexts

Following presentation contexts are offered for each initiated association. During this activity the Application Software uses only

- "Modality Worklist IM - FIND" with Transfer Syntax ILE as SCU

Table 4-9 Proposed Presentation Contexts for Activity Query Modality Worklist

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID 1.2.840.10008. ...**	**Name List**	**UID List 1.2.840.10008. ...**		
Verification	1.1	ILE	1.2	BOTH	None

Storage Commitment Push Model	1.20.1	ILE	1.2	SCU	None
Ophthalmic Photography 8 Bit Image Storage	5.1.4.1.1.77.1.5.1	JPG-1	1.2.4.50	SCU	None
Video Photographic Image Storage	5.1.4.1.1.77.1.4.1	MPEG4-HL4.1	1.2.4.102	SCU	None
Encapsulated PDF Storage	5.1.4.1.1.104.1	ILE	1.2	SCU	None
		ELE	1.2.1	SCU	None
Patient Root Query/Retrieve IM – FIND	5.1.4.1.2.1.1	ILE	1.2	SCU	See Note[1]
Modality Worklist IM – FIND	5.1.4.31	ILE	1.2	SCU	None

Note[1]: C-FIND extended negotiation is offered. Relational-query support is required by the SCP.

Table 4-10 Extended Negotiation as a SCU

SOP Class Name	SOP Class UID	Extended Negotiation
Patient Root Query/Retrieve IM – FIND	1.2.840.10008.5.1.4.1.2.1.1	See Note[1]

Note[1]: Extended negotiation for relational-queries is offered. Relational-query support by the SCP is required for successful Patient Root Queries issued by the SL Imaging AE.

4.2.1.3.2.3 SOP Specific Conformance for Modality Worklist SOP Class

Table 4-11 Modality Worklist C-FIND Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Failure	Refused: Out of Resources	A700	Log message and display user alert message.
Failure	Identifier Does Not Match SOP Class	A900	Log message and display user alert message.
Failure	Unable to process	C000-CFFF	Log message and display user alert message.
Failure	Refused: SOP class not supported	0122	Log message and display user alert message.
Cancel	Matching terminated due to Cancel request	FE00	Log message.
Success	Matching is complete	0000	The Application Software processes the gathered search results and updates the pick list.
Pending	Matches are continuing – Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys	FF00	Log message. The Application Software checks whether the number of received worklist items overstepped the configurable limit. If yes applies, gathering is canceled(C-CANCEL-RQ is sent) and the partial search result gets displayed along with a message informing the user about additional results being on the server. If no applies, gathering is continued.
Pending	Matches are continuing – Warning that one or more Optional Keys were not	FF01	Log message. The Application Software checks whether the number of received worklist items overstepped the configurable limit. If yes applies, gathering is canceled(C-CANCEL-RQ is sent) and the partial search result gets

	supported for existence and / or matching for this Identifier		displayed along with a message informing the user about more results being on the server. If no applies, gathering is continued.
Unknown	All other responses with unknown code meaning	xxxx	Log message and display user alert message

Table 4-12 Modality Worklist C-FIND Communication Failure Behavior

Exception	Behavior
DIMSE response timeout	The Association is aborted using A-ABORT. The reason is written to the log file. A user alert message is displayed.
Network Timeout	The Application Software is unable to connect to the remote Application Entity. The reason is written to the log file. A user alert message is displayed.
Maximum Association Idle Time exceeded	The Artim timer expires and the socket is closed. The reason is written to the log file.

Table 4-13 Attributes Involved in Modality Worklist C-FIND Request and Response

Tag	Tag Name	Query Keys Matching	Mandatory Query Keys Return	Imported	Displayed	Copied to SOP Instance
Scheduled Procedure Step (SPS)						
(0040,0100)	Scheduled Procedure Step Sequence		X			
>(0040,0001)	Scheduled Station Application Entity Title	BRQ, DEF*			PLD	
>(0040,0002)	Scheduled Procedure Step Start Date	BRQ, DEF*, SEL, RNG	X		PLD	
>(0040,0003)	Scheduled Procedure Step Start Time		X		PL, PLD	
>(0008,0060)	Modality	BRQ, SEL, DEF*		X	PLD	
>(0040,0006)	Scheduled Performing Physicians Name					
>(0040,0007)	Scheduled Procedure Step Description		X[1]	X	PL, PLD	X
>(0040,0010)	Scheduled Station Name					
>(0040,0011)	Scheduled Procedure Step Location					
>(0040,0008)	Scheduled Protocol Code Sequence		X[1]	X		X
>>(0008,0100)	Code Value		X*	X		X
>>(0008,0102)	Coding Scheme Designator		X*	X		X
>>(0008,0103)	Coding Scheme Version			X		X
>>(0008,0104)	Code Meaning			X	PLD	X
>(0040,0012)	Pre-Medication					

>(0040,0009)	Scheduled Procedure Step ID		X	X		X
>(0032,1070)	Requested Contrast Agent					
>(0040,0020)	Scheduled Procedure Step Status					
Requested Procedure						
(0040,1001)	Requested Procedure ID	PBQ	X	X	PL, PLD	X
(0032,1060)	Requested Procedure Description		X[2]	X	PLD	X
(0032,1064)	Requested Procedure Code Sequence		X[2]	X		X
>(0008,0100)	Code Value		X*	X		X
>(0008,0102)	Coding Scheme Designator		X*	X		X
>(0008,0103)	Coding Scheme Version			X		X
>(0008,0104)	Code Meaning			X	PLD	X
(0020,000D)	Study Instance UID		X	X		X
(0008,0020)	Study Date			X[3]		X[3]
(0008,0030)	Study Time			X[3]		X[3]
(0008,1110)	Referenced Study Sequence			X		X
>(0008,1150)	Referenced SOP Class UID		X*	X		X
>(0008,1155)	Referenced SOP Instance UID		X*	X		X
(0040,1003)	Requested Procedure Priority					
(0040,1004)	Patient Transport Arrangements					
(0040,1400)	Requested Procedure Comments			X	PL, PLD	
Imaging Service Request						
(0008,0050)	Accession Number	PBQ		X	PL, PLD	X
(0032,1032)	Requesting Physician[5]					
(0008,0090)	Referring Physicians Name			X	PLD	X
Visit Identification						
(0038,0010)	Admission ID					
Visit Status						
(0038,0300)	Current Patient Location					
Visit Relationship						
(0008,1120)	Referenced Patient Sequence					
>(0008,1150)	Referenced SOP Class UID					
>(0008,1155)	Referenced SOP Instance UID					
Patient Identification						
(0010,0010)	Patients Name[1]	PBQ	X	X	PL, PLD, APP	X
(0010,0020)	Patients ID	PBQ	X	X	PL, PLD, APP	X
(0010,0021)	Issuer of Patient ID			X	PLD	X
(0010,1000)	Other Patient IDs			X		X
Patient Demographics						
(0010,0030)	Patients Birth Date			X	PL, PLD, APP	X

(0010,0040)	Patients Sex			X	PL, PLD, APP	X
(0010,1030)	Patients Weight					
(0040,3001)	Confidentiality Constraint on Patient Data Description					
(0010,2160)	Ethnic Group			X		X
(0010,4000)	Patients Comments			X		X
Patient Medical						
(0038,0500)	Patient State					
(0010,2110)	Allergies					
(0010,21C0)	Pregnancy Status					
(0010,2000)	Medical Alerts					
(0038,0050)	Special Needs					

Note [1]: If the multicomponent group name representation is enabled the name component group configured with Priority 1 is shown in the pick list and in the patient's details. The search string entered in patient's last name or first name is sent in the component group of the attribute (0010,0010) Patient's Name which corresponds to the representation configured as Priority 1 (see section 4.4.2.1 for the setting of multicomponent group names).

Note [2]: Only patient's first name and last name are displayed in the GUI, but the entire name including all five components of all three component groups are imported and copied into the storage SOP Instance.

Note [3]: All attributes with grey background are by default excluded from the list of Modality Worklist C-FIND-RQ return keys. If needed they can get activated by service personnel.

Note [4]: All attributes with white background are by default included in the Modality Worklist C-FIND-RQ as return keys with the exception that sequences are sent zero-length (no sequence items included).

Values of column "Query Keys Matching":

PBQ

A tag that is marked with PBQ is used as query key in the Patient Based Query mode of the interactive Modality Worklist Query Dialog.

BRQ

A tag that is marked with BRQ is used as query key in the Broad Query mode of the interactive Modality Worklist Query Dialog.

DEF

A tag that is marked with DEF has a value assigned when the interactive Modality Worklist Query Dialog is shown the first time or when the Reset button is pushed.

Default values can get modified. The modifications will be stored for next use of Modality Worklist Query Dialog.

DEF*

The default value of the associated attribute can be configured in the DICOM settings screen.

RNG

The operator can apply a range as value for the query key.

SEL

The operator can select a value from a given list of values.

Values of column "Mandatory Query Keys Return":

X

The tag shall be present in the Modality Worklist C-FIND response. If any required tag is missing the relevant Modality Worklist C-FIND response item (Scheduled Procedure Step) will be ignored and not imported by the application software.

X*

The tag shall be present in the Modality Worklist C-FIND response if its enclosing sequence is present. If any required tag is missing the relevant Modality Worklist C-FIND response item (Scheduled Procedure Step) will be ignored and not imported by the application software.

X[1]

Either the Scheduled Procedure Step Description (0040,0007) or the Scheduled Protocol Code Sequence (0040,0008) or both shall be present in the Modality Worklist C-FIND response.

X[2]

Either the Requested Procedure Description (0032,1060) or the Requested Procedure Code Sequence (0032,1064) or both shall be present in the Modality Worklist C-FIND response.

Values of column "Imported":

X

The value gets imported in the application. Thus this value may have influence in Information Objects which will be created as a result of the performed examination.

X[3]

Depending on the device settings the Study Date and Study Time is read from the Modality Worklist C-FIND response into the application and copied into the related Storage SOP instance.

Values of column "Displayed":

PL

Values of this tag are instantly visible in the pick list.

PLD

Values of this tag are visible in the details dialog of the current selected pick list item.

APP

Values of this tag are visible in the application.

Values of column SOP Instance:

X

Values of marked tags will be stored in created SOP Instances. See section 8.1 "mapping of attributes" in 8.1.3 Attribute Mapping.

X[3]

Depending on the device settings the Study Date and Study Time is read from the Modality Worklist C-FIND response into the application and copied into the related Storage SOP instance.

Following set of tags can be used as query key in the so called "**Patient Based Query**". The Patient Based Query is a working mode of the Modality Worklist Query Dialog.

Table 4-14 Modality Worklist Query Key Details - Patient Based Query

Tag	Tag Name	Description
(0010,0010)	Patients Name[1]	The SL Imaging Application supports family name and given name only. See Table 4-15 Modality Worklist Query Key – Patient's Name - Wildcard Details
(0010,0020)	Patient ID	The operator can enter a string which conforms to the Value Representation LO.

(0008,0050)	Accession Number	The operator can enter a string which conforms to the Value Representation SH.
(0040,1001)	Requested Procedure ID	The operator can enter a string which conforms to the Value Representation SH.

Note [1]: If the multicomponent group name representation is enabled the name component group which is defined as Priority 1 will contain the specified search string in the C-FIND-RQ data set.

Table 4-15 Modality Worklist Query Key – Patient's Name - Wildcard Details

Multicomponent Group Name Representation		Search on Patient's Name: Search string entered in GUI: "Quincy"	Query key - Value in attribute (0010,0010) Patient's Name
Disabled		Last Name	Quincy*
		First Name	*^Quincy*
Enabled (see section 4.4.2.1 for the setting of multicomponent group names).	Priority 1 - Ideographic	Last Name	*=Quincy*
		First Name	*=*^Quincy*
	Priority 1 - Phonetic	Last Name	*=*=Quincy*
		First Name	*=*=*^Quincy*
	Priority 1 - Alphabetic	Last Name	Quincy*
		First Name	*^Quincy*

Following set of tags can be used as query key in the so called "**Broad Query**". The Broad Query is a working mode of the Modality Worklist Query Dialog.

Table 4-16 Modality Worklist Query Key Details - Broad Query

Tag	Tag Name	Description
(0040,0100)	Scheduled Procedure Step Sequence	This attribute is the container for the tags as listed below. The sequence contains one item.
>(0040,0002)	Scheduled Procedure Step Start Date	The default value is "All" (attribute is sent zero-length) The operator can change the value to today, tomorrow, week and can even enter date ranges.
>(0008,0060)	Modality	The default value is "All" (attribute is sent zero-length) The operator can change the value and select one value of a predefined set of values including an empty string. Possible values are "ALL", "OP"
>(0040,0001)	Scheduled Station AE Title	The default value is given by the local AE Title as configured for the <instrument> The operator can enter the AE Title of another device or leave the field empty.

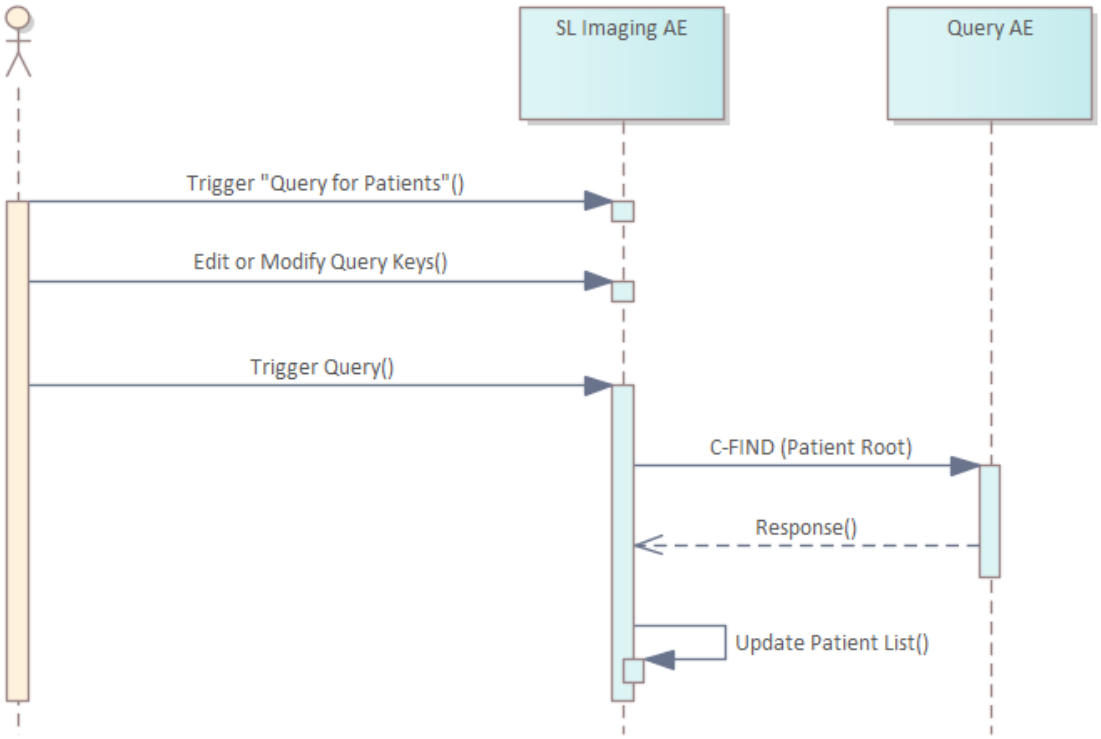
4.2.1.3.3 Activity - Query for Patients

Query is used to get patient information and meta data of instances from a DICOM server.

