DICOM Conformance Statement
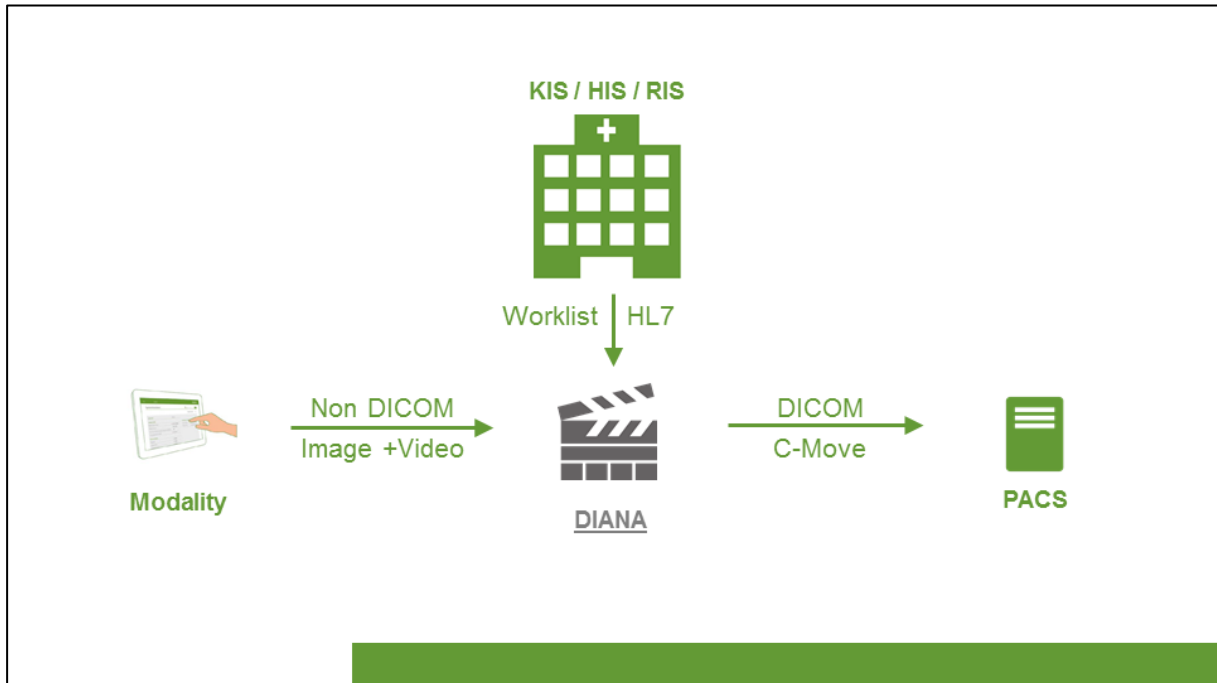
DIANA 3

Software-Release 3.2.x

EDV: QMP-DIANA-3.2_DICOM-Conformance-Statement_2022-06-23

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1   Conformance Statement Overview

DIANA 3 is to be used for viewing, archiving and transmitting images as an acquisition modality which converts analogue and or digital video to a DICOM compliant format. It provides the following DICOM features:

- Query the information system (Department System Scheduler) for a Modality Worklist.
- notifies of the start of a new procedure step or the completion or cancellation of a procedure step
- Save acquired images to an further Image Archive (PACS) and handles the corresponding notification events.

Table 1 presents an overview of the DICOM network services supported by DIANA 3.

Table 1: Network Services

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Transfer		
Secondary Capture Image Storage	Yes	No
Multi-frame True Color Secondary Capture Image Storage	Yes	No
Visible Light Endoscopic Image Storage	Yes	No
Video Endoscopic Image Storage	Yes	No
Visible Light Microscopic Image Storage	Yes	No
Video Microscopic Image Storage	Yes	No
Visible Light Photographic Image Storage	Yes	No
Video Photographic Image Storage	Yes	No
Ultrasound Image Storage	Yes	No
Ultrasound Multi-Frame Image Storage	Yes	No
Storage Commitment Push Model	Yes	No
Workflow Management		
Modality Worklist Information Model – FIND	Yes	No
Modality Performed Procedure Step	Yes	No

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2 Table of Contents:

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3 Introduction

3.1 Revision History

The revision history provides dates and differences of the different releases of DIANA 3.

Version	Date	Editor	Chapter	Remarks
1	25.05.2020	SL	All	Initial version for DIANA 3
1.2	23.06.2022	SL	8	Changes in DIANA 3.2

3.2 Audience

This Conformance Statement is intended for:
- (potential) customers,
- marketing staff interested in system and data exchange functionality,
- support engineers and system integrators of medical equipment,
- software designers and implementers of DICOM interfaces.
- It is assumed that the reader is familiar with the DICOM standard.

3.3 Remarks

This Conformance Statement by itself does not guarantee successful interoperability with other equipment. The user (or user's agent) should be aware of the following issues:

Interoperability

Integration of (networked) systems may require application functions that are not specified within the scope of DICOM.

It is the user's (or a user's agent) responsibility to analyse the application requirements and to specify a solution that integrates different vendor's equipment.

Validation

If the comparison of Conformance Statements indicate that the required information exchange should be possible, additional validation tests will be necessary.

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

3.4 Contents and structure

The DICOM Conformance Statement is contained in chapter 2 through 7 and follows the contents and structuring requirements of DICOM PS 3.2-2011.

3.5 Used definitions and terms

For a description of these, see NEMA PS 3.3-2011 and PS 3.4-2011.

3.6 Abbreviations

The following acronyms and abbreviations are used in the document.

ACR	American College of Radiology
AE	Application Entity
ANSI	American National Standard Institute
DICOM	Digital Imaging and Communication in Medicine
FSC	File Set Creator
GUI	Graphical User Interface
HIS	Hospital Information System
IOD	Image Object Definition
MPPS	Modality Performed Procedure Step
MWL	Modality Worklist Query/Retrieve
N.A.	Not applicable
NEMA	National Electric Manufacturers Association
NM	Nuclear Medicine
OS	Operating System
PACS	Picture Archiving and Communication System
PDU	Protocol Data Unit
RIS	Radiology Information System
RWA	Real World Activity
SC	Secondary Capture/Service Class
SCP	Service Class Provider
SCU	Service Class User
SOP	Service Object Pair
TCP/IP	Transmission Control Protocol/Internet protocol
UID	Unique Identifier
US	Ultra Sound
VL	Visible Light
VR	Value Representation

3.7 References

[DICOM] The Digital Imaging and Communications in Medicine (DICOM) standard:
NEMA PS 3.X.
National Electrical Manufacturers Association (NEMA) Publication Sales
1300 N. 17th Street, Suite 1847
Rosslyn, Va. 22209, United States of America

[DicomNet] DEKOM ENGINEERING DicomNet Systems Product Line
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4   Networking

