

DICOM Conformance Statement

Humphrey Matrix Model 800 Instrument

Version 8.02

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1 Conformance Statement Overview

This document is structured as suggested in the DICOM Standard (PS 3.2, 2011).

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Transfer		
Encapsulated PDF Storage	Option DICOM-1	No
Workflow Management		
Modality Worklist IM - FIND	Option DICOM-1	No

Meaningful combinations of DICOM Service Providers for an Acquisition Modality

The Acquisition Modality allows acquisition of Visual Field data and allows creation of reports from reviewed and processed Visual Field data. A service provider that supports Modality Worklist SCP and Encapsulated PDF Storage can fully integrate the Matrix. The Matrix does not support Media Interchange.

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3 Introduction

3.1 Revision History

Document Version	Author	Date
A	Dana Wheeler	2011-02-09
B	Doug Lim	2012-1-16

3.2 Audience

This document is intended for hospital staff, health system integrators, software designers or implementers. The reader should have a basic understanding of DICOM.

3.3 Remarks

If another device matches this conformance statement based on the comparison with its own conformance statement, there is a chance, but no guarantee, that they interoperate. DICOM deals only with communication; it does not specify what is needed for certain applications to run on a device.

3.4 Definitions and Terms

[PS 3.2-2011] 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
AE	Application Entity
AET	Application Entity Title
DICOM	Digital Imaging and Communications in Medicine
ILE	Implicit Little Endian
ELE	Explicit Little Endian
IOD	Information Object Definition
JPG-1	JPEG Coding Process 1 transfer syntax; JPEG Baseline; ISO 10918-1
J2K	JPEG 2000 Image Compression
J2K-LL	JPEG 2000 Image Compression (Lossless Only)
MWL	Modality Work List
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
IM	Information Model

3.6 References

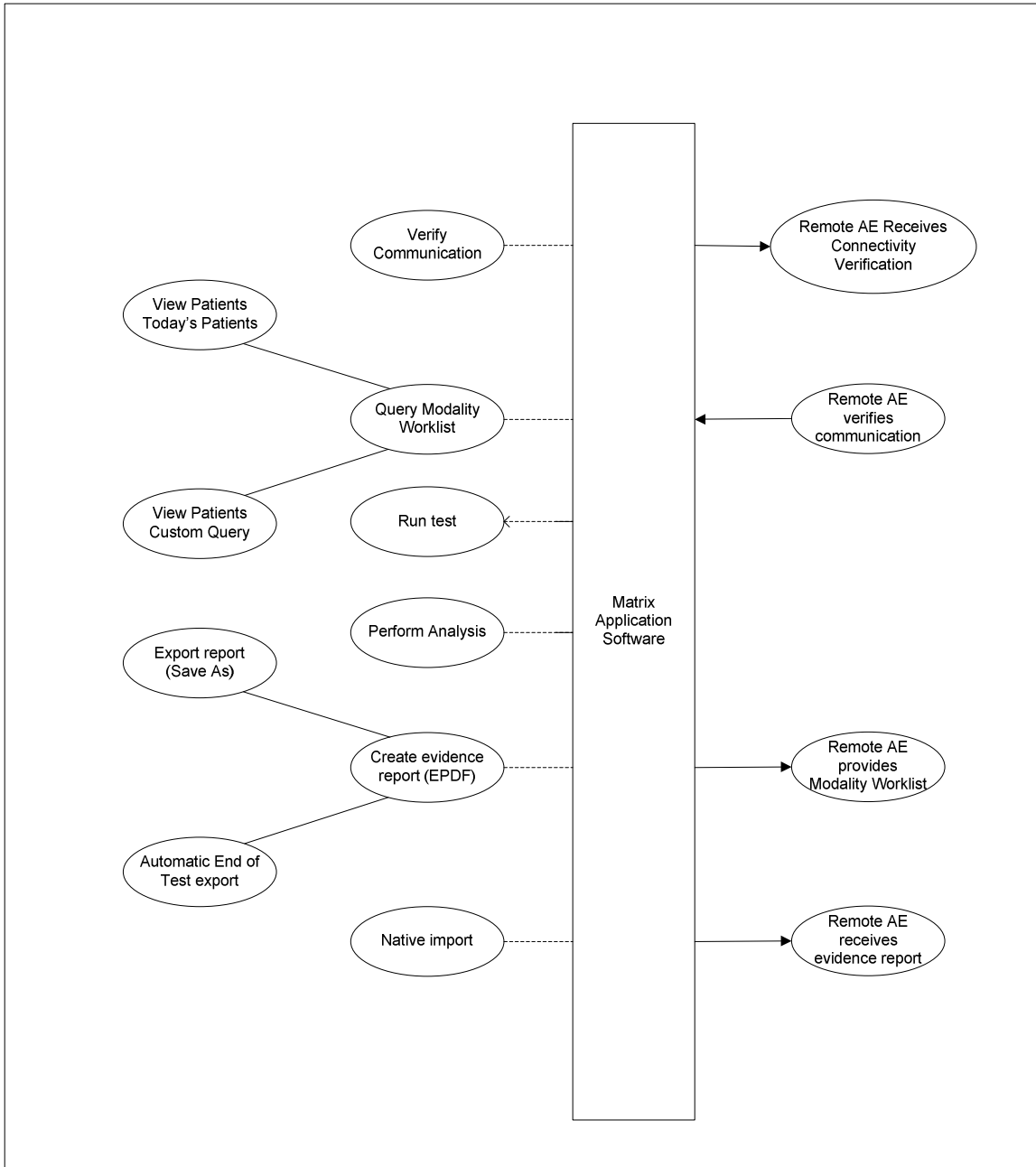
Digital Imaging and Communications in Medicine (DICOM), NEMA PS 3.1-3.20, 2011

4 Networking

4.1 Implementation Model

4.1.1 Application Data Flow

Figure 4-1 Matrix Application Software



4.1.2 Functional Definition of AEs

4.1.2.1 Functional Definition of Matrix 8.0

The Matrix 8.0 Application provides visual field testing capability.

The Matrix Application Software allows to:

- query modality worklist
- export evidence reports

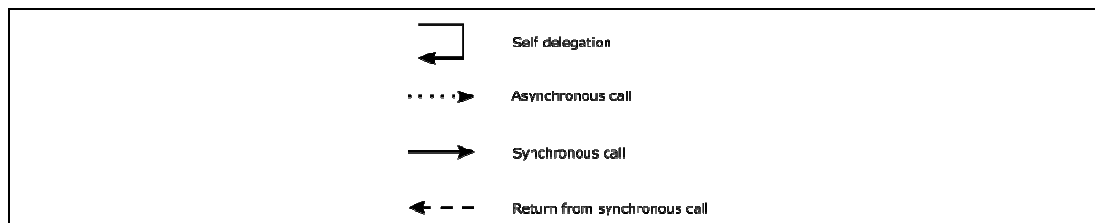
Matrix Application Software AE runs several DICOM Services, as Service Class User and as Service Class Provider for Verification. All DICOM related activities are triggered manually by operator.