4.2.1.3.3.1 Description and Sequencing of Activities

There are two ways for the user to trigger a query request. The "Quick Search" in the main screen will search in "Patient Given Name", "Patient Last Name", "Patient ID" and "Patient Birth Date" in parallel. The second way is the "Advanced" search. The user can select this search by clicking the "Advanced" button in the main screen.

Figure 4-6 Query for Patients and Data



Trigger "Query for Patients"

The activity "Query remote AE for patients" can be triggered by the operator by using the "Quick Search" or change to the "Advanced Search – All Patients" screen.

Edit or Modify Query Keys

The "Advanced Search – All Patients" screen offers a GUI for interactive query. The operator can change or fill in search criteria in the shown search fields.

The top-most search field in the main screen is the "Quick Search" field. Any value entered herein is applied to

(0010,0010) Patient's Name – Family Name

(0010,0010) Patient's Name – Given Name

(0010,0020) Patient ID

(0010,0030) Patient's Birth Date (only if the value entered is in a date format, depends on the locale settings configuration)

The Query is issued as four separate requests.

For more details on supported query keys see Table 4-25 Query Key Details.

Trigger Query

The operator triggers the search after he or she filled in search criteria by either pressing the "Enter" key or click on the "Search button". The Application Software sends a Patient Root Query based DICOM C-FIND request which contains the entered search criteria. The Application Software waits for the response from the Query AE and accepts up to a configurable number of matches. If the number of matches exceeds this limit, the Application Software shows an information about truncated search results and a request to apply more specific query keys. Despite this warning, the operator gets results in the pick-list.
After receiving the response, the patient pick-list is updated. The patient pick-list provides the most important information for a quick overview.

The operator can start over, redefine query keys and trigger the query again. This can be performed as often as required, until he or she finds the correct patient entry.

Important note: For this activity it is required that the SCP supports Patient Root Query/Retrieve SOP Class with Relational Query model since the Application Software does not use Study Root Query/Retrieve SOP Class in this context nor does the Application Software support the Hierarchical Model.

4.2.1.3.3.2 Proposed Presentation Contexts

Following presentation contexts are offered for each initiated association. During this activity the Application Software uses only

- "Patient Root Query/Retrieve Information Model - FIND" with Transfer Syntax ILE as SCU

Important note: For this activity it is required that the SCP supports the Relational query model since Application Software does not use the Hierarchical model.

Table 4-17 Proposed Presentation Contexts for Activity Query for Patients and Data

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID 1.2.840.10008. ...**	**Name List**	**UID List 1.2.840.10008. ...**		
Verification	1.1	ILE	1.2	BOTH	None
Storage Commitment Push Model	1.20.1	ILE	1.2	SCU	None
Ophthalmic Photography 8 Bit Image Storage	5.1.4.1.1.77.1.5.1	JPG-1	1.2.4.50	SCU	None
Video Photographic Image Storage	5.1.4.1.1.77.1.4.1	MPEG4-HL4.1	1.2.4.102	SCU	None
Encapsulated PDF Storage	5.1.4.1.1.104.1	ILE	1.2	SCU	None
		ELE	1.2.1	SCU	None
Patient Root Query/Retrieve IM – FIND	5.1.4.1.2.1.1	ILE	1.2	SCU	See Note[1]
Modality Worklist IM – FIND	5.1.4.31	ILE	1.2	SCU	None

Note[1]: C-FIND extended negotiation is offered. Relational-query support is required by the SCP.

Table 4-18 Extended Negotiation as a SCU

SOP Class Name	SOP Class UID	Extended Negotiation
Patient Root Query/Retrieve IM – FIND	1.2.840.10008.5.1.4.1.2.1.1	See Note[1]

Note[1]: Extended negotiation for relational-queries is offered. Relational-query support by the SCP is required for successful Patient Root Queries issued by the SL Imaging AE.

4.2.1.3.3.3 SOP Specific Conformance for Patient Root Query/Retrieve SOP Class as SCU

Table 4-19 Query C-FIND Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Failure	Refused: Out of Resources	A700	Log message and display user alert message.
Failure	Identifier does not match SOP Class	A900-A9FF	Log message and display user alert message.
Failure	Unable to process	C000-CFFF	Log message and display user alert message.
Failure	Refused: SOP class not supported	0122	Log message and display user alert message.

Cancel	Matching terminated due to Cancel request	FE00	Log message.
Success	Matching is complete – No final Identifier is supplied	0000	The Application Software processes the gathered search results and updates the pick list.
Pending	Matches are continuing – Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys	FF00	Log message. The Application Software checks whether the number of received query result items overstepped the configurable limit. If yes applies, gathering is canceled(C-CANCEL-RQ is sent) and the partial search result gets displayed along with a message informing the user about more results being on the server. If no applies, gathering is continued.
Pending	Matches are continuing – Warning that one or more Optional Keys were not supported for existence and / or matching for this Identifier.	FF01	Log message. The Application Software checks whether the number of received query result items overstepped the configurable limit. If yes applies, gathering is canceled(C-CANCEL-RQ is sent) and the partial search result gets displayed along with a message informing the user about more results being on the server. If no applies, gathering is continued.
Unknown	All other responses with unknown code meaning	xxxx	Log message and display user alert message.

Table 4-20 Query C-FIND Communication Failure Behavior

Exception	Behavior
DIMSE response timeout	The Association is aborted using A-ABORT. The reason is written to the log file. A user alert message is displayed.
Network Timeout	The Application Software is unable to connect to the remote Application Entity. The reason is written to the log file. A user alert message is displayed.
Maximum Association Idle Time exceeded	The Artim timer expires and the socket is closed. The reason is written to the log file.

Table 4-21 PATIENT Level Keys for the Patient Root Query/Retrieve Information Model (Request and Response)

Tag	Tag Name	Query Keys Matching	Mandatory Query Keys Return	Imported	Displayed	Copied into SOP Instance
(0010,0010)	Patient's Name[1]	X		X	X	X
(0010,0020)	Patient ID	X	X	X	X	X
(0010,0021)	Issuer of Patient ID			X		X
(0010,0030)	Patient's Birth Date	RNG		X	X	X
(0010,0032)	Patient's Birth Time					

(0010,0040)	Patient's Sex			X	X	X
(0010,1000)	Other Patient IDs			X		X
(0010,2160)	Ethnic Group			X		X
(0010,4000)	Patient Comments			X		X

Note[1]: If the multicomponent group name representation is enabled the name component group configured with Priority 1 is shown in the pick list and in the patient's details. The search string entered in patient's last name or first name is sent in the component group of the attribute (0010,0010) Patient's Name which corresponds to the representation configured as Priority 1 (see section 4.4.2.1 for the setting of multicomponent group names).

Table 4-22 STUDY Level Keys for the Patient Root Query/Retrieve Information Model (Request and Response)

Tag	Tag Name	Query Keys Matching	Mandatory Query Keys Return	Imported	Displayed	Copied into SOP Instance
(0008,0020)	Study Date					
(0008,0030)	Study Time					
(0008,0050)	Accession Number	X				
(0008,0061)	Modalities in Study					
(0008,0090)	Referring Physician's Name	X				
(0008,0090)	Study Description					
(0008,1080)	Admitting Diagnoses Description					
(0020,0010)	Study ID					
(0020,000D)	Study Instance UID					

Table 4-23 SERIES Level Keys for the Patient Root Query/Retrieve Information Model (Request and Response)

Tag	Tag Name	Query Keys Matching	Mandatory Query Keys Return	Imported	Displayed	Copied into SOP Instance
(0008,0021)	Series Date					
(0008,0031)	Series Time					
(0008,0060)	Modality	SEL				
(0008,103E)	Series Description					
(0008,1050)	Performing Physician's Name					
(0008,1090)	Manufacturer's Model Name					
(0020,000E)	Series Instance UID					
(0020,0011)	Series Number					

(0020,0060)	Laterality					
(0040,0244)	Performed Procedure Step Start Date					
(0040,0245)	Performed Procedure Step Start Time					
(0040,0275)	Request Attributes Sequence					

Table 4-24 IMAGE Level Keys for the Patient Root Query/Retrieve Information Model (Request and Response)

Tag	Tag Name	Query Keys Matching	Mandatory Query Keys Return	Imported	Displayed	Copied into SOP Instance
(0008,0008)	Image Type					
(0008,0012)	Instance Creation Date					
(0008,0013)	Instance Creation Time					
(0008,0016)	SOP Class UID					
(0008,0018)	SOP Instance UID					
(0008,002A)	Acquisition DateTime	RNG				
(0008,114A)	Referenced Instance Sequence					
>(0008,1150)	Referenced SOP Class UID					
>(0008,1155)	Referenced SOP Instance UID					
(0020,0013)	Instance Number					
(0020,0062)	Image Laterality					

Values of Column "Query Keys Matching":

RNG

The operator can apply a range as value for the query key.

SEL

The operator can select a value from a given list of values.

X

The value is included in the query request if not empty.

AUTO

The value cannot be modified by the operator.

Values of Column "Mandatory Query Keys Return":

X

The tag shall be present in the Patient Root Query/Retrieve C-FIND response. If any required tag is missing the relevant Patient Root Query/Retrieve C-FIND response item will be ignored and not imported by the application software.

Values of Column "Imported":

X

The value gets imported in the application. Thus this value may have influence in Information Objects which will be created as a result of the performed examination.

Values of Column "Displayed":

X

Values of this tag are instantly visible in the pick list.

Values of Column SOP Instance:

X

Values of marked tags will be stored in created SOP Instances. See section "mapping of attributes" in 8.1.3 Attribute Mapping.

Table 4-25 Query Key Details

Tag	Tag Name	Description
(0010,0010)	Patient's Name[1]	The default value is empty string. Only family name and given name can be used as query keys. See Table 4-26 Query Key – Patient's Name - Wildcard Details. This is a DICOM Standard query key on Patient level.
(0010,0020)	Patient ID	The default value is empty string. The operator can enter each value that conforms to the Value Representation LO. This is a DICOM Standard query key on Patient level.
(0010,0030)	Patient's Birth Date	The default value is empty date. The operator can enter a specific value that conforms to the Value Representation DA. The operator can also select from a range of dates. This is a DICOM Optional query key on Patient level, thus the effect of this query key on the query depends on Service Provider implementation.
(0008,0050)	Accession Number	The default value is empty string. The operator can enter each value that conforms to the Value Representation SH. This is a DICOM Standard query key on Study level.
(0008,0090)	Referring Physician's Name[2]	The default value is empty string. Only family name can be used as query key. This is a DICOM Optional query key on Study level, thus the effect of this query key on the query depends on Service Provider implementation.
(0008,0060)	Modality	The default value is empty string. The operator can select from a list of pre-defined values and the application software will convert the selection to a value that conforms to the Value Representation CS. This is a DICOM Standard query key on Series level.

Note[1]: If the multicomponent group name representation is enabled the name component group which is defined as Priority 1 will contain the specified search string in the C-FIND-RQ data set.

Note[2]: The search string is always sent in the Alphabetic part of the multicomponent group name of the query key

Table 4-26 Query Key – Patient's Name - Wildcard Details

Multicomponent Group Name Representation		Search on Patient's Name – Search string entered in GUI: "Quincy"	Query key – Value in attribute (0010,0010) Patient's Name
Disabled		Last Name	Quincy*
		First Name	*^Quincy*
Enabled (see section 4.4.2.1 for the setting of multicomponent group names).	Priority 1 - Ideographic	Last Name	*=Quincy*
		First Name	*=*^Quincy*
	Priority 1 - Phonetic	Last Name	*=*=Quincy*
		First Name	*=*=*^Quincy*
	Priority 1 - Alphabetic	Last Name	Quincy*
		First Name	*^Quincy*

4.2.1.3.4 Activity – Acquire Data

Operator can invoke "Acquire Data" at any time if no other activity is in progress.

This activity has no direct relation to DICOM messaging.

During this activity, the Application Software creates images and videos. The created data might become subject to be reviewed within "Review Data" activity and/or to be archived within "Archive Data" activity.

4.2.1.3.5 Activity – Review Data

After acquisition of data the operator can review and edit the acquired data. This can be done in a customizable grid view by selecting previously acquired data and drag it into the review screen portion of the software application.

During this activity the operator can manipulate previously acquired data by means of image editing and visual and textual annotations. The application software allows the user to save this edited data locally.

This activity has no direct relation to DICOM messaging.

During this activity, the Application Software creates images and videos. The created data might become subject to be archived within "Archive Data" activity.

