DICOM Conformance Statement

KINEVO® 900

Version 1.8

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1 Conformance Statement Overview

The KINEVO 900 is a Robotic Visualization System, and suitable for cranial and spinal applications in neurosurgery, for ENT applications in the area of the auditory nerves and the base of the skull. Further fields of application include reconstructive and plastic procedures in accident surgery, plastic and reconstructive surgery, and oral and maxillofacial surgery in hospitals, clinics or other human medical institutions. The KINEVO 900 is also suitable for multidisciplinary use in microsurgery. It is designed for surgical procedures in which endoscopes and surgical microscopes are used simultaneously. KINEVO 900 with its optional fully integrated 3D video system can be used as a hybrid digital visualization system to perform microsurgical treatment using an external 3D Video display. The system offers a complementary integrated micro-inspection tool (QEVO) to observe hidden anatomical structures and can be optionally supplemented with navigation and network systems.

The DICOM option enables a standardized exchange of patient data with the PACS system of the clinic.

The KINEVO 900 Application Software allows to:

- Verify the communication to a remote application entity
- Add or edit patient demographics
- Import Patients from DICOM Modality Worklist
- Take photos and record videos
- Export selected photos and videos to a remote DICOM Storage Provider
- Delete selected photos, videos or patients from local system

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		
VL Microscopic Image Storage	Yes	No
Video Microscopic Image Storage	Yes	No
Workflow Management		
Modality Worklist Information Model – FIND	Yes	No
Verification	Yes	Yes

The KINEVO 900 does not support Media Interchange.

2 Table of Contents

3 Introduction

3.1 Revision History

Document Number	Date	Author	Changes
EN_30_200_0050II	2017-05-11	hnau	Initial Version
EN_30_200_0050III	2018-01-03	Hnau	Update for Version 1.1
EN_30_200_0050IV	2018-02-12	Hnau	Update for Version 1.5
EN_30_200_0050V	2019-03-20	Msmbe	Update for Version 1.6
EN_30_200_0103I		Msmbe	Upgrade to Version 1.8 - Support of different Character Sets

3.2 Audience

This document is written for the people that need to understand how KINEVO 900 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 KINEVO 900 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 3-1 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
AUTO	Automatically generated, cannot be modified by the operator
CONFIG	Configurable parameter
CZM	Carl Zeiss Meditec
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

MPEG-4 2D	MPEG-4 AVC/H.264 High Profile / Level 4.2 For 2D Video Transfer Syntax
MPEG-4 3D	MPEG-4 AVC/H.264 High Profile / Level 4.2 For 3D Video Transfer Syntax
MWL	Modality Worklist
SCP	Service Class Provider
SCU	Service Class User
SOP	Service Object Pair, union of a specific DICOM service and related IOD.
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

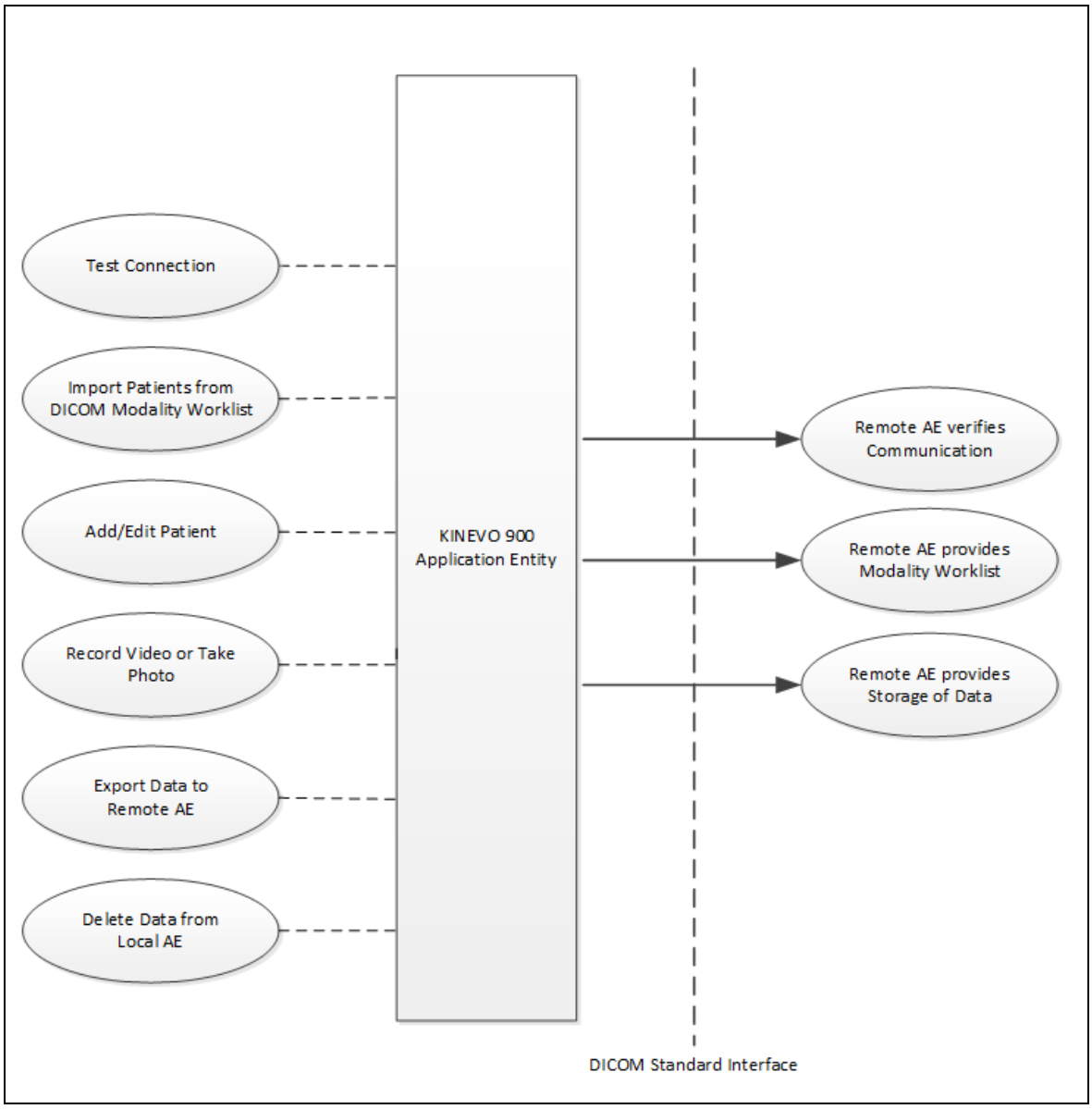
NEMA PS3 / ISO 12052, Digital Imaging and Communications in Medicine (DICOM) Standard, National Electrical Manufacturers Association, Rosslyn, VA, USA (available free at http://medical.nema.org/)

4 Networking

4.1 Implementation Model

4.1.1 Application Data Flow

Figure 4-1 KINEVO 900 Application Software as Acquisition Modality



4.1.2 Functional Definition of AEs

4.1.2.1 Functional Definition of KINEVO 900 AE

The KINEVO 900 is a Robotic Visualization System, and suitable for cranial and spinal applications in neurosurgery, for ENT applications in the area of the auditory nerves and the base of the skull. Further fields of application include reconstructive and plastic procedures in accident surgery, plastic and reconstructive surgery, and oral and maxillofacial surgery in hospitals, clinics or other human medical institutions. The KINEVO 900 is also suitable for multidisciplinary use in microsurgery. It is designed for surgical procedures in which endoscopes and surgical microscopes are used simultaneously. KINEVO 900 with its optional fully integrated 3D video system can be used as a hybrid digital visualization system to perform microsurgical treatment using an external 3D Video display. The system offers a complementary integrated micro-inspection tool (QEVO) to observe hidden anatomical structures and can be optionally supplemented with navigation and network systems.

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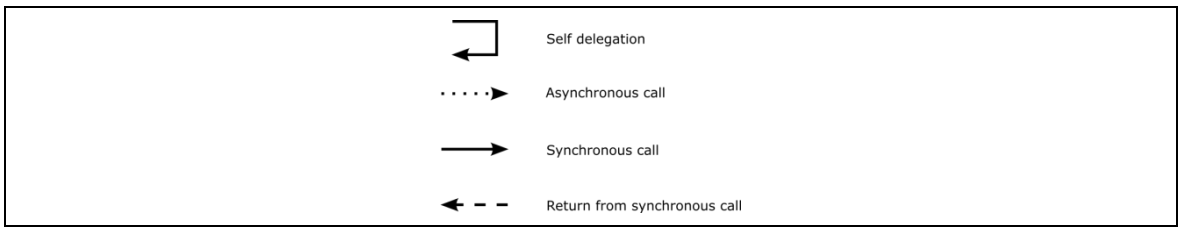
The KINEVO 900 software allows performing a verification of the configured AEs. The result of this verification contains information about the supported SOP Classes and Transfer Syntaxes.

The KINEVO 900 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

Add/Edit Patient

The operator can add new patients or edit existing patient information for patients that have been created on the device.