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

4.1.3 Sequencing of Real-World Activities

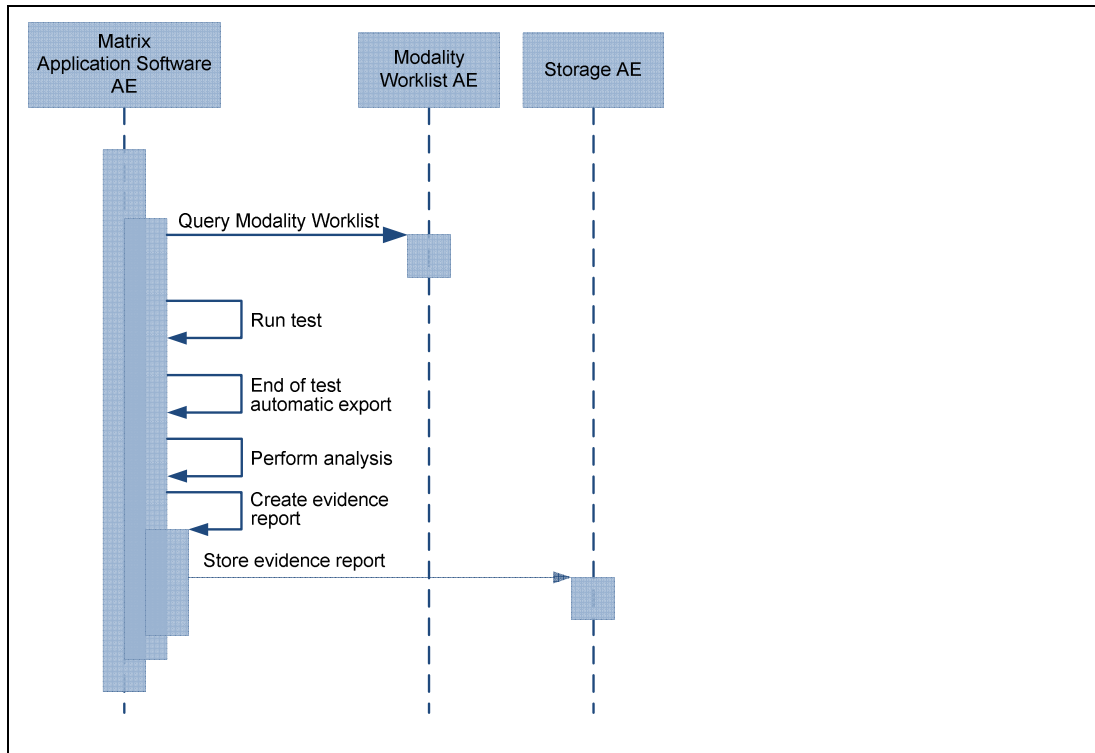
To realize the real world activities, the different entities work together. The sequence diagrams shall depict the intended workflow.



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

4.1.3.1 Scheduled Case – Automatic Export

The normal case is that the patient arrives at the front desk. Then the test can be scheduled. Or the test has been scheduled in advance. All patient and study related information is available at the day the test shall be taken.



All listed activities can be triggered by the operator. An activity can be triggered if no other activity is currently active. The shown order of the activities is the recommended order. Details on DIMSE level will be explained in chapters after this.

Query Modality Worklist

When the patient arrives at the Matrix, the operator queries the worklist. He types in search criteria and gets matching modality worklist items back. The matches are listed in a table, from which the operator can select the correct work item.

Run test

The operator selects a test type and runs visual field tests.

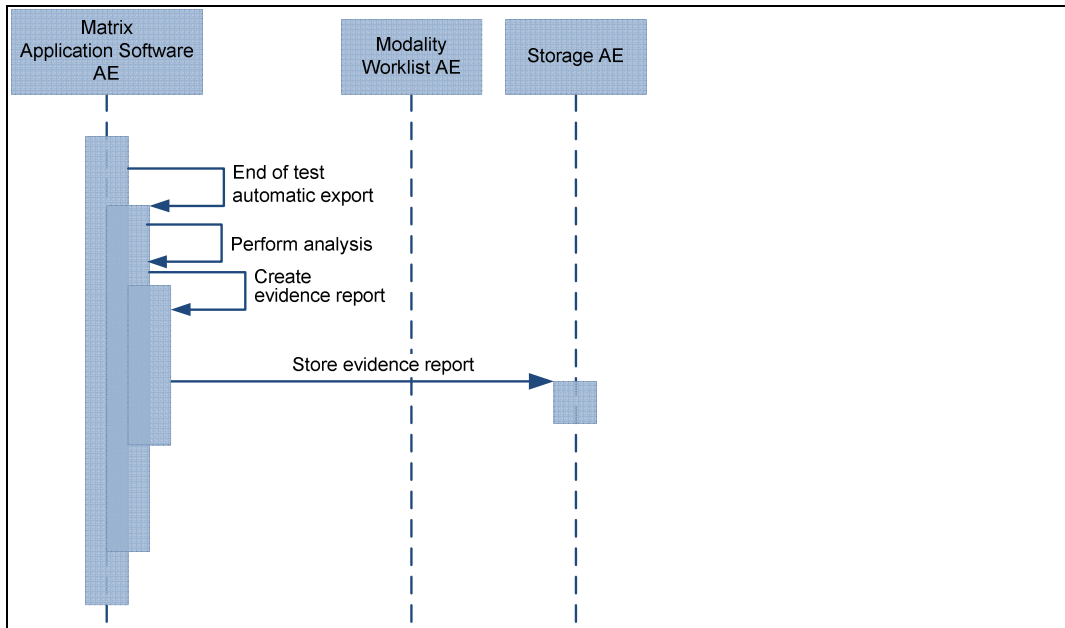
This activity creates the raw test data, which is stored in the local database on the instrument.

Perform analysis

Just prior to the End-of-test automatic export operation an analysis is performed on the raw exam data to create the evidence report to be stored on the Storage AE.

End of test automatic export

This activity is performed automatically right after testing the patient. The Application Software processes all required steps to create a test result as evidence report. This activity calls sub-operations in a defined order. It calls "Create evidence report".



Create evidence report

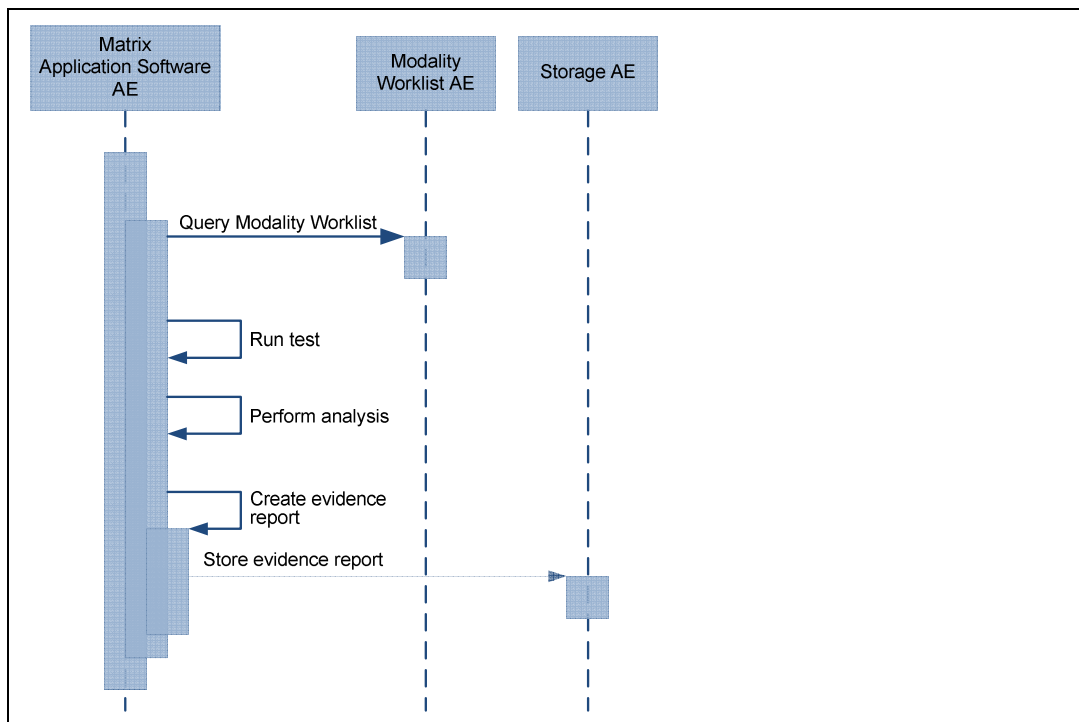
This operation is performed for an end of test automatic export. The evidence report is generated by the perform analysis action on the test data just prior to creating the report.

Store evidence report

After the evidence report is created, it is automatically transmitted to the Storage AE for storage.

4.1.3.2 Scheduled Case - Manual

The normal case is that the patient arrives at the front desk. Then the test can be scheduled. Or the test has been scheduled in advance. All patient and study related information is available at the day the test shall be taken.



All listed activities can be triggered by the operator. An activity can be triggered if no other activity is currently active. The shown order of the activities is the recommended order. Details on DIMSE level will be explained in chapters after this.

Query Modality Worklist

When the patient arrives at the Matrix, the operator queries the worklist. He types in search criteria and gets matching modality worklist items back. The matches are listed in a table, from which the operator can select the correct work item.

Run test

The operator can then select the test type and eye. The operator can then run the test(s) of the patient.

This activity creates the raw test data.

Perform analysis

Just prior to the create evidence report operation an analysis is performed on the raw test data to create the evidence report to be stored on the Storage AE.

