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Philips Medical Systems

DICOM CONFORMANCE STATEMENT

ViewForum 2003 Release 3.2

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1. DICOM CONFORMANCE STATEMENT OVERVIEW

The ViewForum 2003 Release 3.2 system is a comprehensive range of hardware and software modules that allow for tailored clinical solutions. The software applications are categorized in packages, for instance the Volume package for CT/MR images. The hardware consists of a PC Windows workstation.

ViewForum provides the following DICOM data exchange features:

- It receives images sent to it by remote systems (e.g. workstations or imaging modalities) and stores them in a database.
- It allows the operator to copy images from the database to remote databases and vice versa. For this purpose the operator is able to query remote databases.
- It allows a remote system to query the ViewForum database and to retrieve images from it.
- It allows the operator to print images stored in the database on a DICOM printer.
- It is able to read and write DICOM CD-R disks.

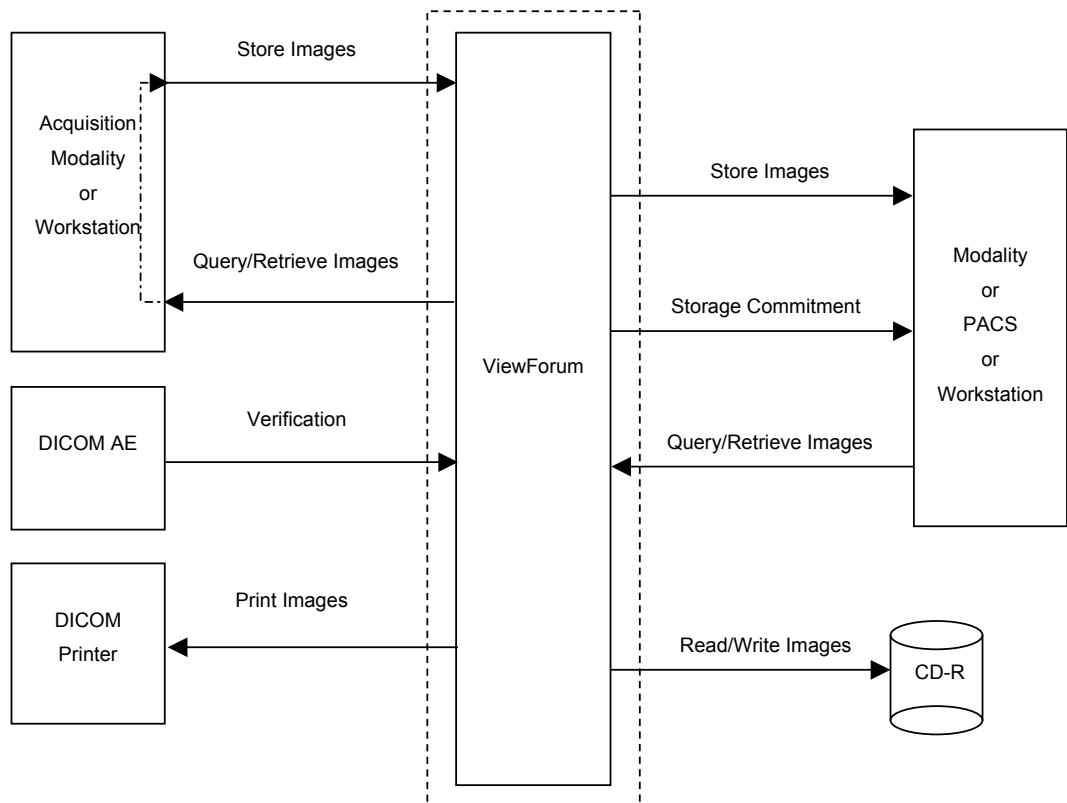


Figure 1: ViewForum in a DICOM Network

ViewForum allows the operator also to view, analyze and process the images stored in the database. Some advanced analysis and processing applications are primarily designed for images generated by Philips equipment when sent to the ViewForum.

This DICOM Conformance Statement describes the DICOM conformance of the ViewForum platform. Application package specific DICOM conformance is described in separate Conformance Statements.

Table 1 presents an overview of all network services and the applicable SOP classes as provided by ViewForum.

Table 1: Network Services

SOP Class		User of Service (SCU)	Provider of Service (SCP)
Name	UID		
Transfer			
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Yes	Yes
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.1	Yes	Yes
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Yes	Yes
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Yes	Yes
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Yes	Yes
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Yes	Yes
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	Yes
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	Yes	Yes
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Yes	Yes
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Yes	Yes
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	Yes	Yes
Private Transfer			
Specialized X-Ray	1.3.46.670589.2.3.1.1	Yes	Yes
CX Image	1.3.46.670589.2.4.1.1	Yes	Yes
3D Volume Storage	1.3.46.670589.5.0.1.1	Yes	Yes
3D Volume Object Storage	1.3.46.670589.5.0.2.1	Yes	Yes
Surface Storage	1.3.46.670589.5.0.3.1	Yes	Yes
MR Cardio Storage	1.3.46.670589.5.0.8.1	Yes	Yes
CT Synthetic Image	1.3.46.670589.5.0.9	Yes	Yes
MR Synthetic Image	1.3.46.670589.5.0.10	Yes	Yes
MR Cardio Analysis Storage	1.3.46.670589.5.0.11.1	Yes	Yes
CX Synthetic Image	1.3.46.670589.5.0.12	Yes	Yes
Perfusion	1.3.46.670589.5.0.13	Yes	Yes
Perfusion Analysis	1.3.46.670589.5.0.14	Yes	Yes
Query/Retrieve			
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	Yes	Yes
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Yes	Yes
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Yes	Yes
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Yes	Yes
Patient/Study Only Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.3.1	Yes	Yes
Patient/Study Only Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.3.2	Yes	Yes
Workflow Management			
Storage Commitment Push Model	1.2.840.10008.1.20.1	Yes	No
Print Management			
Basic Grayscale Print Management (Meta)	1.2.840.10008.5.1.1.9	Yes	No
> Basic Film Session	1.2.840.10008.5.1.1.1	Yes	No

SOP Class		User of Service (SCU)	Provider of Service (SCP)
Name	UID		
> Basic Film Box	1.2.840.10008.5.1.1.2	Yes	No
> Basic Grayscale Image Box	1.2.840.10008.5.1.1.4	Yes	No
> Printer	1.2.840.10008.5.1.1.16	Yes	No
Basic Color Print Management (Meta)	1.2.840.10008.5.1.1.18	Yes	No
> Basic Film Session	1.2.840.10008.5.1.1.1	Yes	No
> Basic Film Box	1.2.840.10008.5.1.1.2	Yes	No
> Basic Color Image Box	1.2.840.10008.5.1.1.4.1	Yes	No
> Printer	1.2.840.10008.5.1.1.16	Yes	No
Presentation LUT	1.2.840.10008.5.1.1.23	Yes	No

The following table lists the Supported Media Storage Application Profiles (with roles).

Table 2: Media Services

Media Storage Application Profile	Write Files (FSC or FSU)	Read Files (FSR)
Compact Disk - Recordable		
General Purpose CD-R	Yes	Yes

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3. INTRODUCTION

3.1. Revision History

Table 3: Revision History

Document Version	Date of Issue	Author	Description
00	14 August 2003	PMS MIT-IO	Preliminary version of the DICOM Conformance Statement for ViewForum 2003 Release 3.2 for 1 st review
01	24 November 2003	PMS MIT-IO	Preliminary version of the DICOM Conformance Statement for ViewForum 2003 Release 3.2 for 2 nd review
02	8 December 2003	PMS MIT-IO	Preliminary version of the DICOM Conformance Statement for ViewForum 2003 Release 3.2 for 3 rd review
03	18 December 2003	PMS MIT-IO	Preliminary version of the DICOM Conformance Statement for ViewForum 2003 Release 3.2 for 4 th review
04	9 January 2004	PMS MIT-IO	Proposal version of the DICOM Conformance Statement for ViewForum 2003 Release 3.2
05	21 January 2004	PMS MIT-IO	Final version of the DICOM Conformance Statement for ViewForum 2003 Release 3.2

3.2. Audience

This DICOM Conformance Statement is intended for:

- (potential) customers
- system integrators of medical equipment
- marketing staff interested in system functionality
- software designers implementing DICOM interfaces

It is assumed that the reader is familiar with the DICOM standard.

3.3. Remarks

The DICOM Conformance Statement is contained in chapter 4 through 8 and follows the contents and structuring requirements of DICOM PS 3.2-2003 per supplement 64.

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

- **Interoperability**
Interoperability refers to the ability of application functions, distributed over two or more systems, to work successfully together. The integration of medical devices into an IT environment may require application functions that are not specified within the scope of DICOM. Consequently, using only the information provided by this Conformance Statement does not guarantee interoperability of Philips equipment with non-Philips equipment. It is the user's responsibility to analyze thoroughly the application requirements and to specify a solution that integrates Philips equipment with non-Philips equipment.
- **Validation**
Philips equipment has been carefully tested to assure that the actual implementation of the DICOM interface corresponds with this DICOM Conformance Statement.

Where Philips equipment is linked to non-Philips equipment, the first step is to compare the relevant DICOM Conformance Statements. If the DICOM Conformance Statements indicate that successful information exchange should be possible, additional validation tests will be necessary to ensure the functionality, performance, accuracy and stability of image and image related data. 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.

- **New versions of the DICOM Standard**

The DICOM Standard will evolve in future to meet the user's growing requirements and to incorporate new features and technologies. Philips is actively involved in this evolution and plans to adapt its equipment to future versions of the DICOM Standard. In order to do so, Philips reserves the right to make changes to its products or to discontinue its delivery.

The user should ensure that any non-Philips provider linking to Philips equipment also adapts to future versions of the DICOM Standard. If not, the incorporation of DICOM enhancements into Philips equipment may lead to loss of connectivity (in case of networking) and incompatibility (in case of media).

3.4. Definitions, Terms and Abbreviations

DICOM definitions, terms and abbreviations are used throughout this Conformance Statement. For a description of these, see NEMA PS 3.3-2003 and PS 3.4-2003. The word Philips in this document refers to Philips Medical Systems.

The following acronyms and abbreviations may be used in this document.

ACC	American College of Cardiology
ACR	American College of Radiology
AE	Application Entity
ANSI	American National Standards Institute
AP	Application Profile
BOT	Basic Offset Table
CD	Compact Disc
CD-R	CD-Recordable
CD-M	CD-Medical
CR	Computed Radiography
CT	Computed Tomography
DCR	Dynamic Cardio Review
DICOM	Digital Imaging and Communications in Medicine
DIMSE	DICOM Message Service Element
DIMSE-C	DIMSE-Composite
DIMSE-N	DIMSE-Normalized
DX	Digital X-Ray
EBE	DICOM Explicit VR Big Endian
ELE	DICOM Explicit VR Little Endian
FSC	File-set Creator
FSR	File-set Reader
FSU	File-set Updater
GUI	Graphical User Interface
HIS	Hospital Information System
HL7	Health Level Seven
ILE	DICOM Implicit VR Little Endian
IOD	Information Object Definition
ISIS	Information System – Imaging System

IVUS	Intravascular Ultrasound
MOD	Magneto-Optical Disk
MPPS	Modality Performed Procedure Step
MR	Magnetic Resonance
N/A	Not applicable
NEMA	National Electrical Manufacturers Association
NM	Nuclear Medicine
PDU	Protocol Data Unit
PMS(N)	Philips Medical Systems (Nederland B.V.)
Q/R	Query/Retrieve (Service Class)
RF	X-Ray Radiofluoroscopic
RIS	Radiology Information System
RWA	Real-World Activity
SC	Secondary Capture
SCM	Study Component Management
SCP	Service Class Provider
SCU	Service Class User
SOP	Service Object Pair
TCP/IP	Transmission Control Protocol/Internet Protocol
UID	Unique Identifier
US	Ultrasound
USMF	Ultrasound Multi-frame
WLM	Worklist Management
XA	X-Ray Angiographic

3.5. References

- [DICOM] Digital Imaging and Communications in Medicine (DICOM), Part 1 – 16 (NEMA PS 3.1-2003 – PS 3.16-2003), National Electrical Manufacturers Association (NEMA) Publication Sales 1300 N. 17th Street, Suite 1847 Rosslyn, Virginia. 22209, United States of America
- [VFRB] Release Bulletin ViewForum 3.2, 4522 170 02282, PMSN

4. NETWORKING

This section contains the networking related services (vs. the media related ones).