4.1   Implementation Model

4.1.1   Application Data Flow

Three Application Entities (AE), QWorklist Application Entity, QMPPS Application Entity and QStore Application Entity represent the DIANA 3 system.
The related implementation model for the AEs is shown in the next figure.
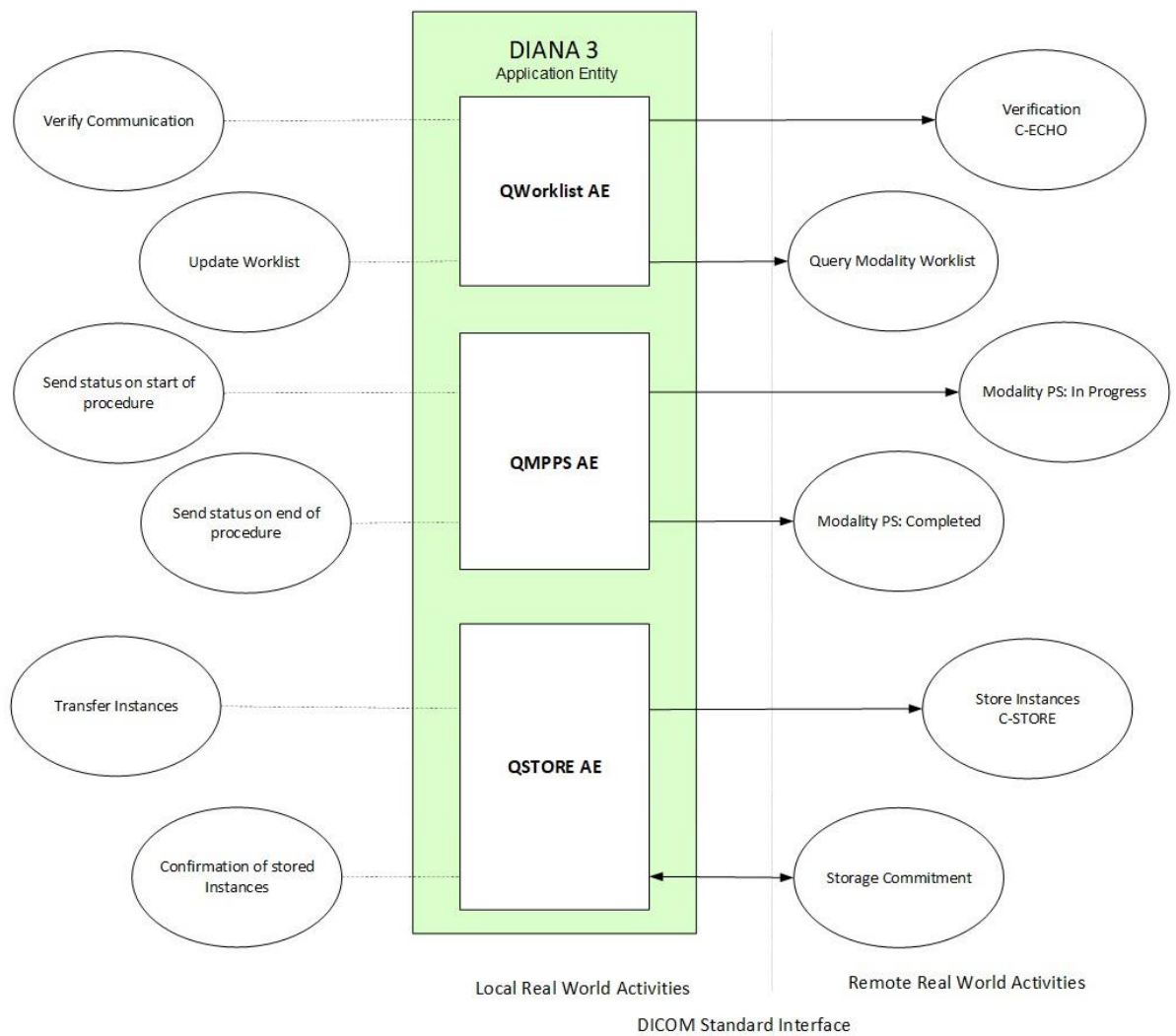

Figure 1:The DIANA 3 Application Data Flow Diagram

4.1.2   Functional definition of Application Entities

This section describes in general terms the functions performed by QWorklist Application Entity, QMPPS Application Entity and QStore Application Entity.

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4.1.2.1   Functional Definition of QWorklist Application Entity

4.1.2.1.1   Basic Worklist Management Service Class

The QWorklist AE can perform a manual and/or cyclic update of its internal schedule data base by acting as a SCU of the Basic Worklist Management Service Class. The local RWA "Update Worklist" initiates a request for a list of scheduled examinations from the (one, preconfigured) Department System Scheduler and updates its internal data base. No duplicate entries will be added.
The content of the updated schedule data base is presented to the user by the GUI.

4.1.2.1.2   Verification Service Class

The QWorklist AE can perform the Verification Service as SCU to the (one, preconfigured) Department System Scheduler. This is triggered by the operator in the service mode.
The QWorklist AE performs the Verification Service as SCU to the (one, preconfigured) system in a cyclic manner to ensure the connectivity and displays a warning to the user if the verification fails.

4.1.2.2   Functional Definition of QMPPS Application Entity

4.1.2.2.1   Modality Performed Procedure Step Service Class

The QMPPS Application Entity is invoked by the system on start and end or cancellation of a procedure step. The possible real-world events are 'Procedure Start', 'Procedure Completed' and 'Procedure Discontinued'

4.1.2.3   Functional Definition of QStore Application Entity

4.1.2.3.1   Storage Service Class

The QStore AE acts as a SCU of the Storage Service Class. When the export is initiated through the local RWA "Transfer Images" the QStore AE will open an association to the configured remote system and convert the acquired images and related data to a DICOM message to be sent to the remote system. The local RWA "Transfer Images" is triggered by user interaction.
The QStore AE optionally requests that the Storage Commitment Acceptor confirms ownership for the specified DICOM objects (e.g. images) that the requestor stored in the storage destination, thus allowing the sender to delete those objects now owned by the storage destination.

4.1.2.3.2   Verification Service Class

The QStore AE can perform the Verification Service as SCU to the (one, preconfigured) PACS system. This is triggered by the operator in the service mode.
The QStore AE performs the Verification Service as SCU to the (one, preconfigured) system in a cyclic manner to ensure the connectivity and displays a warning to the user if the verification fails.

4.1.3 Sequencing of Real World Activities

The following sequence of Real World Activities are supported by DIANA 3.

- The QWorklist AE queries the Department System Scheduler for an update of the scheduled procedure steps in a cyclic manner and/or triggered by manual user input "update Worklist" and updates its internal worklist data base accordingly.
- The user selects the appropriate entry from the internal worklist data base represented in the GUI.
- The user starts the image acquisition, triggered by external contacts (e.g. foot switch) or by user interface. Acquired images are saved to the local image data base.
- The user completes the examination, as a result the images are converted to DICOM IODs and the QStore AE is triggered to send the C-STORE-RQ messages containing the image information to the configured image archive.
- In the case the system is working offline or a store operation fails, the user may select an examination from DIANA 3 local archive and initiate a STORE operation.
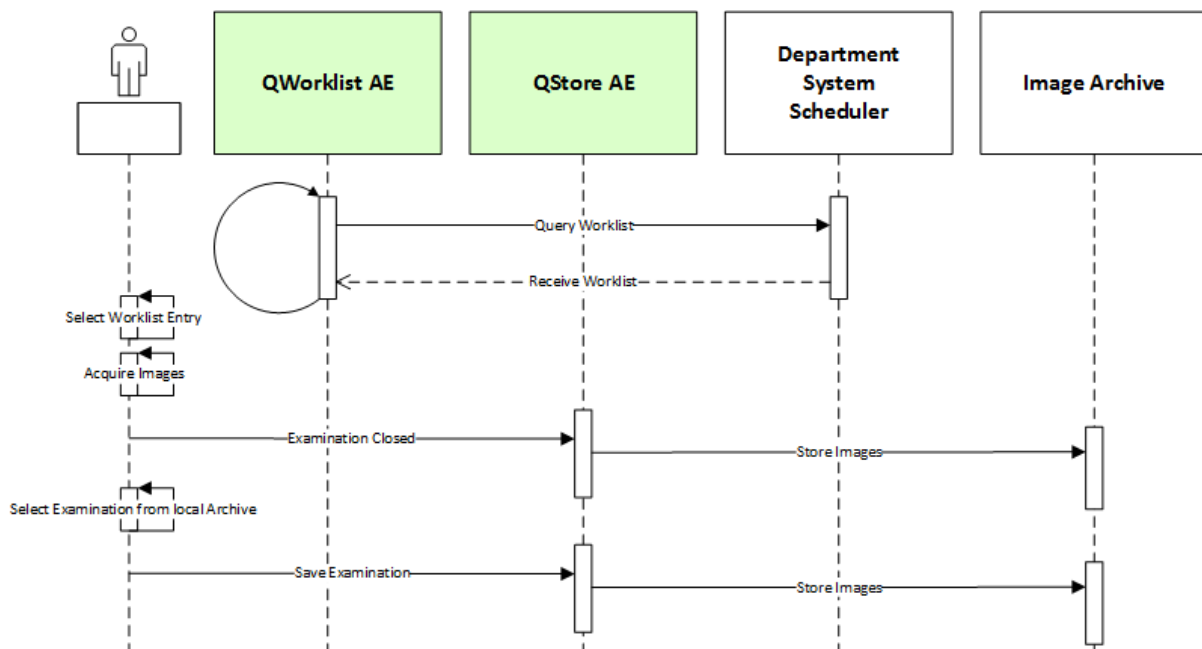
Figure 2:The DIANA 3 Sequence of Real World Activities

4.2 AE Specifications

4.2.1 QWorklist AE

4.2.1.1 SOP Classes

The DIANA 3 QWorklist AE provides Standard Conformance to the following DICOM V 3.0 SOP classes as an SCU.

Table 2: Supported SOP Classes for QWorklist AE

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	Yes	No
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	Yes	No

The DIANA 3 QWorklist AE does not support DICOM V 3.0 SOP Classes as an SCP.

4.2.1.2 Association Policies

4.2.1.2.1 General

The DICOM standard application context name for DICOM 2.0 is always proposed as presented in Table 3. The PDU size is configurable from a minimum of 4096 bytes.