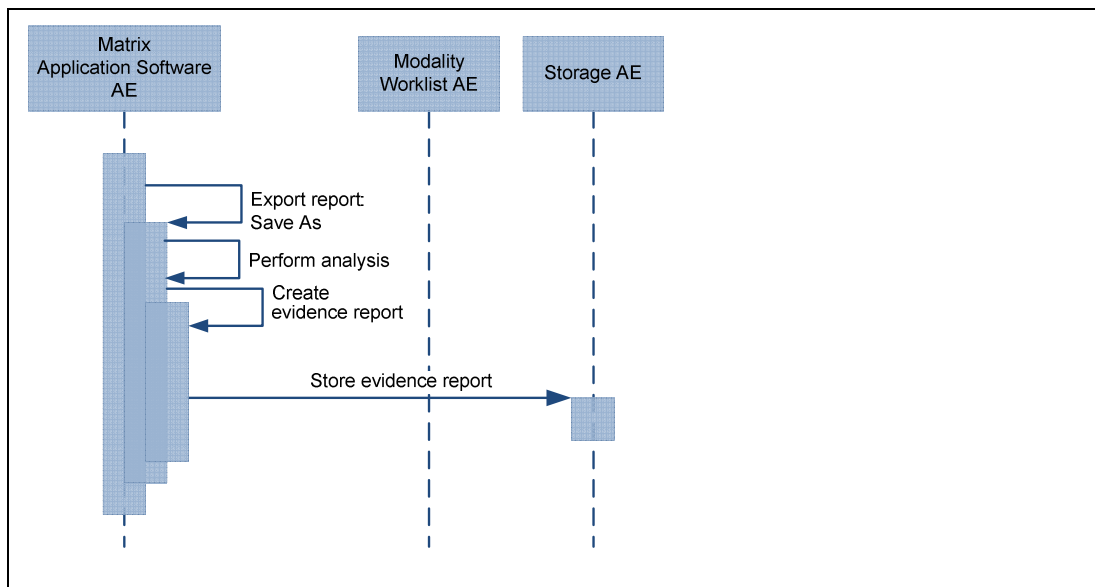
Create evidence report

For the "scheduled case – manual" the creation of the evidence report is initiated by the export reports action (Save As) option being selected by the operator. The "Export Reports – Save As" action is described in more detail below.

After these activities, the operator can trigger activities that include sub-operations. The set of sub-operations of the different activities may overlap. The next paragraphs explain the connection from real world activities of the operator to sub-operations that interact with DICOM Service Class Providers.

Sub-operations and their interaction with Service Class Providers will be described in detail in chapters below.

- See 4.2.1.3.5 for sub-operation "Create evidence report"



Export Reports – Save As

In this activity, the sub-operation "Create evidence report" is triggered. The operator initiates this action by selecting an test from the "Recall Tests" screen or selecting "Recall Tests" from the "View Patients" screen, and choosing the "Save As..." option for the selected test. To store the evidence report in the Storage AE, the operator selects DICOM as the "Save Location." These actions complete the manual export of the evidence report.

Store evidence report

After the evidence report is created, it is transmitted to the Storage AE for storage.

4.1.3.3 Unscheduled Case

The patient arrives at the instrument in the unscheduled case. So the patient has not been registered at the front desk. Thus the test is not scheduled in the Modality Worklist. Therefore the Application Software cannot obtain patient demographics, nor study information and no scheduling information. This is also the case if the Modality Worklist AE could not be reached due to network issues. In this case, the patient can be selected from the instrument database. Once the patient has been selected from the instrument database, either the automatic export or manual export workflows can be used as described in 4.1.3.1 or 4.1.3.2 respectively to export the evidence report to the Storage AE.

4.1.3.4 Native Import

Native import is patient and test data imported from a database backup from another instrument. The imported data is added to the instrument database. Once the data is in the instrument database, the workflow is the workflow described in section 4.1.3.3 *Unscheduled Case* above.

4.2 AE Specifications

4.2.1 Matrix Acquisition Modality AE Specification

4.2.1.1 SOP Classes

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	Yes	Yes
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	No	No
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Yes	No
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66	No	No
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	No	No
Patient Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	No	No
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Yes	No
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	No	No
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3	No	No
Modality Performed Procedure Step Notification SOP Class	1.2.840.10008.3.1.2.3.5	No	No
Ophthalmic Photography 8 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	No	No
Ophthalmic Tomography Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.4	No	No
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	No	No
Ophthalmic Photography 8 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	No	No
Ophthalmic Photography 8 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	No	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:

Application Context Name	1.2.840.10008.3.1.1.1
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4.2.1.2.2 Number of Associations

The number of simultaneous associations can be two. At a time there may be one outgoing association and one incoming association.

Maximum number of simultaneous associations	2
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4.2.1.2.3 Asynchronous Nature

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

4.2.1.2.4 Implementation Identifying Information

Implementation Class UID	1.2.276.0.75.2.5.20
Implementation Version Name	NIM-2.2.1

4.2.1.3 Association Initiation Policy

4.2.1.3.1 Activity – Verify Communication

4.2.1.3.1.1 Description and Sequencing of Activities

This activity is available during the configuration phase. It facilitates the set up of the DICOM Application Entities. From DICOM's perspective, also the Matrix Application Software becomes an Application Entity.

The user can test the application level communication between Instrument's Software Application Entity and its peer DICOM Application Entities. During one test call, all peer DICOM Application Entities are contacted.

In the association request Matrix Application Software proposes not only Verification SOP Class, but also all other SOP Classes as supported by the instruments DICOM interface.

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

The results of the "Verify Communication" activity are shown to the user as success or failure. For e. g. a Storage Provider not only the Verification information is evaluated, but also the response regarding the proposed Storage SOP Classes.

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. All grey cells are not supported by the application software, but are supported by the DICOM interface.

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID 1.2.840.10008. ...	Name List	UID List 1.2.840.10008. ...		
Verification	1.1	ILE	1.2	SCU	No
Modality Worklist IM - FIND	5.1.4.31	ILE	1.2	SCU	No
Study Root Q/R IM - FIND	5.1.4.1.2.2.1	ILE	1.2	SCU	Yes
Study Root Q/R IM - MOVE	5.1.4.1.2.2.2	ILE	1.2	SCU	No
Patient Root Q/R IM – FIND	5.1.4.1.2.1.1	ILE	1.2	SCU	Yes
Modality Performed Procedure Step	3.1.2.3.3	ILE	1.2	SCU	No
Modality Performed Procedure Step Notification	3.1.2.3.5	ILE	1.2	SCU	No
Encapsulated PDF Storage	5.1.4.1.1.104.1	ILE	1.2	SCU	No
Raw Data Storage	5.1.4.1.1.66	ILE	1.2	SCU	No
OP 8 Bit Image Storage	5.1.4.1.1.77.1.5.1	JPG-1	1.2.4.50	SCU	No