4.1. Implementation model

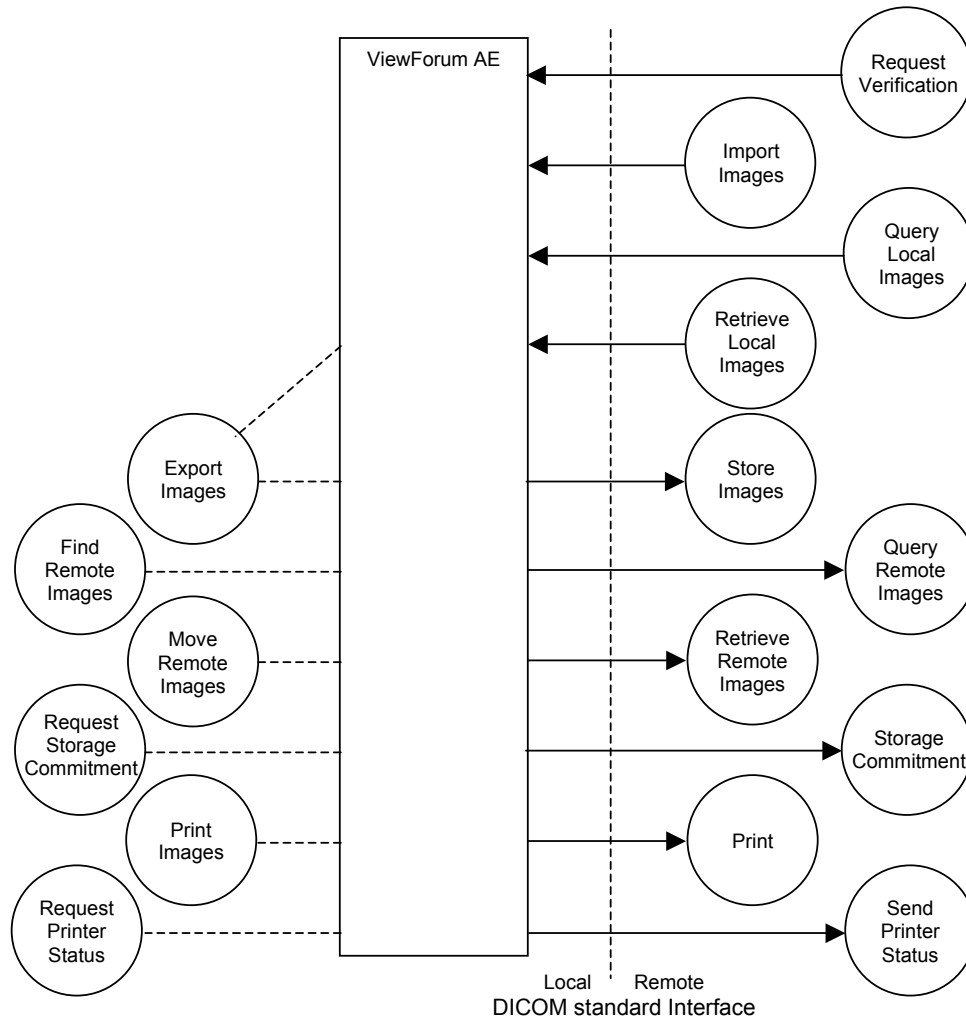
The implementation model consists of three sections:

- the Application Data Flow Diagram, specifying the relationship between the ViewForum Application Entity and the “external world” or Real-World activities,
- a functional description of the ViewForum Application Entity, and
- the sequencing constraints among them.

4.1.1. Application Data Flow

The ViewForum 2003 system consists of one single application entity only: the ViewForum Application Entity (ViewForum AE).

Figure 2 shows the Networking application data flow as a functional overview of the



ViewForum AE.

Figure 2: Networking Application Data Flow Diagram

As depicted in Figure 2, the ViewForum AE incorporates the following functionality.

- After RWA Request Verification, the ViewForum AE as SCP provides standard Verification Service Class functionality to the requesting SCU.
- After RWA Import Images, the ViewForum AE as SCP provides standard Storage Service Class functionality to the requesting SCU.
- After RWA Query Local Images/Retrieve Local Images, the ViewForum AE as SCP provides standard Query/Retrieve Service Class functionality to the requesting SCU.
- After RWA Export Images (triggered by either the operator or RWA Retrieve Local Images), the ViewForum AE as SCU uses the remote SCP Storage Service Class functionality to store local images on a remote database.
- After operator RWA Find Remote Images, the ViewForum AE as SCU uses the remote SCP Query/Retrieve Service Class functionality to query remote images.
- After operator RWA Move Remote Images, the ViewForum AE as SCU uses the remote SCP Query/Retrieve Service Class functionality to retrieve remote images.
- After operator RWA Request Storage Commitment, the ViewForum AE as SCU uses the remote SCP Storage Commitment Service Class functionality to commit remote images.
- After operator RWA Print Images, the ViewForum AE as SCU uses the remote Print Management Service Class to print local images.
- After operator RWA Request Printer Status, the ViewForum AE as SCU uses the remote Print Management Service Class to request the printer status.

4.1.2. Functional Definition of AE's

This section shall describe in general terms the functions to be performed by the AE, and the DICOM services used to accomplish these functions.

4.1.2.1. Functional Definition of ViewForum AE

The ViewForum AE is the one and only application entity within ViewForum. It includes the following service classes.

Verification Service Class

The ViewForum AE can perform the Verification service as SCP (RWA Request Verification).

A remote SCU shall request an association with the ViewForum AE for Verification SOP class. After accepting the association, the ViewForum AE shall receive and respond to the Verification request, and release the association when requested.

Storage Service Class

The ViewForum AE can perform the Storage service as SCP (RWA Import Images).

A remote SCU shall request an association with the ViewForum AE for Storage SOP classes. After accepting the association, the ViewForum AE shall receive the Storage requests, store the data in the local database, send the applicable Storage responses, and release the association when requested.

The ViewForum AE can perform the Storage service as SCU (RWA Export Images, triggered by operator or retrieve request).

The ViewForum AE shall request an association with the selected remote SCP for all applicable Storage SOP classes. When the association is accepted, the ViewForum

AE shall send the Storage requests (including data from local database), receive the Storage responses and act accordingly, and release the association. Finally, the ViewForum AE shall request storage commitment per Storage Commitment service (ref. Storage Commitment service class).

Query/Retrieve Service Class

The ViewForum AE can perform the Query/Retrieve service as SCP (RWA Query Local Images and RWA Retrieve Local Images).

A remote SCU shall request an association with the ViewForum AE for Query/Retrieve SOP classes. After accepting the association, the ViewForum AE shall receive the Query/Retrieve requests. In case of a Retrieve request, the ViewForum AE shall request storage per Storage service as SCU (ref. Storage Service Class). Next, the ViewForum AE shall send the applicable Query/Retrieve responses, and release the association when requested.

The ViewForum AE can perform the Query/Retrieve service as SCU (RWA Find Remote Images and RWA Move Remote Images).

The ViewForum AE shall request an association with the selected remote SCP for the applicable (configured) Query/Retrieve SOP class. When the association is accepted, the ViewForum AE shall send the Query/Retrieve requests, receive the Query/Retrieve responses and act accordingly, and finally release the association.

The ViewForum AE fully supports the Cancel functionality, both as SCU and as SCP.

Storage Commitment Service Class

The ViewForum AE can perform the Storage Commitment service as SCU (RWA Request Storage Commitment).

The ViewForum AE shall request an association with the selected remote SCP for the Storage Commitment Push Model SOP class. When the association is accepted, the ViewForum AE shall send the Storage Commitment requests, receive the Storage Commitment responses and act accordingly, and release the association.

When the remote commitment actions have been finished, the remote SCP should request an association with the ViewForum AE (still SCU). After accepting the association, the ViewForum AE shall receive the Storage Commitment reports, and release the association when requested.

Print Management Service Class

The ViewForum AE can perform the Print service as SCU (RWA Print Images).

The ViewForum AE shall request an association with the selected remote SCP (printer) for all applicable SOP classes of the applicable Print Management Meta SOP class. When the association is accepted, the ViewForum AE shall send the Print requests (including data from local database), receive the Print responses and act accordingly, and finally release the association.

The ViewForum AE can perform the Printer service as SCU (RWA Request Printer Status)

The ViewForum AE shall request an association with the selected remote SCP (printer) for the Printer SOP class. When the association is accepted, the ViewForum AE shall send the Get/Event Report request, receive the Printer responses and act accordingly, and finally release the association.

4.1.3. Sequencing of Real World Activities

This section shall contain a description of specific sequencing as well as potential constraints of Real-World Activities, including any applicable user interactions, as performed by the ViewForum AE.

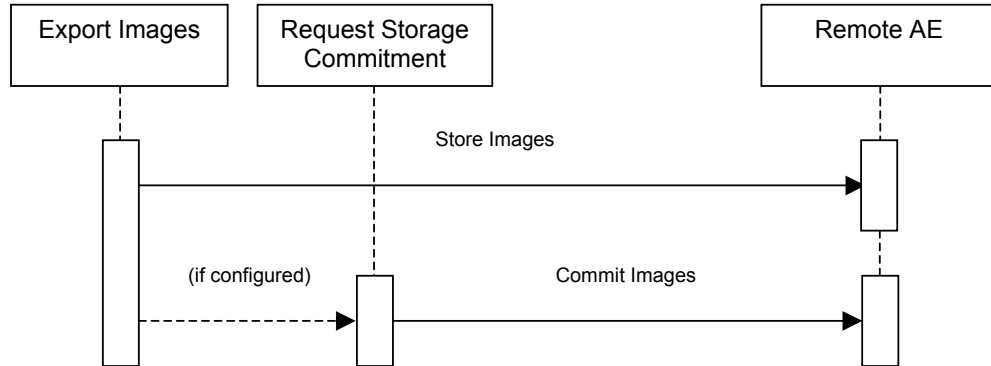


Figure 3: RWA Sequencing for Export Images

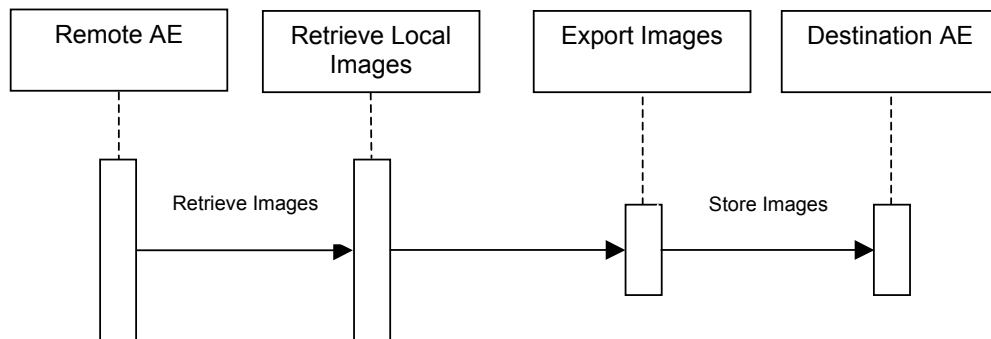


Figure 4: RWA Sequencing for Retrieve Local Images

4.2. AE Specifications

The next section in the DICOM Conformance Statement contains the specification of the one and only ViewForum Application Entity: ViewForum AE.

4.2.1. ViewForum AE

Every detail of this specific Application Entity shall be completely specified under this section.

4.2.1.1. SOP Classes

This Application Entity provides extended Standard Conformance to the following SOP classes.