Table 3: DICOM Application Context

Application Context Name	1.2.840.10008.3.1.1.1

4.2.1.2.2 Number of Associations

QWorklist AE will establish a maximum of two associations at a time. Based on local activities, one association may perform Application Level Communication Verification, another association may be used C-FIND operations.

Table 4: Number of Associations as an Association Initiator for QWorklist AE

Maximum number of simultaneous associations	2

QWorklist AE will not handle incoming associations.

Table 5: Number of Associations as an Association Acceptor for QWorklist AE

Maximum number of simultaneous associations	N.A.

4.2.1.2.3 Asynchronous Nature

QWorklist AE does not support asynchronous operations and will not perform asynchronous window negotiation.

Table 6: Asynchronous Nature as an Association Initiator for QWorklist AE

Maximum number of outstanding asynchronous transactions	N.A.

4.2.1.2.4 Implementation Identifying Information

The implementation information for QWorklist AE is:

Table 7: DICOM Implementation Class and Version for QWorklist AE

Implementation Class UID	2.16.840.1.113669.632.16
Implementation Version Name	QDICNET V4.3.*

* X identifies the version number of the DICOM module.

4.2.1.3 Association Initiation Policy

The QWorklist AE initiates associations as a result of the following events:
- The internal timer for cyclic Worklist Update expires (see 4.2.1.3.1).
- The user requests a worklist update manually (see 4.2.1.3.1).
- The internal timer for cyclic Connectivity Check expires (see 4.2.1.3.2).
- In the service mode, the operator verifies application level communication (see 4.2.1.3.2).

4.2.1.3.1 Update Worklist

4.2.1.3.1.1 Description and Sequencing of Activities

For each Broad Worklist Request, the QWorklist AE opens an association to the Basic Worklist SCP and sends a C-FIND request. After retrieval of all responses the association is closed. The internal schedule database is updated by the returned worklist items and presented to the user.
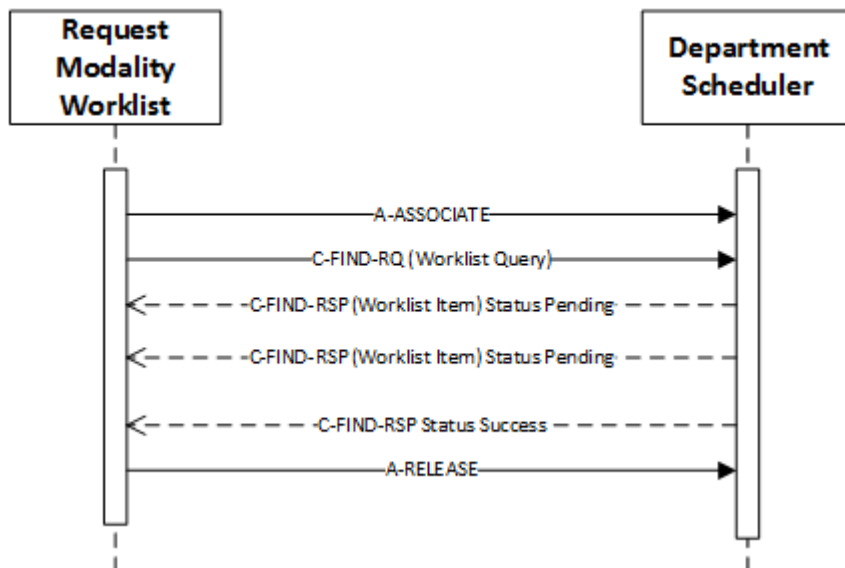
Figure 3:Sequencing of RWA Update Worklist

4.2.1.3.1.2 Proposed Presentation Contexts

The presentation context proposed by QWorklist AE Update Worklist is defined in Table 8.
The implementation will choose ELE transfer syntax in the case multiple transfer syntaxes are accepted by the SCP.

Table 8: Proposed Presentation Contexts for QWorklist AE Update Worklist

Presentation Context table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotia- tion
Name	UID	Name List	UID List		
Modality Worklist Information Model - FIND SOP Class	1.2.840.10008.5.1.4.31	ILE ELE	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None

4.2.1.3.1.3   SOP Specific Conformance for Update Worklist

DIANA 3 Update Worklist supports Broad Worklist Queries with all required search keys.

Table 9 describes the supported search keys. The Broad Worklist Query shall return all scheduled procedure steps for the own modality or modality AE.

Table 9: Search Key Attributes for QWorklist AE Update Worklist

Module Name Attribute Name	Tag	VR	M	Query Value
Scheduled Procedure Step Schedule Procedure Step Sequence	0040,0100	SQ		
Scheduled Station AE Title	0040,0001	AE	S / W	Configurable, local AET or "*"
Scheduled Procedure Step Start Date	0040,0002	DA	S / R	Actual Date or Date Range based on the Configuration
Scheduled Station Name	0040,0010	SH	S / W	Configurable, Station Name or "*"
Modality	0008,0060	CS	S	Modality

The above table should be read as follows:

Tag: DICOM tag for this attribute.

VR: DICOM VR for this attribute.

M: Matching keys for worklist update, a "S" indicates Single Value Matching, a "R" indicates Range Matching, a "W" indicates Wild Card Matching.

Table 10 below presents the Worklist request identifier of QWorklist AE Update Worklist queries and specifies if the attributes presented in the GUI as well as attributed copied to the image IODs. Unexpected attributes in the returned response are ignored, unsupported attributes (by the SCP) are set to have no value.

Table 10: Worklist Request Identifier for QWorklist AE Update Worklist

Module Name Attribute Name	Tag	VR	UI	IOD	Notes
SOP Common Module					
Specific Character Set	0008,0005	CS			ISO_IR 100
Patient Identification Module					
Patient's Name	0010,0010	PN	*	*	
Patient ID	0010,0020	LO	*	*	
Patient Demographic Module					
Patient's Birth Date	0010,0030	DA	*	*	
Patients' Sex	0010,0040	CS	*	*	
Visit Relationship Module					
Referenced Study Sequence	0008,1110	SQ			
Referenced Patient Sequence	0008,1120	SQ			
Scheduled Procedure Step Module					
Scheduled Procedure Step Sequence	0040,0100	SQ			
>Modality	0008,0060	CS	*	*	
>Scheduled Station AE Title	0040,0001	AE			
>Scheduled Procedure Step Start Date	0040,0002	DA	*	*	
>Scheduled Procedure Step Start Time	0040,0003	TM	*	*	
>Scheduled Performing Physician's Name	0040,0006	PN	*	*	
>Scheduled Procedure Step Description	0040,0007	LO	*	*	
>Scheduled Procedure Step ID	0040,0009	SH			
>Scheduled Station Name	0040,0010	SH			
Requested Procedure Module					
Requested Procedure ID	0040,1001	SH			
Study Instance UID	0020,000D	UI		*	
Image Service Request Module					
Accession Number	0008,0050	SH	*	*	
Admission ID	0038,0010	LO			

The behaviour of the QWorklist AE for status codes in a Modality Worklist C-FIND response is presented in Table 11:

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Table 12: Response Status Handling Behavior for QWorklist AE Update Worklist

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Matching is complete – No final Identifier is supplied	The result is imported to the internal scheduler data base, this is presented to the user and is logged.
Refused	A700	Out of Resources	C-Find Responses are not processed, the reason is logged, a failure status is reported to the user.
Failed	A900	Identifier does not match SOP Class	C-Find Responses are not processed, the reason is logged, a failure status is reported to the user.
	C001	Unable to process	C-Find Responses are not processed, the reason is logged, a failure status is reported to the user.
Cancel	FE00	Matching terminated due to Cancel request	C-Find Responses are not processed, the reason is logged, a failure status is reported to the user.
Pending	FF00	Matches are continuing – Current match is supported in the same manner as supplied and any optional keys were required keys.	Continues with processing the find responses.
	FF01	Matches are continuing – Warning that one or more optional keys were not supported for existence for this identifier.	Continues with processing the find responses.
*	Any other code	*	C-Find Responses are not processed, the reason is logged, a failure status is reported to the user.

The behaviour of the QWorklist AE during communication failure is presented in Table 13.

Table 13: Communication Failure Behavior for QWorklist AE Update Worklist

Exception	Behavior
Timeout	The association is aborted using A-ABORT. C-Find Responses are not processed, the reason is logged, a failure status is reported to the user.
Association aborted	The association is aborted using A-ABORT. C-Find Responses are not processed, the reason is logged, a failure status is reported to the user.
Association rejected	C-Find Responses are not processed, the reason is logged, a failure status is reported to the user.