Import Patients from DICOM Modality Worklist

The Import Patient Data option allows the operator to import patients from USB, Network Share or DICOM Modality Worklist.
On import from DICOM Modality Worklist the device always creates a new patient record, i.e. the data is not added to an existing patient record. If a new patient record

is imported which has the same name as the existing patient record, there will be two patient records with the same name.

Record Video or Take Photo

When a patient is selected the operator can choose between two different capture modes:

- Record live video of the integrated camera during the surgical procedure.
- Take a photo with the integrated video camera.

These activities create image data.

Export data to remote AE

This activity is triggered manually by the operator. During this activity acquired and selected data is transferred to the configured Storage Provider.

Delete data from local AE

In the patient menu the operator has the option delete selected photos or videos.

Figure 4-2 Scheduled Case

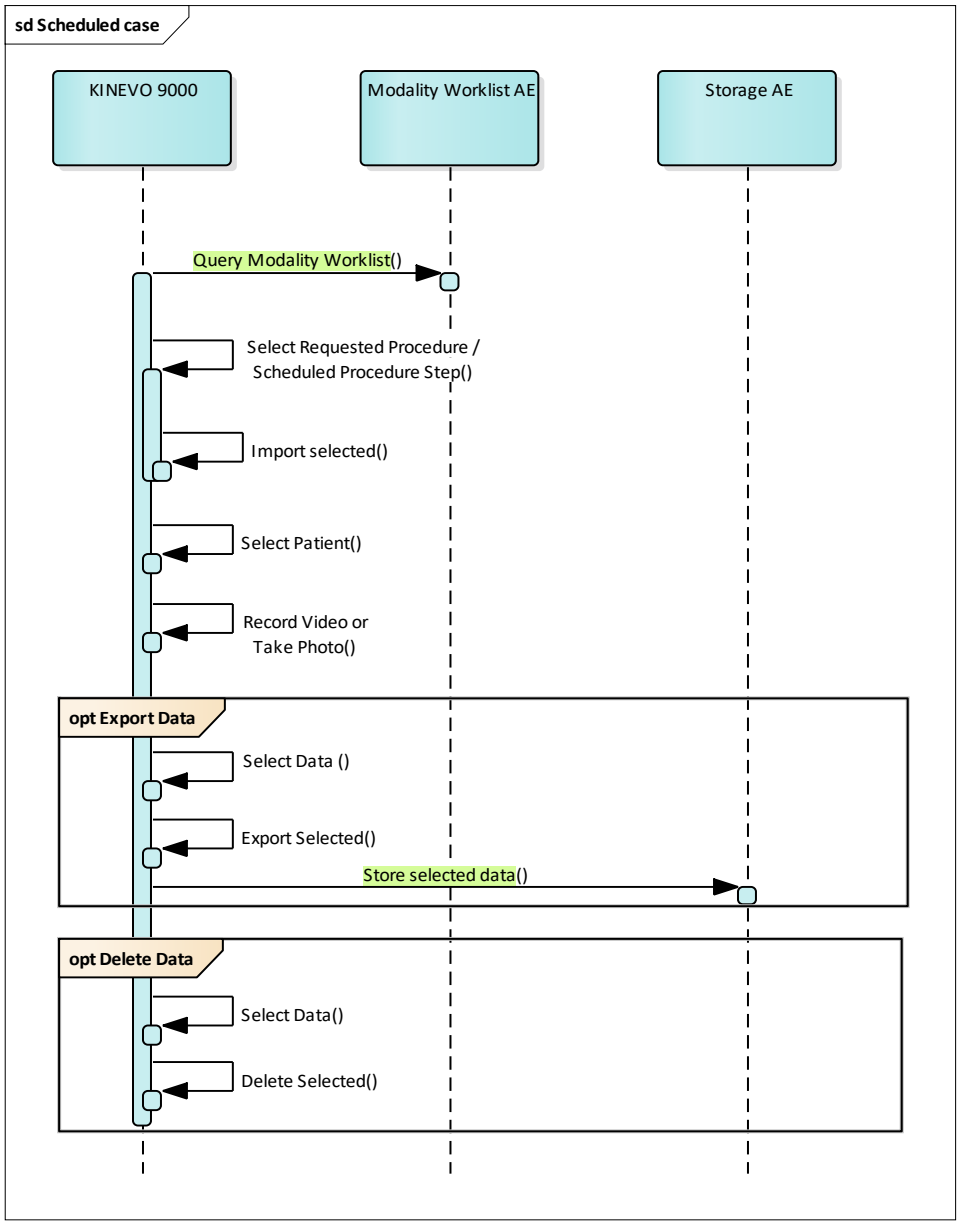
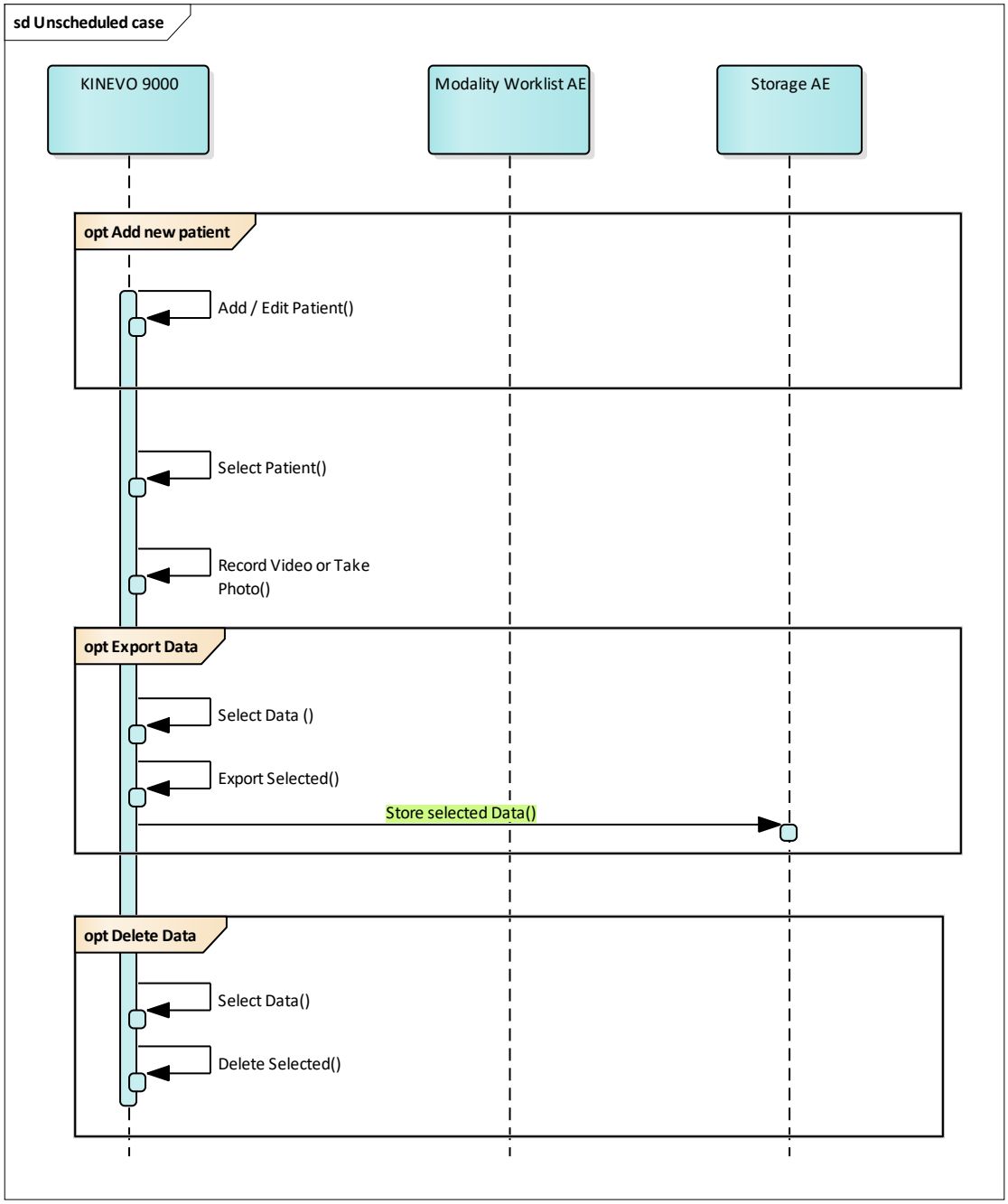


Figure 4-3 Unscheduled Case



4.2 AE Specifications

4.2.1 KINEVO 900 AE Specification

4.2.1.1 SOP Classes

Table 4-1 SOP Classes for KINEVO 900 AE

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	Yes	Yes
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	Yes	No
Video Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2.1	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

The number of simultaneous associations depends on the usage profile. At a certain point of time there might be active simultaneously:

- Up to 2 associations for Verification or
- 1 association for Storage or
- 1 association for Modality Worklist

Table 4-3 Number of associations

Maximum number of simultaneous associations	2

4.2.1.2.3 Asynchronous Nature

KINEVO 900 Application Software does not support asynchronous communication (multiple outstanding transactions over a single Association).