Table 4: SOP Classes for ViewForum AE

SOP Class Name	SOP Class UID	SCU	SCP
Storage Commitment Push Model	1.2.840.10008.1.20.1	Yes	No
Basic Grayscale Print Management (Meta)	1.2.840.10008.5.1.1.9	Yes	No

SOP Class Name	SOP Class UID	SCU	SCP
> Basic Film Session	1.2.840.10008.5.1.1.1	Yes	No
> Basic Film Box	1.2.840.10008.5.1.1.2	Yes	No
> Basic Grayscale Image Box	1.2.840.10008.5.1.1.4	Yes	No
> Printer	1.2.840.10008.5.1.1.16	Yes	No
Basic Color Print Management (Meta)	1.2.840.10008.5.1.1.18	Yes	No
> Basic Film Session	1.2.840.10008.5.1.1.1	Yes	No
> Basic Film Box	1.2.840.10008.5.1.1.2	Yes	No
> Basic Color Image Box	1.2.840.10008.5.1.1.4.1	Yes	No
> Printer	1.2.840.10008.5.1.1.16	Yes	No
Presentation LUT	1.2.840.10008.5.1.1.23	Yes	No
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Yes	Yes
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.1	Yes	Yes
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Yes	Yes
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Yes	Yes
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Yes	Yes
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Yes	Yes
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	Yes
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	Yes	Yes
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Yes	Yes
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Yes	Yes
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	Yes	Yes
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	Yes	Yes
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Yes	Yes
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Yes	Yes
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Yes	Yes
Patient/Study Only Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.3.1	Yes	Yes
Patient/Study Only Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.3.2	Yes	Yes
Specialized X-Ray	1.3.46.670589.2.3.1.1	Yes	Yes
CX Image	1.3.46.670589.2.4.1.1	Yes	Yes
3D Volume Storage	1.3.46.670589.5.0.1.1	Yes	Yes
3D Volume Object Storage	1.3.46.670589.5.0.2.1	Yes	Yes
Surface Storage	1.3.46.670589.5.0.3.1	Yes	Yes
MR Cardio Storage	1.3.46.670589.5.0.8.1	Yes	Yes
CT Synthetic Image	1.3.46.670589.5.0.9	Yes	Yes
MR Synthetic Image	1.3.46.670589.5.0.10	Yes	Yes
MR Cardio Analysis Storage	1.3.46.670589.5.0.11.1	Yes	Yes
CX Synthetic Image	1.3.46.670589.5.0.12	Yes	Yes
Perfusion	1.3.46.670589.5.0.13	Yes	Yes
Perfusion Analysis	1.3.46.670589.5.0.14	Yes	Yes

Note: Any SOP specific behavior is documented later in the conformance statement in the applicable SOP specific conformance section.

Remarks:

- During installation the list of available SOP classes can be configured per ViewForum system. The SOP classes to be supported can be configured per remote station.
- The Private SOP classes may be stored in image archives, but are to be used by ViewForum systems only!

- In case the remote SCP system does not support the import of a specific image storage SOP class, the ViewForum AE will convert and send such images as Secondary Capture images (if configured to do so).
- After storing images as SCU the ViewForum AE shall request Storage Commitment.

4.2.1.2. Association Policies

This section shall contain a description of the General Association Establishment and Acceptance policies of the AE.

4.2.1.2.1. General

The DICOM standard application context shall be specified.

Table 5: DICOM Application Context

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, which an Application Entity may support as a SCU or SCP, shall be specified. Any rules governing simultaneity of associations shall be defined here.

Table 6: Number of Associations as an Association Initiator for ViewForum AE

Maximum number of simultaneous associations	3+*
---	-----

*As a result of local activities, ViewForum will initiate at most 3 simultaneous associations. One association may be used to issue query requests, the other association may be used to issue store or retrieve requests, and another association may be used for print requests. Furthermore, ViewForum may initiate an association for each remote retrieve request, executed by ViewForum as a C-MOVE operation. These associations are used to issue the C-STORE sub-operations implied by the retrieve requests. The number of simultaneous store associations for this retrieve purpose is principally not limited. The number of simultaneous associations for Storage Commitment is configurable.

Table 7: Number of Associations as an Association Acceptor for ViewForum AE

Maximum number of simultaneous associations	Configurable
---	--------------

Nevertheless, the number of simultaneous associations shall be limited by the available resources (CPU, memory, disk space).

4.2.1.2.3. Asynchronous Nature

ViewForum does not support asynchronous operations, and will not perform asynchronous window negotiation.

Table 8: Asynchronous Nature as an Association Initiator for ViewForum AE

Maximum number of outstanding asynchronous transactions	N/A
---	-----

4.2.1.2.4. Implementation Identifying Information

Following Implementation Class UID and Version Name are defined.

Table 9: DICOM Implementation Class and Version for ViewForum AE

Implementation Class UID	1.3.46.670589.5.2.21
Implementation Version Name	ViewForum R3.2

4.2.1.3. Association Initiation Policy

ViewForum shall initiate associations as a result of the following events.

- The operator or a remote (Query/Retrieve) application copies selected images from the ViewForum database to another database; ref. section 4.2.1.3.1 Export Images.
- The operator queries a remote database; ref. section 4.2.1.3.2 Find Remote Images.
- The operator copies selected images from a remote database to another database; ref. section 4.2.1.3.3 Move Remote Images.
- The operator requests storage commitment of images on a remote database; ref. section 4.2.1.3.4 Request Storage Commitment.
- The operator requests to print selected images of the ViewForum database; ref. section 4.2.1.3.5 Print Images.
- The operator requests the status of the selected printer; ref. section 4.2.1.3.6 Request Printer Status.

4.2.1.3.1. Export Images

4.2.1.3.1.1. Description and Sequencing of Activities

The RWA Export Images involves the storage of images from the local ViewForum database to a remote system. There are two ways for the ViewForum AE to initiate Export Images.

1. The operator is able to copy the images selected in a patient folder from the local ViewForum database to another database by means of the copy tool in the ViewForum data-handling tool. For each selected patient ViewForum initiates an association to the selected peer entity, and uses it to send C-STORE requests and receive the associated C-STORE responses. The association is released when all selected images in the selected folder have been transmitted. ViewForum handles operator copy requests one after another.
2. A remote application copies images from the local ViewForum database to another database by sending a C-MOVE request to ViewForum. For each received retrieve request ViewForum initiates an association to the requested retrieve/move destination, and uses it to send C-STORE requests and receive associated C-STORE responses. The association is released when all instances, i.e. images and presentation states as selected by the retrieve request identifier, have been stored. ViewForum is able to simultaneously handle C-MOVE requests.

Along with the image data the ViewForum AE shall also export presentation state data. If the SCP supports the Grayscale Softcopy Presentation State storage SOP class then the applicable presentation state data will be transferred as such, otherwise the presentation state data will be merged with the image data before export.

Please refer to section 8.1.4, Coerced/Modified fields, for more information on presentation state storage.

If configured, the ViewForum AE shall also try and initiate a storage commitment of the stored image (after releasing the storage association). See section 4.2.1.3.4 (RWA Request Storage Commitment) for a detailed specification of the storage commitment.

Figure 5 shows the sequence of events after the operator or remote application initiates the RWA Export Images.

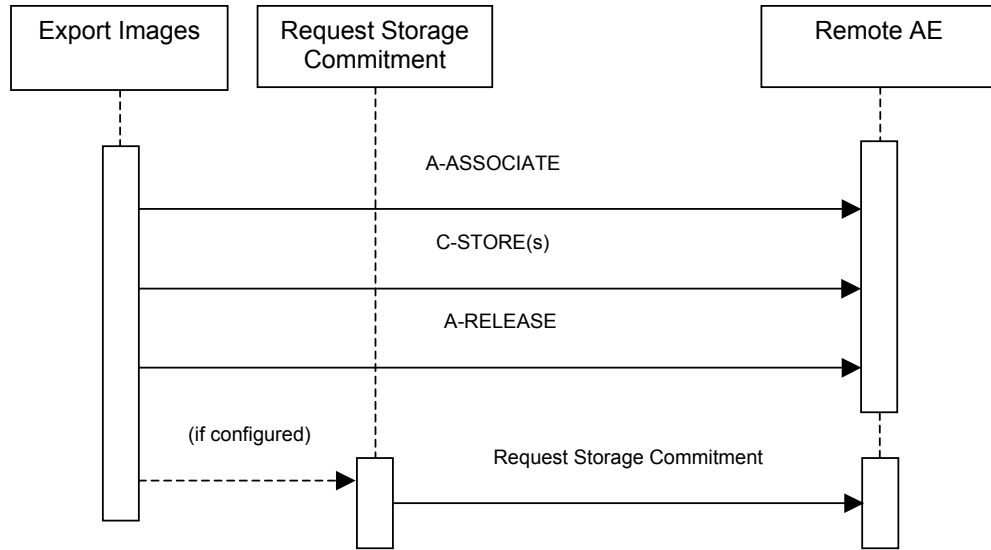


Figure 5: Sequencing of RWA Export Images

4.2.1.3.1.2. Proposed Presentation Contexts

Each time an association is initiated, the association initiator proposes a number of Presentation Contexts to be used on that association. The Presentation Contexts proposed by the ViewForum AE for Export Images are defined in Table 10.

Table 10: Proposed Presentation Contexts for Export Images

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
See Note 1		ELE	1.2.840.10008.1.2.1	SCU	None
		EBE	1.2.840.10008.1.2.2	SCU	None
		ILE	1.2.840.10008.1.2	SCU	None
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	JPEG Baseline See Note 2	1.2.840.10008.1.2.4.50	SCU	None
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	JPEG Baseline See Note 2	1.2.840.10008.1.2.4.50	SCU	None

Note 1: Any of the standard image storage and private SOP classes listed in Table 4.

Note 2: Only for Photometric Interpretation of RGB and YBR_FULL_422. Therefore JPEG Baseline transfer syntax may NOT be configured for SCU systems that are capable of handling storage of monochrome images too.

For performance reasons the ELE transfer syntax is preferred.

4.2.1.3.1.3. SOP Specific Conformance for SOP Classes

Important remarks about the exported images:

- In case the remote system does not support a modality specific image storage SOP class, the ViewForum AE will convert the images (if configured to do so) and send them via the Secondary Capture image storage SOP class. These Secondary Capture images and additional information (like graphics, text and important attribute information) are burnt-in (if configured). The original bit depth of the Secondary Capture image is kept. Note: only standard DICOM images can be converted, private SOP classes cannot be converted.
- In case of color images, all color-coding schemes are sent as they were received.
- Attributes e.g. Study Date and Study Time will be added to images to be exported (if not yet present). This is done because there are imaging systems relying on the existence of these attributes.
- On the export of an imported image the ViewForum adds private attributes to the image.
- The exported ViewForum images do not contain Instance Number if the original images received from modalities do not contain this attribute or provide information in other attributes for ViewForum to generate it.
- Exported CT/MR images relate Scanogram and Slice images in the following way: Attribute 'Referenced Image Sequence' is present in the slice images and points to the related Scanogram image.
Note that Attribute 'Frame of Reference UID' in the Scanogram (Localiser image) and related image slices are not guaranteed to be equal; this depends on the source of the images.
- For Secondary Capture images only one Window Width and Window Centre value is exported.
- When the location of a graphic or text annotation is specified relatively with regards to the displayed area. (i.e. DICOM attribute: Bounding Box Annotation Units, Ancjor Point Annotation Units or Graphic Annotation Units equals "DISPLAY"), the annotation is not displayed.
- Areas occluded by shutter are always black in ViewForum, whereas it is possible to want it to be white in DICOM.
- The ViewForum AE does not support non-linear Modality LUT and VOI LUT objects.
- Please refer to section 8.1.4, Coerced/Modified fields, for more information on stored images.

Use of optional, private and retired attributes

The transmitted Storage SOP instances may include all optional elements specified in the DICOM standard, depending on the source of the images.

The transmitted Storage SOP instances may contain Retired and Private data elements, depending on the source of the images and of the ViewForum configuration.

When exporting images the ViewForum AE can convert the transfer syntax according to the following table.

Table 11: Transfer Syntax Conversion

Syntax	Source	ILE	ELE	EBE	JPEG Baseline
Destination					
ILE		+	+	+	-
ELE		+	+	+	-
EBE		+	+	+	-
JPEG Baseline	*	+	+	+	-

** JPEG Baseline is only supported for images with Photometric Interpretation of YBR_FULL_422. As ViewForum internally stores the images in uncompressed format, the image data shall be compressed to JPEG (RGB to YBR_FULL_422) before export. Note that JPEG Baseline transfer syntax may NOT be configured for SCU systems that are capable of handling storage of monochrome images too.*

The store response status is saved in the log file; a user error will be displayed in the GUI.

The ViewForum AE will stop the transfer of the images and release the association as soon as it receives an unsuccessful store response status. In case that a remote application requested the transfer (by means of a C-MOVE request), a move response with status unsuccessful is sent to the retrieve requestor.

Following are the details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors.