4.2.1.3.2 Verify Application Level Communication

4.2.1.3.2.1 Description and Sequencing of Activities

For each Verify Application Level Communication request QWorklist AE initiates and association to the remote system and transmits a C-ECHO request.
After the response is received the association is closed.
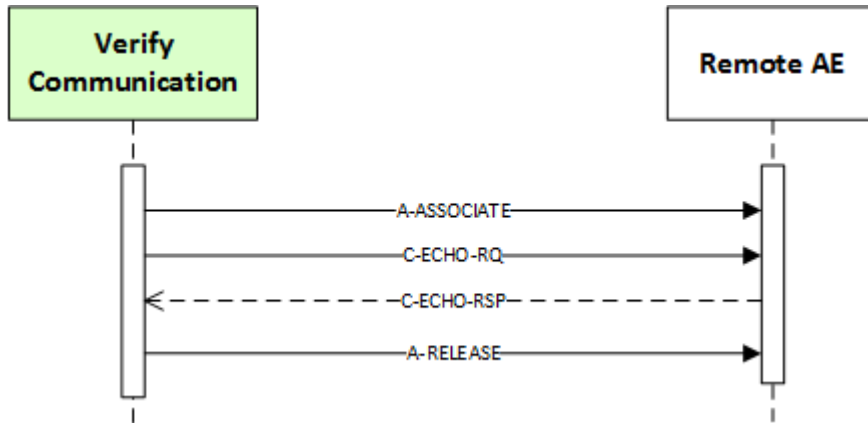
Figure 4:Sequencing of RWA Verify Application Level Communication

4.2.1.3.2.2 Proposed Presentation Contexts

The presentation context proposed by QWorklist AE Verify Application Level Communication is defined in Table 14.
The implementation will choose ELE transfer syntax in the case multiple transfer syntaxes are accepted by the SCP.

Table 14: Proposed Presentation Contexts for QWorklist AE Verify Application Level Communication

Presentation Context table					
		Transfer Syntax			Extended
Name	UID	Name List	UID List	Role	Negotia-tion
Verification	1.2.840.10008.1.1	ILE ELE	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None

4.2.1.3.2.3 SOP Specific Conformance for SOP Classes

The behaviour of the QWorklist AE for status codes in a Verification response is presented in Table 15.

Table 15: Response Status Handling Behavior for QWorklist AE Verify Application Level Communication

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Successful operation	The success is reported to the user
*	Any other code	*	The failure is reported to the user

The behaviour of the QWorklist AE during communication failure is presented in

Table 16.

Table 16: Communication Failure Behavior for QWorklist AE Verify Application Level Communication

Exception	Behavior
Timeout	The reason is logged, a failure status is reported to the user.
Association aborted	The reason is logged, a failure status is reported to the user.
Association rejected	The reason is logged, a failure status is reported to the user.

4.2.1.4 Association Acceptance Policy

DIANA 3 QWorklist AE does not accept associations.

4.2.2 QMPPS AE

4.2.2.1 SOP Classes

The DIANA 3 QMPPS AE provides Standard Conformance to the following DICOM V 3.0 SOP classes as an SCU.

Table 17: Supported SOP Classes for QStore AE

SOP Class Name	SOP Class UID	SCU	SCP
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Yes	No

4.2.2.2 Association Policies

See 4.2.1.2.1 General Association Policies.

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4.2.2.3 Association Initiation Policy

DIANA 3 attempts to initiate a new association for the following service operations:
- Start Procedure Step
- Finish Procedure Step
- Discontinue Procedure Step

4.2.2.3.1 Description and Sequencing of Activities

When the surgery is started, DIANA 3 creates an MPPS (Modality Performed Procedure Step) object from the information that was provided by a previous C-Find request for a worklist from a remote Worklist SCP.

When the surgery is finished, DIANA 3 updates the status of the MPPS object (to 'Completed' or 'Discontinued').

4.2.2.3.1.1 Proposed Presentation Contexts

The presentation context proposed by Worklist AE Update Worklist is defined in Table 18.

The implementation will choose ELE transfer syntax in the case multiple transfer syntaxes are accepted by the SCP.

Table 19: Proposed Presentation Contexts for Worklist AE Update Worklist

Presentation Context table					
Abstract Syntax		Transfer Syntax			Extended Negotia-tion
Name	UID	Name List	UID List	Role	
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	ILE ELE	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None

4.2.2.3.1.2 SOP Specific Conformance Statement - Send Status message to remote AE

Once the MPPS association has been established, DIANA 3 sends an N-CREATE-RQ or N-SET-RQ message to the MPPS SCP. After the response is received the association is closed. The table below lists all Modality Performed Procedure Step attributes, which may be created by N-CREATE and updated by N-SET.

Table 20 describes the supported Attributes.

Table 21: Modality Performed Procedure Step Attributes

Attribute Name	Tag	N-CREATE	N-SET	Additional information
SOP Common Module				
Specific Character Set	(0008,0005)	Yes	No	ISO IR 100
Performed Procedure Step Relationship Module				
Referenced Patient Sequence	(0008,1120)	Yes	No	
>Referenced SOP Class UID	(0008,1150)	N	No	
>Referenced SOP Instance UID	(0008,1155)	N	No	
Patient Name	(0010,0010)	Yes	No	
Patient ID	(0010,0020)	Yes	No	
Patient's Birth Date	(0010,0030)	Yes	No	
Patient's Sex	(0010,0040)	Yes	No	
Scheduled Step Attribute Sequence	(0040,0270)	Yes	No	
>Accession Number	(0008,0050)	Yes	No	
>Referenced Study Sequence	(0008 ,1110)	Yes	No	Always empty
>Study Instance UID	(0020,000D)	Yes	No	
>Requested Procedure Description	(0032,1060)	Yes	No	
>Scheduled Procedure Step ID	(0040,0009)	Yes	No	
>Scheduled Procedure Step Description	(00 40,0007)	Yes	No	
>Scheduled Protocol Code Sequence	(00 40,0008)	Yes	No	Always empty
Performed Procedure Step Information				
Performed Station AE Title	(0040,0241)	Yes	No	
Performed Station Name	(0040,0242)	Yes	No	
Performed Location	(0040,0243)	Yes	No	
Performed Procedure Step Start Date	(0040,0244)	Yes	No	
Performed Procedure Step Start Time	(0040,0245)	Yes	No	
Performed Procedure Step End Date	(0040,0250)	Yes	Yes	empty in N-CREATE
Performed Procedure Step End Time	(0040 ,0251)	Yes	Yes	empty in N-CREATE
Performed Procedure Step Status	(00 40,0252)	Yes	Yes	
Performed Procedure Step ID	(0040 ,0253)	Yes	No	
Performed Procedure Step Description	(00 40,0254)	Yes	Yes	
Performed Procedure Type Description	(00 40,0255)	Yes	Yes	
Image Acquisition Results				
Modality	(0008,0060)	Yes	No	
Study ID	(0020,0010)	Yes	No	
Performed Protocol Code Sequence	(0040,0260)	Yes	Yes	Always empty
Performed Series Sequence	(0040,0340)	Yes	Yes	
>Performing Physician 's Name	(0008,1050)	Yes	Yes	
>Operator's Name	(0008,1070)	Yes	Yes	
>Protocol Name	(0018,1030)	Yes	Yes	
>Series Instance UID	(0020,000E)	Yes	Yes	
>Series Description	(0008,103E)	Yes	Yes	
>Referenced Image Sequence	(0008,1140)	Yes	Yes	empty in N-CREATE
>>Referenced SOP Class UID	(0008,1150)	No	Yes	
>Referenced Non-Image Composite SOP Instance Sequence	(0040,0220)	Yes	Yes	Always empty

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4.2.3 QSTORE AE

4.2.3.1 SOP Classes

The DIANA 3 QStore AE provides Standard Conformance to the following DICOM V 3.0 SOP classes as an SCU.

Table 22: Supported SOP Classes for QStore AE

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	Yes	No
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	No
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Yes	No
Visible Light Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	Yes	No
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	Yes	No
Visible Light 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
Visible Light Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	Yes	No
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1	Yes	No
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Yes	No
Ultrasound Multi-Frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Yes	No
Storage Commitment Push Model	1.2.840.10008.1.20.1	Yes	No

DIANA 3 may be configured to use other Image Storage SOP Classes on customer's request.
The conformance statements will be available as addendum when applicable.

The DIANA 3 QStore AE does not support DICOM V 3.0 SOP Classes as an SCP.

4.2.3.2 Association Policies

4.2.3.2.1 General

The DICOM standard application context name for DICOM 3.0 is always proposed as presented in Table 23. The PDU size is configurable from a minimum of 4096 bytes.