4.2.1.2.4 Implementation Identifying Information

Table 4-4 DICOM implementation class and version

Implementation Class UID	1.2.276.0.75.2.5.20
Implementation Version Name	NIM-2.11.0

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 configuration phase. It facilitates the setup and management of the remote DICOM Application Entities.

The user can test the application level communication between instrument's software Application Entity and its peer DICOM Application Entity.

In the association request KINEVO 900 Application Software 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 “Test Connection” activity are shown to the user as success or failure. Not only the Verification information is evaluated, but also the acceptance of the proposed presentation context comprising the respective Modality Worklist and Storage SOP Class.

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 4-5 Presentation Contexts proposed for Activity “Test Connection”

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name List**	**UID List**		
Verification	1.2.840.10008.1.1	ILE	1.2.840.10008.1.2	BOTH[1]	None
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	ILE	1.2.840.10008.1.2	SCU	None
		JPG-1	1.2.840.10008.1.2.4.50	SCU	None
		ELE	1.2.840.10008.1.2.1	SCU	None
Video Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2.1	MPEG-4 2D	1.2.840.10008.1.2.4.104	SCU	None
		MPEG-4 3D	1.2.840.10008.1.2.4.105	SCU	None
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	ILE	1.2.840.10008.1.2	SCU	None

Note[1]: Depending on Setting #None-listening mode (Off – BOTH | On – SCU only), see 4.4.2.1General Parameters

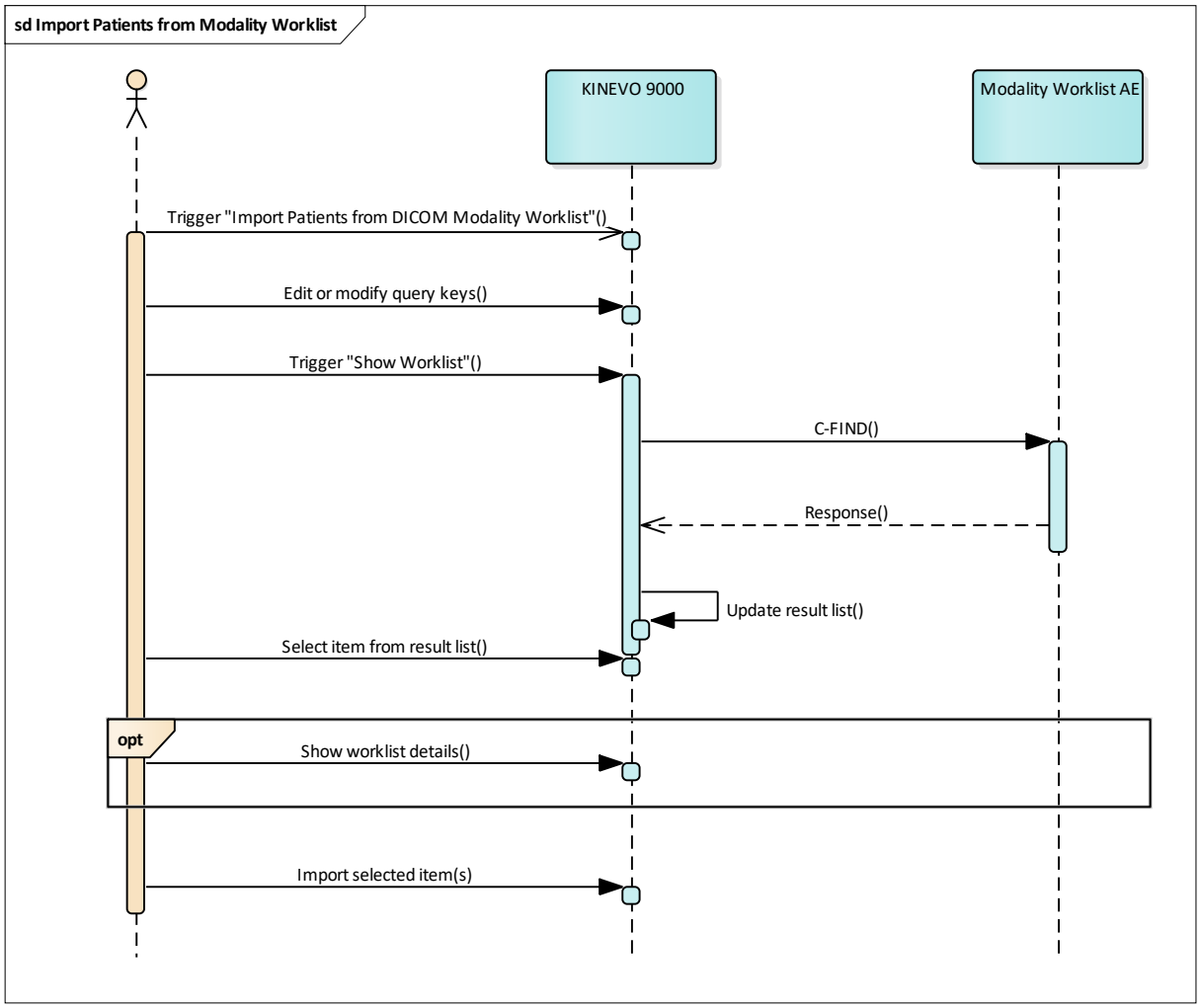
4.2.1.3.1.3 SOP Specific Conformance for Verification SOP Class

The KINEVO 900 Application Software provides standard conformance.

4.2.1.3.2 Activity – Import Patients from Modality Worklist

4.2.1.3.2.1 Description and Sequencing of Activities

Figure 4-4 Modality Worklist – Import Patients from DICOM Modality Worklist



Trigger "Import Patients from DICOM Modality Worklist"

The activity "Import Patients from DICOM Modality Worklist" can be triggered by the operator at any time if no other activity is in progress. It is meaningful to perform the query when the patient arrives at the modality. Then the worklist contains the latest information.

Edit or modify query keys

The Modality Worklist query offers a GUI for interactive query.

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. For more details on supported query keys see Table 4-9 Modality Worklist Query Key Details If the operator likes to use wildcards he may manually add the following wildcard characters:
* signifies any number of characters (including none)

? signifies any one character

The application adds wildcards automatically at the end of the patient's last name and patient's first name search string. For the other query keys no wildcard is added at the end of the specified search string.

Trigger "Show Worklist"

The operator triggers the search after having filled in the search criteria. The Application Software sends a DICOM C-FIND request with the search criteria in the query key attributes. The Application Software waits for the response from the peer Application Entity.

The Application Software will accept 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 followed by an A-RELEASE-RQ to the service provider and a message is displayed. Despite this warning, the operator gets results in the patient list.

After receiving the response, the results list is updated. The results list provides the most important information for a quick overview (see column "Displayed in Result List" in Table 4-8 Attributes involved in Modality Worklist C-FIND request and response 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 item from results list

The operator can select one or more worklist items in the results list. For each worklist item in the results list a detailed view can be opened or one or more items can be imported into the Application Software.

Show worklist details

The detailed view allows a closer look at the returned worklist items. Thus the operator can see more information about patient information and scheduling information (see column "Displayed in Patient Details" in Table 4-8 Attributes involved in Modality Worklist C-FIND request and response for the supported set of tags).

Import selected item

The operator can take over the selected item(s) at any time. The data is stored in the patients' list.

After saving the selected item(s), the operator can start another DICOM Modality Worklist search or perform any other operation like e.g. capturing image data.

On import from DICOM Modality Worklist the device always creates a new patient record, i.e. the data is not added to an existing patient record. If a new patient record is imported which has the same name as the existing patient record, there will be two patient records with the same name.

Multi Component Group Names Handling

The KINEVO 900 is capable to read the first component group of multi-component group names. When the operator triggers a search of a worklist containing multi-component group names the search will be performed using the first component group only. When the response from the modality worklist provider contains a multi-component group name the results list will show only the first component group and the first component group information will be imported at the modality. An empty first component group in the worklist will result in an empty Patient Name attribute in the created DICOM IODs. The second and third component groups are ignored.

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 Information Model - FIND" with Transfer Syntax ILE

Table 4-6 Proposed Presentation Contexts for Activity "Import Patients from Modality Worklist"

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name List**	**UID List**		
Verification	1.2.840.10008.1.1	ILE	1.2.840.10008.1.2	BOTH[1]	None
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	ILE	1.2.840.10008.1.2	SCU	None
		JPG-1	1.2.840.10008.1.2.4.50	SCU	None
		ELE	1.2.840.10008.1.2.1	SCU	None
Video Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2.1	MPEG-4 2D	1.2.840.10008.1.2.4.104	SCU	None
		MPEG-4 3D	1.2.840.10008.1.2.4.105	SCU	None
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	ILE	1.2.840.10008.1.2	SCU	None

Note[1]: Depending on Setting #None-listening mode (Off – BOTH | On – SCU only), see 4.4.2.1General Parameters

4.2.1.3.2.3 SOP Specific Conformance for Modality Worklist SOP Class

Table 4-7 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 Software Application stops receiving worklist items. It finally 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 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.