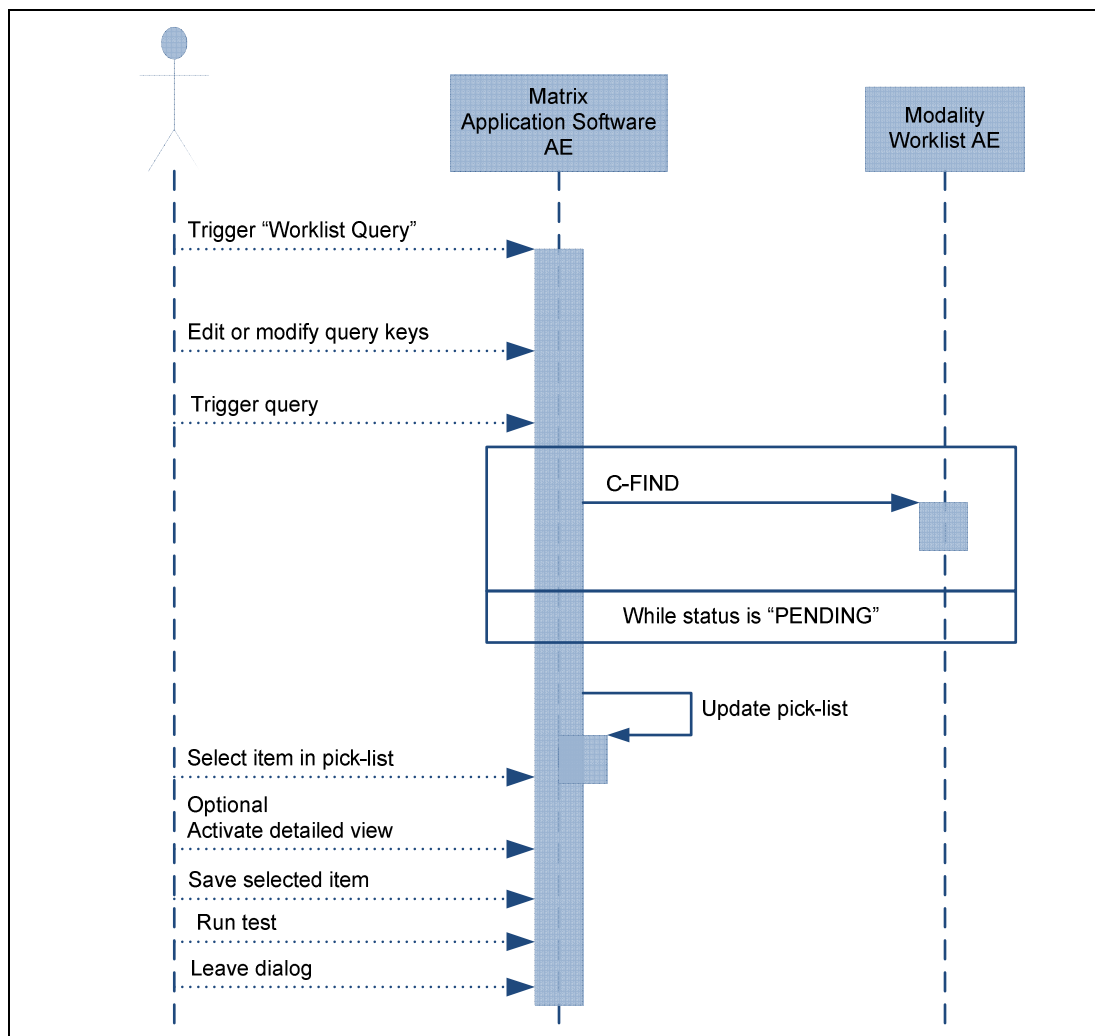
		MPEG2	1.2.4.100	SCU	No
		J2K	1.2.4.91	SCU	No
		J2K-LL	1.2.4.90	SCU	No
OPT Image Storage	5.1.4.1.1.77.1.5.4	J2K	1.2.4.91	SCU	No
		J2K-LL	1.2.4.90	SCU	No
Multi-frame True Color Secondary Capture Image Storage	5.1.4.1.1.7.4	RLE	1.2.5	SCU	No
		JPG-1	1.2.4.50	SCU	No
Storage Commitment Push Model	1.20.1	ILE	1.2	SCU	No

4.2.1.3.1.3 SOP Specific Conformance for Verification SOP Class

The Matrix Application Software provides standard conformance.

4.2.1.3.2 Activity – Query Modality Worklist

4.2.1.3.2.1 Description and Sequencing of Activities



Trigger "Modality Worklist"

The activity "Query Modality Worklist" can be triggered by 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 work list contains latest information.

Edit or modify query keys

There are two forms of Modality Worklist queries for the Matrix. The simplest is a predefined query called "MWL -Today's Patients" and is described in the following section. The other is called "MWL - Custom Query" and offers a GUI for an interactive query. It is the custom query that is described in this section. The custom query GUI offers two sets of query keys. One set belongs to the "Patient-Based Query", the other one belongs to the "Broad Query". The operator can use either the "Broad Query" or "Patient-Based" separately or combine them to form a single combined query. Inclusion of the "Broad Query" and the "Patient-Based Query" sets are accomplished by selecting the check box associated with the set or sets to be included in the query. Any set not chosen behaves as if wildcards were selected for all fields, resulting in no filtering of the results from the not chosen set.

The operator can change or fill in search criteria in the shown dialog. For instance, the incomplete patient name or the patient ID can be used.

Trigger query

The operator triggers the search after he or she filled in search criteria. The Application Software sends a DICOM C-FIND request, which contains the search criteria. The Application Software waits for the response from the partner Application Entity. Application Software will accept up to a configurable number of matches. The Application Software checks whether the number of received worklist items overstepped the configurable limit. If the number of received worklist items overstepped the limit, then the Application Software sends a C-CANCEL-RQ, then an A-RELEASE-RQ to the service provider and a message is displayed. Despite this warning, the operator can see work items in the pick-list. After receiving the response, the pick-list is updated. The pick-list provides the most important information for a quick overview (see 4.2.1.3.2.4 SOP Specific Conformance for Modality Worklist SOP Class 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 the correct work item is found.

Select item in pick-list

The operator can select one work item from the pick-list. The selected item becomes subject for a detailed view or it can be imported into the Application Software.

Activate detailed view

The detailed view allows a closer look to the currently selected work item. Thus the operator can see more details about patient information and schedule information.

Save selected item

The operator can save the selected item at any time.

The Application Software checks the local database for patient data with same combination of Patient ID and Issuer of Patient ID. If there is matching data, then the Application Software checks for differences in Patient's Name, Patient's Birth Date and Patient's Sex. In case of a difference, the Application Software presents the differences to the operator and asks whether to overwrite the data in the local database with the data from the Modality Worklist. The operator can also deny overwriting.

If the operator denies overwriting, a new patient record will be created. This new record will be assigned to a Matrix created Patient ID and Issuer of Patient ID.

For work items which do not relate to existing patient records, the Application Software creates new patient records. Please note that when the operator saves and runs the tests later the modality work list information is lost only the patient demographic information is saved in the local database. To the Storage AE this looks like the unscheduled case.

After that, the operator can start the test of the patient.

Run test

An alternative to saving the selected patient, is executing the "Run Test" option directly from the modality worklist by selecting the patient from the list and choosing "Run Test" instead of "Save." When the test is run directly from the modality worklist, the modality work list information is returned to the Storage AE with the evidence report.

The patient demographics and the test raw data is also stored in the local database when run directly from the modality work list like it is done when the operator chooses to save the patient for running later. The normal workflow is for the operator to run the test directly from the worklist. The only use cases in which the operator would want to save the patient and run the test later is if the patient is not expected to be tested until another day or the network connection is expected to be down when the patient arrives.

Leave dialog

The operator finally finishes the worklist query by leaving the View Patients screen. This automatically occurs when the operator selects the "Runt Test" option.

4.2.1.3.2.2 Today's Patient Query

The other method to execute a modality worklist query besides the custom query is the "MWL -Today's Patient" query. The today's patient query is the simplest query because no query keys need to be specified by the operator. The today's patient query uses predefined query key values of today's date for the "From" and "To" date field keys and the "Local AE Title" specified for this instrument for the "AE Title" key.

Table 4-1 Modality Worklist query key details – Today's Patient Query

Tag	Tag Name	Description
(0040,0100)	Scheduled Procedure Step Sequence	This attribute is the container for the tags as listed below. The sequence contains one item.
>(0040,0002)	Scheduled Procedure Step Start Date	The value is today's date. This value cannot be changed by the operator. The intent is to return only the procedures scheduled for today.
>(0040,0001)	Scheduled Station AE Title	The value is the Local AE Title set on the System Settings – DICOM Gateway tab screen. This value cannot be changed from the Today's Patient Query. The intent is to return only the procedures scheduled for this instrument.

4.2.1.3.2.3 Proposed Presentation Contexts

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

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

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID 1.2.840.10008. ...	Name List	UID List 1.2.840.10008. ...		
Verification	1.1	ILE	1.2	SCU	No
Modality Worklist IM - FIND	5.1.4.31	ILE	1.2	SCU	No
Study Root Q/R IM - FIND	5.1.4.1.2.2.1	ILE	1.2	SCU	Yes
Study Root Q/R IM - MOVE	5.1.4.1.2.2.2	ILE	1.2	SCU	No
Patient Root Q/R IM – FIND	5.1.4.1.2.1.1	ILE	1.2	SCU	Yes
Modality Performed Procedure Step	3.1.2.3.3	ILE	1.2	SCU	No
Modality Performed Procedure Step Notification	3.1.2.3.5	ILE	1.2	SCU	No
Encapsulated PDF Storage	5.1.4.1.1.104.1	ILE	1.2	SCU	No
Raw Data Storage	5.1.4.1.1.66	ILE	1.2	SCU	No
OP 8 Bit Image Storage	5.1.4.1.1.77.1.5.1	JPG-1	1.2.4.50	SCU	No
		MPEG2	1.2.4.100	SCU	No
		J2K	1.2.4.91	SCU	No
		J2K-LL	1.2.4.90	SCU	No
OPT Image Storage	5.1.4.1.1.77.1.5.4	J2K	1.2.4.91	SCU	No
		J2K-LL	1.2.4.90	SCU	No

Multi-frame True Color Secondary Capture Image Storage	5.1.4.1.1.7.4	RLE	1.2.5	SCU	No
		JPG-1	1.2.4.50	SCU	No
Storage Commitment Push Model	1.20.1	ILE	1.2	SCU	No

4.2.1.3.2.4 SOP Specific Conformance for Modality Worklist SOP Class

Table 4-2 Modality Worklist C-FIND Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Matching is complete	0000	The Software Application stops receiving worklist items. It finally updates the pick list.
Pending	Matches are continuing	FF00, FF01	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.
*	*	Any other status code	The user gets an error message.