Table 12: DICOM Command Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Storage is complete	0000	Continues with next store until completed thereafter the store job is marked as completed and the association is released.
Refused	Out of Resources	A7xx	The store job fails and the association is released. The reason is logged and reported to the user.
Error	Data set does not match SOP Class	A9xx	The store job fails and the association is released. The reason is logged and reported to the user.
	Cannot understand	Cxxx	The store job fails and the association is released. The reason is logged and reported to the user.
Warning	Coercion of Data Elements	B000	Continues with next store until completed thereafter the store job is marked as completed and the association is released.
	Elements discarded	B006	Continues with next store until completed thereafter the store job is marked as completed and the association is released.
	Data set does not match SOP class	B007	Continues with next store until completed thereafter the store job is marked as completed and the association is released.

Table 13: DICOM Command Communication Failure Behavior

Exception	Behavior
ARTIM Time-out	The store job fails in case of association setup. The reason is logged and reported to the user.
Reply Time-out	The store job fails and the association is aborted. The reason is logged and reported to the user.

Exception	Behavior
Association Time-out SCU	The association is released.
Association aborted	The store job fails. The reason is logged and reported to the user.

4.2.1.3.2. Find Remote Images

4.2.1.3.2.1. Description and Sequencing of Activities

The RWA Find Remote Images involves the query of a remote system to find matching images in the remote database.

The operator queries a remote database by means of the query tool in the ViewForum data handling facility. The ViewForum AE initiates an association to the selected peer entity and uses it to send Query (C-FIND) requests (and receive the associated responses). The association is released when the execution of the query completes (the Q/R dialog on the GUI is closed).

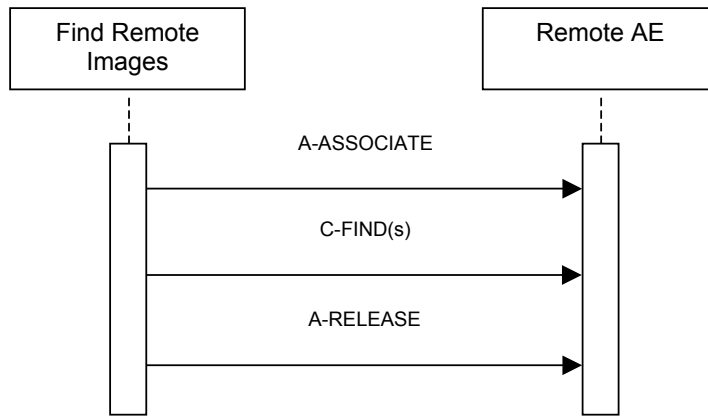


Figure 6: Sequencing of RWA Find Remote Images

4.2.1.3.2.2. Proposed Presentation Contexts

Each time an association is initiated, the association initiator proposes a number of Presentation Contexts to be used on that association. In this subsection, the Presentation Contexts proposed by the ViewForum AE for Find Remote Images are defined in Table 14.

Table 14: Proposed Presentation Contexts for Find Remote Images

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
See Note		ELE	1.2.840.10008.1.2.1	SCU	None
		EBE	1.2.840.10008.1.2.2	SCU	None
		ILE	1.2.840.10008.1.2	SCU	None

Note: Any of the standard Query/Retrieve C-FIND SOP classes listed in Table 4.

For performance reasons the ELE transfer syntax is preferred.

4.2.1.3.2.3. SOP Specific Conformance for SOP Classes

The ViewForum AE will not generate queries containing optional keys. The ViewForum AE will not generate relational queries.

In the following table the supported query keys for each query level are described. Universal matching shall be supported as default.

Table 15: Supported Query Keys

Query Level	Query Key		Type of Matching	
	Name	Tag		
Patient	Patient's Name	(0010,0010)	Wild Card	
	Patient ID	(0010,0020)	Wild Card	
	Patient's Birth Date	(0010,0030)	-	
	Patient's Sex	(0010,0040)	-	
Study	Study Date	(0008,0020)	Range / Study Root only	
	Study Time	(0008,0030)	-	
	Accession Number	(0008,0050)	Wild Card / Study Root only	
	Modalities in Study	(0008,0061)	Wild Card / Study Root only	
	Referring Physician's Name	(0008,0090)	-	
	Study Description	(0008,1030)	-	
	Study Instance UID	(0020,000D)	Single Value	
	Study ID	(0020,0010)	Wild Card / Study Root only	
	Series	Modality	(0008,0060)	-
		Performing Physician's Name	(0008,1050)	-
Body Part Examined		(0018,0015)	-	
Protocol Name		(0018,1030)	-	
Series Instance UID		(0020,000E)	Single Value	
Series Number		(0020,0011)	-	
Performed Station Name		(0040,0242)	-	
Performed Procedure Step Start Date		(0040,0244)	-	
Performed Procedure Step ID		(0040,0253)	-	
Performed Procedure Type Description	(0040,0255)	-		
Image	SOP Class UID	(0008,0016)	-	
	SOP Instance UID	(0008,0018)	Single Value	
	Content Date	(0008,0023)	-	
	Content Time	(0008,0033)	-	
	Instance Number	(0020,0013)	-	

Also refer to Table 70, Table 72, and Table 74 for a complete overview of created attributes for the Query commands.

Do note that the query results screen will display all patients that have an empty Patient ID as one patient entry.

Following are the details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors.

Table 16: DICOM Command Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Matching is complete	0000	The find results are displayed.
Refused	Out of Resources	A700	No find results are displayed. The reason is logged.
Failed	Identifier does not match SOP class	A900	No find results are displayed. The reason is logged.
	Unable to process	Cxxx	No find results are displayed. The reason is logged.
Cancel	Matching terminated due to Cancel Request	FE00	No find results are displayed. The reason is logged.
Pending	Matches are continuing – Current match is supplied and any optional keys were supported in the same manner as required keys	FF00	The find command continues.
	Matches are continuing – Warning that one or more optional keys were not supported for existence and/or matching for this identifier	FF01	The find command continues.

Table 17: DICOM Command Communication Failure Behavior

Exception	Behavior
ARTIM Time-out	N/A
Reply Time-out	The query fails and the association is aborted. The reason is logged and reported to the user.
Association Time-out SCU	The association is released.
Association aborted	The query fails. The reason is logged and reported to the user.

4.2.1.3.3. Move Remote Images

4.2.1.3.3.1. Description and Sequencing of Activities

The RWA Move Remote Images involves the retrieve of images on a remote system by moving matching images from the remote database to another database.

The operator is able to copy the selected images in a patient folder from a remote database to another, local or remote, database by means of the copy tool in the ViewForum data handling facility. The ViewForum AE initiates for each copy request an association to the selected peer entity (Remote AE) and uses it to send the Retrieve (C-MOVE) request (and receive the associated responses). An examination may contain both images and presentation states. The association is released after the final Retrieve (C-MOVE) response for the related request has been received (no more pending).

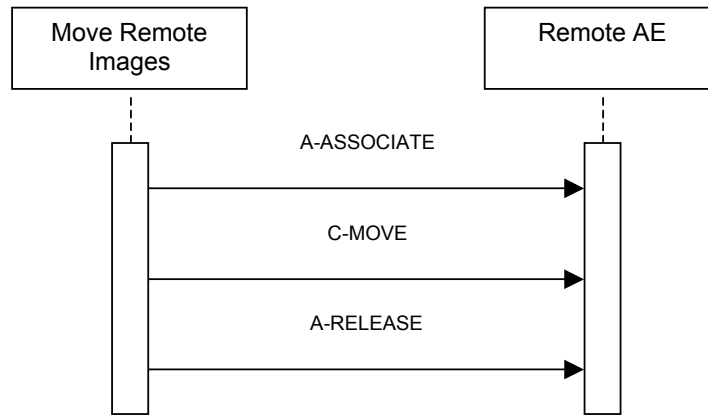


Figure 7: Sequencing of RWA Move Remote Images

4.2.1.3.3.2. Proposed Presentation Contexts

Each time an association is initiated, the association initiator proposes a number of Presentation Contexts to be used on that association. In this subsection, the Presentation Contexts proposed by the ViewForum AE for Move Remote Images are defined in Table 18.

Table 18: Proposed Presentation Contexts for Move Remote Images

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
See Note		ELE	1.2.840.10008.1.2.1	SCU	None
		EBE	1.2.840.10008.1.2.2	SCU	None
		ILE	1.2.840.10008.1.2	SCU	None

Note: Any of the standard Query/Retrieve C-MOVE SOP classes listed in Table 4.

For performance reasons the ELE transfer syntax is preferred.

4.2.1.3.3.3. SOP Specific Conformance for SOP Classes

The ViewForum AE provides standard conformance.

Following are the details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors.

Table 19: DICOM Command Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Sub-operations complete – No Failures	0000	The move job is marked as completed. The association is released.
Refused	Out of Resources – Unable to calculate number of matches	A701	The move job is marked as failed. The association is released. The reason is logged and reported to the user.
	Out of Resources – Unable to perform Sub-operations	A702	The move job is marked as failed. The association is released. The reason is logged and reported to the user.

Service Status	Further Meaning	Error Code	Behavior
	Move Destination unknown	A801	The move job is marked as failed. The association is released. The reason is logged and reported to the user.
Failed	Identifier does not match SOP class	A900	The move job is marked as failed. The association is released. The reason is logged and reported to the user.
	Unable to process	Cxxx	The move job is marked as failed. The association is released. The reason is logged and reported to the user.
Cancel	Sub-operations terminated due to Cancel Indication	FE00	The move job is marked as failed. The association is released. The reason is logged and reported to the user.
Warning	Sub-operations complete – One or more Failures	B000	The move job is marked as completed. The association is released.
Pending	Sub-operations are continuing	FF00	The move job continues.

Table 20: DICOM Command Communication Failure Behavior

Exception	Behavior
ARTIM Time-out	The move job fails in case of association setup. The reason is logged and reported to the user.
Reply Time-out	The move job fails and the association is aborted. The reason is logged and reported to the user.
Association Time-out SCU	N/A
Association aborted	The move job fails. The reason is logged and reported to the user.

4.2.1.3.4. Request Storage Commitment

4.2.1.3.4.1. Description and Sequencing of Activities

The RWA Request Storage Commitment involves the storage commitment of images on a remote system.

If configured, Storage Commitment will be initiated in a new association after closing the association of the related image storage (C-STORE). This new association will be open until the remote archive sends a storage commitment report (synchronous) or when the configured maximum time is passed. When this maximum configured period is passed, it is the responsibility of the remote archive to setup a new association with ViewForum and send the storage commitment report (asynchronous).

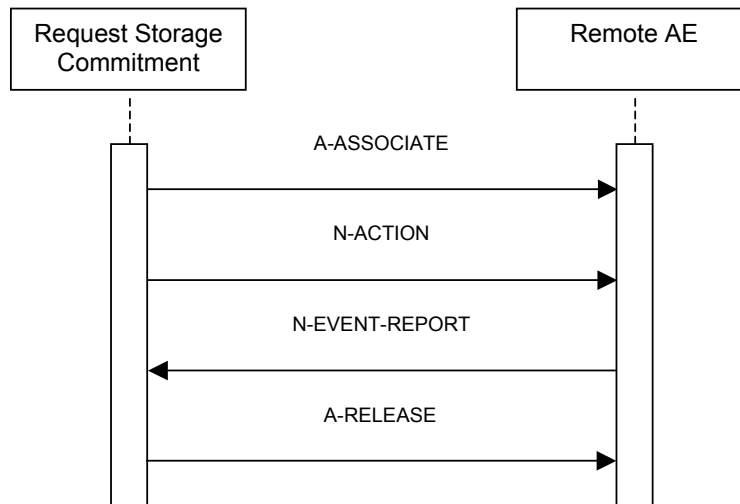


Figure 8: Sequencing of Synchronous RWA Request Storage Commitment

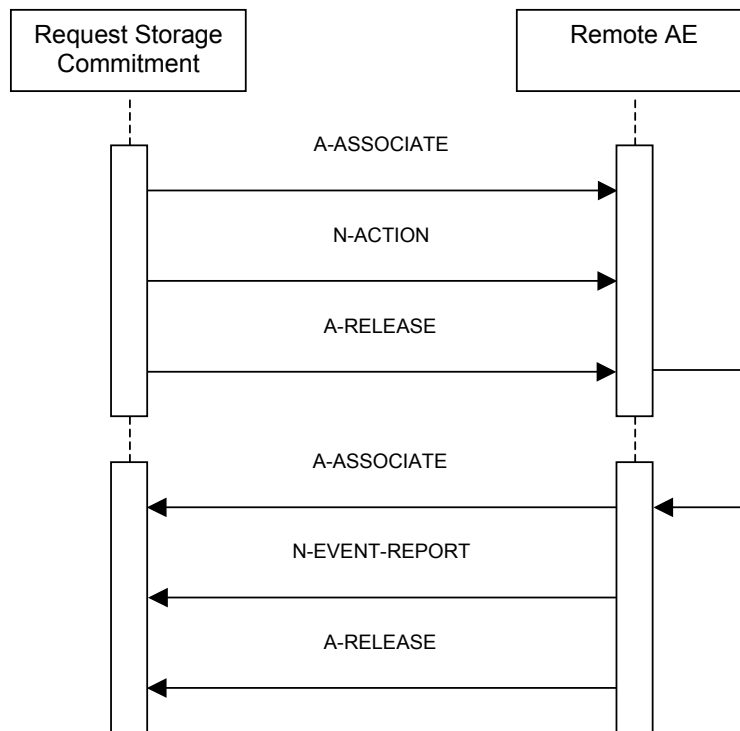


Figure 9: Sequencing of Asynchronous RWA Request Storage Commitment

4.2.1.3.4.2. Proposed Presentation Contexts

Each time an association is initiated, the association initiator proposes a number of Presentation Contexts to be used on that association. In this subsection, the Presentation Contexts proposed by the ViewForum AE for Request Storage Commitment are defined in Table 21.