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 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.
Unknown	All other responses with unknown code meaning	xxxx	Log message and display user alert message

Table 4-8 Attributes involved in Modality Worklist C-FIND request and response

Tag	Tag Name	Query Keys Matching	Query Keys Return	Displayed in Result List	Imported to Modality	Displayed in Patient Details	Copied to SOP Instance
Scheduled Procedure Step (SPS)							
(0040,0100)	Scheduled Procedure Step Sequence		**R**				
>(0040,0001)	Scheduled Station Application Entity Title	X, DEF	**O**		X		
>(0040,0002)	Scheduled Procedure Step Start Date	X, DEF	**R**	X	X	X	
>(0040,0003)	Scheduled Procedure Step Start Time		**R**	X	X	X	
>(0008,0060)	Modality	X	**O**	X	X	X	
>(0040,0006)	Scheduled Performing Physicians Name						
>(0040,0007)	Scheduled Procedure Step Description		**C**[1]	X	X	X	X
>(0040,0010)	Scheduled Station Name						
>(0040,0011)	Scheduled Procedure Step Location						
>(0040,0008)	Scheduled Protocol Code Sequence		**C**[1]		X	X	X
>>(0008,0100)	Code Value		**R***		X	X	X
>>(0008,0102)	Coding Scheme Designator		**R***		X	X	X
>>(0008,0103)	Coding Scheme Version		**O**				

Tag	Tag Name	Query Keys Matching	Query Keys Return	Displayed in Result List	Imported to Modality	Displayed in Patient Details	Copied to SOP Instance
>>(0008,0104)	Code Meaning		**O**		X	X	X
>(0040,0012)	Pre-Medication						
>(0040,0009)	Scheduled Procedure Step ID		**R**		X		X
>(0032,1070)	Requested Contrast Agent						
>(0040,0020)	Scheduled Procedure Step Status						
Requested Procedure							
(0040,1001)	Requested Procedure ID	X	**R**	X	X	X	X
(0032,1060)	Requested Procedure Description		**C**[2]		X	X	X
(0032,1064)	Requested Procedure Code Sequence		**C**[2]		X	X	X
>(0008,0100)	Code Value		**R***		X	X	X
>(0008,0102)	Coding Scheme Designator		**R***		X	X	X
>(0008,0103)	Coding Scheme Version		**O**				
>(0008,0104)	Code Meaning		**O**		X	X	X
(0020,000D)	Study Instance UID		**R**		X		X
(0008,0020)	Study Date		**O**		X		X
(0008,0030)	Study Time		**O**		X		X
(0008,1110)	Referenced Study Sequence		**O**		X		X
>(0008,1150)	Referenced SOP Class UID		**R***		X		X
>(0008,1155)	Referenced SOP Instance UID		**R***		X		X
(0040,1003)	Requested Procedure Priority						
(0040,1004)	Patient Transport Arrangements						
(0040,1400)	Requested Procedure Comments						
Imaging Service Request							

Tag	Tag Name	Query Keys Matching	Query Keys Return	Displayed in Result List	Imported to Modality	Displayed in Patient Details	Copied to SOP Instance
(0008,0050)	Accession Number	X	**O**	X	X	X	X
(0032,1032)	Requesting Physician						
(0008,0090)	Referring Physicians Name		**O**		X	X	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	X	**R**	X	X	X	X
(0010,0020)	Patients ID	X	**R**	X	X	X	X
(0010,0021)	Issuer of Patient ID		**O**		X	X	X
(0010,1000)	Other Patient IDs		**O**		X	X	X
Patient Demographic							
(0010,0030)	Patients Birth Date		**O**	X	X	X	X
(0010,0040)	Patients Sex		**O**	X	X	X	X
(0010,1030)	Patients Weight						
(0040,3001)	Confidentiality Constraint on Patient Data Description						
(0010,2160)	Ethnic Group						
(0010,4000)	Patients Comments		**O**		X	X	X

Tag	Tag Name	Query Keys Matching	Query Keys Return	Displayed in Result List	Imported to Modality	Displayed in Patient Details	Copied to SOP Instance
Patient Medical							
(0038,0500)	Patient State						
(0010,21C0)	Pregnancy Status						
(0010,2000)	Medical Alerts						
(0010,2110)	Allergies						
(0038,0050)	Special Needs						

Values of column "Query Key":

X

A tag that is marked with X can be used as query key in 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.

Default values can get modified.

Symbols in column "Query Keys Return" mean:

R

An attribute value shall be present in the Modality Worklist C-FIND response. If any required tag is missing, the complete Modality Worklist is omitted and an error message is displayed.

R*

An attribute value shall be present in the Modality Worklist C-FIND response if its enclosing sequence is present.

C^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.

C^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.

O

An attribute value is optional in the Modality Worklist C-FIND response.

Gray background color:

No return key is requested for attributes indicated with gray background color.

Values of column “Imported to Modality”:

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 in Results List” or “Displayed in Patient Details”:

X

Values of this tag are visible in the respective results list or in patient details.

Values of column SOP Instance:

X

Values of marked tags will be stored in created SOP Instances. See also table “Mapping of Attributes” in 8.1.3 Attribute Mapping.

Following set of tags can be used as query keys:

Table 4-9 Modality Worklist Query Key Details

Tag	Tag Name	Description
(0010,0010)	Patients Name	The KINEVO 900 Application Software supports family name and given name only. The operator can use ‘*’ or ‘?’ as wild cards. A wildcard ‘*’ is automatically appended to the family name and given name search string.
(0010,0020)	Patient ID	The operator can enter a string which conforms to the Value Representation LO. The operator can use ‘*’ or ‘?’ as wild cards.
(0008,0050)	Accession Number	The operator can enter a string which conforms to the Value Representation SH. The operator can use ‘*’ or ‘?’ as wild cards.
(0040,1001)	Requested Procedure ID	The operator can enter a string which conforms to the Value Representation SH. The operator can use ‘*’ or ‘?’ as wild cards.
(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 today’s date. The operator can select between the following options: - Today - Tomorrow - From – To (start and end date of the date range can be specified) - all dates (the attribute is sent empty in the request)
>(0008,0060)	Modality	The default value is an empty string. The operator can change the value and select one value of a predefined set of values. Possible values are “DOC”, “ES”, “GM”, “OP”, “OT”, “SM”, “XC” and empty string.
>(0040,0001)	Scheduled Station AE Title	The default value is set by configuration. The operator can enter the AE Title of another device or leave the field empty.

4.2.1.3.3 Activity – Add/Edit Patient

4.2.1.3.4 Activity – Record Video or Take Photo

When a patient is selected the operator can choose between two different capture modes:

- Record video
- Take photo

This activity does not directly invoke any DICOM activity, but depending on the capture mode, different information objects are created.

Video recording generates videos which can be exported as DICOM Video Microscopic Images with SOP Class UID 1.2.840.10008.5.1.4.1.1.77.1.2.1. Depending on the video settings 2D or 3D videos can be generated.

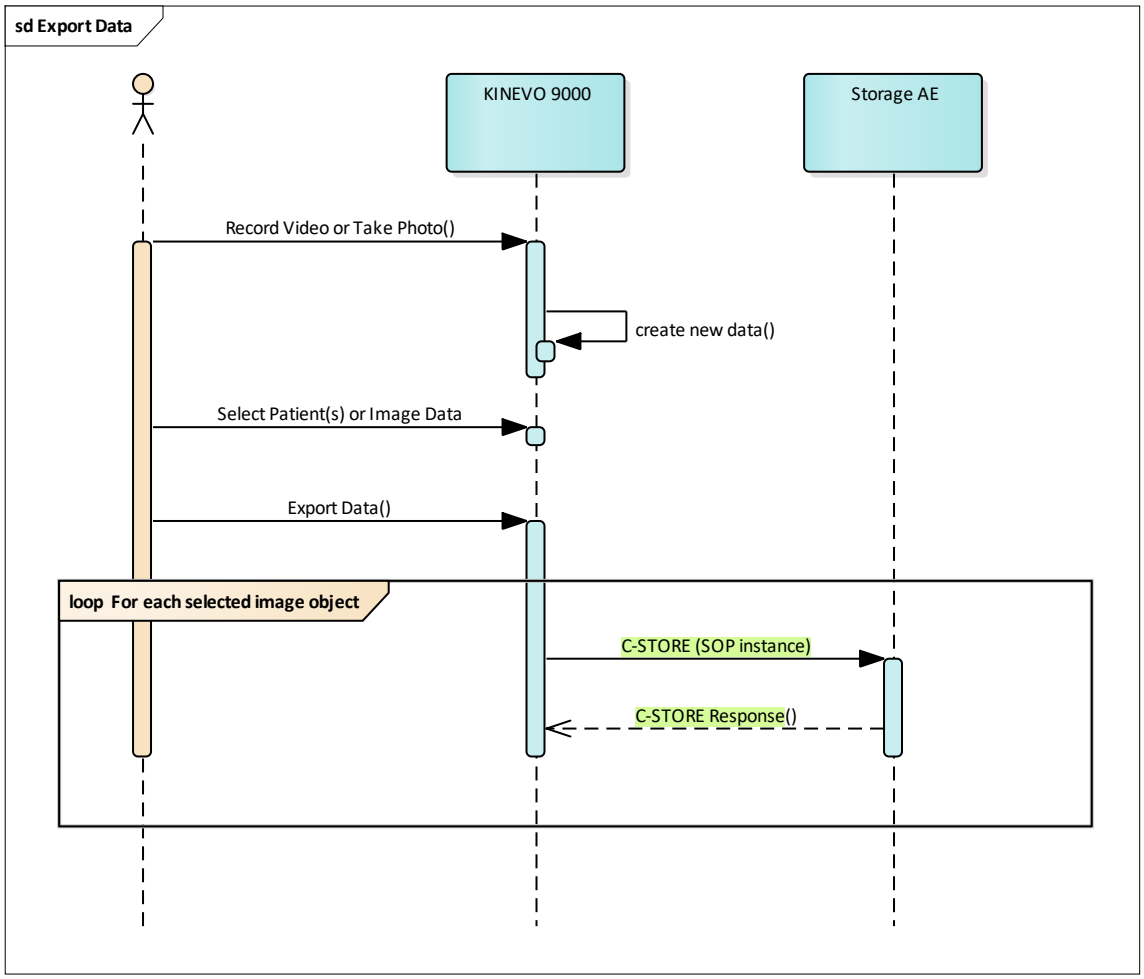
The activity of taking photos generates still images which can be exported as DICOM VL Microscopic Images with SOP Class UID 1.2.840.10008.5.1.4.1.1.77.1.2.