Table 4-3 Attributes involved in Modality Worklist C-FIND request and response

Tag	Tag Name	Query Key	Imported	Displayed	Modifiable	SOP Instance
Scheduled Procedure Step (SPS)						
(0040,0100)	Scheduled Procedure Step Sequence					
>(0040,0001)	Scheduled Station Application Entity Title	BRQ		PLD		
>(0040,0003)	Scheduled Procedure Step Start Time			PLD		
>(0040,0002)	Scheduled Procedure Step Start Date	BRQ		PL, PLD		
>(0008,0060)	Modality	BRQ		PLD		
>(0040,0006)	Scheduled Performing Physicians Name					
>(0040,0007)	Scheduled Procedure Step Description		X	PLD		X
>(0040,0010)	Scheduled Station Name					
>(0040,0011)	Scheduled Procedure Step Location					
>(0040,0008)	Scheduled Protocol Code Sequence		X			X
>>(0008,0100)	Code Value		X			X
>>(0008,0102)	Coding Scheme Designator		X			X
>>(0008,0103)	Coding Scheme Version		X			X
>>(0008,0104)	Code Meaning		X	PLD		X
>(0040,0012)	Pre-Medication					
>(0040,0009)	Scheduled Procedure Step ID		X			X
>(0032,1070)	Requested Contrast Agent					
Requested Procedure						
(0040,1001)	Requested Procedure ID	PBQ	X	PL, PLD		X
(0032,1060)	Requested Procedure Description		X	PL, PLD		X
(0032,1064)	Requested Procedure Code Sequence		X			X
>(0008,0100)	Code Value		X			X
>(0008,0102)	Coding Scheme Designator		X			X
>(0008,0103)	Coding Scheme Version		X			X
>(0008,0104)	Code Meaning		X	PLD		X

(0020,000D)	Study Instance UID		X				X
(0008,1110)	Referenced Study Sequence						
>(0008,1150)	Referenced SOP Class UID						
>(0008,1155)	Referenced SOP Instance UID						
(0040,1003)	Requested Procedure Priority						
(0040,1004)	Patient Transport Arrangements						
(0040,1400)	Requested Procedure Comments This is of VR type LT, which has a maximum of 10240 characters. The Matrix instrument only supports a maximum of 255 characters.						
Visit Identification							
(0008,0050)	Accession Number	PBQ	X	PL, PLD			X
(0032,1032)	Requesting Physician						
(0008,0090)	Referring Physicians Name		X	PLD			X
Visit Status							
(0038,0010)	Admission ID						
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	PBQ	X	PL, PLD, APP	A		X
(0010,0020)	Patients ID	PBQ	X	PL, PLD, APP			X
(0010,0021)	Issuer of Patient ID		X				X
(0010,1000)	Other Patient IDs ¹		X				X
Patient Demographic							
(0010,0030)	Patients Birth Date		X	PLD	A		X
(0010,0040)	Patients Sex		X	PLD	X		X
(0010,1030)	Patients Weight						
(0040,3001)	Confidentiality Constraint on Patient Data Description						
(0010,4000)	Patients Comments						
Patient Medical							
(0038,0500)	Patient State						
(0010,21C0)	Pregnancy Status						
(0010,2000)	Medical Alerts						
(0038,0050)	Special Needs						

Values of column "Query Key":

PBQ

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

BRQ

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

The scheduled procedure start date is set to today's date when the custom query screen is first displayed. The AE Title is set to the Local AE Title from the DICOM Gateway system setting screen.

Values for these keys can be entered by the operator.

¹ The Software Application supports one value.

Predefined system default values can be set by the operator using the Default button.
 Values for these keys will persist over power cycles.

Values of column "Imported":

- X** The value gets imported in the application. Thus this value may have influence in Information Objects which will be created as a result of the run test.

Values of column "Displayed":

- PL** Values of this tag are instantly visible in the pick list.
- PLD** Values of this tag are visible in the details dialog of the current selected pick list item.
- APP** Values of this tag are visible in the application.

Values of column "Modifiable":

- X** A value which has been imported to the application might be modified inside the application.
 Important note: The operator should not change Patient Demographic information if not absolutely necessary! Patient Demographic information shall always be modified at the Patient Management System Level and changes propagated to the instrument.
- A** The value for that attribute can be changed if the operator has administrator permissions.

Values of column IOD:

- X** Values of marked tags will be stored in created IODs. See also table "mapping of attributes" in 8.1.2 Attribute Mapping.

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

Table 4-4 Modality Worklist query key details - Patient Based Query

Tag	Tag Name	Description
(0010,0010)	Patients Name	The Matrix Application Software supports family name and given name only. The operator can use '*' or '?' as wild cards.
(0010,0020)	Patient ID	The operator can enter a string which conforms to the Value Representation LO.
(0008,0050)	Accession Number	The operator can enter a string which conforms to the Value Representation SH.
(0040,1001)	Requested Procedure ID	The operator can enter a string which conforms to the Value Representation SH.

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

Table 4-5 Modality Worklist query key details - Broad Query

Tag	Tag Name	Description
(0040,0100)	Scheduled Procedure Step Sequence	This attribute is the container for the tags as listed below. The sequence contains one item.
>(0040,0002)	Scheduled Procedure Step Start Date	The default value is today's date. The operator can change the value and can even enter date ranges. It is also possible to search for all dates if the operator activates a check box.

>(0008,0060)	Modality	The default value is "OPV". The operator can change the value and type in any value that is conform to Value Representation CS.
>(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 – Native import

The activity "Native import" can be triggered by operator at any time if no other activity is in progress. This activity has no direct effect on DICOM messaging. During this activity, the Application Software imports test data that has been created in Application Software instances other than this instance through a backup on another instrument.

4.2.1.3.4 Activity – Run Test

The activity "Run Test" can be triggered by operator at any time if no other activity is in progress. This activity has no direct relation to DICOM messaging. This activity can be seen in the figures in section 4.1.3.1 Scheduled Case – Automatic Export and 4.1.3.2 Scheduled Case - Manual.

4.2.1.3.5 Activity – Perform Analysis

The activity "Perform Analysis" is triggered when an evidence report is requested. This happens during a recall test operation, manual "Save As", a print test operation or any of the Automatic "End of Test Actions." This activity precedes the activity create evidence report, which can result in an EPDF export if the destination of the report is the DICOM Storage AE. This activity can be seen in the figures in section 4.1.3.1 Scheduled Case – Automatic Export and 4.1.3.2 Scheduled Case - Manual.