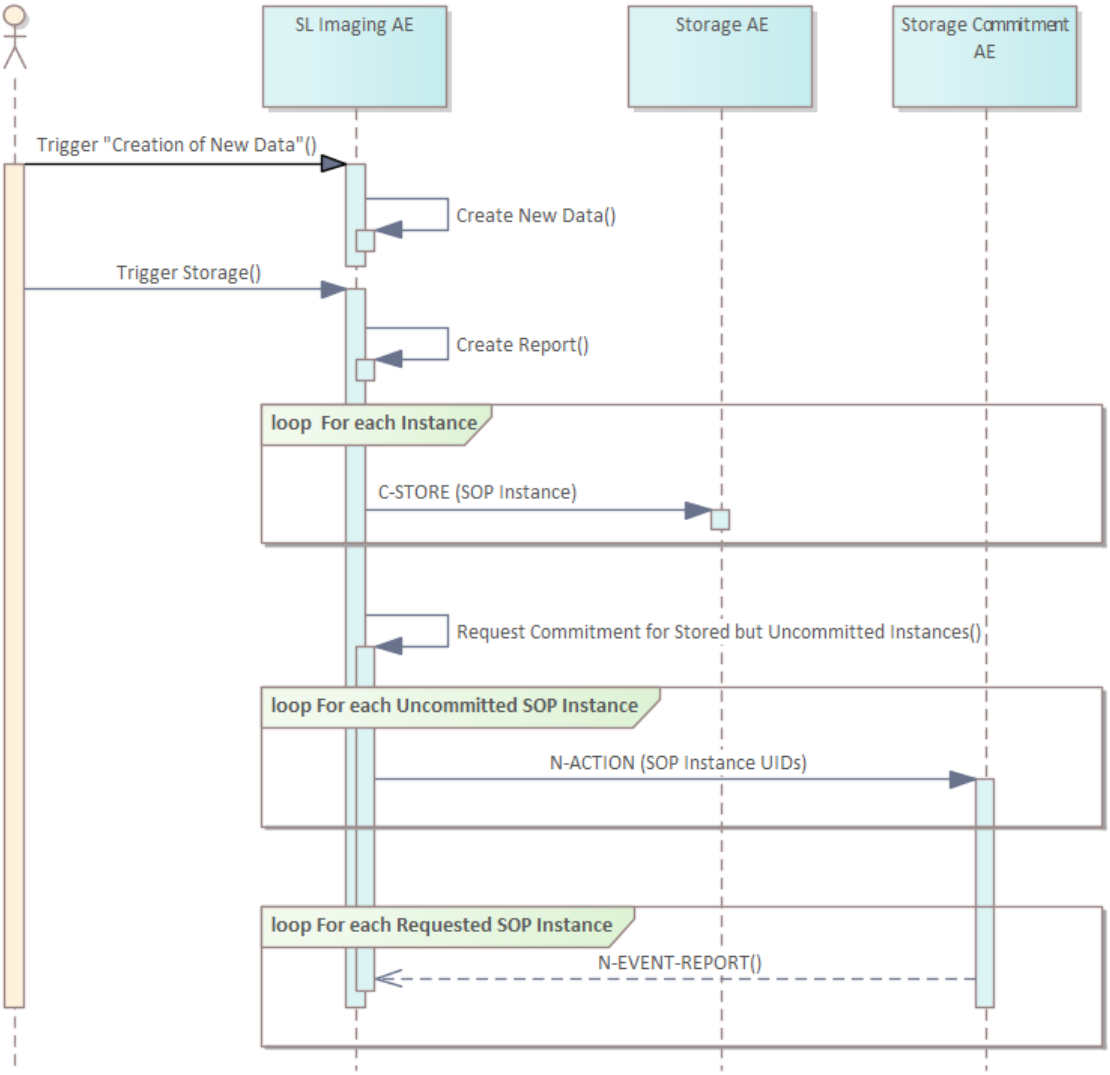
4.2.1.3.6 Activity – Archive Data

This activity can be invoked by the operator when selecting "DICOM Export" from the "Review" screen. During this activity the Application Software automatically creates an evidence report for the currently selected images and videos and transfers the selected images and the created evidence report to the configured Storage Provider. Videos are not transferred to the remote Storage AE.

After a configurable amount of time, the Application Software asks the configured Storage Commitment Provider to take over responsibility on data persistence for the data previously transferred by the "Archive data" activity.

4.2.1.3.6.1 Description and Sequencing of Activities

Figure 4-7 Archive Data



Trigger "Creation of New Data"

New data can be created during activity "Acquire Data" as well as during "Review Data". See chapters 4.2.1.3.4 Activity – Acquire Data and 4.2.1.3.6 Activity – Archive Data for more details on these activities.

Trigger "Storage"

This activity can be invoked by pressing the "DICOM Export" button in the Review screen of the SL Imaging Application.

Once triggered the SL Imaging Application automatically creates an evidence report for the currently selected images and videos and transfers the selected images and the created evidence report to the configured Storage Provider. Videos are not transferred to the remote Storage AE.

Request Commitment for Stored but Uncommitted Instances

To verify that the data has been safely archived, the Application Software can be set up to request the configured Storage Commitment AE for commitment of the stored instances.

4.2.1.3.6.2 Proposed Presentation Contexts

Following presentation contexts are offered for each initiated association. During this activity the Application Software uses only

- Encapsulated PDF Storage with Transfer Syntax ELE (Transfer Syntax ILE as fallback) as SCU
- Ophthalmic Photography 8 Bit Image Storage with Transfer Syntax JPG-1 as SCU

- Video Photographic Image Storage with Transfer Syntax MPEG4 AVC/H.264 High Profile / Level 4.1

Table 4-27 Proposed Presentation Contexts for Activity Archive Data

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID 1.2.840.10008. ...**	**Name List**	**UID List 1.2.840.10008. ...**		
Verification	1.1	ILE	1.2	BOTH	None
Storage Commitment Push Model	1.20.1	ILE	1.2	SCU	None
Ophthalmic Photography 8 Bit Image Storage	5.1.4.1.1.77.1.5.1	JPG-1	1.2.4.50	SCU	None
Video Photographic Image Storage	5.1.4.1.1.77.1.4.1	MPEG4-HL4.1	1.2.4.102	SCU	None
Encapsulated PDF Storage	5.1.4.1.1.104.1	ILE	1.2	SCU	None
		ELE	1.2.1	SCU	None
Patient Root Query/Retrieve IM – FIND	5.1.4.1.2.1.1	ILE	1.2	SCU	See Note[1]
Modality Worklist IM – FIND	5.1.4.31	ILE	1.2	SCU	None

Note[1]: C-FIND extended negotiation is offered. Relational-query support is required by the SCP.

Table 4-28 Extended Negotiation as a SCU

SOP Class Name	SOP Class UID	Extended Negotiation
Patient Root Query/Retrieve IM – FIND	1.2.840.10008.5.1.4.1.2.1.1	See Note[1]

Note[1]: Extended negotiation for relational-queries is offered. Relational-query support by the SCP is required for successful Patient Root Queries issued by the SL Imaging AE.

4.2.1.3.6.3 SOP Specific Conformance for Storage SOP Classes

Table 4-29 Storage C-STORE Response Status Handling Behavior

Service Status	Further Meaning	Status Code	Behavior
Failure	Refused: Out of Resources	A700-A7FF	Log message and retry c-store. If error persists then display user alert message. After initial failure the storage request will be repeated two more times. Afterwards it will be taken up by the Background Storage Activity until successful completion.
Failure	Error: Data Set does not match SOP Class	A900-AFF	Log message and do not retry c-store. Display user alert message.
Failure	Error: Cannot understand	C000-CFFF	Log message and do not retry c-store. Display user alert message.
Failure	Refused: SOP class not supported	0122	Log message and do not retry c-store. Display user alert message.
Warning	Coercion of data Elements	B000	Log message.

Warning	Data Set does not match SOP Class	B007	Log message.
Warning	Elements Discarded	B006	Log message.
Success	Successful Storage	0000	The Application Software flags the data as successfully stored.
Unknown	All other responses with unknown code	xxxx	Log message and do not retry c-store. Display user alert message.

Table 4-30 C-STORE Communication Failure Behavior

Exception	Behavior
DIMSE response timeout	The Association is aborted using A-ABORT. The reason is written to the log file. A user alert message is displayed.
Network Timeout	The Application Software is unable to connect to the remote Application Entity. The reason is written to the log file. A user alert message is displayed.
Maximum Association Idle Time exceeded	The Artim timer expires and the socket is closed. The reason is written to the log file.

4.2.1.3.6.4 SOP Specific Conformance for Storage Commitment SOP Class

4.2.1.3.6.4.1 Storage Commitment Operations (N-ACTION)

The Application Software will request storage commitment for instances of the Ophthalmic Photography 8 Bit Image and Encapsulated PDF Image Storage if the Remote AE is configured as Storage Commitment Provider and a presentation context for the Storage Commitment Push Model has been accepted.

The Storage Commitment Request addresses at least one SOP Instance and at maximum 500 SOP instances.

The behavior of the Application Software when encountering status codes in an N-ACTION response is summarized in the table below:

Table 4-31 Storage Commitment N-ACTION Response Status Handling Behavior

Service Status	Further Meaning	Status Code	Behavior
Failure	Class-instance conflict	0119	Log message and display user alert message.
Failure	Duplicate invocation	0210	Log message.
Failure	Invalid argument value	0115	Log message and display user alert message.
Failure	Invalid SOP Instance	0117	Log message and display user alert message.
Failure	Mistyped argument	0212	Log message and display user alert message.
Failure	No such action	0123	Log message and display user alert message.
Failure	No such argument	0114	Log message and display user alert message.
Failure	No such SOP class	0118	Log message and display user alert message.

Failure	No such SOP Instance	0112	Log message.
Failure	Processing failure	0110	Log message and display user alert message.
Failure	Resource limitation	0213	Log message.
Failure	Unrecognized operation	0211	Log message and display user alert message.
Success	Success	0000	The Application Software will wait for an incoming N-EVENT-REPORT.
Unknown	All other responses with unknown code meaning.	xxxx	Log message and display user alert message.

4.2.1.3.6.4.2 Storage Commitment Communication Failure Behaviour

If the Application Software runs in a timeout or if the association is aborted by the provider or network layer, or if waiting duration for Storage Commitment N-EVENT-REPORT oversteps a configurable time limit then the related SOP Instance is considered as not being committed. Then the SOP Instance is subject of a future Storage Commitment service call. It will be included again within next call of this activity.

In addition to that, the Application Software writes the SOP Instance UID to the log file, together with the failure reason.

4.2.1.3.7 Activity – Merge and Reassign

The operator has the possibility to merge a local patient into a patient imported via Modality Worklist or into a patient imported via Patient Root Query from a DICOM Query Provider.

In case the SL Imaging Application is fully connected with a leading system (Modality Worklist, Storage, and Query services are enabled and connected to a remote AE) the application software does not provide any means to reassign local exams to a different patient. Reassign of exams shall be performed on the leading system in this case.
In the disconnected or partially connected mode however Reassign of exams is allowed. Partially connected mode describes an integration where the SL Imaging Application is connected

- to a Modality Worklist and Query Provider, but no Storage Provider
- to a Modality Worklist, Query, and Storage Provider, but only a subset of the created SOP Instances are accepted by the Storage Provider

4.2.1.3.8 Activity – Delete data

The activity "Delete data" can be invoked only manually by the operator. Typically this can be invoked for single data instances or a series of data instances or complete patient data.

Manual invocation:

The operator can invoke this activity from the "Patient" screen by pressing the "Delete" button shown for a certain measurement, a complete group of measurements or a patient. When connected to a DICOM network, an instance or a patient cannot be removed from the modality until the storage to a remote AE is successfully completed and committed.

Manually triggered deletion of data is performed immediately.

Automatic invocation:

Automatically triggered deletion is done during the shutdown process and will be performed for any instance where the storage to a remote AE is successfully completed and committed. Patient demographic data will only be deleted from the modality after all related storage instances have been successfully deleted.

Furthermore the software application provides configurable options for automatic deletion of data in case of certain error conditions:

Delete Exam when "Instance not found": When configured with Delete Exam, the affected instance, which cannot be found anymore on the remote AE, is flagged for deletion as soon as the Storage Commitment report contains a failure reason “instance not found” for this particular instance. The deletion of the instance happens on next shutdown.

Re-Archive when "Instance not found": When configured with Re-Archive, the affected instance is re-archived immediately when storage commitment reports a failure reason "Instance not found". New Storage Commitment will be requested in a future Storage Commitment call. In case the new Storage Commitment fails again it will be retried until the maximum number of retries (3 Storage Commitment calls) is reached.

Delete when "Failed Instances": When the user hits the Delete Button all instances which are in Storage Commitment error status (any error or failure reason other than “Instance not found”) will be marked for deletion when the maximum number of retries (3 Storage Commitment calls) is reached. Deletion happens on next shutdown.

Reset when "Failed Instances": When the user hits the Reset Button all instances which are in Storage Commitment error status (any error or failure reason other than “Instance not found”) will be marked as already archived, but not storage committed.

The status for these instances will be reset as if no storage commitment has been ever requested before. In a future Storage Commitment call the Application Software will request again storage commitment for these particular instances and retries any future failed storage commitment until the maximum number of retries (3 Storage Commitment calls) is reached.

4.2.1.4 Association Acceptance Policy

4.2.1.4.1 Activity – Verify Communication

The activity can be performed at any time. The service is available as soon as the Application Software has been started.

4.2.1.4.1.1 Description and Sequencing of Activities

The Software AE responds to verification requests made by remote AEs.

4.2.1.4.1.2 Accepted Presentation Contexts

Table 4-32 Acceptable Presentation Context for Activity Verify Communication

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID 1.2.840.10008. ...**	**Name List**	**UID List 1.2.840.10008. ...**		
Verification	… 1.1	ILE	… 1.2	BOTH	None

4.2.1.4.1.3 SOP Specific Conformance for Verification SOP Class as SCP

The Application Software AE provides standard conformance.

4.2.1.4.2 Activity – Archive Data

This chapter describes the aspect of association acceptance of the activity “Archive Data”. The activity stores images and reports created at the modality and requests a storage commitment afterwards.

4.2.1.4.2.1 Description and Sequencing of Activities

The description and sequencing of activities is covered by chapter “4.2.1.3.6 Activity – Archive Data”.

4.2.1.4.2.2 Accepted Presentation Contexts

Table 4-33 Acceptable Presentation Contexts for Activity Archive Data

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID 1.2.840.10008. ...**	**Name List**	**UID List 1.2.840.10008. ...**		
Verification	1.1	ILE	1.2	BOTH	None
Storage Commitment Push Model	1.20.1	ILE	1.2	SCU	None

4.2.1.4.2.3 SOP Specific Conformance for Storage SOP Class as SCP

The Application Software AE provides standard conformance.

4.2.1.4.2.4 SOP Specific Conformance for Storage Commitment SOP Class

4.2.1.4.2.4.1 Storage Commitment Operations (N-EVENT-REPORT)

The Application Software is capable of receiving an N-EVENT-REPORT notification if it has successfully negotiated a Presentation Context for the Storage Commitment Push

The behavior of Application Software when receiving Event Types within the N-EVENT-REPORT is summarized in the table below.

Table 4-34 Storage Commitment N-EVENT-REPORT Request Failure Reasons

Service Status	Further Meaning	Status Code	Behavior

Failure	Processing Failure	0110	Log message and retry Storage Commitment for the failed SOP Instance(s). A failed Storage Commitment request will be repeated two more times.
Failure	No such object instance	0112	Log message. The SOP Instance(s) is also considered as not being committed. The application will re-archive or delete the local instance based on a setting (see section 4.4.2.1 General Parameters). The default setting is to re-archive the exam.
Failure	Resource limitation	0213	Log message and retry Storage Commitment for the failed SOP Instance(s). A failed Storage Commitment request will be repeated two more times.
Failure	Referenced SOP Class not supported	0122	Log message.
Failure	Class / Instance conflict	0119	Log message. A failed Storage Commitment request will be repeated two more times.
Failure	Duplicate transaction UID	0131	Log message and retry Storage Commitment for the failed SOP Instance(s). A failed Storage Commitment request will be repeated two more times
Unknown	All other responses with unknown code meaning	xxxx	Log message and retry Storage Commitment for the failed SOP Instance(s). A failed Storage Commitment request will be repeated two more times.

If the N-EVENT-REPORT contains failed instances the behavior of the application depends on the failure reason associated with the failed instances (see table above). In general retry means a retry for 2 times, no retry will set the error counter to maximum. A reset of the error counter is possible in the application settings screen (Networking).