4.2.1.3.5 Activity – Export Data

During the activity “Export data” selected videos or photos can be exported to a configured DICOM Storage Provider.

4.2.1.3.5.1 Description and Sequencing of Activities

Figure 4-5 Export data



Trigger “Export data”

This activity can be triggered in the patient screen. The operator can select images (photos or videos) of a single patient or of several patients. Also he can select a

subset of images by selecting single images or entire series of images for export. The number of selected images is displayed in the patient list.

Once triggered, the application software transfers all data that has been stored locally to the configured Storage AE.

4.2.1.3.5.2 Proposed Presentation Contexts

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

- VL Microscopic Image Storage with Transfer Syntax JPEG Baseline (Process 1) as SCU
- VL Microscopic Image Storage with Transfer Syntax ILE as SCU
- VL Microscopic Image Storage with Transfer Syntax ELE as SCU
- Video Microscopic Image Storage with Transfer Syntax MPEG-4 2D
- Video Microscopic Image Storage with Transfer Syntax MPEG-4 3D

Table 4-10 Presentation Contexts proposed for Activity "Export Data"

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID 1.2.840.10008. ...**	**Name List**	**UID List**		
Verification	1.1	ILE	1.2.840.10008.1.2	BOTH[1]	None
VL Microscopic Image Storage	5.1.4.1.1.77.1.2	ILE	1.2.840.10008.1.2	SCU	None
		JPG-1	1.2.840.10008.1.2.4.50	SCU	None
		ELE	1.2.840.10008.1.2.1	SCU	None
Video Microscopic Image Storage	5.1.4.1.1.77.1.2.1	MPEG-4 2D	1.2.840.10008.1.2.4.104	SCU	None
		MPEG-4 3D	1.2.840.10008.1.2.4.105	SCU	None
Modality Worklist Information Model - FIND	5.1.4.31	ILE	1.2.840.10008.1.2	SCU	None

Note[1]: Depending on Setting #None-listening mode (Off – BOTH | On – SCU only), see 4.4.2.1General Parameters

4.2.1.3.5.3 SOP Specific Conformance for Storage SOP Classes

Table 4-11 Storage C-STORE Response Status Handling Behavior

Service Status	Further Meaning	Status Code	Behavior
Failure	Refused: Out of Resources	A700-A7FF	Log message and show user alert.
Failure	Error: Data Set does not match SOP Class	A900-AFF	Log message and show user alert.
Failure	Error: Cannot understand	C000-CFFF	Log message and show user alert.
Failure	Duplicate SOP Instance	0111	Log message only. It is not a failure, so no user alert is shown.
Failure	Refused: SOP class not supported	0122	Log message and show user alert.
Warning	Coercion of data Elements	B000	The Application Software logs this event.

Warning	Data Set does not match SOP Class	B007	The Application Software logs this event.
Warning	Elements Discarded	B006	The Application Software logs this event.
Success	Successful Storage	0000	None
Unknown	All other responses with unknown code	xxxx	Log message and show user alert.

4.2.1.3.6 Activity – Delete data

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

4.2.1.4 Association Acceptance Policy

4.2.1.4.1 Activity – Test Connection

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 4-12 Presentation Context accepted for Activity "Test Connection"

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Verification	1.2.840.10008.1.1	ILE	1.2.840.10008.1.2	BOTH[1]	No

Note[1]: Depending on Setting #None-listening mode (Off – BOTH | On – SCU only), see 4.4.2.1General Parameters

4.2.1.4.1.3 SOP Specific Conformance for Verification SOP Class as SCP

The Application Software AE provides standard conformance.

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 KINEVO 900 supports IPv4. The local PC and network parameters (hostname, IP address, subnet mask, gateway and DHCP) are configurable.

4.4 Configuration

Local application entity and remote application entity information as well as Institution Name and Station Name can be configured.

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 is configurable (LAN-Adapter or WLAN-Adapter settings).

The Application Entity Title as well as the port number are configurable in the DICOM section. The default port number is 104.

4.4.1.2 Remote AE Titles

The mapping of external AE Titles to TCP/IP addresses and ports is configurable. The KINEVO 900 Application Software allows setting up a remote Application Entity for the Storage Service and a separate remote Application Entity for Modality Worklist Service. Host name or IP address, Port and the Application Entity Title of the remote AE must be known.

4.4.2 Parameters

4.4.2.1 General Parameters

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

Table 4-13 Configuration Parameters

Parameter	Configurable (Yes/No)	Default Value
General Parameters		
DIMSE RSP Timeout in seconds (the timeout for receiving a DICOM DIMSE-RSP on an open association)	Yes (10 – 600 sec.)	20 sec
Network Timeout in seconds (the timeout for socket connect, request, accept and release operations)	Yes (5-20 sec.)	20 sec.
Max. Association Idle Time in seconds (the maximum time that a DICOM association may remain idle)	Yes (10 – 600 sec.)	30 sec

Network log level	Yes	INFO
(0008,0080) Institution Name	Yes	EMPTY
(0008,1010) Station Name	Yes	EMPTY
Verification SCU and 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).		
None-listening mode The verification in SCP role can be switched on or off.	Yes	OFF
Modality Worklist SCU Parameters		
Specific Character Set	Yes	ISO_IR192
Modality (Today's Patient Query)		Today
Storage SCU Parameters		
No specific configuration required The configuration of local and remote port numbers, host names and Application Entity Titles are part of the Local Application Entity setup (see 4.4.1.1 Local AE Titles).and Remote Application Entity setup (see 4.4.1.2 Remote AE Titles)		
Specific Character Set	Yes	ISO_IR192

Table 4-14 Specific Character Set

Defined Term	Description	Default
ISO_IR 192	Unicode in UTF-8	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	

Note[2]: Per default the KINEVO 900 Application Software uses ISO_IR 192 (UTF-8). Modification to the default settings is only recommended in case of integration issues which result in incorrect interpretation of transmitted characters.

5 Media Interchange

Media Interchange is not scope of this document since Media Interchange is not supported by KINEVO 900 Application Software.

6 Support of Character Sets

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

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.
The KINEVO 900 Application Software 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

The DICOM capabilities of the KINEVO 900 Application Software do not support any specific security measures.

It is assumed that KINEVO 900 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 KINEVO 900 Application Software
- Firewall or router protections to ensure that KINEVO 900 Application Software only has network access to approved 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 the "Presence of Module" column in the IOD tables:

ALWAYS
Module is always present

Abbreviations used for the "Presence of Values" (PoV) column in the Module tables:

VNAP
Value Not Always Present (attribute sent zero length if no value is present) – Applicable for Type 2, 2C.