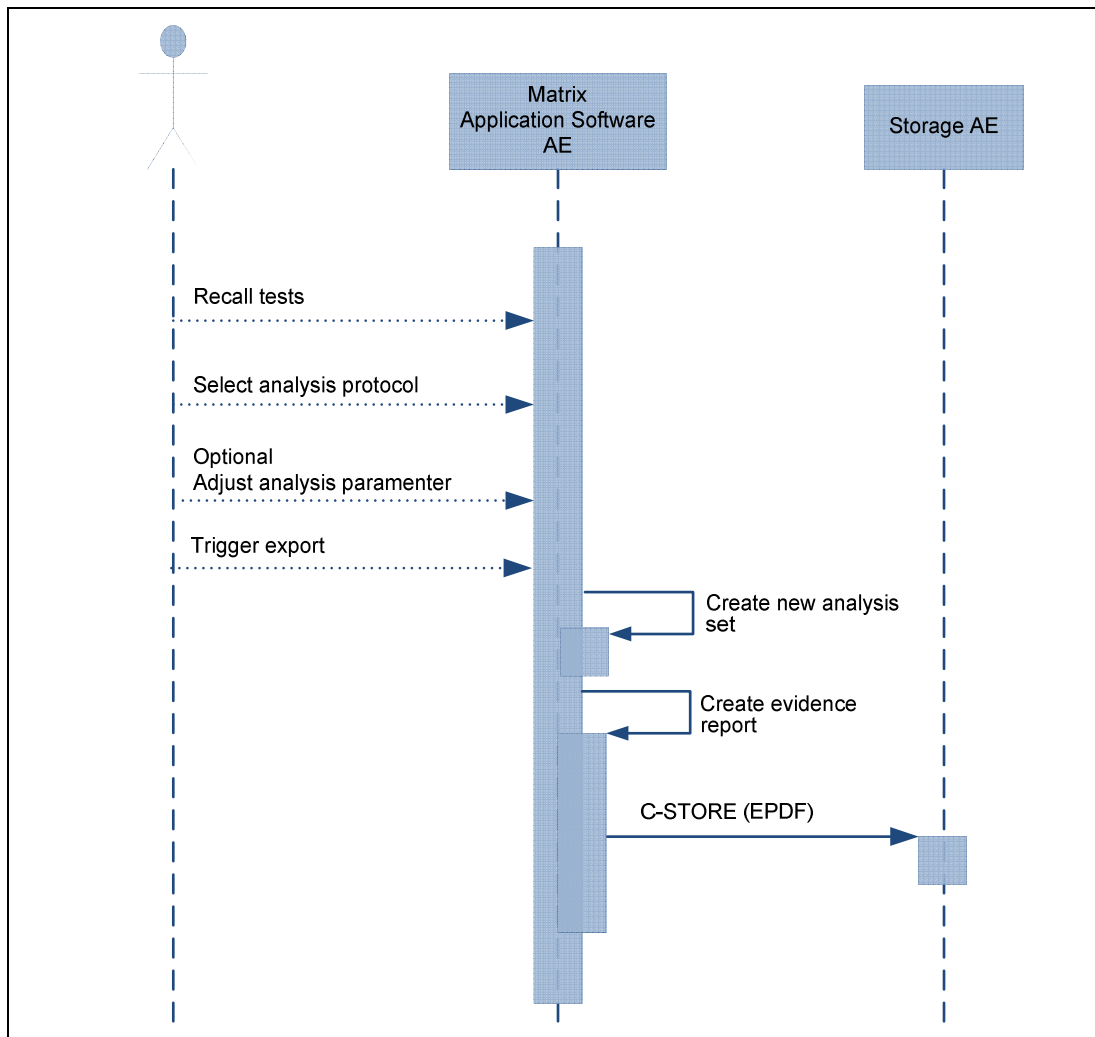
4.2.1.3.6 Activity – End of test automatic export

The activity "End of test automatic export" is triggered by the completion of a test performed on the patient. The export causes an analysis to be performed, which in turn triggers the creation of an evidence report. This can result in an EPDF export if the destination of the report is the DICOM Storage AE.

4.2.1.3.7 Activity – Create evidence report

The activity "Create evidence report" can be triggered by operator at any time if no other activity is in progress. An evidence report created on a day, later than the test day will reside in a new unscheduled study.

4.2.1.3.7.1 Description and Sequencing of Activities



Trigger “export”

The activity “Trigger export” can be triggered by operator at any time if no other activity is in progress.

Recall tests

The operator selects one or more tests to include in the analysis.

Select analysis protocol

The Application Software performs an analysis.

Adjust analysis parameter

The operator can adjust parameters and thus, modify the analysis.

Trigger export

At any time the operator can create an evidence report. The Application Software sends evidence reports to the configured Storage Application Entity.

Evidence reports won’t be stored or archived on the instrument itself.

The created evidence report contains the information that was presented on screen when the operator triggered the export. The page orientation of the created report is portrait. Usually the evidence report contains one to three pages.

4.2.1.3.7.2 Proposed Presentation Contexts

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

- Encapsulated PDF with Transfer Syntax ELE
- Encapsulated PDF with Transfer Syntax ILE as fallback

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID 1.2.840.10008. ...	Name List	UID List 1.2.840.10008. ...		
Verification	1.1	ILE	1.2	SCU	No
Modality Worklist IM - FIND	5.1.4.31	ILE	1.2	SCU	No
Study Root Q/R IM - FIND	5.1.4.1.2.2.1	ILE	1.2	SCU	Yes
Study Root Q/R IM - MOVE	5.1.4.1.2.2.2	ILE	1.2	SCU	No
Patient Root Q/R IM - FIND	5.1.4.1.2.1.1	ILE	1.2	SCU	Yes
Modality Performed Procedure Step	3.1.2.3.3	ILE	1.2	SCU	No
Modality Performed Procedure Step Notification	3.1.2.3.5	ILE	1.2	SCU	No
Encapsulated PDF Storage	5.1.4.1.1.104.1	ILE	1.2	SCU	No
Raw Data Storage	5.1.4.1.1.66	ILE	1.2	SCU	No
OP 8 Bit Image Storage	5.1.4.1.1.77.1.5.1	JPG-1	1.2.4.50	SCU	No
		MPEG2	1.2.4.100	SCU	No
		J2K	1.2.4.91	SCU	No
		J2K-LL	1.2.4.90	SCU	No
OPT Image Storage	5.1.4.1.1.77.1.5.4	J2K	1.2.4.91	SCU	No
		J2K-LL	1.2.4.90	SCU	No
Multi-frame True Color Secondary Capture Image Storage	5.1.4.1.1.7.4	RLE	1.2.5	SCU	No
		JPG-1	1.2.4.50	SCU	No
Storage Commitment Push Model	1.20.1	ILE	1.2	SCU	No

4.2.1.3.7.3 SOP Specific Conformance for Encapsulated PDF Storage SOP Class as SCU

Service Status	Further Meaning	Status Code	Behavior
Success	Success	0000	The Application Software returns from this activity, prompting a success message.
Refused	Out of Resources	A700 - A7FF	An error message is shown to the operator. The Application Software logs this event and returns.
Error	Data Set does not match SOP Class	A900 - A9FF	
Error	Cannot Understand	C000 - CFFF	
Warning	Coercion of Data Elements	B000	
Warning	Data Set does not match SOP Class	B007	
Warning	Elements Discarded	B006	
*	*	Any other status value	

4.2.1.4 Association Acceptance Policy

4.2.1.4.1 Activity – Verify Communication

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

4.2.1.4.1.1 Description and Sequencing of Activities

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

4.2.1.4.1.2 Accepted Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
	1.2.840.10008. ...		1.2.840.10008. ...		
Verification	... 1.1	ILE	... 1.2	SCP	No

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

No additional protocols are supported.

4.4 Configuration

4.4.1 AE Title/Presentation Address Mapping

This description is about the configuration of the Matrix DICOM Gateway.

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 local IP is configurable. The Application Entity Title as well as the port number is configurable. The default port number is 11112.

4.4.1.2 Remote AE Titles

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

4.4.2 Parameters

4.4.2.1 General Parameters

4.4.2.1.1 Configuration of the Matrix DICOM Gateway

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

The socket timeout (Network Timeout) is configurable. Default is 20 seconds. The socket timeout can be configured from 5 to 20 seconds. It affects association opening and association closing.

The service timeout (DIMSE RSP Timeout) is configurable. Default is 20 seconds. The service timeout can be configured between 10 and 60 seconds. It defines for how long the Application Software waits after sending a service request for the belonging service response from the remote AE.

Also the Application Software allows the configuration of

- (0008,0080) Institution Name
Created SOP Instances contain this value.
- (0008,1010) Station Name
Created SOP Instances contain this value.

4.4.2.2 Verification SCU Parameters

No specific configuration is required.

4.4.2.3 C-FIND Parameters

There is a limit configurable for the number of matching C-FIND responses ('Maximum Query Responses'). Default limit is set to 100 matching items. The limit can be configured from 10 to 999. It affects Modality Worklist service.

4.4.2.4 Storage SCU Parameters

No specific configuration is required.

4.4.2.5 Verification SCP Parameters

No specific configuration is 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).



5 Media Interchange

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

6 Support of Character Sets

The Application Software supports UTF-8 encoded Unicode.