4.3 Network Interfaces

4.3.1 Physical Network Interface

The physical network interface is not visible for the instrument application. The instrument application uses the communication stack as offered by the Operating System.

4.3.2 Additional Protocols

Both IP addresses and host names are supported and get resolved.
Else no additional protocols are supported.

4.3.3 IPv4 and IPv6 Support

The SL Imaging Application supports IPv4 as well as IPv6 Addresses.

4.4 Configuration

Local application entity and remote application entity information can be configured in the DICOM section of the software application's "Settings" dialog. This dialog does also allow the configuration of other DICOM related settings, like different timeouts, Modality Worklist and Patient Query item limits etc.

Institution related settings, like Institution Name and Address etc. can be set from the "General Settings" section of the "Settings" dialog.

4.4.1 AE Title/Presentation Address Mapping

The mapping from AE Title to TCP/IP addresses and ports is configurable and set at the time of installation by Installation Personnel.

4.4.1.1 Local AE Titles

The IP address can be configured to be set up manually or to be administered by the Operating System. The Application Entity Title as well as the port number is configurable.

Table 4-35 AE Title Configuration Table

Application Entity	Default AE Title	Default TCP/IP Port
SL Imaging AE	*"SL Imaging"*	11112

In case AutoConnect™ is enabled in both SL Imaging Application and FORUM, the Local AE configuration is registered automatically in the FORUM AE Title Administration.

4.4.1.2 Remote AE Titles/Presentation Address Mapping

The mapping of external AE Titles to TCP/IP addresses and ports is configurable. The SL Imaging Application allows setting up a remote Application Entity for each service. For all Application Entities, the host name or IP, the Port and the Application Entity Title must be known.

Mapping of DICOM services to remote AE can be done either manually or by using the AutoConnect™ feature. In case AutoConnect™ is enabled in both SL Imaging Application and FORUM, the configuration of the Remote Application Entities can be performed automatically using the AutoConnect™ button.

4.4.2 Parameters

4.4.2.1 General Parameters

The general parameters are shared for associations to any of the configured AE.

Table 4-36 Configuration Parameters

Parameter	Configurable (Yes/No)	Default Value
General Parameters		
DIMSE RSP Timeout	Yes (10 – 60 sec.)	20 sec
Network Timeout	Yes (5-20 sec.)	20 sec.
Max. Association Idle Time	Yes (10 – 60 sec.)	30 sec
Network log level	Yes	Error
Storage Commitment for failed instances	Yes	Re-archive
(0008,0080) Institution Name	Yes	EMPTY
(0008,1040) Institutional Department Name	Yes	EMPTY
(0008,0081) Institution Address	Yes	EMPTY
(0008,1010) Station Name	Yes	EMPTY
(0010,0021) Issuer of Patient ID	Yes	Product Name + Serial Number
Use multicomponent name representation	Yes	Disabled

Anonymize patient information during Remote data exchange (only applies to exchange via USB, Shared directory, EyeFi card or Bluetooth)	Yes	Disabled
AE Specific Parameters		
Number of simultaneous Associations by Service and/or SOP Class	No	50
Verification SCU Parameters		
No specific configuration required.		
Modality Worklist SCU Parameters		
Maximum Query Responses (Modality Worklist IM, Patient Root Q/R IM and Study Root Q/R IM)	Yes (10-999)	200
Automatic MWL update	Yes	Enabled
Today's Patient List Refresh Rate (Modality Worklist Polling Interval)	Yes (Min. – Max.)	5 min.
Scheduled Station AE Title (Today's Patient Query)	Yes Possible values: - Use local AE Title - Empty value - User configurable value	Same as Local AE Title
Modality (Today's Patient Query)	Yes Possible Values: - "All" (Empty) - Value from pre-defined list (Table 4-16 Modality Worklist Query Key Details - Broad Query)	"All" (Empty)
Scheduled Procedure Step Start Date (Today's Patient Query)	Yes Possible Values: - Today - Tomorrow - Week (Today – Today + 7 days) - All dates	Today
(0008,0020) Study Date (0008,0030) Study Time	Yes Device: Values are generated by the instrument Query response: Values are copied from Modality Worklist response	Device
Specific Character Set[1]	Yes (by service personnel only)	None (SL Imaging Application uses UTF-8)
Patient Root Q/R and Study Root Q/R SCU Parameters		
Maximum Query Responses (Modality Worklist IM, Patient Root Q/R IM and Study Root Q/R IM)	Yes (10-999)	200
Extended Negotiation – relational query support negotiation	Yes	Yes

(Patient Root Q/R IM and Study Root Q/R IM)		
DICOM Specific Character Set[1]	Yes (by service personnel only)	None (SL Imaging Application uses UTF-8)
Retrieve SCU Parameters		
DICOM Specific Character Set[1]	Yes (by service personnel only)	None (SL Imaging Application uses UTF-8)
Storage Commitment SCU Parameters		
Storage Commitment enable/disable	Yes	enabled
Storage Commitment interval	No	15 min.
Number of trials on error	No	3 times
Storage SCU Parameters		
Specific Character Set[1]	Yes (by service personnel only)	None (SL Imaging Application uses UTF-8)
Storage SCP Parameters		
No specific configuration required The configuration of port number and Application Entity Title are part of the Local Application Entity setup (see 4.4.1.1 Local AE Titles).		
Verification SCP Parameters		
No specific configuration required The configuration of port number and Application Entity Title are part of the Local Application Entity setup (see 4.4.1.1 Local AE Titles).		
Other configurable parameters?		

Note[1]: DICOM Specific Character Set (Configuration settings available for Service user only)

Table 4-37 Specific Character Set

Defined Term	Description	Default
None[2]		None
ISO_IR 100	Latin alphabet No. 1	
ISO_IR 101	Latin alphabet No. 2	
ISO_IR 109	Latin alphabet No. 3	
ISO_IR 110	Latin alphabet No. 4	
ISO_IR 148	Latin alphabet No. 5	
ISO_IR 144	Cyrillic	
ISO_IR 127	Arabic	
ISO_IR 126	Greek	
ISO_IR 138	Hebrew	
ISO_IR 13	Japanese	
ISO_IR 166	Thai	
GB18030	Chinese	
ISO_IR 192	Unicode in UTF-8	

Note[2]: Per default the SL Imaging Application uses ISO_IR 192 (UTF-8), (Setting is “None”). Modification to the default settings is only recommended in case of integration issues which result in incorrect interpretation of transmitted characters. See chapter 6 Support of Character Sets for more information.

5 Media Interchange

Media Interchange is not scope of this document since Media Interchange is not supported by SL Imaging Application.

6 Support of Character Sets

All application entities described in the previous chapters support UTF-8 character set per default.

A specific character set can be provided optionally and individually per remote Service Provider with the exception of the Storage Commitment service, where specific character set is not needed. Possible defined terms for the character set element are listed in. SL Imaging Application does not support Code Extension techniques via configuration, so ISO 2022 standard cannot be used.

Table 6-1 Supported Character Set

Supported Specific Character Set	
Character Set Description	**Defined Term**
UTF-8 encoded Unicode	ISO_IR 192 (Default)
Latin alphabet No. 1	ISO_IR 100
Latin alphabet No. 2	ISO_IR 101
Latin alphabet No. 3	ISO_IR 109
Latin alphabet No. 4	ISO_IR 110
Latin alphabet No. 5	ISO_IR 148
Cyrillic	ISO_IR 144
Arabic	ISO_IR 127
Greek	ISO_IR 126
Hebrew	ISO_IR 138
Japanese	ISO_IR 13
Thai	ISO_IR 166
Chinese	GB18030

Please note, configured Character Set will only come into effect if the remote Service Provider does not send it in the DICOM response. The latter would be a violation of the DICOM standard which now can be corrected by service personnel via Character Set configuration.

Configuration of Specific Character Sets can only be performed by a Service User.

If Specific Character Set is missing in the request or response data set and no Character Set is configured (settings is “None”), the SL Imaging Application uses ISO_IR 192 (UTF-8) as default.

Examples of when to use the optional configuration of specific character sets:

- A 3rd party MWL Provider sends responses with string values encoded in Latin alphabet No. 1 but does not provide corresponding Specific Character Set attribute. The MWL Character Set should be set to ISO_IR 100 to ensure a proper decoding of the data set.
- A 3rd party Storage/Query/Retrieve Provider does only support DICOM instances with Specific Character Set ISO_IR 100. The Storage/Query/Retrieve Character Set should be set to ISO_IR 100 to ensure a proper encoding of the DICOM data set..
- Configuration of a Character Set is not needed if connected to FORUM Archive.

7 Security

7.1 Security Profiles

7.1.1 Security Transport Connection Profiles

The DICOM capabilities of the SL Imaging Application Software supports Non-Downgrading BCP 195 TLS Secure Transport Connection Profile. Optionally, the SL Imaging Application Software also supports configurable TLS Secure Transport Connection Profile through selection of transport protocol(s) and cipher suite(s).

Table 7-1 Transport Protocols

Transport Protocol	Supported
TLS 1.0	N
TLS 1.1	N
TLS 1.2	Y – Default
TLS 1.3	Y

Table 7-2 Secure Transport Connection Profiles

Profile	Creator/Sender	Consumer/Receiver
Non-Downgrading BCP 195 TLS Secure Transport Connection	Y	Y

Table 7-3 Supported Cipher Suites

Profile	Cipher Suites	Default Preference Order (from 1=preferred to n=less preferred)
Non-Downgrading BCP 195 TLS Secure Transport Connection	TLS_DHE_RSA_WITH_AES_128_GCM_SHA256	1
	TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256	2
	TLS_DHE_RSA_WITH_AES_256_GCM_SHA384	3
	TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384	4
	TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384	5
	TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256	6
Configurable TLS Secure Transport Connection on the SL Imaging Application Software	TLS_AES_128_GCM_SHA256	based on user selection
	TLS_AES_256_GCM_SHA384	
	TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384	
	TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256	
	TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384	
	TLS_RSA_WITH_AES_256_GCM_SHA384	
	TLS_ECDH_ECDSA_WITH_AES_256_GCM_SHA384	
	TLS_ECDH_RSA_WITH_AES_256_GCM_SHA384	
	TLS_DHE_RSA_WITH_AES_256_GCM_SHA384	
	TLS_DHE_DSS_WITH_AES_256_GCM_SHA384	
	TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256	
	TLS_RSA_WITH_AES_128_GCM_SHA256	

	TLS_ECDH_ECDSA_WITH_AES_128_GCM_SHA256	
	TLS_ECDH_RSA_WITH_AES_128_GCM_SHA256	
	TLS_DHE_RSA_WITH_AES_128_GCM_SHA256	
	TLS_DHE_DSS_WITH_AES_128_GCM_SHA256	
	TLS_ECDHE_ECDSA_WITH_AES_256_CBC_SHA384	
	TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA384	
	TLS_RSA_WITH_AES_256_CBC_SHA256	
	TLS_ECDH_ECDSA_WITH_AES_256_CBC_SHA384	
	TLS_ECDH_RSA_WITH_AES_256_CBC_SHA384	
	TLS_DHE_RSA_WITH_AES_256_CBC_SHA256	
	TLS_DHE_DSS_WITH_AES_256_CBC_SHA256	
	TLS_ECDHE_ECDSA_WITH_AES_256_CBC_SHA	
	TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA	
	TLS_RSA_WITH_AES_256_CBC_SHA	
	TLS_ECDH_ECDSA_WITH_AES_256_CBC_SHA	
	TLS_ECDH_RSA_WITH_AES_256_CBC_SHA	
	TLS_DHE_RSA_WITH_AES_256_CBC_SHA	
	TLS_DHE_DSS_WITH_AES_256_CBC_SHA	
	TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA256	
	TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA256	
	TLS_RSA_WITH_AES_128_CBC_SHA256	
	TLS_ECDH_ECDSA_WITH_AES_128_CBC_SHA256	
	TLS_ECDH_RSA_WITH_AES_128_CBC_SHA256	
	TLS_DHE_RSA_WITH_AES_128_CBC_SHA256	
	TLS_DHE_DSS_WITH_AES_128_CBC_SHA256	
	TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA	
	TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA	
	TLS_RSA_WITH_AES_128_CBC_SHA	
	TLS_ECDH_ECDSA_WITH_AES_128_CBC_SHA	
	TLS_ECDH_RSA_WITH_AES_128_CBC_SHA	
	TLS_DHE_RSA_WITH_AES_128_CBC_SHA	
	TLS_DHE_DSS_WITH_AES_128_CBC_SHA	

The Private Key and the Certificate used by the SL Imaging Application Software to identify itself in the TLS negotiation with remote application have to be provided in a local keystore file in PKCS12 or JKS (Java Key Store) format on the application host. Certificates of Certificate Authorities (CA) to validate Certificates received from remote applications during the TLS negotiation can also be provided in a local keystore file in JKS format or PKCS12 format.

7.1.2 Basic Application Level Confidentiality Profile

None supported.

7.1.3 Association Level Security

None supported.

7.1.4 Application Level Security

The DICOM capabilities of the SL Imaging Application Software allows the use of either a conventional (non-secure) DICOM communication or a secure DICOM communication based on the Transport Layer Security (TLS) protocol.

Additionally,

- It is assumed that SL Imaging Application Software is used within a secured environment. It is assumed that a secured environment includes at a minimum Firewall or router protections to ensure that only approved external hosts have network access to SL Imaging Application Software
- Firewall or router protections to ensure that <instrument> Application Software only has network access to approve external hosts and services.
- Any communication with external hosts and services outside the locally secured environment use appropriate secure network channels (e.g. such as a Virtual Private Network (VPN))
- Other network security procedures such as automated intrusion detection may be appropriate in some environments. Additional security features may be established by the local security policy and are beyond the scope of this conformance statement.

8 Annexes

8.1 IOD Contents

8.1.1 Created SOP Instance(s)

Abbreviations used for Presence of Values (PoV):

VNAP
: Value Not Always Present (attribute sent zero length if no value is present)

ANAP
: Attribute is not always present

ALWAYS
: Attribute is always present with a value

EMPTY
: Attribute is sent without a value

Abbreviations used for Sources of Data (Source):

USER
: The attribute value source is from User input

AUTO
: The attribute value is generated automatically

MWL
: The attribute value is the same as the value received using the DICOM Modality Worklist service

CONFIG
: The attribute value source is a configurable parameter

ACQUISITION
: The sources of data come from data acquisition process. Include Image and data relate to Image

ANALYSIS
: The sources of data come from data generate by application or add/edit/update by user when images are analysed.

SRQ
: The attribute value is same as the value received using a DICOM service such as Study Root Query.