ANAP
Attribute is not always present – Applicable for Type 3

ALWAYS
Attribute is always present with a value – Applicable for Type 1

EMPTY
Attribute is sent without a value – Applicable for Type 2

Abbreviations used for sources of data:

USER
The attribute value source is from User input

AUTO
The attribute value is generated automatically

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

8.1.1.1 VL Microscopic Image IOD

Table 8-1 VL Microscopic Image IOD – Module Overview

IE	Module	Usage	Presence of Module
Patient			
	Patient	MANDATORY	ALWAYS
	Clinical Trial Subject	OPTIONAL	NEVER
Study			
	General Study	MANDATORY	ALWAYS
	Patient Study	OPTIONAL	NEVER
	Clinical Trial Study	OPTIONAL	NEVER
Series			
	General Series	MANDATORY	ALWAYS
	Clinical Trial Series	OPTIONAL	NEVER
Equipment			
	General Equipment	MANDATORY	ALWAYS
Image			
	General Image	MANDATORY	ALWAYS
	Image Pixel	MANDATORY	ALWAYS
	Acquisition Context	MANDATORY	ALWAYS
	Device	OPTIONAL	NEVER
	Specimen	CONDITIONAL	NEVER
	VL Image	MANDATORY	ALWAYS
	Optical Path	OPTIONAL	NEVER
	Overlay Plane	OPTIONAL	NEVER
	Icc Profile	OPTIONAL	NEVER
	Sop Common	MANDATORY	ALWAYS

Table 8-2 VL Microscopic Image IOD, Module "Patient"

Attribute Name	Tag	VR	Value	PoV	Source
Patient's Name	(0010,0010)	PN	When patient is created in KINEVO 900 only last name and first name components can be set. Also empty value is possible. When imported via MWL all components of the alphabetic component group are copied into the storage header.	VNAP	USER, MWL
Patient ID	(0010,0020)	LO	Might be empty when patient is created in KINEVO 900. Copied from MWL response if attribute value is available, otherwise MWL import fails.	VNAP	USER, MWL
Issuer of Patient ID	(0010,0021)	LO	Copied from MWL response if attribute value is available.	ANAP	MWL

			Attribute is absent, if empty in MWL or in the unscheduled case.		
Patient's Birth Date	(0010,0030)	DA	Copied from MWL response if attribute value is available, otherwise left empty. Always contains a value when patient is created in KINEVO 900.	VNAP	USER, MWL
Patient's Sex	(0010,0040)	CS	Possible values: M = male, F = female, O = other or empty	VNAP	USER, MWL
Other Patient IDs	(0010,1000)	LO	Copied from MWL response if available. Attribute is absent, if empty in MWL or in the unscheduled case.	ANAP	MWL
Patient Comments	(0010,4000)	LT	Available in unscheduled case if entered by user. In scheduled case copied from MWL response if available. Otherwise attribute is absent.	ANAP	USER, MWL

Table 8-3 VL Microscopic Image IOD, Module "General Study"

Attribute Name	Tag	VR	Value	PoV	Source
Study Instance UID	(0020,000D)	UI	In the unscheduled case KINEVO 900 uses a constant prefix of 1.2.276.0.75.2.7.20.1.1. followed by a date/time stamp and machine specific identifier. In scheduled case the value is copied from the Study Instance UID attribute in MWL.	ALWAYS	MWL, AUTO
Study Date	(0008,0020)	DA	Copied from Study Date attribute in MWL response if both Study Date and Time are available Otherwise the value is generated by KINEVO 900.	ALWAYS	MWL, AUTO
Study Time	(0008,0030)	TM	Copied from Study Time attribute in MWL response if both Study Date and Time are available. Otherwise the value is generated by KINEVO 900.	ALWAYS	MWL, AUTO
Referring Physician's Name	(0008,0090)	PN	Copied from Referring Physician’s Name in MWL response. Attribute is left empty, if empty in MWL or in the unscheduled case.	VNAP	MWL

Study ID	(0020,0010)	SH	Copied from Requested Procedure ID (0040,1001) attribute in MWL response. Generated by KINEVO 900 if empty in MWL or in the unscheduled case.	ALWAYS	MWL, AUTO
Accession Number	(0008,0050)	SH	Copied from Accession Number attribute in MWL response Attribute is left empty, if empty in MWL or in the unscheduled case.	VNAP	MWL
Study Description	(0008,1030)	LO	Copied from Requested Procedure Description (0032,1060) attribute in MWL response. Attribute is absent, if empty in MWL or in the unscheduled case.	ANAP	MWL
Referenced Study Sequence	(0008,1110)	SQ	Only available in the scheduled case: Copied from Referenced Study Sequence attribute in MWL response if attribute value is available. Otherwise attribute is absent.	ANAP	MWL
> Referenced SOP Class UID	(0008,1150)	UI	Only available in the scheduled case: Copied from Referenced Study Sequence attribute in MWL response if both attribute values for Referenced SOP Class uid and Referenced SOP Instance UID are available. Otherwise attribute is absent.	ALWAYS	MWL
> Referenced SOP Instance UID	(0008,1155)	UI	Only available in the scheduled case: Copied from Referenced Study Sequence attribute in MWL response if both attribute values for Referenced SOP Class uid and Referenced SOP Instance UID are available. Otherwise attribute is absent.	ALWAYS	MWL
Procedure Code Sequence	(0008,1032)	SQ	Copied from “Requested Procedure Code Sequence” (0032,1064). Attribute is absent, if empty in MWL or in the unscheduled case.	ANAP	MWL
> Include 'Code Sequence Macro'.					

Table 8-4 VL Microscopic Image IOD, Module "General Series"

Attribute Name	Tag	VR	Value	PoV	Source
Modality	(0008,0060)	CS	GM	ALWAYS	AUTO
Series Instance UID	(0020,000E)	UI	KINEVO 900 uses a constant prefix of 1.2.276.0.75.2.7.20.1.2. followed by a	ALWAYS	AUTO

			date/time stamp and machine specific identifier.		
Series Number	(0020,0011)	IS	2 for image series	ALWAYS	AUTO
Series Date	(0008,0021)	DA	Same value as Study Date.	ALWAYS	AUTO
Series Time	(0008,0031)	TM	Same value as Study Time.	ALWAYS	AUTO
Series Description	(0008,103E)	LO	“Documentary Still Image” for image series.	ANAP	AUTO
Request Attributes Sequence	(0040,0275)	SQ	Only available in the scheduled case.	ANAP	MWL
> Requested Procedure ID	(0040,1001)	SH	Copied from “Requested Procedure ID” (0040,1001) attribute in MWL response.	ALWAYS	MWL
> Requested Procedure Description	(0032,1060)	LO	Copied from “Requested Procedure Description” (0032,1060) attribute in MWL response. Attribute is absent, if empty in MWL or unscheduled case.	ANAP	MWL
> Requested Procedure Code Sequence	(0032,1064)	SQ	Copied from “Requested Procedure Code Sequence” (0032,1064). Attribute is absent, if empty in MWL or unscheduled case.	ANAP	MWL
> Include 'Code Sequence Macro'.					
> Scheduled Procedure Step ID	(0040,0009)	SH	Copied from “Scheduled Procedure Step Sequence” (0040,0100) > “Scheduled Procedure Step ID” (0040,0009) attribute in MWL response.	ALWAYS	MWL
> Scheduled Procedure Step Description	(0040,0007)	LO	Copied from “Scheduled Procedure Step Sequence” (0040,0100) > “Scheduled Procedure Step Description” (0040,0007) attribute in MWL response. Attribute is absent, if empty in MWL or in the unscheduled case.	ANAP	MWL
> Scheduled Protocol Code Sequence	(0040,0008)	SQ	Copied from “Scheduled Procedure Step Sequence” (0040,0100) > “Scheduled Protocol Code Sequence” (0040,0008)	ANAP	MWL
> Include 'Code Sequence Macro'.					

Table 8-5 VL Microscopic Image IOD, Module "General Equipment"

Attribute Name	Tag	VR	Value	PoV	Source

Manufacturer	(0008,0070)	LO	Carl Zeiss Meditec	ALWAYS	AUTO
Institution Name	(0008,0080)	LO	Value as configured in DICOM section.	ANAP	CONFIG
Station Name	(0008,1010)	SH	Value as configured in DICOM section.	ALWAYS	CONFIG
Manufacturer's Model Name	(0008,1090)	LO	”KINEVO900”	ALWAYS	AUTO
Device Serial Number	(0018,1000)	LO	Device serial number as specified on the sticker on the device stand.	ALWAYS	AUTO
Software Version(s)	(0018,1020)	LO	The attribute always contains three values: „Software Version\ZEISS Installation (Stick) Version\Language PackVersion“	ALWAYS	AUTO

Table 8-6 VL Microscopic Image IOD, Module "General Image"

Attribute Name	Tag	VR	Value	PoV	Source
Instance Number	(0020,0013)	IS	A number that identifies this SOP Instance within a Series.	ALWAYS	AUTO
Patient Orientation	(0020,0020)	CS	Always empty.	EMPTY	AUTO
Content Date	(0008,0023)	DA	Same value as Acquisition Date	ALWAYS	AUTO
Acquisition Date	(0008,0022)	DA	Date the image was acquired.	ALWAYS	ACQUISITION
Acquisition Time	(0008,0032)	TM	Time the image was acquired.	ALWAYS	ACQUISITION
Acquisition Datetime	(0008,002A)	DT	Date and time the image was acquired.	ALWAYS	ACQUISITION
Burned In Annotation	(0028,0301)	CS	NO	ALWAYS	AUTO

Table 8-7 VL Microscopic Image IOD, Module "Image Pixel"