Supported Specific Character Set	
Character Set Description	Defined Term
UTF-8 encoded Unicode	ISO_IR 192

7 Security

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

It is assumed that Matrix 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 Matrix Application Software.
- Firewall or router protections to ensure that Matrix 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 presence of values:

- 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
- MWL, MPPS the attribute value is the same as the value received using a DICOM service such as Modality Worklist, Modality Performed Procedure Step, etc.
- CONFIG the attribute value source is a configurable parameter

8.1.1.1 Encapsulated PDF IOD

IE	Module	Usage
Patient		
	Patient	MANDATORY
Study		
	General Study	MANDATORY
Series		
	Encapsulated Document Series	MANDATORY
	CZM Matrix Series	
Equipment		
	General Equipment	MANDATORY
	SC Equipment	MANDATORY
Encapsulated Document		
	Encapsulated Document	MANDATORY
	SOP Common	MANDATORY
	CZM Matrix Analysis	

Table 8-1 Encapsulated PDF- Module "Patient"

Tag	Type	VR	Name	Description	PoV	Source
(0010,0010)	2	PN	Patient's Name	Patient's full name.	ALWAYS	MWL, USER
(0010,0020)	2	LO	Patient ID	Primary hospital identification number or code for the patient. If operator creates a patient record at the Application Software, the proposed value is a hash of Patient's Name and Patient's Birth Date. The operator can change that value.	ALWAYS	MWL, USER

(0010,0021)	3	LO	Issuer of Patient ID	Identifier of the Assigning Authority that issued the Patient ID. If operator creates a patient record at the Application Software, the proposed value is the value configured in System Settings 'General' tab (default is "Matrix .- Device Serialnumber").	VNAP	MWL, USER
(0010,0030)	2	DA	Patient's Birth Date	Birth date of the patient.	ALWAYS	MWL, USER
(0010,0040)	2	CS	Patient's Sex	Sex of the named patient. Enumerated Values: M = male F = female O = other	VNAP	MWL, USER
(0010,1000)	3	LO	Other Patient IDs	Other identification numbers or codes used to identify the patient. The Software Application supports multiple values imported via Modality Worklist.	VNAP	MWL
(0010,2160)	3	SH	Ethnic Group	Ethnic group or race of the patient.	VNAP	USER

Table 8-2 Encapsulated PDF - Module "General Study"

Tag	Type	VR	Name	Description	PoV	Source
(0020,000D)	1	UI	Study Instance UID	<i>Unique identifier for the Study</i> Uses value as given by the Modality Worklist service in scheduled case. The software creates the UID in the unscheduled case. Then it uses "1.2.276.0.75.2.2.60.2.1.." as constant prefix for generated UIDs.	ALWAYS	MWL, AUTO
(0008,0020)	2	DA	Study Date	<i>Date the Study started.</i> Date, when test was started.	ALWAYS	AUTO
(0008,0030)	2	TM	Study Time	<i>Time the Study started.</i> Time, when test was started. Study time is updated when laterality of the eye changes.	ALWAYS	AUTO
(0008,0090)	2	PN	Referring Physician's Name	<i>Name of the patient's referring physician.</i> Value does not exist in unscheduled case.	VNAP	MWL
(0020,0010)	2	SH	Study ID	Equipment generated Study identifier. "<study date>+<study time>"	ALWAYS	AUTO
(0008,0050)	2	SH	Accession Number	<i>A RIS generated number that identifies the order for the Study.</i> Value does not exist in unscheduled case.	VNAP	MWL
(0008,1030)	3	LO	Study Description	<i>Institution-generated description or classification of the Study (component) performed.</i> In scheduled case, the source attribute for this value is Requested Procedure Description. Attribute is empty in the unscheduled case.	VNAP	MWL

Table 8-3 Encapsulated PDF - Module "Encapsulated Document Series"

Tag	Type	VR	Name	Description	PoV	Source
(0020,0060)	3	CS	Laterality	Laterality of (paired) body part tested. Enumerated Values: R = right L = left B = both Note: This is a CZM standard attribute extension.	ALWAYS	AUTO

(0008,0060)	1	CS	Modality	<i>The modality appropriate for the encapsulated document. This Type definition shall override the definition in the SC Equipment Module. See section C.7.3.1.1.1 for Defined Terms. Note: SR may be an appropriate value for an Encapsulated CDA document with a structured XML Body</i> Always "OPV".	ALWAYS	AUTO
(0020,000E)	1	UI	Series Instance UID	<i>Unique identifier of the Series.</i> "1.2.276.0.75.2.2.60.2.2." extended by machine identifier and time information.	ALWAYS	AUTO
(0020,0011)	1	IS	Series Number	<i>A number that identifies the Series.</i> Always "1".	ALWAYS	AUTO
(0008,103E)	3	LO	Series Description	User provided description of the Series	EMPTY	AUTO
(0040,0275)	3	SQ	Request Attributes Sequence	<i>Sequence that contains attributes from the Imaging Service Request. The sequence may have one or more Items.</i> Attribute does not exist in unscheduled case. Attribute exists and contains two identical items in the scheduled case.	ANAP	AUTO
>(0040,1001)	1C	SH	Requested Procedure ID	<i>Identifier that identifies the Requested Procedure in the Imaging Service Request. Required if procedure was scheduled. May be present otherwise. Note: The condition is to allow the contents of this macro to be present (e.g., to convey the reason for the procedure, such as whether a mammogram is for screening or diagnostic purposes) even when the procedure was not formally scheduled and a value for this identifier is unknown, rather than making up a dummy value.</i> Value as given by the Modality Worklist item that was accepted for this test.	ANAP	MWL
>(0032,1060)	3	LO	Requested Procedure Description	<i>Institution-generated administrative description or classification of Requested Procedure.</i> Value as given by the Modality Worklist item that was accepted for this test.	ANAP	MWL
>(0032,1064)	3	SQ	Requested Procedure Code Sequence	A sequence that conveys the Procedure Type of the requested procedure. The Requested Procedure Code Sequence shall contain only a single item.	ANAP	MWL
>>(0008,0100)	1	SH	Code Value	Value as given by the Modality Worklist item that scheduled this test.	ANAP	MWL
>>(0008,0102)	1	SH	Coding Scheme Designator	Value as given by the Modality Worklist item that scheduled this test.	ANAP	MWL
>>(0008,0103)	1C	SH	Coding Scheme Version	Value as given by the Modality Worklist item that scheduled this test. Required if the value of Coding Scheme Designator (0008,0102) is not sufficient to identify the Code Value (0008,0100) unambiguously.	ANAP	MWL
>>(0008,0104)	1	LO	Code Meaning	Value as given by the Modality Worklist item that scheduled this test.	ANAP	MWL
>(0040,0009)	1C	SH	Scheduled Procedure	<i>Identifier that identifies the Scheduled Procedure Step. Required if procedure was</i>	ANAP	MWL

			Step ID	<i>scheduled. Note: The condition is to allow the contents of this macro to be present (e.g., to convey the reason for the procedure, such as whether a mammogram is for screening or diagnostic purposes) even when the procedure step was not formally scheduled and a value for this identifier is unknown, rather than making up a dummy value.</i> Value as given by the Modality Worklist item that was accepted for this test.		
>(0040,0007)	3	LO	Scheduled Procedure Step Description	<i>Institution-generated description or classification of the Scheduled Procedure Step to be performed.</i> Value as given by the Modality Worklist item that was accepted for this test.	ANAP	MWL
>(0040,0008)	3	SQ	Scheduled Protocol Code Sequence	<i>Sequence describing the Scheduled Protocol following a specific coding scheme. This sequence contains one or more Items.</i> Value as given by the Modality Worklist item that was accepted for this test.	ANAP	MWL
>>(0008,0100)	1	SH	Code Value	Value as given by the Modality Worklist item that was accepted for this test.	ANAP	MWL
>>(0008,0102)	1	SH	Coding Scheme Designator	Value as given by the Modality Worklist item that was accepted for this test.	ANAP	MWL
>>(0008,0103)	1C	SH	Coding Scheme Version	Value as given by the Modality Worklist item that was accepted for this test.	ANAP	MWL
>>(0008,0104)	1	LO	Code Meaning	Value as given by the Modality Worklist item that was accepted for this test.	ANAP	MWL

Table 8-4 Encapsulated PDF - Module "General Equipment"