Table 23: DICOM Application Context

Application Context Name	1.2.840.10008.3.1.1.1

4.2.3.2.2 Number of Associations

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QStore AE will establish a maximum of two associations at a time. Based on local activities, one association may perform Application Level Communication Verification, another association may be used for image storage.

Table 24: Number of Associations as an Association Initiator for QStore AE

Maximum number of simultaneous associations	2

QStore AE will not handle incoming associations.

Table 25: Number of Associations as an Association Acceptor for QStore AE

Maximum number of simultaneous associations	N.A.

4.2.3.2.3 Asynchronous Nature

QStore AE does not support asynchronous operations and will not perform asynchronous window negotiation.

Table 26: Asynchronous Nature as an Association Initiator for QStore AE

Maximum number of outstanding asynchronous transactions	N.A.

4.2.3.2.4 Implementation Identifying Information

The implementation information for QStore AE is:

Table 27: DICOM Implementation Class and Version for QStore AE

Implementation Class UID	2.16.840.1.113669.632.16
Implementation Version Name	QDICNET V4.3.*

* X identifies the version number.

4.2.3.3 Association Initiation Policy

The QStore AE initiates associations as a result of the following events:
- The user ends an examination (see 4.2.3.3.2).
- The user initiates an image transfer from DIANA 3 local archive (see 4.2.3.3.2)
- In the service mode, the operator verifies application level communication (see 4.2.3.3.1).
- Request Storage Commitment from a remote AE (if enabled)

4.2.3.3.1 Verify Application Level Communication

4.2.3.3.1.1 Description and Sequencing of Activities

For each Verify Application Level Communication request QStore AE initiates and association to the remote system and transmits a C-ECHO request.
After the response is received the association is closed.

Figure 5:Sequencing of RWA Verify Application Level Communication
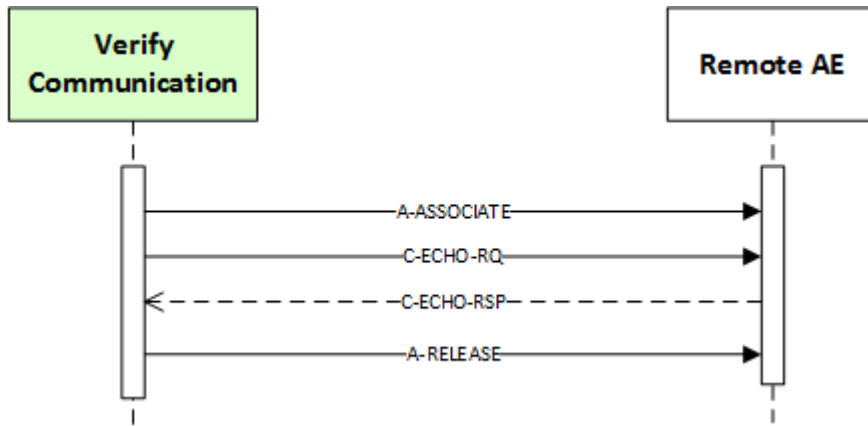
4.2.3.3.1.2   Proposed Presentation Contexts

The presentation context proposed by QStore AE Verify Application Level Communication is defined in Table 28.
The implementation will choose ELE transfer syntax in the case multiple transfer syntaxes are accepted by the SCP.

Table 28: Proposed Presentation Contexts for QWorklist AE Verify Application Level Communication

Presentation Context table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotia-tion**
Name	**UID**	**Name List**	**UID List**		
Verification	1.2.840.10008.5.1.4.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

4.2.3.3.1.3   SOP Specific Conformance for Verification SOP Class

The behaviour of the QStore AE for status codes in a Verification response is presented in Table 29.

Table 29: Response Status Handling Behavior for QStore AE Verify Application Level Communication

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Successful operation	The success is reported to the user
*	Any other code	*	The failure is reported to the user

The behaviour of the QStore AE during communication failure is presented in Table 30.

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Table 30: Communication Failure Behavior for QStore AE Verify Application Level Communication

Exception	Behavior
Timeout	The reason is logged, a failure status is reported to the user.
Association aborted	The reason is logged, a failure status is reported to the user.
Association rejected	The reason is logged, a failure status is reported to the user.

4.2.3.3.2   Transfer Images and request Commitment

4.2.3.3.2.1   Description and Sequencing of Activities

The acquired images will be sent to the configured remote system after the user ends the examination. Studies out of DIANA 3 local archive will be sent after the user requests "Save Examination".

QStore AE initiates one association to the configured SCP and uses it to send the images via C-STORE requests. If the examination contains multiple images, then multiple C-STORE requests will be issued within the same association.

The association will be closed after successful transfer of all images or when an error occurs.

QStore AE handles each send request after another.
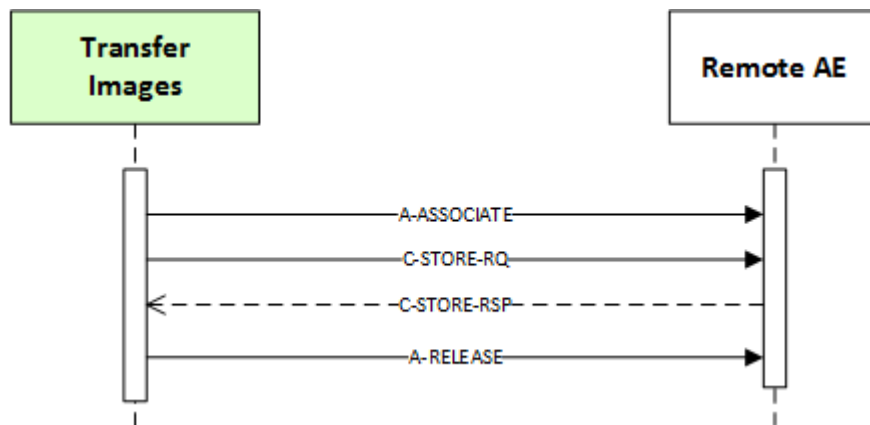
If Storage Commitment is enabled, DIANA 3 automatically requests a storage commitment after the storage. The Storage Commitment is requested in one request for all images. Also a timed-out commit request is automatically repeated once or twice.

4.2.3.3.2.2   Proposed Presentation Contexts

Each time an association is initiated QStore AE will propose one or two presentation contexts from the list presented in

Table 31.
The abstract syntax selection criteria are based on the configuration in combination with the modality attribute coming from the corresponding worklist item and if acquired images are single frame or multi-frame images.
The abstract syntax is taken either from the modality attribute of the selected worklist entry or, for manually entered demographics or an "emergency patient" from the modality type the user selects in the GUI.

Modality Type	Abstract Syntax single frame		Abstract Syntax multi frame	
	Name	UID	Name	UID
US	Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Ultrasound Multi-Frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
ES	Visible Light Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1
GM	Visible Light Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	Video Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2.1
XC	Visible Light Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1
SC	Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4

For single frame instances the proposed transfer syntax is always Implicit VR Little Endian and Explicit VR Little Endian.
For multi frame instances the proposed transfer syntax is based on the systems multi frame compression configuration (see 4.4.2.1)
Once multi-frame images are compressed they will not be decompressed if the remote AE does not support the presentation context. There will be no "fall back" to the DICOM default transfer syntax.
Presentation contexts for a SOP Class will only be proposed if the transfer job contains instances of these SOP Classes.

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Table 31: Presentation Contexts for QStore AE Transfer Images

Abstract Syntax		Transfer Syntax		Role	Extended Negotia-tion
Name	UID	Name List	UID List		
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		MPEG-4 AVC/H.264 High Profile/Level 4.1 *	1.2.840.10008.1.2.4.102		
		MPEG-4 AVC/H.264 BD-compatible, High Profile/Level 4.1 *	1.2.840.10008.1.2.4.103		
Visible Light Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		MPEG-4 AVC/H.264 High Profile/Level 4.1 *	1.2.840.10008.1.2.4.102		
		MPEG-4 AVC/H.264 BD-compatible, High Profile/Level 4.1 *	1.2.840.10008.1.2.4.103		
Visible Light Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Video Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		MPEG-4 AVC/H.264 High Profile/Level 4.1 *	1.2.840.10008.1.2.4.102		
		MPEG-4 AVC/H.264 BD-	1.2.840.10008.1.2.4.103		

DEKOM

MEDICAL

		compatible, High Profile/Level 4.1 *			
Visible Light Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		MPEG-4 AVC/H.264 High Profile/Level 4.1 *	1.2.840.10008.1.2.4.102		
		MPEG-4 AVC/H.264 BD-compatible, High Profile/Level 4.1 *	1.2.840.10008.1.2.4.103		
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Ultrasound Multi-Frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		MPEG-4 AVC/H.264 High Profile/Level 4.1 *	1.2.840.10008.1.2.4.102		
		MPEG-4 AVC/H.264 BD-compatible, High Profile/Level 4.1 *	1.2.840.10008.1.2.4.103		
Storage Commitment Push Model	1.2.840.10008.1. 20.1	Implicit VR Little Endian	1.2.840.10008.1.2	scu	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

* MPEG-4 TransferSyntaxes are optional and not supported on all systems.