Table 21: Proposed Presentation Contexts for Request Storage Commitment

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Storage Commitment Push Model	1.2.840.10008.1.20.1	ELE	1.2.840.10008.1.2.1	SCU	None
		EBE	1.2.840.10008.1.2.2	SCU	None
		ILE	1.2.840.10008.1.2	SCU	None

For performance reasons the ELE transfer syntax is preferred.

4.2.1.3.4.3. SOP Specific Conformance for SOP Class

The ViewForum AE provides standard conformance. The storage commitment service is only configurable for one remote node.

Following are the details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors.

Table 22: DICOM Command Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Operation complete	0000	Continues with waiting for storage commitment.
Failure	(any failure)	xxxx	The reason is logged.

The ViewForum AE does not take any more actions on receiving the N-EVENT-REPORT, even when failures exist (Event Type ID 2).

Table 23: DICOM Command Communication Failure Behavior

Exception	Behavior
ARTIM Time-out	The reason is logged.
Reply Time-out	The association is released. Continues with waiting for storage commitment.
Association Time-out SCU	The association is released. Continues with waiting for storage commitment.
Association aborted	Continues with waiting for storage commitment.

4.2.1.3.5. Print Images

4.2.1.3.5.1. Description and Sequencing of Activities

The RWA Print Images involves the printing of images by sending the selected images to a Print Management SCP (i.e. printer).

After selecting the print destination (out of choice list of configured printers) and some print parameters (depending on the configuration and the selected printer; these values can be configured too), the ViewForum AE shall initiate an association to the selected printer and use it to send the print job.

ViewForum also has an option for print preview.

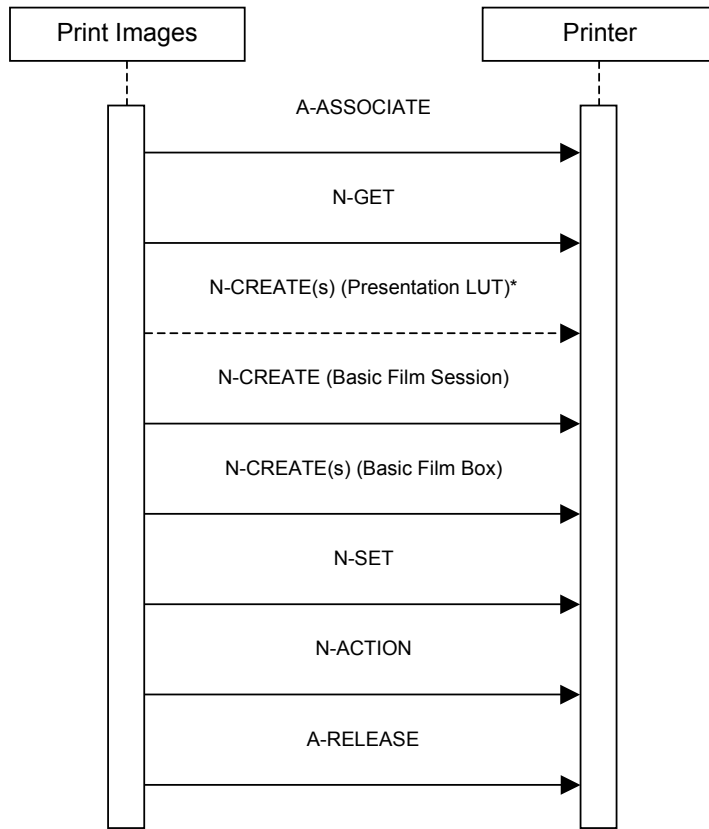


Figure 10: Sequencing of RWA Print Images

* Note that the Presentation LUT SOP class is only supported for Grayscale image printing.

4.2.1.3.5.2. Proposed Presentation Contexts

Each time an association is initiated, the association initiator proposes a number of Presentation Contexts to be used on that association. In this subsection, the Presentation Contexts proposed by the ViewForum AE for Print Images are defined in Table 24.

Table 24: Proposed Presentation Contexts for Print Images

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
See Note		ELE	1.2.840.10008.1.2.1	SCU	None
		EBE	1.2.840.10008.1.2.2	SCU	None
		ILE	1.2.840.10008.1.2	SCU	None

Note: The Presentation LUT SOP class and any of the standard Print Meta SOP classes as listed in Table 4.

For performance reasons the ELE transfer syntax is preferred.

4.2.1.3.5.3. SOP Specific Conformance for SOP Classes

All details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors are provided in Table 25 to Table 32.

Table 25: DICOM Command Response Status Handling Behavior for Printer N-GET

Service Status	Further Meaning	Error Code	Behavior
Success	Successful operation	0000	The print job continues.
Warning	(any warning)	xxxx	The print job continues and the warning is logged.
Failure	(any failure)	xxxx	The print job is marked as failed, the reason is logged and reported to the user.

Table 26: DICOM Command Response Status Handling Behavior for Presentation LUT N-CREATE

Service Status	Further Meaning	Error Code	Behavior
Success	Presentation LUT successfully created	0000	The print job continues.
Warning	Requested Min Density or Max Density outside of printer's operating range. The printer will use its respective minimum or maximum density value instead.	B605	The print job continues and the warning is logged.

Table 27: DICOM Command Response Status Handling Behavior for Basic Film Session N-CREATE

Service Status	Further Meaning	Error Code	Behavior
Success	Film Session successfully created	0000	The print job continues.
Warning	Memory Allocation not supported	B600	The print job continues and the warning is logged.

Table 28: DICOM Command Response Status Handling Behavior for Basic Film Box N-CREATE

Service Status	Further Meaning	Error Code	Behavior
Success	Film Box successfully created	0000	The print job continues.
Warning	Requested Min Density or Max Density outside of Printer's operating Range	B605	The print job continues and the warning is logged.
Failure	There is an existing Film Box that has not been printed	C616	The print job is marked as failed and the reason is logged.

Table 29: DICOM Command Response Status Handling Behavior for Basic Grayscale Image Box N-SET

Service Status	Further Meaning	Error Code	Behavior
Success	Image successfully stored in Image Box	0000	The print job continues.
Warning	Image Size is larger than Image Box Size – The Image has been de-magnified	B604	The print job continues and the warning is logged and reported to the user.
	Requested Min Density or Max Density outside of Printer's operating Range	B605	The print job continues and the warning is logged and reported to the user.
	Image Size is larger than Image Box Size – The Image has been cropped to fit	B609	The print job continues and the warning is logged and reported to the user.
	Image Size or combined Print Image Size is larger than Image Box Size – The Image or combined Print Image has been decimated to fit	B60A	The print job continues and the warning is logged and reported to the user.
Error	Image Size is larger than Image Box Size	C603	The print job is marked as failed and the reason is logged and reported to the user
	Insufficient Memory in Printer to store the Image	C605	The print job is marked as failed and the reason is logged and reported to the user
	Combined Print Image Size is larger than Image Box Size	C613	The print job is marked as failed and the reason is logged and reported to the user

Table 30: DICOM Command Response Status Handling Behavior for Basic Color Image Box N-SET

Service Status	Further Meaning	Error Code	Behavior
Success	Image successfully stored in Image Box	0000	The print job continues.
Warning	Image Size is larger than Image Box Size – The Image has been de-magnified	B604	The print job continues and the warning is logged and reported to the user.
	Requested Min Density or Max Density outside of Printer's operating Range	B605	The print job continues and the warning is logged and reported to the user.
	Image Size is larger than Image Box Size – The Image has been cropped to fit	B609	The print job continues and the warning is logged and reported to the user.
	Image Size or combined Print Image Size is larger than Image Box Size – The Image or combined Print Image has been decimated to fit	B60A	The print job continues and the warning is logged and reported to the user.
Error	Image Size is larger than Image Box Size	C603	The print job is marked as failed and the reason is logged and reported to the user.

Service Status	Further Meaning	Error Code	Behavior
	Insufficient Memory in Printer to store the Image	C605	The print job is marked as failed and the reason is logged and reported to the user.
	Combined Print Image Size is larger than Image Box Size	C613	The print job is marked as failed and the reason is logged and reported to the user.

Table 31: DICOM Command Response Status Handling Behavior for Basic Film Box N-ACTION

Service Status	Further Meaning	Error Code	Behavior
Success	Film accepted for printing	0000	The print job continues.
Warning	Film Box SOP Instance Hierarchy does not contain Image Box SOP Instances	B603	The print job continues and the warning is logged and reported to the user.
	Image Size is larger than Image Box Size – The Image has been de-magnified	B604	The print job continues and the warning is logged and reported to the user.
	Image Size is larger than Image Box Size – The Image has been cropped to fit	B609	The print job continues and the warning is logged and reported to the user.
	Image Size or combined Print Image Size is larger than Image Box Size – The Image or combined Print Image has been decimated to fit	B60A	The print job continues and the warning is logged and reported to the user.
Failure	Unable to create Print Job SOP Instance – Print Queue is full	C602	The print job is marked as failed and the reason is logged and reported to the user.
	Image Size is larger than Image Box Size	C603	The print job is marked as failed and the reason is logged and reported to the user.
	Combined Print Image Size is larger than Image Box Size	C613	The print job is marked as failed and the reason is logged and reported to the user.

Table 32: DICOM Command Response Status Handling Behavior for Printer N-EVENT-REPORT

Service Status	Further Meaning	Error Code	Behavior
Normal	Successful operation	0000	The print job is marked as completed.
Warning	(any warning)	xxxx	The print job is marked as completed and the warning is logged and reported to the user.
Failure	(any failure)	xxxx	The print job is marked as failed and the reason is logged and reported to the user

The behavior of the AE during communication failure is summarized in Table 33.

Table 33: DICOM Command Communication Failure Behavior

Exception	Behavior
ARTIM Time-out	Print job fails.

Exception	Behavior
Reply Time-out	The association is released.
Association Time-out SCU	The association is released.
Association aborted	The Print job is marked as failed. The reason is logged and reported to the user.

4.2.1.3.6. Request Printer Status

4.2.1.3.6.1. Description and Sequencing of Activities

The RWA Request Printer Status involves the request for the printer status of the configured Print Management SCP's (i.e. printers).

The ViewForum AE will periodically request the printer status. If an association already exists for a print job (RWA Print Images) then the ViewForum AE shall use this association, otherwise a new association shall be initiated.

The status codes as returned by the printer shall be logged for service purposes and shall not be shown on the GUI.

The Printer Status Tool may be used to reveal the received printer status.