Attribute Name	Tag	VR	Value	PoV	Source
Rows	(0028,0010)	US	Value according image data. 1080 for full HD images.	ALWAYS	ACQUISITION
Columns	(0028,0011)	US	Value according image data. 1920 for full HD images.	ALWAYS	ACQUISITION
Pixel Data	(7FE0,0010)	OW|OB	Binary data of the image.	ALWAYS	ACQUISITION

Table 8-8 VL Microscopic Image IOD, Module "Acquisition Context"

Attribute Name	Tag	VR	Value	PoV	Source
Acquisition Context Sequence	(0040,0555)	SQ	Always empty.	EMPTY	AUTO

Table 8-9 VL Microscopic Image IOD, Module "VL Image"

Attribute Name	Tag	VR	Value	PoV	Source
Image Type	(0008,0008)	CS	ORIGINAL\ PRIMARY	ALWAYS	AUTO

Photometric Interpretation	(0028,0004)	CS	Depending on the chosen encoding of pixel data one of the following values are set: RGB (uncompressed pixel data) YBR_FULL_422 (JPEGBaseline1)	ALWAYS	AUTO
Bits Allocated	(0028,0100)	US	8	ALWAYS	AUTO
Bits Stored	(0028,0101)	US	8	ALWAYS	AUTO
High Bit	(0028,0102)	US	7	ALWAYS	AUTO
Pixel Representation	(0028,0103)	US	0	ALWAYS	AUTO
Samples per Pixel	(0028,0002)	US	3	ALWAYS	AUTO
Planar Configuration	(0028,0006)	US	0 (color-by-pixel)	ALWAYS	AUTO
Content Time	(0008,0033)	TM	Same value as Acquisition Time	ALWAYS	AUTO
Lossy Image Compression	(0028,2110)	CS	In case of uncompressed pixel data: “00”, in case of JPEGBaseline1: “01”.	ALWAYS	AUTO

Table 8-10 VL Microscopic Image IOD, Module "Sop Common"

Attribute Name	Tag	VR	Value	PoV	Source
SOP Class UID	(0008,0016)	UI	1.2.840.10008.5.1.4.1.1.77.1.2	ALWAYS	AUTO
SOP Instance UID	(0008,0018)	UI	KINEVO 900 uses a constant prefix of 1.2.276.0.75.2.7.20.1.3. followed by a date/time stamp and machine specific identifier.	ALWAYS	AUTO
Specific Character Set	(0008,0005)	CS	ISO_IR 192	ALWAYS	AUTO
Instance Creation Date	(0008,0012)	DA	Date the instance was created.	ALWAYS	AUTO
Instance Creation Time	(0008,0013)	TM	Time the instance was created.	ALWAYS	AUTO
Content Qualification	(0018,9004)	CS	“PRODUCT”	ALWAYS	AUTO

8.1.1.2 Video Microscopic Image IOD

Table 8-11 Video Microscopic Image IOD – Module Overview

IE	Module	Usage	Presence of Module
Patient			
	Patient	MANDATORY	ALWAYS
	Clinical Trial Subject	OPTIONAL	NEVER
Study			
	General Study	MANDATORY	ALWAYS
	Patient Study	OPTIONAL	NEVER
	Clinical Trial Study	OPTIONAL	NEVER
Series			
	General Series	MANDATORY	ALWAYS
	Clinical Trial Series	OPTIONAL	NEVER
Equipment			
	General Equipment	MANDATORY	ALWAYS
Image			
	General Image	MANDATORY	ALWAYS
	Cine	MANDATORY	ALWAYS
	Multi Frame	MANDATORY	ALWAYS
	Image Pixel	MANDATORY	ALWAYS
	Acquisition Context	MANDATORY	ALWAYS
	Device	OPTIONAL	NEVER
	Specimen	CONDITIONAL	NEVER
	VL Image	MANDATORY	ALWAYS
	Icc Profile	OPTIONAL	NEVER
	Sop Common	MANDATORY	ALWAYS
	Frame Extraction	CONDITIONAL	NEVER

Table 8-12 Video Microscopic Image IOD, Module "Patient"

Attribute Name	Tag	VR	Value	PoV	Source
Patient's Name	(0010,0010)	PN	When patient is created in KINEVO 900 only last name and first name components can be set. Also empty value is possible. When imported via MWL all components of the alphabetic component group are copied into the storage header.	VNAP	USER, MWL
Patient ID	(0010,0020)	LO	Might be empty when patient is created in KINEVO 900. Copied from MWL response if attribute value is available, otherwise MWL import fails.	VNAP	USER, MWL
Issuer of Patient ID	(0010,0021)	LO	Copied from MWL response if attribute value is available.	ANAP	MWL

			Attribute is absent, if empty in MWL or in the unscheduled case.		
Patient's Birth Date	(0010,0030)	DA	Copied from MWL response if attribute value is available, otherwise left empty. Always contains a value when patient is created in KINEVO 900.	VNAP	USER, MWL
Patient's Sex	(0010,0040)	CS	Possible values: M = male, F = female, O = other or empty	VNAP	USER, MWL
Other Patient IDs	(0010,1000)	LO	Copied from MWL response if available. Attribute is absent, if empty in MWL or in the unscheduled case.	ANAP	MWL
Patient Comments	(0010,4000)	LT	Available in unscheduled case if entered by user. In scheduled case copied from MWL response if available. Otherwise attribute is absent.	ANAP	USER, MWL

Table 8-13 Video Microscopic Image IOD, Module "General Study"

Attribute Name	Tag	VR	Value	PoV	Source
Study Instance UID	(0020,000D)	UI	In the unscheduled case KINEVO 900 uses a constant prefix of 1.2.276.0.75.2.7.20.1.1. followed by a date/time stamp and machine specific identifier. In scheduled case the value is copied from the Study Instance UID attribute in MWL.	ALWAYS	MWL, AUTO
Study Date	(0008,0020)	DA	Copied from Study Date attribute in MWL response if both Study Date and Time are available Otherwise the value is generated by KINEVO 900.	ALWAYS	MWL, AUTO
Study Time	(0008,0030)	TM	Copied from Study Time attribute in MWL response if both Study Date and Time are available. Otherwise the value is generated by KINEVO 900.	ALWAYS	MWL, AUTO
Referring Physician's Name	(0008,0090)	PN	Copied from Referring Physician's Name in MWL response. Attribute is left empty, if empty in MWL or in the unscheduled case.	VNAP	MWL
Study ID	(0020,0010)	SH	Copied from Requested Procedure ID (0040,1001) attribute in MWL response.	ALWAYS	MWL, AUTO

			Generated by KINEVO 900 if empty in MWL or in the unscheduled case.		
Accession Number	(0008,0050)	SH	Copied from Accession Number attribute in MWL response Attribute is left empty, if empty in MWL or in the unscheduled case.	VNAP	MWL
Study Description	(0008,1030)	LO	Copied from Requested Procedure Description (0032,1060) attribute in MWL response. Attribute is absent, if empty in MWL or in the unscheduled case.	ANAP	MWL
Referenced Study Sequence	(0008,1110)	SQ	Only available in the scheduled case: Copied from Referenced Study Sequence attribute in MWL response if attribute value is available. Otherwise attribute is absent.	ANAP	MWL
> Referenced SOP Class UID	(0008,1150)	UI	Only available in the scheduled case: Copied from Referenced Study Sequence attribute in MWL response if both attribute values for Referenced SOP Class uid and Referenced SOP Instance UID are available. Otherwise attribute is absent.	ALWAYS	MWL
> Referenced SOP Instance UID	(0008,1155)	UI	Only available in the scheduled case: Copied from Referenced Study Sequence attribute in MWL response if both attribute values for Referenced SOP Class uid and Referenced SOP Instance UID are available. Otherwise attribute is absent.	ALWAYS	MWL
Procedure Code Sequence	(0008,1032)	SQ	Copied from “Requested Procedure Code Sequence” (0032,1064). Attribute is absent, if empty in MWL or in the unscheduled case.	ANAP	MWL
> Include 'Code Sequence Macro'.					