4.2.3.3.2.3   SOP Specific Conformance for Image SOP Classes

All image SOP Classes supported by QStore AE exhibit the same behaviour.
In the case no presentation context for an abstract syntax can be negotiated, instances of this SOP Class will not be sent and the transfer job is marked as failed. The failure is logged and presented to the user via the GUI.

The behaviour of QStore AE Transfer Images for status codes in a C-STORE response is summarized in Table 32.

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Table 32: Response Status Handling Behavior for QStore AE Transfer Images

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Successful operation	If all SOP instances in a transfer job have status success, then the job is marked completed. The result is logged and reported to the user.
Refused	A700-A7FF	Out of Resources	The association is aborted using A-ABORT and the job is marked as failed. The failure is logged and reported to the user.
Error	0110	Processing Failure	The association is aborted using A-ABORT and the job is marked as failed. The failure is logged and reported to the user.
	A900-A9FF	Data Set does not match SOP Class	The association is aborted using A-ABORT and the job is marked as failed. The failure is logged and reported to the user.
	C001-CFFF	Cannot understand	The association is aborted using A-ABORT and the job is marked as failed. The failure is logged and reported to the user.
Warning	B000	Coercion of Data Elements	If all SOP instances in a transfer job have status success, then the job is marked completed. The result is logged.
	B006	Elements discarded	If all SOP instances in a transfer job have status success, then the job is marked completed. The result is logged.
	B007	Data Set does not match SOP Class	If all SOP instances in a transfer job have status success, then the job is marked completed. The result is logged.
*	Any other status code	*	The association is aborted using A-ABORT and the job is marked as failed. The failure is logged and reported to the user.

The behaviour of the QWorklist AE during communication failure is presented in Table 33.

QMP-DIANA-3.2_DICOM-Conformance-Statement_2022-06-23

DEKOM
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Table 33: Communication Failure Behavior for QStore AE Transfer Images

Exception	Behavior
Timeout	The association is aborted using A-ABORT and the job is marked as failed. The failure is logged and reported to the user.
Association aborted	The association is aborted using A-ABORT and the job is marked as failed. The failure is logged and reported to the user.
Association rejected	The job is marked as failed. The failure is logged and reported to the user.

4.2.3.4   Association Acceptance Policy

DIANA 3 QStore accepts an association request for the following service operation:
•   Receive Storage Commitment from a remote AE (if enabled)
DIANA 3 accepts an association request for storage commitment event s if the requested AE title and the requestor's AE title and IP address correspond to the configured values.

4.2.3.4.1   Associated Real-World Activity - Receive Storage Commitment

The remote provider (archive) sends a storage commitment when they take over the responsibility for the stored image. After receiving this commitment for all objects of the procedure, DIANA 3 marks the procedure as committed

4.2.3.4.2   Accepted Presentation Contexts - Receive Storage Commitment

The presentation context Receive by QStore AE Verify Application Level Communication is defined in Table 28.
The implementation will choose ELE transfer syntax in the case multiple transfer syntaxes are accepted by the SCP.

Table 34: Proposed Presentation Contexts for Worklist AE Verify Application Level Communication

Presentation Context table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotia-tion
Name	UID	Name List	UID List		
Storage Commitment Push Model	1.2.840.10008.1.20.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

4.2.3.4.2.1   SOP Specific Conformance for Receive Storage Commitment

None

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4.3   Network Interfaces

4.3.1   Physical Network Interface

The DIANA 3 provides DICOM V3.0 TCP/IP Network Communication.
The TCP/IP stack is inherited from the Windows operating system.

The DIANA 3 supports a single network interface: Ethernet ISO.8802-3. Standard AUI, optional twisted pair 100/1000-BaseT.

4.3.2   Additional Protocols

Additional protocols like DHCP, DNS, NTP may be present in the Windows operating system, its usage is transparent for DIANA 3.

4.4   Configuration

The DIANA 3 QWorklist AE, QMPPS AE and QStore AE are configured via the Service / Installation Tool. The Service / Installation Tool is intended to be used by DEKOM Service Engineers only. The configuration is stored in configuration repositories.

4.4.1   AE Title/Presentation Address Mapping

4.4.1.1   Local AE Titles

No default AE Titles are provided; they must be configured during installation.
The Application Entities may be configured to use the same local AE Title.

Application Entity	Default AE Title	Default TCP/IP Port
QWorklist AE	No Default	N.A.
QStore AE	No Default	N.A.

4.4.1.2   Remote AE Titles/Presentation Address Mapping

The AE Title, host names / IP addresses and port numbers of remote applications are configured using the DIANA Service/Installation Tool.

4.4.1.2.1   QWorklist AE

The AE Title, host name / IP address and port number of the remote Modality Worklist SCP is configured using the DIANA Service/Installation Tool.
Only one remote Modality Worklist SCP can be defined.

4.4.1.2.2   QStore AE

The AE Title, host name / IP address and port number of the remote STORE SCP is configured using the DIANA Service/Installation Tool.
Only one remote STORE SCP can be defined.

4.4.2   Parameters

A large number of parameters related to image acquisition and general operation can be configured using the DIANA Service/Installation Tool (see the DIANA 3 Service Manual). The following table presents just parameter relevant to the DICOM communication.

Parameter	Configurable (Yes / No)	Default Value
Worklist AE (local System)		
AE Title	Yes	No Default
Max PDU Receive Size		
Max PDU Send Size		
Time-out waiting for an acceptance or rejection to an Association Request(Application Level Timeout)	No	15 s
Time-out waiting for a response to an Association Release Request(Application Level Timeout)	No	15 s
Time-out waiting for completion of a TCP/IP connect request (Low-level timeout)		
Time-out waiting for a response to a DIMSE Request (Low-level timeout)		
Time-out for waiting for data between TCP/IP-packets (Low-level timeout)		
QWorklist AE (Remote System)		
AE Title	Yes	No Default
IP host name/address	Yes	localhost
Port Number	Yes	104
Modality Worklist SCU time-out waiting for a response to the C-FIND_RQ	Yes	15 s
Supported Transfer Syntaxes for Modality Worklist	No	ILE ELE
Delay between automatic Worklist Updates	Yes	5 Min
Query Worklist for specific Scheduled Station AE Title	Yes	No Default
Query Worklist for specific Modality Value	Yes	No Default
Delay between automatic Verification Check	Yes	5 Min
QStore AE (local System)		
AE Title	Yes	No Default
Max PDU Receive Size		
Max PDU Send Size		
Time-out waiting for an acceptance or rejection to an Association Request(Application Level Timeout)	No	15 s
Time-out waiting for a response to an Association Release Request(Application Level Timeout)	No	15 s
Time-out waiting for completion of a TCP/IP connect request (Low-level timeout)		
Time-out waiting for a response to a DIMSE Request (Low-level timeout)		
Time-out for waiting for data between TCP/IP-packets (Low-level timeout)		

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QStore AE (Remote System)		
AE Title	Yes	No Default
IP host name/address	Yes	No Default
Port Number	Yes	No Default
Time-out waiting for a response to a C-STORE-RQ	Yes	15 sec
Multiframe Compression configuration: affects supported transfer syntaxes	Yes	See chapter 4.4.2.1
Delay between automatic Verification Check	Yes	5 Min

4.4.2.1   Multi frame Compression Configuration

Within the DIANA 3 configuration the user configures the Video compression type the system shall use for multi frame images:

User Selection	Resulting Transfer Syntax
Uncompressed	1.2.840.10008.1.2.1
JPEG Compression	1.2.840.10008.1.2.4.50
MPEG-4 Compression	1.2.840.10008.1.2.4.102
MPEG-4 BD Compression	1.2.840.10008.1.2.4.103

See also chapter 4.2.3.3.2.2 for more details on Presentation Context selection.

5　Media Interchange

DIANA 3 does not support DICOM Media Storage.

6 Support of Character Sets

The following character sets are supported by DIANA 3 DICOM applications:

ISO_IR 100 (ISO 8859-1 Latin Alphabet No. 1 supplementary set)

QMP-DIANA-3.2_DICOM-Conformance-Statement_2022-06-23

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7   Security

The DICOM applications of DIANA 3 do not support any specific security measures. It is assumed that DIANA is used within a secured environment. It is assumed that a secured environment includes at a minimum:

- Firewall or routers protections to ensure that only approved external hosts have network access to DIANA 3.
- Firewall or router protections to ensure that DIANA 3 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 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 Instances

The chapters contain the lists of DICOM attributes provided by DIANA 3 image instances.