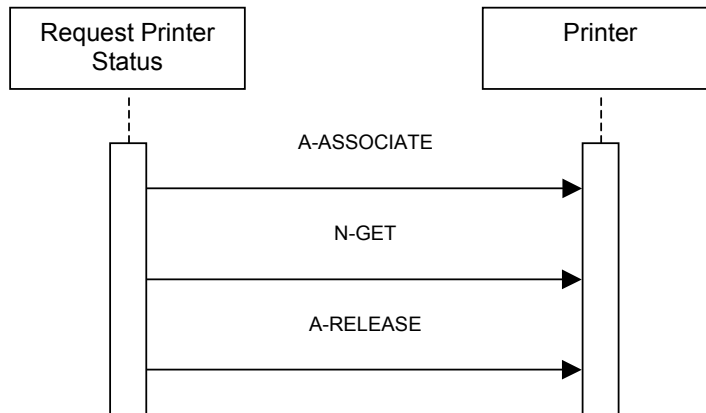


Figure 11: Sequencing of RWA Request Printer Status

4.2.1.3.6.2. Proposed Presentation Contexts

Each time an association is initiated, the association initiator proposes a number of Presentation Contexts to be used on that association. In this subsection, the Presentation Contexts proposed by the ViewForum AE for Request Printer Status are defined in Table 34.

Table 34: Proposed Presentation Contexts for Request Printer Status

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Printer	1.2.840.10008.5.1 .1.16	ELE	1.2.840.10008.1.2.1	SCU	None
		EBE	1.2.840.10008.1.2.2	SCU	None
		ILE	1.2.840.10008.1.2	SCU	None

For performance reasons the ELE transfer syntax is preferred and shall be chosen in case multiple Transfer Syntaxes are accepted in the Association Acceptance.

4.2.1.3.6.3. SOP Specific Conformance for SOP Class

The ViewForum AE provides standard conformance to the Printer SOP class.

All details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors are provided in Table 35.

Table 35: DICOM Command Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Matching is complete	0000	The print job continues.
Warning	(any warning)	xxxx	The print job continues and the warning is logged and reported to the user.
Error	(any failure)	xxxx	The print job is marked as failed. The reason is logged and reported to the user.

The behavior of the AE during communication failure is summarized in Table 36.

Table 36: DICOM Command Communication Failure Behavior

Exception	Behavior
ARTIM Timeout	Print job fails.
Reply Time-out	The association is released.
Association Time-out SCU	The association is released.
Association aborted	The print job is marked as failed. The reason is logged and reported to the user.

4.2.1.4. Association Acceptance Policy

ViewForum shall accept Associations for the following purposes:

- To allow remote applications to verify application level communication with ViewForum; ref. section 4.2.1.4.1 Request Verification.
- To allow remote applications to store images in the ViewForum database (i.e. image import); ref. section 4.2.1.4.2 Import Images.
- To allow remote applications to query the ViewForum database; ref. section 4.2.1.4.3 Query Local Images.
- To allow remote applications to retrieve images from the ViewForum database; ref. section 4.2.1.4.4 Retrieve Local Images.

The ViewForum AE shall reject association requests from unknown applications, i.e. applications that offer an unknown “calling AE title”. An application is known if – and only if – it is defined during configuration of the ViewForum system.

The ViewForum AE shall reject association requests from applications that do not address the ViewForum AE, i.e. applications that offer a wrong “called AE title”. The ViewForum AE title is defined during configuration of the ViewForum system.

4.2.1.4.1. Request Verification

4.2.1.4.1.1. Description and Sequencing of Activities

The ViewForum AE shall accept associations from systems that wish to verify application level communication using the C-ECHO command.

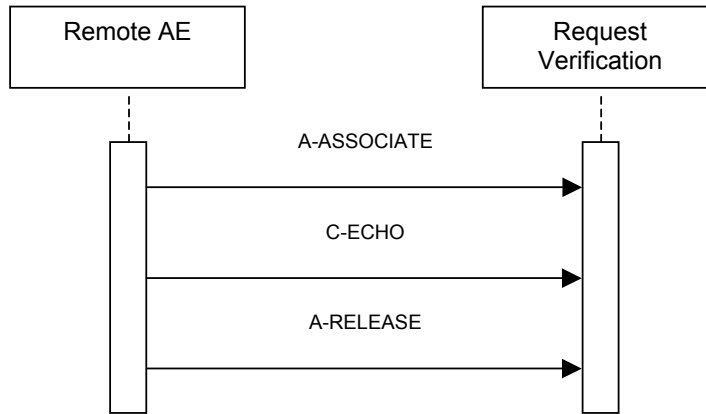


Figure 12: Sequencing of RWA Request Verification

4.2.1.4.1.2. Accepted Presentation Contexts

The ViewForum AE shall be able to accept the presentation contexts as specified in the next table.

Table 37: Acceptable Presentation Contexts for Request Verification

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification	1.2.840.10008.1.1	ILE	1.2.840.10008.1.2	SCP	None
		ELE	1.2.840.10008.1.2.1	SCP	None
		EBE	1.2.840.10008.1.2.2	SCP	None

For performance reasons the ELE transfer syntax is preferred and shall be chosen in case multiple Transfer Syntaxes are proposed in the Association Negotiation.

The ViewForum AE shall accept all contexts in the intersection of the proposed and acceptable Presentation Contexts. This means that the ViewForum AE accepts multiple proposed Presentation Contexts with the same SOP class but different Transfer Syntaxes.

There is no check for duplicate contexts, and these will therefore be accepted.

4.2.1.4.1.3. SOP Specific Conformance for SOP Class

The ViewForum AE provides standard conformance to the Verification service class.

The behavior of an Application Entity shall be summarized as shown in Table 38. The standard as well as the manufacturer specific status codes and their corresponding behavior shall be specified.

Table 38: Verification C-ECHO Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
N/A			

4.2.1.4.2. Import Images

4.2.1.4.2.1. Description and Sequencing of Activities

The ViewForum AE shall accept associations from systems that wish to store images in the ViewForum database using the C-STORE command.

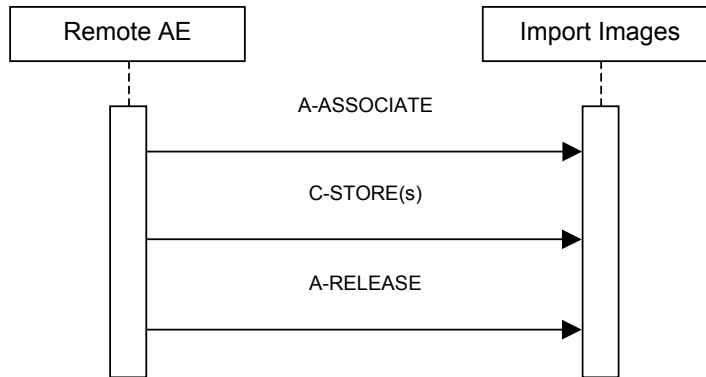


Figure 13: Sequencing of RWA Import Images

4.2.1.4.2.2. Accepted Presentation Contexts

The ViewForum AE shall be able to accept the presentation contexts as specified in the next table.

Table 39: Acceptable Presentation Contexts for Import Images

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
See Note 1		ILE	1.2.840.10008.1.2	SCP	None
		ELE	1.2.840.10008.1.2.1	SCP	None
		EBE	1.2.840.10008.1.2.2	SCP	None
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	JPEG Baseline See Note 2	1.2.840.10008.1.2.4.50	SCP	None
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	JPEG Baseline See Note 2	1.2.840.10008.1.2.4.50	SCP	None

Note 1: Any of the standard image storage and private SOP classes listed in Table 4.

Note 2: Only for Photometric Interpretation of RGB and YBR_FULL_422. Therefore JPEG Baseline transfer syntax may NOT be configured for SCU systems that are capable of handling storage of monochrome images too.

For performance reasons the ELE transfer syntax is preferred and shall be chosen in case multiple Transfer Syntaxes are proposed in the Association Negotiation.

The ViewForum AE shall accept all contexts in the intersection of the proposed and acceptable Presentation Contexts. This means that the ViewForum AE accepts multiple proposed Presentation Contexts with the same SOP class but different Transfer Syntaxes.

There is no check for duplicate contexts, and these will therefore be accepted.

4.2.1.4.2.3. SOP Specific Conformance for SOP Classes

The ViewForum AE provides standard level 1 (Base) conformance to the Storage service class.

If the ViewForum AE imports an image and during the association negotiation the Presentation State SOP class was not negotiated, then the ViewForum AE creates a Presentation State instance for the imported image.

The following table gives an overview of the image formats that can be viewed or stored.

Table 40: Support for Photometric Interpretation

Photometric Interpretation	Storing	Viewing
MONOCHROME1	✓	✓
MONOCHROME2	✓	✓
RGB	✓	✓ Instances are not sorted
YBR_FULL	✓	-
YBR_FULL_422	✓*	✓*
YBR_PARTIAL_422	✓	-
PALETTE COLOR	✓	-
Other	✓	-

* Compressed YBR_FULL_422 images received per JPEG Baseline transfer shall be stored (and consequently viewed) as RGB images.

If the ViewForum AE receives improper DICOM, ViewForum tries as much as possible to make it proper DICOM (if configured to do so). But ViewForum also tries to remain as transparent as possible on images; on export the images must be changed only to such extent as really necessary. Therefore it is not guaranteed that all DICOM violations of incoming images are repaired (e.g. enumerated values are not changed). Thus improper DICOM import may result in improper DICOM export from the ViewForum AE (no checks are available for incorrect UIDs, Date/Time formats, etc.).

ViewForum stores all additional standard, private and retired attributes in received images. Retrieval of these attributes VR's is only possible (by means of a C-STORE) if the following conditions are satisfied:

- The image was encoded (when ViewForum was C-STORE SCP) using one of the explicit value representations; or
- The image was encoded (when ViewForum was C-STORE SCP) using implicit value representation and the destination (i.e. a remote C-STORE SCP) has accepted implicit value representation as the only transfer syntax applicable to the storage SOP class of the image (with ViewForum as C-STORE SCU).

Otherwise the VR shall be set to unknown (UN).

Important implementation remarks and restrictions:

- The DICOM standard does not guarantee that the advanced ViewForum applications can process the received images. This depends on the presence and consistency of a set of attributes in these images. The conditions for running the ViewForum applications shall be specified in separate Annexes.
- ViewForum does NOT support IVUS (Intravascular Ultrasound) images.
- See section 8.1.4, Coerced/Modified fields, for details on coerced and modified attributes.

The response status behavior of the ViewForum AE is as described in Table 41. The standard as well as the manufacturer specific status codes and their corresponding behavior shall be specified.

Table 41: Storage C-STORE Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Storage is complete	0000	The image(s) shall be stored in the ViewForum database.
Refused	Out of Resources	A700	The ViewForum database is full – recovery from this condition is left to the SCU. ViewForum shall send a notification, log the condition, and abort the association.
Error	Data set does not match SOP class	A900	The SOP class of the image(s) does not match the negotiated abstract syntax. ViewForum shall send a notification, log the condition, and abort the association.
	Cannot understand	C000	The image(s) cannot be parsed. ViewForum shall send a notification, log the condition, and abort the association.
Warning	Coercion of Data Elements	B000	N/A
	Elements discarded	B006	N/A
	Data set does not match SOP class	B007	N/A

4.2.1.4.3. Query Local Images

4.2.1.4.3.1. Description and Sequencing of Activities

The ViewForum AE shall accept associations from systems that wish to query the ViewForum database using the C-FIND command.

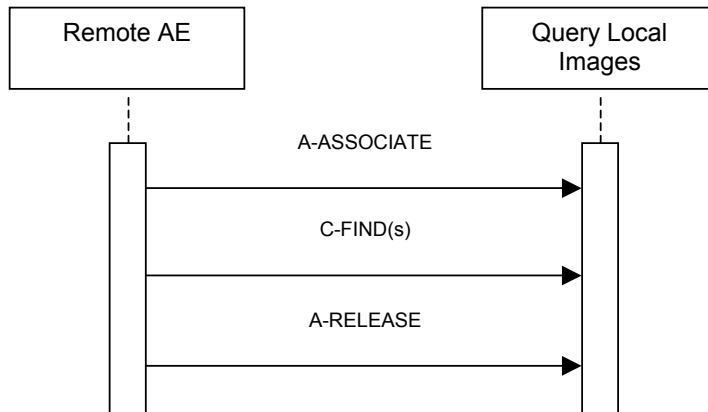


Figure 14: Sequencing of RWA Query Local Images

4.2.1.4.3.2. Accepted Presentation Contexts

The ViewForum AE shall be able to accept the presentation contexts as specified in the next table.