8.1.1.1 Encapsulated PDF Information Object Definition

IE	Module	Reference	Presence of Module
Patient	Patient	Table 8-1	ALWAYS
Study	General Study	Table 8-2	ALWAYS
Series	Encapsulated Document Series	Table 8-5	ALWAYS
Equipment	General Equipment	Table 8-4	ALWAYS
	SC Equipment	Table 8-6	ALWAYS
Encapsulated Document	Encapsulated Document	Table 8-7	ALWAYS
	SOP Common	Table 8-8	ALWAYS

8.1.1.2 Ophthalmic Photography 8 Bit Information Object Definition

IE	Module	Reference	Presence of Module
Patient	Patient	Table 8-1	ALWAYS
Study	General Study	Table 8-2	ALWAYS
Series	General Series	Table 8-3	ALWAYS
	Ophthalmic Photography Series	Table 8-9	ALWAYS
Frame Of Reference	Synchronization	Table 8-10	ALWAYS
Equipment	General Equipment	Table 8-4	ALWAYS
Image	General Image	Table 8-11	ALWAYS
	Image Pixel	Table 8-12	ALWAYS
	Cine	Table 8-13	ALWAYS
	Multi-frame	Table 8-14	ALWAYS
	Ophthalmic Photography Image	Table 8-15	ALWAYS
	Ocular Region Imaged	Table 8-16	ALWAYS
	Ophthalmic Photography Acquisition Parameters	Table 8-17	ALWAYS
	Ophthalmic Photographic Parameters	Table 8-18	ALWAYS
	SOP Common	Table 8-19	ALWAYS

8.1.1.3 Video Photographic Image Information Object Definition

IE	Module	Reference	Presence of Module
Patient	Patient	Table 8-1	ALWAYS
Study	General Study	Table 8-2	ALWAYS
Series	General Series	Table 8-3	ALWAYS
Equipment	General Equipment	Table 8-4	ALWAYS
Images	General Image	Table 8-20	ALWAYS

	Cine	Table 8-21	ALWAYS
	Multi-frame	Table 8-22	ALWAYS
	Image Pixel	Table 8-23	ALWAYS
	Acquisition Context	Table 8-24	ALWAYS
	VL Image	Table 8-25	ALWAYS
	SOP Common	Table 8-26	ALWAYS

8.1.1.4 Common Modules

Table 8-1 Common Modules - Module "Patient"

Name	Tag	VR	Type	Description	PoV	Source
Patient's Name	(0010,0010)	PN	2	Patient's full name.	ALWAYS	MWL, PRQ, USER
Patient ID	(0010,0020)	LO	2	Primary hospital identification number or code for the patient.	ALWAYS	MWL, PRQ, AUTO, USER
Issuer of Patient ID	(0010,0021)	LO	3	Identifier of the Assigning Authority (system, organization, agency, or department) that issued the Patient ID. Note: Equivalent to HL7 v2 CX component 4 subcomponent 1.	ANAP	MWL, PRQ, CONFIG
Patient's Birth Date	(0010,0030)	DA	2	Birth date of the patient.	VNAP	MWL, PRQ, USER
Patient's Sex	(0010,0040)	CS	2	Sex of the named patient. Enumerated Values: M = male F = female O = other	VNAP	MWL, PRQ, USER
Other Patient IDs	(0010,1000)	LO	3	Other identification numbers or codes used to identify the patient.	ANAP	MWL, PRQ
Ethnic Group	(0010,2160)	SH	3	Ethnic group or race of the patient.	ANAP	MWL, PRQ
Patient Comments	(0010,4000)	LT	3	User-defined additional information about the patient.	ANAP	MWL, PRQ

Table 8-2 Common Modules - Module "General Study"

Name	Tag	VR	Type	Description	PoV	Source
Study Instance UID	(0020,000D)	UI	1	Unique identifier for the Study. In unscheduled case SL Imaging Application uses a constant prefix of "1.2.276.0.75.2.1.71.1.1." followed by a date/time stamp and machine specific identifier.	ALWAYS	MWL, AUTO

				In scheduled case the value is copied from the Modality Worklist.		
Study Date	(0008,0020)	DA	2	Date the Study started. Depending on user settings Study Date is either copied from Modality Worklist or created by SL Imaging Application. See chapters 4.4 Configuration and 8.1.3 Attribute Mapping	ALWAYS	MWL, AUTO
Study Time	(0008,0030)	TM	2	Time the Study started. Depending on user settings Study Time is either copied from Modality Worklist or created by SL Imaging Application. See chapters 4.4 Configuration and 8.1.3 Attribute Mapping	ALWAYS	MWL, AUTO
Referring Physician's Name	(0008,0090)	PN	2	Name of the patient's referring physician.	EMPTY	AUTO
Study ID	(0020,0010)	SH	2	User or equipment generated Study identifier. In scheduled case the source attribute for this value is Requested Procedure ID. In unscheduled case the value is an Equipment generated Study identifier.	ALWAYS	MWL, AUTO
Accession Number	(0008,0050)	SH	2	A RIS generated number that identifies the order for the Study. Value does not exist in unscheduled case.	VNAP	MWL
Study Description	(0008,1030)	LO	3	Institution-generated description or classification of the Study (component) performed. In scheduled case the source attribute for this value is Requested Procedure Description. Value does not exist in unscheduled case.	ANAP	MWL
Referenced Study Sequence	(0008,1110)	SQ	3	A sequence that provides reference to a Study SOP Class/Instance pair. The sequence may have zero or more Items.	ANAP	MWL
>Referenced SOP Class UID	(0008,1150)	UI	1	Uniquely identifies the referenced SOP Class.	ALWAYS	MWL
>Referenced SOP Instance UID	(0008,1155)	UI	1	Uniquely identifies the referenced SOP Instance.	ALWAYS	MWL
Procedure Code Sequence	(0008,1032)	SQ	3	A Sequence that conveys the type of procedure performed. One or more Items may be included in this Sequence. Attribute does not exist in unscheduled case.	ANAP	MWL
>Code Value	(0008,0100)	SH	1	See NEMA PS3.3 Section 8.1.	ALWAYS	MWL
>Coding Scheme Designator	(0008,0102)	SH	1	See NEMA PS3.3 Section 8.2.	ALWAYS	MWL
>Coding Scheme Version	(0008,0103)	SH	1C	Required if the value of Coding Scheme Designator (0008,0102) is not sufficient to identify the Code Value (0008,0100) unambiguously.	ANAP	MWL
>Code Meaning	(0008,0104)	LO	1	See NEMA PS3.3 Section 8.3.	ALWAYS	MWL

Table 8-3 Common Modules - Module "General Series"

Name	Tag	VR	Type	Description	PoV	Source
Modality	(0008,0060)	CS	1	Type of device, process or method that originally acquired or produced the data used to create the Instances in this Series. See NEMA PS3.3 C.7.3.1.1.1 for Defined Terms. OP for Ophthalmic Photography 8 Bit Image instances XC for Video Photographic Image instances	ALWAYS	AUTO
Series Instance UID	(0020,000E)	UI	1	Unique identifier of the Series. SL Imaging Application uses a constant prefix of "1.2.276.0.75.2.1.71.1.2." followed by a date/time stamp and a machine specific identifier.	ALWAYS	AUTO
Series Number	(0020,0011)	IS	2	A number that identifies this Series.	ALWAYS	AUTO
Series Date	(0008,0021)	DA	3	Date the Series started.	ALWAYS	AUTO
Series Time	(0008,0031)	TM	3	Time the Series started.	ALWAYS	AUTO
Protocol Name	(0018,1030)	LO	3	User-defined description of the conditions under which the Series was performed. Note: This Attribute conveys Series-specific protocol identification and may or may not be identical to the protocol described in the Performed Protocol Code Sequence (0040,0260) in the Performed Protocol Code Sequence (0040,0260) in 10-16 "Performed Procedure Step Summary Macro Attributes". In scheduled case the source attribute for this value is Requested Procedure Description. Value does not exist in unscheduled case.	ANAP	MWL
Operators' Name	(0008,1070)	PN	3	Name(s) of the operator(s) supporting the Series.	ALWAYS	AUTO
Body Part Examined	(0018,0015)	CS	3	Text description of the part of the body examined. See @{PS3.16/chapter_L/template:Annex %n “%t” in PS3.16}@ for Defined Terms. Note: Some IODs support the Anatomic Region Sequence (0008,2218), which can provide a more comprehensive mechanism for specifying the body part being examined. Always "EYE"	ALWAYS	AUTO
Request Attributes Sequence	(0040,0275)	SQ	3	Sequence that contains Attributes from the Imaging Service Request. One or more Items are permitted in this Sequence. The Request Attributes Sequence is only included in Scheduled Case.	ANAP	MWL
> Requested Procedure ID	(0040,1001)	SH	1C	Identifier that identifies the Requested Procedure in the Imaging Service Request. Required if procedure was scheduled. May be present otherwise.	ALWAYS	MWL

				Note: The condition is to allow the contents of this Macro to be present (e.g., to convey the reason for the procedure, such as whether a mammogram is for screening or diagnostic purposes) even when the procedure was not formally scheduled and a value for this identifier is unknown, rather than making up a dummy value.		
> Requested Procedure Description	(0032,1060)	LO	3	Institution-generated administrative description or classification of Requested Procedure.	ANAP	MWL
> Requested Procedure Code Sequence	(0032,1064)	SQ	3	A Sequence that conveys the Procedure Type of the requested procedure. Only a single Item is permitted in this Sequence.	ANAP	MWL
>> Include 'Code Sequence Macro'.				>Include 8.8-1 "Code Sequence Macro Attributes". No Baseline CID is defined.	ALWAYS	MWL
> Scheduled Procedure Step ID	(0040,0009)	SH	1C	Identifier that identifies the Scheduled Procedure Step. Required if procedure was scheduled. Note: The condition is to allow the contents of this Macro to be present (e.g., to convey the reason for the procedure, such as whether a mammogram is for screening or diagnostic purposes) even when the procedure step was not formally scheduled and a value for this identifier is unknown, rather than making up a dummy value.	ALWAYS	MWL
> Scheduled Procedure Step Description	(0040,0007)	LO	3	Institution-generated description or classification of the Scheduled Procedure Step to be performed.	ANAP	MWL
> Scheduled Protocol Code Sequence	(0040,0008)	SQ	3	Sequence describing the Scheduled Protocol following a specific coding scheme. One or more Items are permitted in this Sequence.	ANAP	MWL
>> Include 'Code Sequence Macro'.				>Include 8.8-1 "Code Sequence Macro Attributes". CID may be defined in the Macro invocation.	ALWAYS	MWL
Performed Procedure Step ID	(0040,0253)	SH	3	User or equipment generated identifier of that part of a Procedure that has been carried out within this step.	ALWAYS	AUTO
Performed Procedure Step Start Date	(0040,0244)	DA	3	Date on which the Performed Procedure Step started.	ALWAYS	AUTO
Performed Procedure Step Start Time	(0040,0245)	TM	3	Time on which the Performed Procedure Step started.	ALWAYS	AUTO
Performed Procedure Step Description	(0040,0254)	LO	3	Institution-generated description or classification of the Procedure Step that was performed. Always "SL Imaging Measurement".	ALWAYS	AUTO

Table 8-4 Common Modules - Module "General Equipment"

Name	Tag	VR	Type	Description	PoV	Source
Manufacturer	(0008,0070)	LO	2	Manufacturer of the equipment that produced the composite instances Always "Carl Zeiss Meditec"	ALWAYS	AUTO
Institution Name	(0008,0080)	LO	3	Institution where the equipment that produced the composite instances is located. Attribute does not exist if no Institution Name is configured.	ANAP	CONFIG
Institution Address	(0008,0081)	ST	3	Mailing address of the institution where the equipment that produced the composite instances is located. Attribute does not exist if no Institution Address is configured.	ANAP	CONFIG
Station Name	(0008,1010)	SH	3	User defined name identifying the machine that produced the composite instances. Attribute does not exist if no Station Name is configured.	ANAP	CONFIG
Institutional Department Name	(0008,1040)	LO	3	Department in the institution where the equipment that produced the composite instances is located. Attribute does not exist if no Institutional Department Name is configured.	ANAP	CONFIG
Manufacturer's Model Name	(0008,1090)	LO	3	Manufacturer’s model name of the equipment that produced the composite instances. Always "SL Imaging"	ALWAYS	AUTO
Device Serial Number	(0018,1000)	LO	3	Manufacturer's serial number of the equipment that produced the Composite Instances. Note: This identifier corresponds to the device that actually created the images, such as a CR plate reader or a CT console, and may not be sufficient to identify all of the equipment in the imaging chain, such as the generator or gantry or plate.	ALWAYS	AUTO
Software Versions	(0018,1020)	LO	3	Manufacturer's designation of software version of the equipment that produced the Composite Instances. See C.7.5.1.1.3. "2.1.5.bb" higher versions: "2.1.pp.bb" where pp denotes a patch version and bb denotes a build information	ALWAYS	AUTO

8.1.1.5 Encapsulated PDF Modules

Table 8-5 Encapsulated PDF IOD - Module "Encapsulated Document Series"

Name	Tag	VR	Type	Description	PoV	Source
Modality	(0008,0060)	CS	1	Type of device, process or method that created the Instances in this Series. This Type definition shall override the definition in the SC Equipment Module. See C.7.3.1.1.1 for Defined Terms. Note: SR may be an appropriate value for an Encapsulated CDA document with a structured XML Body. Always "OP"	ALWAYS	AUTO
Series Instance UID	(0020,000E)	UI	1	Unique identifier of the Series. SL Imaging uses a constant prefix of "1.2.276.0.75.2.1.71.1.2." followed by a date/time stamp and machine specific identifier.	ALWAYS	AUTO
Series Number	(0020,0011)	IS	1	A number that identifies the Series.	ALWAYS	AUTO
Request Attributes Sequence	(0040,0275)	SQ	3	Sequence that contains Attributes from the Imaging Service Request. One or more Items are permitted in this Sequence. The Request Attributes Sequence is only included in Scheduled Case.	ANAP	AUTO
> Requested Procedure ID	(0040,1001)	SH	1C	Identifier that identifies the Requested Procedure in the Imaging Service Request. Required if procedure was scheduled. May be present otherwise. Note: The condition is to allow the contents of this Macro to be present (e.g., to convey the reason for the procedure, such as whether a mammogram is for screening or diagnostic purposes) even when the procedure was not formally scheduled and a value for this identifier is unknown, rather than making up a dummy value.	ALWAYS	MWL
> Requested Procedure Description	(0032,1060)	LO	3	Institution-generated administrative description or classification of Requested Procedure.	ANAP	MWL
> Requested Procedure Code Sequence	(0032,1064)	SQ	3	A Sequence that conveys the Procedure Type of the requested procedure. Only a single Item is permitted in this Sequence.	ANAP	MWL
>> Include 'Code Sequence Macro'.				>Include 8.8-1 "Code Sequence Macro Attributes". No Baseline CID is defined.	ALWAYS	MWL
> Scheduled Procedure Step ID	(0040,0009)	SH	1C	Identifier that identifies the Scheduled Procedure Step. Required if procedure was scheduled. Note: The condition is to allow the contents of this Macro to be present (e.g., to convey the reason for the procedure, such as whether a mammogram is for screening or diagnostic purposes) even when the procedure step was not formally scheduled and a value for this identifier is unknown, rather than making up a dummy value.	ALWAYS	MWL