Tag	Type	VR	Name	Description	PoV	Source
(0008,0070)	2	LO	Manufacturer	<i>Manufacturer of the equipment that produced the composite instances</i> Always "Carl Zeiss Meditec"	ALWAYS	AUTO
(0008,0080)	3	LO	Institution Name	<i>Institution where the equipment that produced the composite instances is located.</i> Value as configured.	ALWAYS	CONFIG
(0008,1010)	3	SH	Station Name	<i>User defined name identifying the machine that produced the composite instances.</i> Value as configured.	ALWAYS	CONFIG
(0008,1090)	3	LO	Manufacturer's Model Name	<i>Manufacturer's model name of the equipment that produced the composite instances.</i> Always "Matrix 800"	ALWAYS	AUTO
(0018,1000)	3	LO	Device Serial Number	<i>Manufacturer's serial number of the equipment that produced the composite instances. Note: This identifier corresponds to the device that actually created the images, such as a CR plate reader or a CT console, and may not be sufficient to identify all of the equipment in the imaging chain, such as the generator or gantry or plate.</i> The serial number of the instrument.	ALWAYS	AUTO



(0018,1020)	3	LO	Software Version(s)	<p>Manufacturer's designation of software version of the equipment that produced the composite instances.</p> <p>The value is a paired value, where the first value represents the software used to run the test, the second value represents the software that generated the ePDF report.</p> <p>E.g. "08.02.22[0]\ 08.02.22[0]".</p>	ALWAYS	AUTO
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Table 8-5 Encapsulated PDF - Module "SC Equipment"

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

Table 8-6 Encapsulated PDF - Module "Encapsulated Document"

Tag	Type	VR	Name	Description	PoV	Source
(0020,0013)	1	IS	Instance Number	<p>A number that identifies this SOP Instance. The value shall be unique within a series.</p> <p>Always "1" since there is always only one instance per series.</p>	ALWAYS	AUTO
(0008,0023)	2	DA	Content Date	<p>The time the document content creation was started.</p> <p>The date the document creation was started. Same date when the document is transferred.</p>	ALWAYS	AUTO
(0008,0033)	2	TM	Content Time	<p>The time the document content creation was started.</p> <p>The date the document creation was started. Same the time when the document is transferred.</p>	ALWAYS	AUTO
(0008,002A)	2	DT	Acquisition Datetime	<p>The date and time that the original generation of the data in the document started.</p> <p>The date of to the most recent test included in this report.</p>	ALWAYS	AUTO
(0028,0301)	1	CS	Burned In Annotation	<p>Indicates whether or not the encapsulated document contains sufficient burned in annotation to identify the patient and date the data was acquired. Enumerated Values: YES NO Identification of patient and date as text in an encapsulated document (e.g., in an XML attribute or element) is equivalent to "burned in annotation". A de-identified document may use the value NO.</p> <p>Always "YES" since the PDF instance contains sufficient information to identify the patient.</p>	ALWAYS	AUTO
(0042,0010)	2	ST	Document Title	<p>The title of the document. Note: In the case of a PDF encapsulated document, this may be the value of the "Title" entry in the "Document Information Directory" as encoded in the PDF data.</p> <p>Contains prefix (SFA or OVR) and then test name separated by a space (e.g. "SFA N-30-5 FDT Screening").</p>	ALWAYS	AUTO

				SFA represents Single Field Analysis. OVR represents overview. The test name values are N-30-F FDT Threshold, N-30-1 FDT Screening, N-30-5 FDT Screening, 24-2 FDT Threshold, 30-2 FDT Threshold, 10-2 FDT Threshold, Macula FDT Threshold, 24-2-1 FDT Screening, 24-2-5 FDT Screening, Engineering and Blind Spot.		
(0040,A043)	2	SQ	Concept Name Code Sequence	<i>A coded representation of the document title. Zero or one item may be present. Always empty.</i>	EMPTY	AUTO
(0042,0012)	1	LO	MIME Type of Encapsulated Document	<i>The type of the encapsulated document stream described using the MIME Media Type (see RFC 2046). Always "application/pdf"</i>	ALWAYS	AUTO
(0042,0011)	1	OB	Encapsulated Document	Encapsulated Document stream, containing a document encoded according to the MIME Type.	ALWAYS	AUTO

Table 8-7 Encapsulated PDF - Module "SOP Common"

Tag	Type	VR	Name	Description	PoV	Source
(0008,0016)	1	UI	SOP Class UID	Always "1.2.840.10008.5.1.4.1.1.104.1"	ALWAYS	AUTO
(0008,0018)	1	UI	SOP Instance UID	"1.2.276.0.75.2.2.60.2.3." as constant prefix for generated UIDs	ALWAYS	AUTO
(0008,0005)	1C	CS	Specific Character Set	Always "ISO_IR 192" for UTF-8 encoded Unicode. Even though, the characters are of set of Latin-1 and/or Kanji.	ALWAYS	AUTO
(0008,0012)	3	DA	Instance Creation Date	Date the SOP Instance was created.	ALWAYS	AUTO
(0008,0013)	3	TM	Instance Creation Time	Time the SOP Instance was created.	ALWAYS	AUTO

8.1.1.2 Usage of Attributes from Received IOD's

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

8.1.2 Attribute Mapping

In scheduled case, the following attributes are mapped from Modality Worklist to instances of Encapsulated PDF IOD

Modality Worklist	Instance IOD	Editable
Study Instance UID	Study Instance UID	
Accession Number	Accession Number	
Requested Procedure ID	Request Attributes Sequence > Requested Procedure ID	
Requested Procedure Description	Request Attributes Sequence > Requested Procedure Description	
Requested Procedure Description	Study Description	
Requested Procedure Code Sequence	Request Attributes Sequence > Requested Procedure Code Sequence	
Scheduled Procedure Step Sequence > Scheduled Procedure Step ID	Request Attributes Sequence > Scheduled Procedure Step ID	

Scheduled Procedure Step Sequence > Scheduled Procedure Step Description	Request Attributes Sequence > Scheduled Procedure Step Description	
Scheduled Procedure Step Sequence > Schedule Protocol Code Sequence	Request Attributes Sequence > Scheduled Protocol Code Sequence	
Issuer of Patient ID	Issuer of Patient ID	
Other Patient IDs ²	Other Patient IDs	
Referring Physicians Name	Referring Physicians Name	
Patients Name	Patients Name	
Patient ID	Patient ID	
Patients Birth Date	Patients Birth Date	
Patients Sex	Patients Sex	

8.1.3 Coerced/Modified Files

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

8.2 Data Dictionary of Private Attributes

Group ID: 2201

Private Creator String: "99CZM_NIM_INTERNAL_01"

Occurs in: Encapsulated PDF IOD instances

Tag Name	Element ID	VR	VM
Private Creator String	0010	LO	1
IOD Name Meta Info	xx00	LT	1
CZM XML Version	xx01	LT	1
Private Module Names and Versions	xx02	LT	1-n

² The Application Software supports one value.

Group ID: 2401

Private Creator String: "99CZM_Matrix_Series" and "99CZM_Matrix_EncapsulatedDocument"

Occurs in: Encapsulated PDF IOD instances

Tag Name	Element ID	VR	VM
Test Name	01	LO	1
Test Strategy	02	LO	1
Stimulus Size	03	CS	1
Stimulus Color	04	SH	1
Background State	05	SH	1
Foveal Result	06	CS	1
Screening Mode	07	LO	1
Fixation Trials	08	IS	1
Fixation Errors	09	IS	1
False Positive Trials	11	IS	1
False Positive Errors	12	IS	1
False Negative Trials	14	IS	1
False Negative Errors	15	IS	1
Mean Deviation	16	DS	1
Mean Deviation Probability	17	LO	1
Pattern Standard Deviation	18	DS	1
Pattern Standard Deviation Probability	19	LO	1
Glaucoma Hemifield Test	23	LO	1
Fixation Monitor	24	LO	1
Fixation Target	25	LO	1
Pupil Diameter	26	DS	1
Visual Acuity	30	SH	1
Test Date	32	DA	1
Test Time	33	TM	1

Group ID: 22a1

Private Creator String: "99CZM_SpecializedEncapsulatedDocument"

Occurs in: Encapsulated PDF IOD instances

Tag Name	Element ID	VR	VM
Document Type	01	LO	1

Note: Document Type is SFA or OVR for Revision 8.0

8.3 Coded Terminology and Templates

The Application Software AE does not specify a custom coded terminology.

8.4 Greyscale Image Consistency

Not applicable.

8.5 Standard Extended / Specialized/ Private SOP Classes

Neither Specialized nor Private SOP Classes are supported.

8.6 Private Transfer Syntaxes

No Private Transfer Syntax is supported.