Table 42: Acceptable Presentation Contexts for Query Local Images

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
See Note		ILE	1.2.840.10008.1.2	SCP	None
		ELE	1.2.840.10008.1.2.1	SCP	None
		EBE	1.2.840.10008.1.2.2	SCP	None

Note: Any of the standard Query/Retrieve C-FIND SOP classes listed in Table 4.

For performance reasons the ELE transfer syntax is preferred and shall be chosen in case multiple Transfer Syntaxes are proposed in the Association Negotiation.

The ViewForum AE shall accept all contexts in the intersection of the proposed and acceptable Presentation Contexts. This means that the ViewForum AE accepts multiple proposed Presentation Contexts with the same SOP class but different Transfer Syntaxes.

There is no check for duplicate contexts, and these will therefore be accepted.

4.2.1.4.3.3. SOP Specific Conformance for SOP Classes

The ViewForum AE provides standard conformance to the Query/Retrieve service class. Relational queries are not supported. The ViewForum AE shall handle simultaneous C-FIND requests simultaneously.

The ViewForum database distinguishes two patients with the same Patient ID but different Patient's Name or Patient's Birth Date. However, the DICOM Query/Retrieve service class has Patient ID as a unique key at Patient level, and thus two patients with the same Patient ID cannot be distinguished via a standard DICOM Query.

The following query keys shall be supported.

Table 43: Supported Query Keys

Query Level	Query Key		Standard Matching
	Name	Tag	
Patient	Patient's Name	(0010,0010)	✓
	Patient ID	(0010,0020)	✓
Study	Study Date	(0008,0020)	✓
	Study Time	(0008,0030)	✓
	Accession Number	(0008,0050)	✓
	Study Instance UID	(0020,000D)	✓
	Study ID	(0020,0010)	✓
Series	Modality	(0008,0060)	✓
	Series Instance UID	(0020,000E)	✓
	Series Number	(0020,0011)	✓
Image	SOP Instance UID	(0008,0018)	✓
	Instance Number	(0020,0013)	✓

When querying optional keys the ViewForum will respond successfully for available keys if queried per universal matching; otherwise it will respond with warning.

Note that when querying optional keys with non-universal matching the ViewForum will return information using universal matching for those keys.

Note that when a query is performed per Patient/Study Only Query/Retrieve Information Model SOP class on Patient Level, the ViewForum always sends back the attribute "Patient's Name" (0010,0010), also when it was not requested.

The response status behavior of the ViewForum AE is as described in Table 44. The standard as well as the manufacturer specific status codes and their corresponding behavior shall be specified.

Table 44: Query/Retrieve C-FIND Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Matching is complete	0000	The C-FIND request handling is completed, no more C-FIND responses are sent.
Refused	Out of Resources	A700	N/A
Failed	Identifier does not match SOP class	A900	N/A
	Unable to process	C000	The C-FIND request cannot be parsed. ViewForum logs the reason.
Cancel	Matching terminated due to Cancel Request	FE00	The C-FIND request is canceled, no more C-FIND responses are sent.
Pending	Matches are continuing – Current match is supplied and any optional keys were supported in the same manner as required keys	FF00	The C-FIND responses are continuing.
	Matches are continuing – Warning that one or more optional keys were not supported for existence and/or matching for this identifier	FF01	The C-FIND responses are continuing.

4.2.1.4.4. Retrieve Local Images

4.2.1.4.4.1. Description and Sequencing of Activities

The ViewForum AE shall accept associations from systems that wish to retrieve images from the ViewForum database using the C-MOVE command.

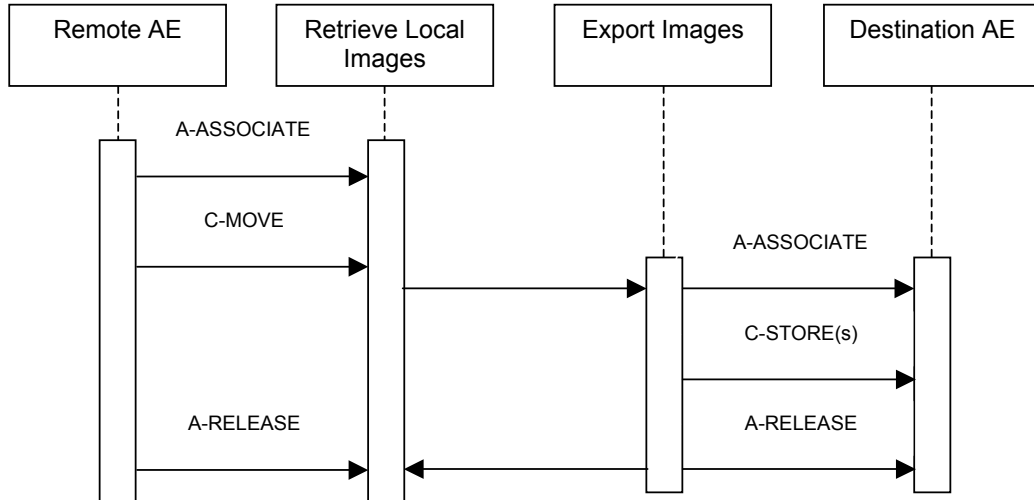


Figure 15: Sequencing of RWA Retrieve Local Images

After RWA Retrieve Local Images the RWA Export Images is started; the RWA Export Images is described in section 4.2.1.3.1.

4.2.1.4.4.2. Accepted Presentation Contexts

The ViewForum AE shall be able to accept the presentation contexts as specified in the next table.

Table 45: Acceptable Presentation Contexts for Retrieve Local Images

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
See Note		ILE	1.2.840.10008.1.2	SCP	None
		ELE	1.2.840.10008.1.2.1	SCP	None
		EBE	1.2.840.10008.1.2.2	SCP	None

Note: Any of the standard Query/Retrieve C-MOVE SOP classes listed in Table 4.

For performance reasons the ELE transfer syntax is preferred and shall be chosen in case multiple Transfer Syntaxes are proposed in the Association Negotiation.

The ViewForum AE shall accept all contexts in the intersection of the proposed and acceptable Presentation Contexts. This means that the ViewForum AE accepts multiple proposed Presentation Contexts with the same SOP class but different Transfer Syntaxes.

There is no check for duplicate contexts, and these will therefore be accepted.

4.2.1.4.4.3. SOP Specific Conformance for SOP Classes

The response status behavior of the ViewForum AE is as described in Table 46. The standard as well as the manufacturer specific status codes and their corresponding behavior shall be specified.

Table 46: Query/Retrieve C-MOVE Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Sub-operations complete – No Failures	0000	The C-MOVE command has been completed.
Refused	Out of Resources – Unable to calculate number of matches	A701	N/A
	Out of Resources – Unable to perform Sub-operations	A702	N/A
	Move Destination unknown	A801	No C-STORE command will be sent. ViewForum logs the reason.
Failed	Identifier does not match SOP class	A900	N/A
	Unable to process	C000	The C-MOVE request cannot be parsed. No Store Command will be sent. ViewForum logs the reason.
Cancel	Sub-operations terminated due to Cancel Indication	FE00	The C-MOVE request is canceled, no more C-MOVE responses are sent.
Warning	Sub-operations complete – One or more Failures	B000	N/A
Pending	Sub-operations are continuing	FF00	Approximately every 30 seconds to indicate progress.

4.3. Network Interfaces

4.3.1. Physical Network Interface

The ViewForum application provides DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of [DICOM].

ViewForum inherits its TCP/IP stack from Windows XP (i.e. the operating system platform).

ViewForum supports a single network interface: Ethernet ISO.8802-3, Standard AUI, optional twisted pair 10/100-BaseT.

4.3.2. Additional Protocols

None.

4.4. Configuration

The ViewForum system is configured by means of a configuration program. This program is accessible at start-up of the ViewForum system. It is password protected and intended to be used by Philips Customer Support Engineers only.

The configuration program shall prompt the Customer Support Engineer to enter configuration information as required by the ViewForum application.

4.4.1. AE Title/Presentation Address Mapping

An important installation issue is the translation from AE title to Presentation Address. How this is to be performed shall be described in this section.

4.4.1.1. Local AE Titles

Per default the ViewForum AE title is equal to the IP host name. At installation the Customer Support Engineer can change this host name. The ViewForum AE can be changed independently.

ViewForum listens on port 3010. This port number is not configurable.

Table 47: AE Title Configuration Table

Application Entity	Default AE Title	Default TCP/IP Port
ViewForum AE	<IP host name>	3010*

* Not configurable.

4.4.1.2. Remote AE Title/Presentation Address Mapping

4.4.1.2.1. Remote Association Initiators

All relevant remote applications able to setup a DICOM association towards ViewForum must be configured at ViewForum configuration time. The Customer Support Engineer must provide the following information for each remote application:

- The Application Entity Title.
- The SOP classes and transfer syntaxes for which ViewForum accepts associations.

4.4.1.2.2. Remote Association Acceptors

The following information must be provided for all relevant remote applications that are able to accept DICOM associations from ViewForum:

- The Application Entity Title.
- The host name/IP address on which the remote application resides.
- The port number at which the remote application accepts association requests.

4.4.2. Parameters

The specification of important operational parameters, and if configurable, their default value and range, shall be specified here.

The configuration parameters are given in Table 48, categorized in the following sections:

- General Parameters of ViewForum.
- Local Configurable Parameters of the ViewForum AE.
- Remote Configurable Parameters of the ViewForum AE.
- General Print Parameters.
- Printer Specific Print Parameters.

Table 48: Configuration Parameters table

Parameter	Configurable	Default Value
General Parameters of ViewForum		
Time-out waiting for acceptance or rejection Response to an Association Open Request. (Application Level timeout)	No	-
General DIMSE level time-out values	No	-
Time-out waiting for response to TCP/IP connect request. (Low-level timeout)	No	-

Parameter	Configurable	Default Value
Time-out waiting for acceptance of a TCP/IP message over the network. (Low-level timeout)	No	-
Time-out for waiting for data between TCP/IP packets. (Low-level timeout)	No	-
Any changes to default TCP/IP settings, such as configurable stack parameters.	No	-
Local Configurable Parameters of the ViewForum AE		
Size constraint in maximum object size (see note)	No	-
Maximum PDU size the AE can receive	Yes	0 (unlimited)
Maximum PDU size the AE can send	No	-
AE specific DIMSE level time-out values	No	-
Number of simultaneous associations by Service and/or SOP class	No	-
SOP class support	Yes	none
Transfer Syntax support ¹	Yes	ELE
Remote Configurable Parameters of the ViewForum AE		
Size constraint in maximum object size (see note)	No	-
Maximum PDU size the AE can receive	Yes	0 (unlimited)
Maximum PDU size the AE can send	No	-
AE specific DIMSE level time-out values	No	-
Number of simultaneous associations by Service and/or SOP class	No	-
SOP class support	Yes	none
Transfer Syntax support	Yes	ELE
Storage Commitment request must be sent after Storage request	Yes	not
Storage Commitment time-out (synchronous to asynchronous)	Yes	none
Automatic conversion of images of SOP classes not supported by remote systems into Secondary Capture Image Storage SOP instances	Yes	convert to SC
Export of pure DICOM images (i.e. only the standard DICOM attributes as defined in the related IOD) or extended DICOM images (with additional Standard DICOM, Private and Retired attributes)	Yes	allow all attributes
Support of overlays for DICOM node not supporting Presentation State objects ²	Yes	enabled
Support of overlays for DICOM node supporting Presentation State objects ²	Yes	disabled
Support of overlays for CD ²	Yes	disabled
General Print Parameters		
The DICOM printers that may be selected by the operator	Yes	none
Printer Specific Print Parameters³		
Medium type	Yes	all available
Film size ID (i.e. Media size)	Yes	all available
Resolution (300/600 dpi)	Yes	300
Color model (8/16 bits color)	Yes	8
Min Density	Yes	0
Max Density	Yes	0

Note 1: The JPEG Baseline transfer syntax is only supported for RGB and YBR_FULL_422 images; therefore JPEG Baseline may NOT be configured for systems that are capable of handling storage of monochrome images too.

Note 2: The ViewForumCopy-tool can override the configured setting of overlay support.

Note 3: These print parameters can be selected from choice lists. These choice lists are defined via so-called prototypes for each type of printer and print medium. These prototypes are also configurable.

5. MEDIA INTERCHANGE

5.1. Implementation Model

The Implementation Model identifies the DICOM Application Entities in a specific implementation, and relates the Application Entities to Real-World Activities.