> Scheduled Procedure Step Description	(0040,0007)	LO	3	Institution-generated description or classification of the Scheduled Procedure Step to be performed.	ANAP	MWL
> Scheduled Protocol Code Sequence	(0040,0008)	SQ	3	Sequence describing the Scheduled Protocol following a specific coding scheme. One or more Items are permitted in this Sequence.	ANAP	MWL
>> Include 'Code Sequence Macro'.				>Include 8.8-1 "Code Sequence Macro Attributes". CID may be defined in the Macro invocation.	ALWAYS	MWL
Performed Procedure Step ID	(0040,0253)	SH	3	User or equipment generated identifier of that part of a Procedure that has been carried out within this step.	ALWAYS	AUTO
Performed Procedure Step Start Date	(0040,0244)	DA	3	Date on which the Performed Procedure Step started.	ALWAYS	AUTO
Performed Procedure Step Start Time	(0040,0245)	TM	3	Time on which the Performed Procedure Step started.	ALWAYS	AUTO
Performed Procedure Step Description	(0040,0254)	LO	3	Institution-generated description or classification of the Procedure Step that was performed. Always "SL Imaging Measurement".	ALWAYS	AUTO

Table 8-6 Encapsulated PDF IOD - Module "SC Equipment"

Name	Tag	VR	Type	Description	PoV	Source
Conversion Type	(0008,0064)	CS	1	Describes the kind of image conversion. Defined Terms: DV - Digitized Video. DI - Digital Interface. DF - Digitized Film. WSD - Workstation. SD - Scanned Document. SI - Scanned Image. DRW - Drawing. SYN - Synthetic Image. Always "SYN" for Synthetic Image	ALWAYS	AUTO

Table 8-7 Encapsulated PDF IOD - Module "Encapsulated Document"

Name	Tag	VR	Type	Description	PoV	Source
Instance Number	(0020,0013)	IS	1	A number that identifies this SOP Instance. The value shall be unique within a Series.	ALWAYS	AUTO

Content Date	(0008,0023)	DA	2	The date the document content creation was started.	ALWAYS	AUTO
Content Time	(0008,0033)	TM	2	The time the document content creation was started.	ALWAYS	AUTO
Acquisition DateTime	(0008,002A)	DT	2	The date and time that the original generation of the data in the document started.	ALWAYS	AUTO
Image Laterality	(0020,0062)	CS	3	Laterality of the (possibly paired) body part that is the subject of the encapsulated document. Enumerated Values: R - right. L - left. U - unpaired. B - both left and right. If Modality (0008,0060) is M3D, then values for this Attribute shall refer to the intended placement of the created object regardless of how it was generated (see also C.35.1 "Manufacturing 3D Model Module").	ALWAYS	AUTO
Burned In Annotation	(0028,0301)	CS	1	Indicates whether or not the encapsulated document contains sufficient burned in annotation to identify the patient and date the data was acquired. Enumerated Values: YES NO. Identification of patient and date as text in an encapsulated document (e.g., in an XML attribute or element) is equivalent to "burned in annotation". A de-identified document may use the value NO. If Modality (0008,0060) is M3D, the presence of identifying information embossed or engraved on any part of the model shall be indicated by a value of YES. Always “YES”	ALWAYS	AUTO
Source Instance Sequence	(0042,0013)	SQ	1C	A Sequence that identifies the set of Instances that were used to derive the encapsulated document. One or more Items shall be included in this Sequence. Required if derived from one or more DICOM Instances. May be present otherwise. Note: Unlike other uses of Source Instance Sequence (0042,0013), such as in the General Reference Module, references to images are permitted in this Module. This Module does not include the Source Image Sequence (0008,2112). The Defined Context Group for Purpose of Reference Code Sequence (0040,A170) includes an appropriate concept.	ANAP	AUTO
> Referenced SOP Class UID	(0008,1150)	UI	1	Uniquely identifies the referenced SOP Class.	ALWAYS	AUTO
> Referenced SOP Instance UID	(0008,1155)	UI	1	Uniquely identifies the referenced SOP Instance.	ALWAYS	AUTO

Document Title	(0042,0010)	ST	2	The title of the document. Note: In the case of a PDF encapsulated document, this may be the value of the "Title" entry in the "Document Information Directory" as encoded in the PDF data.	ALWAYS	AUTO, USER
Concept Name Code Sequence	(0040,A043)	SQ	2	A coded representation of the document title. Zero or one Item shall be included in this Sequence.	EMPTY	AUTO
MIME Type of Encapsulated Document	(0042,0012)	LO	1	The type of the encapsulated document stream described using the MIME Media Type (see RFC 2046). Always "application/pdf"	ALWAYS	AUTO
Encapsulated Document	(0042,0011)	OB	1	Encapsulated Document stream, containing a document encoded according to the MIME Type.	ALWAYS	AUTO

Table 8-8 Encapsulated PDF IOD - Module "SOP Common"

Name	Tag	VR	Type	Description	PoV	Source
SOP Class UID	(0008,0016)	UI	1	Uniquely identifies the SOP Class. See C.12.1.1.1 for further explanation. See also PS3.4. Always "1.2.840.10008.5.1.4.1.1.104.1"	ALWAYS	AUTO
SOP Instance UID	(0008,0018)	UI	1	Uniquely identifies the SOP Instance. See C.12.1.1.1 for further explanation. See also PS3.4. SL Imaging uses a constant prefix of "1.2.276.0.75.2.1.71.1.3." followed by a date/time stamp and machine specific identifier.	ALWAYS	AUTO
Specific Character Set	(0008,0005)	CS	1C	Character Set that expands or replaces the Basic Graphic Set. Required if an expanded or replacement character set is used. See C.12.1.1.2 for Defined Terms. See chapter 6 Support of Character Sets	ALWAYS	AUTO, CONFIG
Instance Creation Date	(0008,0012)	DA	3	Date the SOP Instance was created. This is the date that the SOP Instance UID was assigned, and does not change during subsequent coercion of the Instance.	ALWAYS	AUTO
Instance Creation Time	(0008,0013)	TM	3	Time the SOP Instance was created. This is the time that the SOP Instance UID was assigned, and does not change during subsequent coercion of the Instance.	ALWAYS	AUTO

Contributing Equipment Sequence	(0018,A001)	SQ	3	Sequence of Items containing descriptive Attributes of related equipment that has contributed to the acquisition, creation or modification of the Composite Instance. One or more Items are permitted in this Sequence. See C.12.1.1.5 for further explanation. Sequence contains one single item defining the equipment which originally acquired the measurement data.	ALWAYS	AUTO
> Purpose of Reference Code Sequence	(0040,A170)	SQ	1	Describes the purpose for which the related equipment is being referenced. Only a single Item shall be included in this Sequence. See C.12.1.1.5 for further explanation.	ALWAYS	AUTO
>> Include 'Code Sequence Macro'.				>>Include 8.8-1 "Code Sequence Macro Attributes". DCID 7005 "Contributing Equipment Purposes of Reference". Always (109101, DCM, “Acquisition Equipment”)	ALWAYS	AUTO
> Manufacturer	(0008,0070)	LO	1	Manufacturer of the equipment that contributed to the composite instance. Always "Carl Zeiss Meditec"	ALWAYS	AUTO
> Institution Name	(0008,0080)	LO	3	Institution where the equipment that contributed to the composite instance is located. Attribute does not exist if no Institution Name is defined for contributing equipment.	ANAP	CONFIG
> Institution Address	(0008,0081)	ST	3	Address of the institution where the equipment that contributed to the composite instance is located. Attribute does not exist if no Institution Address is defined for contributing equipment.	ANAP	CONFIG
> Station Name	(0008,1010)	SH	3	User defined name identifying the machine that contributed to the composite instance. Attribute does not exist if no Station Name is defined for contributing equipment.	ANAP	CONFIG
> Institutional Department Name	(0008,1040)	LO	3	Department in the institution where the equipment that contributed to the composite instance is located. Attribute does not exist if no Institutional Department Name is defined for contributing equipment.	ANAP	CONFIG
> Manufacturer's Model Name	(0008,1090)	LO	3	Manufacturer’s model name of the equipment that contributed to the composite instance. Attribute does not exist if no Manufacturer's Model Name is defined for contributing equipment.	ANAP	AUTO
> Device Serial Number	(0018,1000)	LO	3	Manufacturer’s serial number of the equipment that contributed to the composite instance. Attribute does not exist if no Device Serial Number is defined for contributing equipment.	ANAP	AUTO

> Software Versions	(0018,1020)	LO	3	Manufacturer's designation of the software version of the equipment that contributed to the composite instance. Attribute does not exist if no Software Version(s) is defined for contributing equipment.	ANAP	AUTO
> Date of Last Calibration	(0018,1200)	DA	3	Date when the image acquisition device calibration was last changed in any way. Multiple entries may be used for additional calibrations at other times. See NEMA PS3.3 Section C.7.5.1.1.1 for further explanation. Attribute does not exist if no Date of Last Calibration is defined for contributing equipment.	ANAP	AUTO
> Time of Last Calibration	(0018,1201)	TM	3	Time when the image acquisition device calibration was last changed in any way. Multiple entries may be used. See NEMA PS3.3 Section C.7.5.1.1.1 for further explanation. Attribute does not exist if no Time of Last Calibration is defined for contributing equipment.	ANAP	AUTO
> Contribution DateTime	(0018,A002)	DT	3	The Date & Time when the equipment contributed to the Composite Instance.		
> Contribution Description	(0018,A003)	ST	3	Description of the contribution the equipment made to the Composite Instance.		

8.1.1.6 Ophthalmic Photography 8 Bit Modules

Table 8-9 Ophthalmic Photography IOD - Module "Ophthalmic Photography Series"

Name	Tag	VR	Type	Description	PoV	Source
Modality	(0008,0060)	CS	1	Type of device, process or method that originally acquired the data used to create the images in this Series. Enumerated Values: OP. Always "OP"	ALWAYS	AUTO

Table 8-10 Ophthalmic Photography IOD - Module "Synchronization"

Name	Tag	VR	Type	Description	PoV	Source
Synchronization Frame of Reference UID	(0020,0200)	UI	1	UID of common synchronization environment. See C.7.4.2.1.1.	ALWAYS	AUTO

Synchronization Trigger	(0018,106A)	CS	1	Data acquisition synchronization with external equipment. Enumerated Values: SOURCE - this equipment provides synchronization channel or trigger to other equipment. EXTERNAL - this equipment receives synchronization channel or trigger from other equipment. PASSTHRU - this equipment receives synchronization channel or trigger and forwards it. NO TRIGGER - data acquisition not synchronized by common channel or trigger. Always "NO TRIGGER"	ALWAYS	AUTO
Acquisition Time Synchronized	(0018,1800)	CS	1	Acquisition DateTime (0008,002A) synchronized with external time reference. Enumerated Values: Y N. See C.7.4.2.1.4. Always "N"	ALWAYS	AUTO

Table 8-11 Ophthalmic Photography IOD - Module "General Image"

Name	Tag	VR	Type	Description	PoV	Source
Patient Orientation	(0020,0020)	CS	2C	Patient direction of the rows and columns of the image. Required if image does not require Image Orientation (Patient) (0020,0037) and Image Position (Patient) (0020,0032) or if image does not require Image Orientation (Slide) (0048,0102). May be present otherwise. See C.7.6.1.1.1 for further explanation. Note: IODs may have Attributes other than Patient Orientation, Image Orientation, or Image Position (Patient) to describe orientation in which case this Attribute will be zero length. Always "L\F"	ALWAYS	AUTO

Table 8-12 Ophthalmic Photography IOD - Module "Image Pixel"

Name	Tag	VR	Type	Description	PoV	Source
Rows	(0028,0010)	US	1	Number of rows in the image. Shall be an exact multiple of the vertical downsampling factor if any of the samples (planes) are encoded downsampled in the vertical direction for pixel data encoded in a Native (uncompressed) format. E.g., required to be an even value for a Photometric Interpretation (0028,0004) of YBR_FULL_422.	ALWAYS	AUTO
Columns	(0028,0011)	US	1	Number of columns in the image. Shall be an exact multiple of the horizontal downsampling factor if any of the samples (planes) are encoded downsampled in the horizontal direction for pixel data encoded in a	ALWAYS	AUTO

				Native (uncompressed) format. E.g., required to be an even value for a Photometric Interpretation (0028,0004) of YBR_FULL_422.		
Bits Allocated	(0028,0100)	US	1	Number of bits allocated for each pixel sample. Each sample shall have the same number of bits allocated. Bits Allocated (0028,0100) shall be either 1, or a multiple of 8. See PS3.5 for further explanation. Always "8"	ALWAYS	AUTO
Bits Stored	(0028,0101)	US	1	Number of bits stored for each pixel sample. Each sample shall have the same number of bits stored. See PS3.5 for further explanation. Always "8"	ALWAYS	AUTO
High Bit	(0028,0102)	US	1	Most significant bit for pixel sample data. Each sample shall have the same high bit. High Bit (0028,0102) shall be one less than Bits Stored (0028,0101). See PS3.5 for further explanation. Always "7"	ALWAYS	AUTO
Pixel Data	(7FE0,0010)	OB|OW	1C	A data stream of the pixel samples that comprise the Image. See C.7.6.3.1.4 for further explanation. Required if Pixel Data Provider URL (0028,7FE0) is not present.	ALWAYS	ACQUISITION

Table 8-13 Ophthalmic Photography IOD - Module "Cine"

Name	Tag	VR	Type	Description	PoV	Source
Frame Time	(0018,1063)	DS	1C	Nominal time (in msec) per individual frame. See C.7.6.5.1.1 for further explanation. Required if Frame Increment Pointer (0028,0009) points to Frame Time. Always "0"	ALWAYS	AUTO

Table 8-14 Ophthalmic Photography IOD - Module "Multi-frame"

Name	Tag	VR	Type	Description	PoV	Source
Number of Frames	(0028,0008)	IS	1	Number of frames in a Multi-frame Image. See C.7.6.6.1.1 for further explanation. Always “1”	ALWAYS	AUTO
Frame Increment Pointer	(0028,0009)	AT	1	Contains the Data Element Tag of the Attribute that is used as the frame increment in Multi-frame pixel data. See C.7.6.6.1.2 for further explanation. Always "(0018,1063)" for Frame Time	ALWAYS	AUTO

Table 8-15 Ophthalmic Photography IOD - Module "Ophthalmic Photography Image"