The following tables use a number of abbreviations. The abbreviations used in the "Presence of …" column are:
VNAP Value Not Always Present (attribute sent zero length if no value is present)
ANAP Attribute Not Always Present
ALWAYS Always Present
NEVER Never Present
EMPTY Attribute is sent without a value

The abbreviations used in the "Source" column:
MWL the attribute value source Modality Worklist
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

8.1.1.1   Secondary Capture Image IOD

Table 35: IOD of Created Secondory Capture SOP Instances

IE	Module	Reference	Presence of Module
Patient	Patient	Table 46	ALWAYS
Study	General Study	Table 47	ALWAYS
Series	General Series	Table 48	ALWAYS
Equipment	General Equipment	Table 50	ALWAYS
	SC Equipment	Table 55	ALWAYS
Image	General Image	Table 51	ALWAYS
	Image Pixel	Table 36	ALWAYS
	SC Image	Table 56	ALWAYS
	VOI LUT	Table 53	ALWAYS
	SOP Common	Table 54	ALWAYS

8.1.1.2 Multi-frame True Color Secondary Capture Image IOD

Table 37: IOD of Created Multi-frame True Color Secondary Capture SOP Instances

IE	Module	Reference	Presence of Module
Patient	Patient	Table 46	ALWAYS
Study	General Study	Table 47	ALWAYS
Series	General Series	Table 48	ALWAYS
Frame Of Reference	Frame of Reference	-	NEVER
Equipment	General Equipment	Table 50	ALWAYS
	SC Equipment	Table 55	ALWAYS
Image	General Image	Table 51	ALWAYS
	Image Pixel	Table 52	ALWAYS
	Cine	Table 59	ALWAYS
	Multi-frame	Table 60	ALWAYS
	SC Image	Table 56	ALWAYS
	SC Multi-frame Image	Table 57	ALWAYS
	SC Multi-frame Vector	Table 58	ALWAYS
	SOP Common	Table 54	ALWAYS

8.1.1.3 Visible Light Endoscopic Image IOD

Table 38: IOD of Created Visible Light Endoscopic SOP Instances

IE	Module	Reference	Presence of Module
Patient	Patient	Table 46	ALWAYS
Study	General Study	Table 47	ALWAYS
Series	General Series	Table 48	ALWAYS
Frame Of Reference	Frame of Reference	-	NEVER
Equipment	General Equipment	Table 49	ALWAYS
Image	General Image	Table 51	ALWAYS
	Image Pixel	Table 52	ALWAYS
	Acquisition Context	Table 61	ALWAYS
	VL Image	Table 62	ALWAYS
	SOP Common	Table 54	ALWAYS

DEKOM
MEDICAL

8.1.1.4   Video Endoscopic Image IOD

Table 39: IOD of Created Video Endoscopic SOP Instances

IE	Module	Reference	Presence of Module
Patient	Patient	Table 46	ALWAYS
Study	General Study	Table 47	ALWAYS
Series	General Series	Table 48	ALWAYS
Equipment	General Equipment	Table 49	ALWAYS
Image	General Image	Table 51	ALWAYS
	Cine	Table 59	ALWAYS
	Multi-frame	Table 60	ALWAYS
	Image Pixel	Table 52	ALWAYS
	Acquisition Context	Table 61	ALWAYS
	Specimen	-	NEVER, DIANA 3 is not designed to be used for specimen
	VL Image	Table 62	ALWAYS
	SOP Common	Table 54	ALWAYS
	Frame Extraction	-	NEVER, DIANA does not support Frame-Level retrieve request

8.1.1.5   Visible Light Microscopic Image IOD

Table 40: IOD of Created Visible Light Microscopic SOP Instances

IE	Module	Reference	Presence of Module
Patient	Patient	Table 46	ALWAYS
Study	General Study	Table 47	ALWAYS
Series	General Series	Table 48	ALWAYS
Equipment	General Equipment	Table 49	ALWAYS
Image	General Image	Table 51	ALWAYS
	Image Pixel	Table 52	ALWAYS
	Acquisition Context	Table 61	ALWAYS
	Specimen	-	NEVER, DIANA 3 is not designed to be used for specimen
	VL Image	Table 62	ALWAYS
	SOP Common	Table 54	ALWAYS

8.1.1.6   Video Microscopic Image IOD

Table 41: IOD of Created Video Microscopic SOP Instances

IE	Module	Reference	Presence of Module
Patient	Patient	Table 46	ALWAYS
Study	General Study	Table 47	ALWAYS
Series	General Series	Table 48	ALWAYS
Equipment	General Equipment	Table 49	ALWAYS
Image	General Image	Table 51	ALWAYS
	Cine	Table 59	ALWAYS
	Multi-frame	Table 60	ALWAYS
	Image Pixel	Table 52	ALWAYS
	Acquisition Context	Table 61	ALWAYS
	Specimen	-	NEVER, DIANA 3 is not designed to be used for specimen
	VL Image	Table 62	ALWAYS
	SOP Common	Table 54	ALWAYS
	Frame Extraction	-	NEVER, DIANA 3 does not support Frame-Level retrieve request

8.1.1.7   Visible Light Photographic Image IOD

Table 42: IOD of Created Visible Light Photographic SOP Instances

IE	Module	Reference	Presence of Module
Patient	Patient	Table 46	ALWAYS
Study	General Study	Table 47	ALWAYS
Series	General Series	Table 48	ALWAYS
Equipment	General Equipment	Table 49	ALWAYS
Image	General Image	Table 51	ALWAYS
	Image Pixel	Table 52	ALWAYS
	Acquisition Context	Table 61	ALWAYS
	Specimen	-	NEVER, DIANA 3 is not designed to be used for specimen
	VL Image	Table 62	ALWAYS
	SOP Common	Table 54	ALWAYS

8.1.1.8　Video Photographic Image IOD

Table 43: IOD of Created Video Photographic SOP Instances

IE	Module	Reference	Presence of Module
Patient	Patient	Table 46	ALWAYS
Study	General Study	Table 47	ALWAYS
Series	General Series	Table 48	ALWAYS
Equipment	General Equipment	Table 49	ALWAYS
Image	General Image	Table 51	ALWAYS
	Cine	Table 59	ALWAYS
	Multi-frame	Table 60	ALWAYS
	Image Pixel	Table 52	ALWAYS
	Acquisition Context	Table 61	ALWAYS
	Specimen	-	NEVER, DIANA 3 is not designed to be used for specimen
	VL Image	Table 62	ALWAYS
	SOP Common	Table 54	ALWAYS
	Frame Extraction	-	NEVER, DIANA 3 does not support Frame-Level retrieve request

8.1.1.9　Ultrasound Image IOD

Table 44: IOD of Created Ultrasound Image SOP Instances

IE	Module	Reference	Presence of Module
Patient	Patient	Table 46	ALWAYS
Study	General Study	Table 47	ALWAYS
Series	General Series	Table 48	ALWAYS
Equipment	General Equipment	Table 49	ALWAYS
Image	General Image	Table 51	ALWAYS
	Image Pixel	Table 52	ALWAYS
	Contrast/bolus	-	NEVER
	Palette Color Lookup Table	-	NEVER
	US Image	Table 63	ALWAYS
	SOP Common	Table 54	ALWAYS

DEKOM
MEDICAL

8.1.1.10 Ultrasound Multi-Frame Image IOD

Table 45: IOD of Created Ultrasound Multi-Frame SOP Instances

IE	Module	Reference	Presence of Module
Patient	Patient	Table 46	ALWAYS
Study	General Study	Table 47	ALWAYS
Series	General Series	Table 48	ALWAYS
Frame Of Reference	Frame of Reference	-	NEVER
Equipment	General Equipment	Table 49	ALWAYS
Image	General Image	Table 51	ALWAYS
	Image Pixel	Table 52	ALWAYS
	Contrast/bolus	-	NEVER
	Cine	Table 59	ALWAYS
	Multi-frame	Table 60	ALWAYS
	Palette Color Lookup Table	-	NEVER
	US Image	Table 63	ALWAYS
	SOP Common	Table 54	ALWAYS