Table 8-14 Video Microscopic Image IOD, Module "General Series"

Attribute Name	Tag	VR	Value	PoV	Source
Modality	(0008,0060)	CS	GM	ALWAYS	AUTO
Series Instance UID	(0020,000E)	UI	KINEVO 900 uses a constant prefix of 1.2.276.0.75.2.7.20.1.2. followed by a date/time stamp and machine specific identifier.	ALWAYS	AUTO
Series Number	(0020,0011)	IS	1 for video series	ALWAYS	AUTO
Series Date	(0008,0021)	DA	Same value as Study Date.	ALWAYS	AUTO

Series Time	(0008,0031)	TM	Same value as Study Time.	ALWAYS	AUTO
Series Description	(0008,103E)	LO	“Documentary Motion Picture” for video series.	ANAP	AUTO
Request Attributes Sequence	(0040,0275)	SQ	Only available in the scheduled case.	ANAP	MWL
> Requested Procedure ID	(0040,1001)	SH	Copied from “Requested Procedure ID” (0040,1001) attribute in MWL response.	ALWAYS	MWL
> Requested Procedure Description	(0032,1060)	LO	Copied from “Requested Procedure Description” (0032,1060) attribute in MWL response. Attribute is absent, if empty in MWL or unscheduled case.	ANAP	MWL
> Requested Procedure Code Sequence	(0032,1064)	SQ	Copied from “Requested Procedure Code Sequence” (0032,1064). Attribute is absent, if empty in MWL or unscheduled case.	ANAP	MWL
> Include 'Code Sequence Macro'.					
> Scheduled Procedure Step ID	(0040,0009)	SH	Copied from “Scheduled Procedure Step Sequence” (0040,0100) > “Scheduled Procedure Step ID” (0040,0009) attribute in MWL response.	ALWAYS	MWL
> Scheduled Procedure Step Description	(0040,0007)	LO	Copied from “Scheduled Procedure Step Sequence” (0040,0100) > “Scheduled Procedure Step Description” (0040,0007) attribute in MWL response. Attribute is absent, if empty in MWL or in the unscheduled case.	ANAP	MWL
> Scheduled Protocol Code Sequence	(0040,0008)	SQ	Copied from “Scheduled Procedure Step Sequence” (0040,0100) > “Scheduled Protocol Code Sequence” (0040,0008)	ANAP	MWL
> Include 'Code Sequence Macro'.			If Code Meaning is empty in MWL response a hyphen will be written “-“ in the attribute Code Meaning		

Table 8-15 Video Microscopic Image IOD, Module "General Equipment"

Attribute Name	Tag	VR	Value	PoV	Source
Manufacturer	(0008,0070)	LO	Carl Zeiss Meditec	ALWAYS	AUTO
Institution Name	(0008,0080)	LO	Value as configured in DICOM section.	ANAP	CONFIG
Station Name	(0008,1010)	SH	Value as configured in DICOM section.	ALWAYS	CONFIG
Manufacturer's Model Name	(0008,1090)	LO	”KINEVO900”	ALWAYS	AUTO

Device Serial Number	(0018,1000)	LO	Device serial number as specified on the sticker on the device stand.	ALWAYS	AUTO
Software Version(s)	(0018,1020)	LO	The attribute always contains three values: „Software Version\ZEISS Installation (Stick) Version\Language Pack-Version“	ALWAYS	AUTO

Table 8-16 Video Microscopic Image IOD, Module "General Image"

Attribute Name	Tag	VR	Value	PoV	Source
Instance Number	(0020,0013)	IS	A number that identifies this SOP Instance within a Series.	ALWAYS	AUTO
Patient Orientation	(0020,0020)	CS	Always empty.	EMPTY	AUTO
Content Date	(0008,0023)	DA	Same value as Acquisition Date	ALWAYS	AUTO
Acquisition Date	(0008,0022)	DA	Date the video (fragment) was acquired.	ALWAYS	ACQUISITION
Acquisition Time	(0008,0032)	TM	Time the video (fragment) was acquired.	ALWAYS	ACQUISITION
Acquisition Datetime	(0008,002A)	DT	Date and time the video (fragment) was acquired.	ALWAYS	ACQUISITION
Burned In Annotation	(0028,0301)	CS	NO	ALWAYS	AUTO

Table 8-17 Video Microscopic Image IOD, Module "Cine"

Attribute Name	Tag	VR	Value	PoV	Source
Frame Time	(0018,1063)	DS	Nominal time (in msec) per individual frame: 20.00 (50 Hz HD Video) or 16.67 (60 Hz HD Video)	ALWAYS	ACQUISITION
Cine Rate	(0018,0040)	IS	Number of frames per second: 50 or 60	ALWAYS	ACQUISITION
Multiplexed Audio Channels Description Code Sequence	(003A,0300)	SQ	Attribute is present only if microphone was switched on or an audio source was connected to line-in socket.	ANAP	AUTO
> Channel Identification Code	(003A,0301)	IS	1	ALWAYS	AUTO
> Channel Mode	(003A,0302)	CS	STEREO	ALWAYS	AUTO
> Channel Source Sequence	(003A,0208)	SQ		ALWAYS	AUTO
>> Include 'Code Sequence Macro'.			(109111, DCM, Operator's narrative)	ALWAYS	AUTO

Table 8-18 Video Microscopic Image IOD, Module "Multi Frame"

Attribute Name	Tag	VR	Value	PoV	Source

Number of Frames	(0028,0008)	IS	Number of frames acquired during video recording.	ALWAYS	ACQUISITION
Frame Increment Pointer	(0028,0009)	AT	00181063	ALWAYS	ACQUISITION
Stereo Pairs Present	(0022,0028)	CS	YES, for 3D video acquisition NO for 2D video acquisition	ALWAYS	ACQUISITION

Table 8-19 Video Microscopic Image IOD, Module "Image Pixel"

Attribute Name	Tag	VR	Value	PoV	Source
Rows	(0028,0010)	US	Value according image data. 1080 for full HD videos.	ALWAYS	ACQUISITION
Columns	(0028,0011)	US	Value according image data. 1920 for full HD videos.	ALWAYS	ACQUISITION
Pixel Data	(7FE0,0010)	OW| OB	Binary data of the image or video.	ALWAYS	ACQUISITION

Table 8-20 Video Microscopic Image IOD, Module "Acquisition Context"

Attribute Name	Tag	VR	Value	PoV	Source
Acquisition Context Sequence	(0040,0555)	SQ	Always empty.	EMPTY	AUTO

Table 8-21 Video Microscopic Image IOD, Module "VI Image"

Attribute Name	Tag	VR	Value	PoV	Source
Image Type	(0008,0008)	CS	ORIGINAL\ PRIMARY	ALWAYS	AUTO
Photometric Interpretation	(0028,0004)	CS	YBR_PARTIAL_420	ALWAYS	AUTO
Bits Allocated	(0028,0100)	US	8	ALWAYS	AUTO
Bits Stored	(0028,0101)	US	8	ALWAYS	AUTO
High Bit	(0028,0102)	US	7	ALWAYS	AUTO
Pixel Representation	(0028,0103)	US	0	ALWAYS	AUTO
Samples per Pixel	(0028,0002)	US	3	ALWAYS	AUTO
Planar Configuration	(0028,0006)	US	0	ALWAYS	AUTO
Content Time	(0008,0033)	TM	Same as Acquisition Time	ALWAYS	AUTO
Lossy Image Compression	(0028,2110)	CS	01	ALWAYS	AUTO

Table 8-22 Video Microscopic Image IOD, Module "Sop Common"

Attribute Name	Tag	VR	Value	PoV	Source
SOP Class UID	(0008,0016)	UI	1.2.840.10008.5.1.4.1.1.77.1.2.1	ALWAYS	AUTO
SOP Instance UID	(0008,0018)	UI	KINEVO 900 uses a constant prefix of 1.2.276.0.75.2.7.20.1.3. followed by a date/time stamp and machine specific identifier.	ALWAYS	AUTO
Specific Character Set	(0008,0005)	CS	ISO_IR 192	ALWAYS	AUTO

Instance Creation Date	(0008,0012)	DA	Date the instance was created.	ALWAYS	AUTO
Instance Creation Time	(0008,0013)	TM	Time the instance was created.	ALWAYS	AUTO
Content Qualification	(0018,9004)	CS	“PRODUCT”	ALWAYS	AUTO

8.1.2 Usage of Attributes from Received IOD's

Not applicable.

8.1.3 Attribute Mapping

In scheduled case, the following attributes are mapped from Modality Worklist to instances of VL Microscopic Image IOD and Video Microscopic Image IOD.

Table 8-23 Modality Worklist 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
(0010,4000)	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
		(0040,0275) >(0032,1064)	Request Attributes Sequence > Requested Procedure Code Sequence	No
(0020,000D)	Study Instance UID	(0020,000D)	Study Instance UID	No
(0008,1110)	Referenced Study Sequence	(0008,1110)	Referenced Study Sequence	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
>(0040,0009)	Scheduled Procedure Step ID	(0040,0275) >(0040,0009)	Request Attributes Sequence > Scheduled Procedure Step ID	No

8.1.4 Coerced/Modified Files

The KINEVO 900 is capable to read the first component group of multi-component group names. When the operator triggers a search of a worklist containing multi-component group names the search will be performed using the first component group only. When the response from the modality worklist provider contains a multi-component group name the results list will show only the first component group and the first component group information will be imported at the modality. An empty first component group in the worklist will result in an empty Patient Name attribute in the created DICOM IODs. The second and third component groups are ignored.

8.2 Data Dictionary of Private Attributes

Table 8-24 Private Dictionary Group (2201,00xx) = "99CZM_NIM_INTERNAL_01"

Occurs in: VL Microscopic Image and Video Microscopic Image Storage 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

8.3 Coded Terminology and Templates

Not applicable.

8.4 Greyscale Image Consistency

Not applicable.

8.5 Standard Extended / Specialized/ Private SOP Classes

Not applicable.

8.6 Private Transfer Syntaxes

No Private Transfer Syntax is supported.

The product is labeled with:

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