Name	Tag	VR	Type	Description	PoV	Source
Image Type	(0008,0008)	CS	1	Image identification characteristics. See C.8.17.2.1.4 for specialization. "ORIGINAL\PRIMARY\\SL_IMAGE" for original images “DERIVED\PRIMARY\\SL_IMAGE” for image copies	ALWAYS	AUTO
Instance Number	(0020,0013)	IS	1	A number that identifies this image.	ALWAYS	AUTO
Samples per Pixel	(0028,0002)	US	1	Number of samples (planes) in this image. Enumerated Values: 3 1. See C.8.17.2.1.2 for further explanation. Always "3"	ALWAYS	AUTO
Photometric Interpretation	(0028,0004)	CS	1	Specifies the intended interpretation of the pixel data. See C.8.17.2.1.3. Always "YBR_FULL_422"	ALWAYS	AUTO
Pixel Representation	(0028,0103)	US	1	Data representation of the pixel samples. Enumerated Values: 0. Always "0"	ALWAYS	AUTO
Planar Configuration	(0028,0006)	US	1C	Indicates whether the pixel data are encoded color-by-plane or color-by-pixel. Required if Samples per Pixel (0028,0002) has a value greater than 1. Enumerated Values: 0 - color-by-pixel. Always "0"	ALWAYS	AUTO
Content Time	(0008,0033)	TM	1	The time the image pixel data creation started.	ALWAYS	AUTO
Content Date	(0008,0023)	DA	1	The date the image pixel data creation started.	ALWAYS	AUTO
Acquisition DateTime	(0008,002A)	DT	1C	The date and time that the acquisition of data started. Note: The synchronization of this time with an external clock is specified in the synchronization Module in Acquisition Time Synchronized (0018,1800). Required if Image Type (0008,0008) Value 1 is ORIGINAL. May be present otherwise.	ALWAYS	AUTO
Lossy Image Compression	(0028,2110)	CS	1	Specifies whether an Image has undergone lossy compression (at a point in its lifetime). Enumerated Values: 00 - Image has NOT been subjected to lossy compression. 01 - Image has been subjected to lossy compression. Once this value has been set to 01 it shall not be reset. See C.7.6.1.1.5.	ALWAYS	AUTO

				Always "01"		
Lossy Image Compression Ratio	(0028,2112)	DS	1C	Describes the approximate lossy compression ratio(s) that have been applied to this image. See C.7.6.1.1.5.2. Required if Lossy Image Compression (0028,2110) is "01".	ALWAYS	AUTO
Lossy Image Compression Method	(0028,2114)	CS	1C	A label for the lossy compression method(s) that have been applied to this image. See C.7.6.1.1.5.1. Required if Lossy Image Compression (0028,2110) is "01". Always "ISO_10918_1"	ALWAYS	AUTO
Burned In Annotation	(0028,0301)	CS	1	Indicates whether or not image contains sufficient burned in annotation to identify the patient and date the image was acquired. Enumerated Values: YES NO. Always "NO"	ALWAYS	AUTO

Table 8-16 Ophthalmic Photography IOD - Module "Ocular Region Imaged"

Name	Tag	VR	Type	Description	PoV	Source
Image Laterality	(0020,0062)	CS	1	Laterality of object imaged (as described in Anatomic Region Sequence (0008,2218)) examined. Enumerated Values: R - right eye. L - left eye. B - both left and right eye. Shall be consistent with any laterality information contained in Primary Anatomic Structure Modifier Sequence (0008,2230), if present. Note: Laterality (0020,0060) is a Series level Attribute and must be the same for all Images in the Series, hence it must be absent if Image Laterality (0020,0062) has different values for Images in the same Series. Since most Ophthalmic Photographic Image Series contain images of both eyes, the Series level Attribute will rarely be present. Always "L" or "R" depending on the eye examined	ALWAYS	AUTO

Table 8-17 Ophthalmic Photography IOD - Module "Ophthalmic Photography Acquisition Parameters"

Name	Tag	VR	Type	Description	PoV	Source
Patient Eye Movement Commanded	(0022,0005)	CS	2	Enumerated Values: YES NO. Always empty	EMPTY	AUTO

Horizontal Field of View	(0022,000C)	FL	2	The horizontal field of view in degrees. Always empty	EMPTY	AUTO
Refractive State Sequence	(0022,001B)	SQ	2	The refractive state of the imaged eye at the time of acquisition. Zero or one Itemshall be included in this Sequence. Zero length means the refractive state was not measured. Always empty sequence	EMPTY	AUTO
Emmetropic Magnification	(0022,000A)	FL	2	Emmetropic magnification value (dimensionless). Zero length means the emmetropic magnification was not measured. Always empty	EMPTY	AUTO
Intra Ocular Pressure	(0022,000B)	FL	2	Value of intraocular pressure in mmHg. Zero length means the pressure was not measured. Always empty	EMPTY	AUTO
Pupil Dilated	(0022,000D)	CS	2	Whether or not the patient's pupils were pharmacologically dilated for this acquisition. Enumerated Values: YES NO. If this Attribute is empty, no information is available. Always empty	EMPTY	AUTO

Table 8-18 Ophthalmic Photography IOD - Module "Ophthalmic Photographic Parameters"

Name	Tag	VR	Type	Description	PoV	Source
Acquisition Device Type Code Sequence	(0022,0015)	SQ	1	Describes the type of acquisition device. Only a single Item shall be included in this Sequence.	ALWAYS	AUTO
> Include 'Code Sequence Macro'.				>Include 8.8-1 "Code Sequence Macro Attributes". BCID 4202 "Ophthalmic Photography Acquisition Device". Always (A-2B201, SRT, "Slit Lamp Biomicroscope")	ALWAYS	AUTO
Illumination Type Code Sequence	(0022,0016)	SQ	2	Coded value for illumination. Zero or one Item shall be included in this Sequence. Always empty sequence	EMPTY	AUTO
Light Path Filter Type Stack Code Sequence	(0022,0017)	SQ	2	Filters used in the light source path. Zero or more Items shall be included in this Sequence. Always empty sequence	EMPTY	AUTO

Image Path Filter Type Stack Code Sequence	(0022,0018)	SQ	2	Describes stack of filters used in image path. Zero or more Items shall be included in this Sequence. Always empty sequence	EMPTY	AUTO
Lenses Code Sequence	(0022,0019)	SQ	2	Lenses that were used during the image acquisition. Zero or more Items shall be included in this Sequence. Always empty sequence	EMPTY	AUTO
Detector Type	(0018,7004)	CS	2	Type of detector used for creating this image. Defined Terms: CCD - Charge Coupled Devices. CMOS - Complementary Metal Oxide Semiconductor. Always "CMOS"	ALWAYS	AUTO

Table 8-19 Ophthalmic Photography IOD - Module "SOP Common"

Name	Tag	VR	Type	Description	PoV	Source
SOP Class UID	(0008,0016)	UI	1	Uniquely identifies the SOP Class. See C.12.1.1.1 for further explanation. See also PS3.4. Always "1.2.840.10008.5.1.4.1.1.77.1.5.1"	ALWAYS	AUTO
SOP Instance UID	(0008,0018)	UI	1	Uniquely identifies the SOP Instance. See C.12.1.1.1 for further explanation. See also PS3.4. SL Imaging uses a constant prefix of "1.2.276.0.75.2.1.71.1.3." followed by a date/time stamp and machine specific identifier.	ALWAYS	AUTO
Specific Character Set	(0008,0005)	CS	1C	Character Set that expands or replaces the Basic Graphic Set. Required if an expanded or replacement character set is used. See C.12.1.1.2 for Defined Terms. See chapter 6 Support of Character Sets	ALWAYS	AUTO, CONFIG
Instance Creation Date	(0008,0012)	DA	3	Date the SOP Instance was created. This is the date that the SOP Instance UID was assigned, and does not change during subsequent coercion of the Instance.	ALWAYS	AUTO
Instance Creation Time	(0008,0013)	TM	3	Time the SOP Instance was created. This is the time that the SOP Instance UID was assigned, and does not change during subsequent coercion of the Instance.	ALWAYS	AUTO

Contributing Equipment Sequence	(0018,A001)	SQ	3	Sequence of Items containing descriptive Attributes of related equipment that has contributed to the acquisition, creation or modification of the Composite Instance. One or more Items are permitted in this Sequence. See C.12.1.1.5 for further explanation. Sequence contains one single item defining the equipment which originally acquired the measurement data.	ALWAYS	AUTO
> Purpose of Reference Code Sequence	(0040,A170)	SQ	1	Describes the purpose for which the related equipment is being referenced. Only a single Item shall be included in this Sequence. See C.12.1.1.5 for further explanation.	ALWAYS	AUTO
>> Include 'Code Sequence Macro'.				>>Include 8.8-1 "Code Sequence Macro Attributes". DCID 7005 "Contributing Equipment Purposes of Reference". Always (109101, DCM, “Acquisition Equipment”)	ALWAYS	AUTO
> Manufacturer	(0008,0070)	LO	1	Manufacturer of the equipment that contributed to the composite instance. Always "Carl Zeiss Meditec"	ALWAYS	AUTO
> Institution Name	(0008,0080)	LO	3	Institution where the equipment that contributed to the composite instance is located. Attribute does not exist if no Institution Name is defined for contributing equipment.	ANAP	CONFIG
> Institution Address	(0008,0081)	ST	3	Address of the institution where the equipment that contributed to the composite instance is located. Attribute does not exist if no Institution Address is defined for contributing equipment.	ANAP	CONFIG
> Station Name	(0008,1010)	SH	3	User defined name identifying the machine that contributed to the composite instance. Attribute does not exist if no Station Name is defined for contributing equipment.	ANAP	CONFIG
> Institutional Department Name	(0008,1040)	LO	3	Department in the institution where the equipment that contributed to the composite instance is located. Attribute does not exist if no Institutional Department Name is defined for contributing equipment.	ANAP	CONFIG
> Manufacturer's Model Name	(0008,1090)	LO	3	Manufacturer’s model name of the equipment that contributed to the composite instance. Attribute does not exist if no Manufacturer's Model Name is defined for contributing equipment.	ANAP	AUTO
> Device Serial Number	(0018,1000)	LO	3	Manufacturer’s serial number of the equipment that contributed to the composite instance. Attribute does not exist if no Device Serial Number is defined for contributing equipment.	ANAP	AUTO

> Software Versions	(0018,1020)	LO	3	Manufacturer's designation of the software version of the equipment that contributed to the composite instance. Attribute does not exist if no Software Version(s) is defined for contributing equipment.	ANAP	AUTO
> Date of Last Calibration	(0018,1200)	DA	3	Date when the image acquisition device calibration was last changed in any way. Multiple entries may be used for additional calibrations at other times. See NEMA PS3.3 Section C.7.5.1.1.1 for further explanation. Attribute does not exist if no Date of Last Calibration is defined for contributing equipment.	ANAP	AUTO
> Time of Last Calibration	(0018,1201)	TM	3	Time when the image acquisition device calibration was last changed in any way. Multiple entries may be used. See NEMA PS3.3 Section C.7.5.1.1.1 for further explanation. Attribute does not exist if no Time of Last Calibration is defined for contributing equipment.	ANAP	AUTO
> Contribution DateTime	(0018,A002)	DT	3	The Date & Time when the equipment contributed to the Composite Instance.		
> Contribution Description	(0018,A003)	ST	3	Description of the contribution the equipment made to the Composite Instance.		

8.1.1.7 Video Photographic Image Modules

Table 8-20 Video Photographic Image IOD - Module "General Image"

Name	Tag	VR	Type	Description	PoV	Source
Instance Number	(0020,0013)	IS	2	A number that identifies this image. Note: This Attribute was named Image Number in earlier versions of this Standard.	ALWAYS	AUTO
Patient Orientation	(0020,0020)	CS	2C	Patient direction of the rows and columns of the image. Required if image does not require Image Orientation (Patient) (0020,0037) and Image Position (Patient) (0020,0032). May be present otherwise. See C.7.6.1.1.1 for further explanation. Note: IOD's may have attributes other than Patient Orientation, Image Orientation, or Image Position (Patient) to describe orientation in which case this attribute will be zero length. Always "L\F"	ALWAYS	AUTO
Content Date	(0008,0023)	DA	2C	The date the image pixel data creation started. Required if image is part of a series in which the images are temporally related. May be present otherwise. Note: This Attribute was formerly known as Image Date.	ALWAYS	AUTO
Acquisition Datetime	(0008,002A)	DT	3	The date and time that the acquisition of data that resulted in this image started. Note: The synchronization of this time with an external clock is specified in the Synchronization Module in Acquisition Time Synchronized (0018,1800).	ALWAYS	AUTO

Lossy Image Compression Method	(0028,2114)	CS	3	A label for the lossy compression method(s) that have been applied to this image. See C.7.6.1.1.5 for further explanation. May be multivalued if successive lossy compression steps have been applied; the value order shall correspond to the values of Lossy Image Compression Ratio (0028,2112). Note: For historical reasons, the lossy compression method may also be described in Derivation Description (0008,2111). Always “ISO_14496_10” for MPEG-4 AVC/H.264 Compression	ALWAYS	AUTO

Table 8-21 Video Photographic Image IOD - Module "Cine"

Name	Tag	VR	Type	Description	PoV	Source
Frame Time	(0018,1063)	DS	1C	Nominal time (in msec) per individual frame. See C.7.6.5.1.1 for further explanation. Required if Frame Increment Pointer (0028,0009) points to Frame Time. Always "40.00"	ALWAYS	AUTO
Cine Rate	(0018,0040)	IS	3	Number of frames per second. Always “25”	ALWAYS	AUTO

Table 8-22 Video Photographic Image IOD - Module "Multi-frame"

Name	Tag	VR	Type	Description	PoV	Source
Number of Frames	(0028,0008)	IS	1	Number of frames in a Multi-frame Image. See C.7.6.6.1.1 for further explanation.	ALWAYS	AUTO
Frame Increment Pointer	(0028,0009)	AT	1	Contains the Data Element Tag of the attribute that is used as the frame increment in Multi-frame pixel data. See C.7.6.6.1.2 for further explanation. Always "(0018,1063)" for Frame Time	ALWAYS	AUTO

Table 8-23 Video Photographic Image IOD - Module "Image Pixel"

Name	Tag	VR	Type	Description	PoV	Source
Rows	(0028,0010)	US	1	Number of rows in the image. Always “1080”	ALWAYS	AUTO
Columns	(0028,0011)	US	1	Number of columns in the image. Always “1920”	ALWAYS	AUTO
Pixel Data	(7FE0,0010)	OB|OW	1C	A data stream of the pixel samples that comprise the Image. See C.7.6.3.1.4 for further explanation. Required if Pixel Data Provider URL (0028,7FE0) is not present.	ALWAYS	ACQUISITION

Table 8-24 Video Photographic Image IOD - Module "Acquisition Context"