8.1.1.11 Common Modules

Table 46: Patient Module of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Patient's Name	0010,0010	PN	In the case the user selects an „Emergency Patient", a template based auto generated value is used. The „Emergency Patient" template is configurable.	ALWAYS	MWL/ USER/ AUTO
Patient ID	0010,0020	LO	In the case the user selects an „Emergency Patient" a template based unique auto generated value is used	ALWAYS	MWL/ USER/ AUTO
Patient's Birth Date	0010,0030	DA	<yyyymmdd>	VNAP	MWL/ USER/ AUTO
Patient's Sex	0010,0040	CS		VNAP	MWL/ USER/ AUTO

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Table 47: General Study Module of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Study Instance UID	0020,000D	UI	Taken from MWL or auto generated	ALWAYS	MWL/AUTO
Study Date	0008,0020	DA	<yyyymmdd>	ALWAYS	AUTO
Study Time	0008,0030	TM	<hhmmss>	ALWAYS	AUTO
Referring Physician's Name	0008,0090	PN	Taken from MWL or empty	VNAP	MWL
Study ID	0020,0010	SH	auto generated	ALWAYS	AUTO
Accession Number	0010,0020	SH	In the case the user selects an „Emergency Patient" a template based auto generated value is used	ALWAYS	MWL/ USER/ AUTO
Study Description	0008,1030	LO	Taken from MWL or empty	VNAP	MWL
Admission ID	0038, 0010	LO	Taken from MWL or empty	VNAP	MWL

Table 48: General Series Module of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Modality	0008,0060	CS	Taken from MWL or user selection. In the case the user selects an „Emergency Patient" does not select a modality, the first configured Modality is used	ALWAYS	MWL/ USER/ AUTO
Series Instance UID	0020,000E	UI		ALWAYS	AUTO
Series Number	0020,0011	IS		ALWAYS	AUTO
Series Date	0008,0021	DA	<yyyymmdd>	ALWAYS	AUTO
Series Time	0008,0031	TM	<hhmmss>	ALWAYS	AUTO

Table 49: General Equipment Module (Type 1) of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Manufacturer	0008,0070	LO	DEKOM - Engineering GmbH	ALWAYS	AUTO
Institution Name	0008,0080	LO	MyHospital	ALWAYS	CONFIG
Institution Address	0008,0081	ST		ALWAYS	CONFIG
Manufacturer's Model Name	0008,1090	LO	DIANA	ALWAYS	AUTO
Software Versions	0018,1020	LO		ALWAYS	AUTO

Table 50: General Equipment Module (Type 2) of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Institution Name	0008,0080	LO		ALWAYS	CONFIG
Institution Address	0008,0081	ST		ALWAYS	CONFIG

Table 51: General Image Module of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Instance Number	0020,0013	IS		ALWAYS	AUTO
Image Type	0008,0008	CS	Value 1: ORIGINAL Value 2: PRIMARY	ALWAYS	AUTO
Acquisition Date	0008,0022	DA	<yyyymmdd>	ALWAYS	AUTO
Acquisition Time	0008,0032	TM	<hhmmss>	ALWAYS	AUTO
Lossy Image Compression	0028,2110	CS	Dependent on the Transfer Syntax used.	ALWAYS	AUTO

Table 52: Image Pixel Module (Color) of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Samples per Pixel	0028,0002	US	3	ALWAYS	AUTO
Photometric Interpretation	0028,0004	CS	Uncompressed and JPEG compression: RGB MPEG compression: YBR_PARTIAL_420	ALWAYS	AUTO
Rows	0028,0010	US		ALWAYS	AUTO
Columns	0028,0011	US		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
Planar Configuration	0028,0006	US	0	ALWAYS	AUTO
Pixel Data	7FE0,0010	OB		ALWAYS	AUTO

Table 53: VOI LUT Module of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Window Center	0028,1050	DS	128	ALWAYS	AUTO
Window Width	0028,1051	DS	256	ALWAYS	AUTO

Table 54: SOP Common Module of created SOP Instances

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

Table 55: SC Equipment Module of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Conversion Type	0008,0064	CS	DV	ALWAYS	AUTO
Secondary Capture Device Manufacturer	0018,1016	LO	DEKOM – Engineering GmbH	ALWAYS	AUTO
Secondary Capture Device Manufacturer's Model Name	0018,1018	LO	DIANA	ALWAYS	AUTO
Secondary Capture Device Software Versions	0018,1019	LO		ALWAYS	AUTO

Table 56: SC Image Module of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
			No attribute of this module is used	NEVER	

Table 57: SC Multi-Frame Image Module (Color) of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Burned In Annotation	0028,0301	CS	Yes or No based on config	ALWAYS	CONFIG
Frame Increment Pointer	0028,0009	AT	If No Of Frames > 1 Points to (0018,1063)	ANAP	AUTO

Table 58: SC Multi-Frame Vector Module of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Frame Time Vector	0018,1065	DS	Frame Increment Pointer never points to (0018,1065) Therefore, this tag is not used.	NEVER	

Table 59: Cine Module of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Frame Time	0018,1063	DS		ALWAYS	AUTO

Table 60: Multi-Frame Module of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Number Of Frames	0028,0008	IS		ALWAYS	AUTO
Frame Increment Pointer	0028,0009	AT	0018,1063	ALWAYS	AUTO

Table 61: Acquisition Context Module of created SOP Instances

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

Table 62: VL Image Module of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Image Type	0008,0008	CS	Value 1: ORIGINAL Value 2: PRIMARY	ALWAYS	AUTO
Photometric Interpretation	0028,0004	CS	RGB	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
Lossy Image Compression	0028,2110	CS	Dependent on the Transfer Syntax used.	ALWAYS	AUTO
Anatomic Region Sequence	0008,2218	SQ	See note**	ANAP	MWL/USER/AUTO
>Code Value	0008,0100	SH			
>Coding Scheme Designator	0008,0102	SH			
>Code Meaning	0008,0104	LO			

*NOTE: values given in the VL Image Module Table overrule related entries in the General Image Module, Image Pixel Module and VOI Module.

**Anatomic Region Sequence behaviour:

The Anatomic Region Sequence is present in the Video Endoscopic Image IOD only.
If the DICOM Worklist Procedure Code can be mapped to an Anatomic Region as proposed in DICOM part 16, Annex I, the appropriate CID 4040 Code is taken.

When the Procedure Code cannot be mapped AND no user input is present the following Anatomic Region Sequence is taken (because an entry is required):

Code Value	0008,0100	D-0000
Coding Scheme Designator	0008,0102	99DEKOM-VL
Code Meaning	0008,0104	Unknown

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Table 63: US Image Module of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Samples per Pixel	0028,0002	US	3	ALWAYS	AUTO
Photometric Interpretation	0028,0004	CS	RGB	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
Planar Configuration	0028,0006	US	0	ALWAYS	AUTO
Pixel Representation	0028,0103	US	0	ALWAYS	AUTO
Frame Increment Pointer	0028,0009	AT	If Number of Frames set Then 0018,1063	ANAP	AUTO
Image Type	0008,0008	CS	Value 1: ORIGINAL Value 2: PRIMARY	ALWAYS	AUTO
Lossy Image Compression	0028,2110	CS	Dependent on the Transfer Syntax used.	ALWAYS	AUTO

*NOTE: values given in the US Image Module Table overrule related entries in the General Image Module, Image Pixel Module and VOI Module.

8.1.2   Used Fields in received IODs

DIANA 3 QSTORE AE does not receive SOP Instances.
The usage of attributes received by QWorklist AE is described in chapter 4.2.1.3.1.3.

8.1.3   Attribute Mapping

The relationships between attributes received by QWorklist AE and attributes in the image IOD is described in Table 64.

Table 64: Attribute Mapping between Modality Worklist, Image IOD and MPPS

Modality Worklist	Image IOD	MPPS IOD
Patient's Name	Patient's Name	Patient's Name
Patient ID	Patient ID	Patient ID
Patient's Birth Date	Patient's Birth Date	Patient's Birth Date
Patient's Sex	Patient's Sex	Patient's Sex
Referring Physician's Name	Referring Physician's Name	Referring Physician's Name
Study Instance UID	Study Instance UID	Study Instance UID
Accession Number	Accession Number	Accession Number
Study ID	Study ID	Study ID
Scheduled Procedure Step Description	Study Description	Study Description

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8.1.4   Coerced/Modified Fields

The QWorklist AE will truncate attribute values received in the response to a modality worklist query if the value is longer than the maximum length permitted by the attribute's VR.

8.2   Data Dictionary of Private Attributes

No Private Attributes are supported.

8.3   Coded Terminology and Templates

N.A.

8.4   Grayscale Image consistency

N.A.

8.5   Standard Extended / Specialized / Private SOP Classes

No Extended, Specialized or Private SOP Classes are supported.

8.6   Private Transfer Syntaxes

No Private Transfer Syntaxes are supported.

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