Name	Tag	VR	Type	Description	PoV	Source
Acquisition Context Sequence	(0040,0555)	SQ	2	A sequence of Items that describes the conditions present during the acquisition of the data of the SOP Instance. Zero or more items shall be included in this sequence. Always empty sequence	EMPTY	AUTO

Table 8-25 Video Photographic Image IOD - Module "VL Image"

Name	Tag	VR	Type	Description	PoV	Source
Image Type	(0008,0008)	CS	1	Image identification characteristics. See C.8.12.1.1.6 for specialization. Always "ORIGINAL\PRIMARY\\SL_VIDEO"	ALWAYS	AUTO
Photometric Interpretation	(0028,0004)	CS	1	Specifies the intended interpretation of the pixel data. See C.8.12.1.1.1 for specialization of this Attribute. Always "YBR_PARTIAL_420"	ALWAYS	AUTO
Bits Allocated	(0028,0100)	US	1	Number of bits allocated for each pixel sample. Each sample shall have the same number of bits allocated. See C.8.12.1.1.2 for specialization of this Attribute. See PS 3.5 for further explanation. Always "8"	ALWAYS	AUTO
Bits Stored	(0028,0101)	US	1	Number of bits stored for each pixel sample. Each sample shall have the same number of bits stored. See C.8.12.1.1.2 for specialization of this Attribute. See PS 3.5 for further explanation. Always "8"	ALWAYS	AUTO
High Bit	(0028,0102)	US	1	Most significant bit for pixel sample data. Each sample shall have the same high bit. See C.8.12.1.1.2 for specialization of this Attribute. See PS 3.5 for further explanation. Always "7"	ALWAYS	AUTO
Pixel Representation	(0028,0103)	US	1	Data representation of the pixel samples. Each sample shall have the same pixel representation. See Section C.8.12.1.1.3 for specialization of this Attribute. Always "0"	ALWAYS	AUTO
Samples per Pixel	(0028,0002)	US	1	Number of samples (planes) per image. See C.8.12.1.1.4 for specialization of this Attribute. Always "3"	ALWAYS	AUTO

Planar Configuration	(0028,0006)	US	1C	Indicates whether the pixel data are sent color-by-plane or color-by-pixel. Required if Samples per Pixel (0028,0002) has a value greater than 1. See C.8.12.1.1.5 for specialization of this Attribute. Enumerated value shall be 0 (color-by-pixel). Always “0”	ALWAYS	AUTO
Content Time	(0008,0033)	TM	1C	The time the image pixel data creation started. Required if the Image is part of a series in which the images are temporally related. Note: This Attribute was formerly known as Image Time.	ALWAYS	AUTO
Lossy Image Compression	(0028,2110)	CS	2	Specifies whether an Image has undergone lossy compression. Enumerated Values: 00 = Image has NOT been subjected to lossy compression. 01 = Image has been subjected to lossy compression. See NEMA PS3.3 C.7.6.1.1.5 Always "01"	ALWAYS	AUTO
Anatomic Region Sequence	(0008,2218)	SQ	1C	Sequence that identifies the anatomic region of interest in this image (i.e. external anatomy, surface anatomy, or general region of the body). Only a single Item shall be included in this sequence. Required if Number of Frames (0028,0008) is present and Specimen Description Sequence (0040,0560) is absent. May be present otherwise.	ALWAYS	AUTO
>Code Value	(0008,0100)	SH	1	Always "T-AA000"	ALWAYS	AUTO
>Coding Scheme Designator	(0008,0102)	SH	1	Always "SRT"	ALWAYS	AUTO
>Code Meaning	(0008,0104)	LO	1	Always "Eye"	ALWAYS	AUTO

Table 8-26 Video Photographic Image IOD - Module "Sop Common"

Name	Tag	VR	Type	Description	PoV	Source
SOP Class UID	(0008,0016)	UI	1	Uniquely identifies the SOP Class. See C.12.1.1.1 for further explanation. See also PS3.4. Always "1.2.840.10008.5.1.4.1.1.77.1.4.1"	ALWAYS	AUTO
SOP Instance UID	(0008,0018)	UI	1	Uniquely identifies the SOP Instance. See C.12.1.1.1 for further explanation. See also PS3.4. SL Imaging uses a constant prefix of "1.2.276.0.75.2.1.71.1.3." followed by a date/time stamp and machine specific identifier.	ALWAYS	AUTO
Specific Character Set	(0008,0005)	CS	1C	Character Set that expands or replaces the Basic Graphic Set. Required if an expanded or replacement character set is used. See C.12.1.1.2 for Defined Terms. See chapter 6 Support of Character Sets	ALWAYS	AUTO, CONFIG

Instance Creation Date	(0008,0012)	DA	3	Date the SOP Instance was created. This is the date that the SOP Instance UID was assigned, and does not change during subsequent coercion of the Instance.	ALWAYS	AUTO
Instance Creation Time	(0008,0013)	TM	3	Time the SOP Instance was created. This is the time that the SOP Instance UID was assigned, and does not change during subsequent coercion of the Instance.	ALWAYS	AUTO
Contributing Equipment Sequence	(0018,A001)	SQ	3	Sequence of Items containing descriptive Attributes of related equipment that has contributed to the acquisition, creation or modification of the Composite Instance. One or more Items are permitted in this Sequence. See C.12.1.1.5 for further explanation. Sequence contains one single item defining the equipment which originally acquired the measurement data.	ALWAYS	AUTO
> Purpose of Reference Code Sequence	(0040,A170)	SQ	1	Describes the purpose for which the related equipment is being referenced. Only a single Item shall be included in this Sequence. See C.12.1.1.5 for further explanation.	ALWAYS	AUTO
>> Include 'Code Sequence Macro'.				>>Include 8.8-1 "Code Sequence Macro Attributes". DCID 7005 "Contributing Equipment Purposes of Reference". Always (109101, DCM, “Acquisition Equipment”)	ALWAYS	AUTO
> Manufacturer	(0008,0070)	LO	1	Manufacturer of the equipment that contributed to the composite instance. Always "Carl Zeiss Meditec"	ALWAYS	AUTO
> Institution Name	(0008,0080)	LO	3	Institution where the equipment that contributed to the composite instance is located. Attribute does not exist if no Institution Name is defined for contributing equipment.	ANAP	CONFIG
> Institution Address	(0008,0081)	ST	3	Address of the institution where the equipment that contributed to the composite instance is located. Attribute does not exist if no Institution Address is defined for contributing equipment.	ANAP	CONFIG
> Station Name	(0008,1010)	SH	3	User defined name identifying the machine that contributed to the composite instance. Attribute does not exist if no Station Name is defined for contributing equipment.	ANAP	CONFIG
> Institutional Department Name	(0008,1040)	LO	3	Department in the institution where the equipment that contributed to the composite instance is located. Attribute does not exist if no Institutional Department Name is defined for contributing equipment.	ANAP	CONFIG
> Manufacturer's Model Name	(0008,1090)	LO	3	Manufacturer’s model name of the equipment that contributed to the composite instance.	ANAP	AUTO

				Attribute does not exist if no Manufacturer's Model Name is defined for contributing equipment.		
> Device Serial Number	(0018,1000)	LO	3	Manufacturer’s serial number of the equipment that contributed to the composite instance. Attribute does not exist if no Device Serial Number is defined for contributing equipment.	ANAP	AUTO
> Software Versions	(0018,1020)	LO	3	Manufacturer’s designation of the software version of the equipment that contributed to the composite instance. Attribute does not exist if no Software Version(s) is defined for contributing equipment.	ANAP	AUTO
> Date of Last Calibration	(0018,1200)	DA	3	Date when the image acquisition device calibration was last changed in any way. Multiple entries may be used for additional calibrations at other times. See NEMA PS3.3 Section C.7.5.1.1.1 for further explanation. Attribute does not exist if no Date of Last Calibration is defined for contributing equipment.	ANAP	AUTO
> Time of Last Calibration	(0018,1201)	TM	3	Time when the image acquisition device calibration was last changed in any way. Multiple entries may be used. See NEMA PS3.3 Section C.7.5.1.1.1 for further explanation. Attribute does not exist if no Time of Last Calibration is defined for contributing equipment.	ANAP	AUTO
> Contribution DateTime	(0018,A002)	DT	3	The Date & Time when the equipment contributed to the Composite Instance.		
> Contribution Description	(0018,A003)	ST	3	Description of the contribution the equipment made to the Composite Instance.		

8.1.2 Usage of Attributes from Received IOD's

The usage of attributes of Modality Worklist IODs is described in chapter 4.2.1.3.2 Activity – Query Modality Worklist.

8.1.3 Attribute Mapping

In scheduled case, the following attributes are mapped from Modality Worklist to Storage SOP Instances.

Table 8-27 Attribute Mapping

Modality Worklist		Instance IOD		Editable
(0010,0010)	Patient's Name	(0010,0010)	Patient's Name	No
(0010,0020)	Patient ID	(0010,0020)	Patient ID	No
(0010,0021)	Issuer of Patient ID	(0010,0021)	Issuer of Patient ID	No
(0010,1000)	Other Patient IDs	(0010,1000)	Other Patient IDs	No
(0010,0030)	Patient's Birth Date	(0010,0030)	Patient's Birth Date	No
(0010,0040)	Patient's Sex	(0010,0040)	Patient's Sex	No
(0010,2160)	Ethnic Group	(0010,2160)	Ethnic Group	No
(0010,4000)	Patient Comments	(0010,4000)	Patient Comments	No
(0008,0050)	Accession Number	(0008,0050)	Accession Number	No
(0008,0090)	Referring Physicians Name	(0008,0090)	Referring Physicians Name	No
(0040,1001)	Requested Procedure ID	(0020,0010)	Study ID	No
		(0040,0275)> (0040,1001)	Request Attributes Sequence > Requested Procedure ID	No
(0032,1060)	Requested Procedure Description	(0008,1030)	Study Description	No
		(0040,0275)> (0032,1060)	Request Attributes Sequence > Requested Procedure Description	No
(0032,1064)	Requested Procedure Code Sequence	(0008,1032)	Procedure Code Sequence	No
>(0008,0100)	Code Value	>(0008,0100)	Code Value	No
>(0008,0102)	Coding Scheme Designator	>(0008,0102)	Coding Scheme Designator	No
>(0008,0103)	Coding Scheme Version	>(0008,0103)	Coding Scheme Version	No
>(0008,0104)	Code Meaning	>(0008,0104)	Code Meaning	No
(0020,000D)	Study Instance UID	(0020,000D)	Study Instance UID	No
(0008,0020)	Study Date[1]	(0008,0020)	Study Date	No
(0008,0030)	Study Time[1]	(0008,0030)	Study Time	No
(0008,1110)	Referenced Study Sequence	(0008,1110)	Referenced Study Sequence	No
>(0008,1150)	Referenced Sop Class UID	>(0008,1150)	Referenced Sop Class UID	No
>(0008,1155)	Referenced Sop Instance UID	>(0008,1155)	Referenced Sop Instance UID	No

(0040,0100)	Scheduled Procedure Step Sequence			
>(0040,0007)	Scheduled Procedure Step Description	(0040,0275)> (0040,0007)	Request Attributes Sequence > Scheduled Procedure Step Description	No
>(0040,0008)	Scheduled Protocol Code Sequence	(0040,0275)> (0040,0008)	Request Attributes Sequence > Scheduled Protocol Code Sequence	No
>>(0008,0100)	Code Value	>(0008,0100)	Code Value	No
>>(0008,0102)	Coding Scheme Designator	>(0008,0102)	Coding Scheme Designator	No
>>(0008,0103)	Coding Scheme Version	>(0008,0103)	Coding Scheme Version	No
>>(0008,0104)	Code Meaning	>(0008,0104)	Code Meaning	No
>(0040,0009)	Scheduled Procedure Step ID	(0040,0275)> (0040,0009)	Request Attributes Sequence > Scheduled Procedure Step ID	No

Note [1]: Study Date and Time are copied from Modality Worklist response in case the DICOM settings for Modality Worklist - Visit date and time are set to “Query response”

8.1.4 Coerced/Modified Fields

Those tags are listed in chapter 4.2.1.3.2 Activity – Query Modality Worklist. Other attributes get lost and are not available in the SL Imaging Application.

8.2 Data Dictionary of Private Attributes

The Private Attributes added to created SOP Instances are listed in the tables below. SL Imaging Application reserves blocks of private attributes in groups XXXX, YYYY,… and 2201.

Table 8-28 Private Dictionary Group (2201,00xx) = “99CZM_NIM_INTERNAL_01”

Occurs in: Encapsulated PDF SOP Instance SOP Instance, Ophthalmic Photography 8 Bit SOP Instance

Tag	Attribute Name	VR	VM
(2201,00xx)	Private Creator	LO	1
(2201,xx00)	IOD Name Meta Info	LT	1
(2201,xx01)	CZM-XML Version	LT	1
(2201,xx02)	Private Module Names and Versions	LT	1

8.3 Coded Terminology and Templates

This chapter describes the coded terminology and templates used by the application entity. This includes especially the used codes and DICOM Content Mapping Resource context groups where the codes are taken from.

8.3.1 CID 4202. Ophthalmic Photography Acquisition Device

The application software uses (0022,0015) Acquisition Device Type Code Sequence to specify detailed information on the type of acquisition device used for the OP image.

Occurs in: Ophthalmic Photography 8 Bit Image IOD SOP Instance

Table 8-29 Coded Values - Ophthalmic Photography Acquisition Device

Code Value	Coding Scheme Designator	Coding Scheme Version	Code Meaning / Comments
A-2B201	SRT	n/a	Slit Lamp Biomicroscope

8.3.2 CID 4209. Ophthalmic Anatomic Structure Imaged

The application software uses (0008,2218) Anatomic Region Sequence to specify detailed information on the anatomic region that was examined.

Occurs in: Ophthalmic Photography 8 Bit Image IOD SOP Instance

Table 8-30 Coded Values - Ophthalmic Anatomic Structure Imaged

Code Value	Coding Scheme Designator	Coding Scheme Version	Code Meaning / Comments
T-AA000	SRT	n/a	Eye

8.3.3 CID 7005. Contributing Equipment Purposes of Reference

The application software uses (0018,A001) Contributing Equipment Sequence to specify any contributing equipment and therein the (0040,A170) Purpose of Reference Code Sequence to describe the purpose for which the equipment is being referenced.

Occurs in: Ophthalmic Photography 8 Bit Image SOP Instance, Encapsulated PDF SOP Instance

Table 8-31 Coded Values - Contributing Equipment Purposes of Reference

Code Value	Coding Scheme Designator	Coding Scheme Version	Code Meaning / Comments
109101	DCM	n/a	Acquisition Equipment

8.4 Greyscale Image Consistency

Not applicable.

8.5 Standard Extended / Specialized/ Private SOP Classes

No standard extensions are used in the IODs described in chapter 8.1.1 Created SOP Instance(s).

8.6 Private Transfer Syntaxes

No Private Transfer Syntax is supported.

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