5.1.1. Application Data Flow

The ViewForum 2003 system consists of one single application entity only: the ViewForum Application Entity (ViewForum AE).

Figure 16 shows the Media Interchange application data flow as a functional overview of the ViewForum AE.

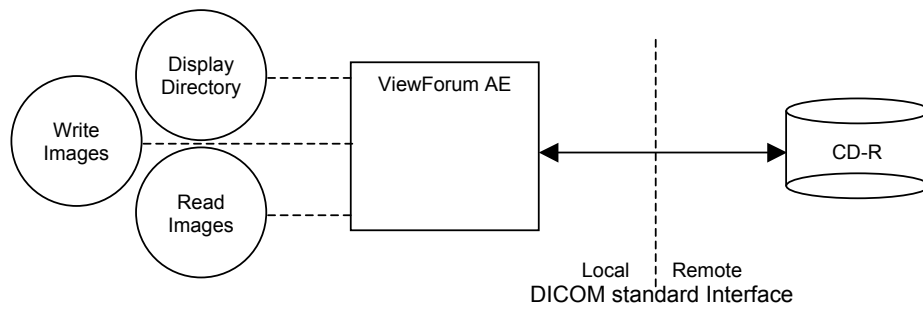


Figure 16: Media Interchange Application Data Flow Diagram

The ViewForum AE will act as a FSR when reading the directory of the medium. The ViewForum AE will act as a FSC/FSU when writing the selected images in a patient folder onto the CD-R medium.

5.1.2. Functional Definitions of AE's

This section shall describe in general terms the functions to be performed by the AE, and the DICOM services used to accomplish these functions.

5.1.2.1. Functional Definition of ViewForum AE

The ViewForum AE is the one and only application entity within ViewForum. It includes the following service class.

Media Storage Service Class

The ViewForum AE can perform the Media Storage service as SCU, with capabilities for RWA Display Directory (as FSR), RWA Write Images (as FSC/FSU), and RWA Read Images (as FSR).

5.1.3. Sequencing of Real World Activities

Whenever a CD has to be written the ViewForum AE first tries to read the DICOMDIR. The ViewForum AE will compile the updated DICOMDIR and any required DICOM images into a CD session image; this CD session image will be written to CD.

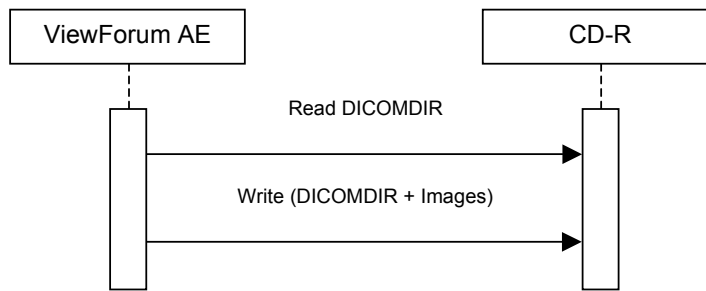


Figure 17: Sequencing of RWA Write Images

5.1.4. File Meta Information for Implementation Class and Version

This section shall be used to list the values assigned to the File Meta Information attributes (ref. [DICOM] PS 3.10) that pertain to the Implementation Class and Version.

The Implementation Class UID and the Implementation Version Name in the File Meta Header are as specified for Networking (ref. Table 9 in section 4.2.1.2.4).

Table 49: DICOM Implementation Class and Version for ViewForum AE

File Meta Information Version	00, 01
Implementation Class UID	1.3.46.670589.5.2.21
Implementation Version Name	ViewForum R3.2

5.2. AE Specifications

The next section in the DICOM Conformance Statement contains the specification of the one and only ViewForum Application Entity: ViewForum AE.

5.2.1. ViewForum AE

The ViewForum AE provides Standard Conformance to the DICOM Media Storage Service and File Format ([DICOM] PS 3.10) and the Media Storage Application Profiles STD-GEN-CD ([DICOM] PS 3.11) for reading and writing. ViewForum supports multi-patient and multi-session CD-R disks, both for reading and writing.

The supported Application Profiles, their Roles and the Service Class (SC) options, all defined in DICOM terminology, are listed in Table 50.

Table 50: AE Related Application Profiles, Real-World Activities, and Roles

Supported Application Profile	Real-World Activity	Roles	SC Option
STD-GEN-CD	Display Directory	FSR	Interchange
	Write Images	FSC, FSU	Interchange
	Read Images	FSR	Interchange

Only adding on instances is supported for the FSU, deleting is not supported.

5.2.1.1. File Meta Information for the ViewForum AE

The Source Application Entity Title is configurable (ref. section 5.4 Media Configuration).

5.2.1.2. Real-World Activities

The first sentence in this section shall state the Roles and Media Storage Service Class Options supported by the ViewForum AE.

5.2.1.2.1. Display Directory

When a database open action is initiated on the CD-R then the ViewForum AE acts as an FSR using the interchange option to read the DICOMDIR of the CD-R medium.

This will result in an overview of the patients, studies, series and images on the ViewForum screen.

5.2.1.2.1.1. Media Storage Application Profile

As depicted in Table 50, the ViewForum AE supports the RWA Display Directory for the STD-GEN-CD Application Profile.

5.2.1.2.1.1.1. Options

The mandatory DICOMDIR keys are required for the correct display of directory information. The display is structured according the DICOM Composite Information Model: Patient, Study, Series, and Image.

5.2.1.2.2. Write Images

When an image transfer to CD-R is initiated then the ViewForum AE acts as an FSC or FSU using the interchange option to export SOP Instances from the local database to a CD-R medium.

5.2.1.2.2.1. Media Storage Application Profile

As depicted in Table 50, the ViewForum AE supports the RWA Write Images for the STD-GEN-CD Application Profile.

5.2.1.2.2.1.1. Options

The same remarks as in section 4.2.1.3.1.3 about the existence of Optional, Retired and Private Attributes are applicable.

The DICOMDIR file will be extended when new images are written. In case some attributes are not present in an image but are specified as mandatory in the DICOMDIR definition in DICOM Media, a generated value will be filled in.

Implementation remarks and restrictions

When writing the DICOMDIR records, key values are generated when no value of the corresponding attribute is supplied, according to the following tables.

Table 51: Generated Keys

Key	Tag	Generated Value
Patient Keys		
Patient ID	(0010,0020)	At import ViewForum each time creates a new value based on the Study Instance UID for each new study written to the CD-R (even if this study belongs to a patient recorded earlier). Otherwise the default-generated value shall be a succession of "UNKNOWN", the Patient's Name, the Patient's Birth Date, and the Patient's Sex, concatenated by using underscore characters.

Key	Tag	Generated Value
Study Keys		
Study Date	(0008,0020)	Current date
Study Time	(0008,0030)	Current time
Study ID	(0020,0010)	"UNKNOWN"
Series Keys		
Series Number	(0020,0011)	1
Image Keys		
Instance Number	(0020,0013)	1

The default value for the Pixel Intensity Relationship (0028,1040) is set to DISP.

5.2.1.2.3. Read Images

When an image transfer from CD-R is initiated then the ViewForum AE acts as an FSR using the interchange option to import SOP Instances from the CD-R medium.

5.2.1.2.3.1. Media Storage Application Profile

As depicted in Table 50, the ViewForum AE supports the RWA Read Images for the STD-GEN-CD Application Profile.

5.2.1.2.3.1.1. Options

The mandatory attributes of the DICOM images are required for the correct storage of the images in the ViewForum internal image database. Optional attributes and Retired/Private attributes are stored too – if present; this is equivalent with the level 2 (Full) conformance for the Storage service class in the Network support; ref. section 4.2.1.4.2.

The same remarks as in section 4.2.1.4.2.3 about the storage of images and about requirements to process read images via the dedicated ViewForum application functions are applicable.

5.3. Augmented and Private Application Profiles

This section shall be used for the description of Augmented and Private Application Profiles.

5.3.1. Augmented Application Profiles

None.

5.3.2. Private Application Profiles

None.

5.4. Media Configuration

Any configuration issues may be found in the Networking section 4.4 Configuration.

6. SUPPORT OF CHARACTER SETS

ViewForum supports the extended character set ISO 2022 IR 100, which is the Latin alphabet No 1, supplementary set.

Characters stored with DICOM defined but ViewForum unsupported character set will be displayed as question marks “?”.

When the ViewForum AE receives images with undefined character set then the import will be terminated with error status code.

7. SECURITY

7.1. Security Profiles

None supported.

7.2. Association level security

None supported.

Any calling AE title and/or IP address may open an association.

7.3. Application level security

None supported.

8. ANNEXES

8.1. IOD Contents

8.1.1. Created SOP Instances

This section specifies each IOD created by the ViewForum AE.

Used abbreviations are:

ALWAYS	the module shall always be present
EMPTY	the (mandatory) module shall not contain any attributes
MAYBE	the module may be present under specified condition
NEVER	the module shall not be present
NOT	the module shall not be present for actual condition
OPTIONAL	the module may be available, depending on source object
W	the attribute shall always be present with value
WC	the attribute shall be present with value under specified condition
WO	the attribute shall always be present without value
WOC	the attribute shall be present without value under specified condition
WVO	the attribute shall always be present, either with or without value
WVOC	the attribute shall be present, either with or without value, under specified condition
AUTO	the attribute value is generated automatically
CONF	the attribute value source is a configurable parameter
IMPL	the attribute value source is a user-implicit configuration setting
SPEC	the attribute value source is a specific DICOM object
USER	the attribute value source is explicit user input

8.1.1.1. Storage Commitment Push Model SOP Class

Table 52: Modules of the Storage Commitment Push Model SOP Class

Information Entity	Module Name	Usage
Image	SOP Common Module	EMPTY
	Storage Commitment Module	ALWAYS (N-ACTION)

Table 53: Created Storage Commitment Push Model SOP Class Attributes

Name	Tag	VR	Definition	Comment
Storage Commitment Module				
Transaction UID	(0008,1195)	UI	W, AUTO	-
Referenced SOP Sequence	(0008,1199)	SQ	W, AUTO	-
> Referenced SOP Class UID	(0008,1150)	UI	W, SPEC	-
> Referenced SOP Instance UID	(0008,1155)	UI	W, SPEC	-

8.1.1.2. Basic Film Session SOP Class

Table 54: Modules of the Basic Film Session SOP Class

Information Entity	Module Name	Usage
Image	SOP Common Module	EMPTY
Film	Basic Film Session Presentation Module	ALWAYS (N-CREATE)
	Basic Film Session Relationship Module	EMPTY

Table 55: Created Basic Film Session SOP Class Attributes

Name	Tag	VR	Definition	Comment
Basic Film Session Presentation Module				
Number of Copies	(2000,0010)	IS	W, IMPL / USER	Enumerated values: 1 to 99.
Print Priority	(2000,0020)	CS	W, IMPL / USER	Enumerated value: HIGH
Medium Type	(2000,0030)	CS	W, IMPL	Enumerated values: BLUE FILM, CLEAR FILM, PAPER
Film Destination	(2000,0040)	CS	W, IMPL	Enumerated values: MAGAZINE, PROCESSOR

8.1.1.3. Basic Film Box SOP Class

Table 56: Modules of the Basic Film Box SOP Class

Information Entity	Module Name	Usage
Image	SOP Common Module	EMPTY
Film	Basic Film Box Presentation Module	ALWAYS (N-CREATE)
	Basic Film Box Relationship Module	ALWAYS

Table 57: Created Basic Film Box SOP Class Attributes

Name	Tag	VR	Definition	Comment
Basic Film Box Presentation Module				
Image Display Format	(2010,0010)	ST	W, CONF	Enumerated values: CUSTOM\1, STANDARD\1,1
Film Orientation	(2010,0040)	CS	WC, CONF	Enumerated values: LANDSCAPE, PORTRAIT
Film Size ID	(2010,0050)	CS	W, CONF	Defined terms: A3, A4, 8INX10IN, 8_5INX11IN, 10INX12IN, 10INX14IN, 11INX14IN, 11INX17IN, 14INX14IN, 14INX17IN, 24CMX24CM, 24CMX30CM
Magnification Type	(2010,0060)	CS	WC, CONF	Enumerated value: NONE
Min Density	(2010,0120)	US	WC, CONF	If configured value is greater than 0.
Max Density	(2010,0130)	US	WC, CONF	If configured value is greater than 0.
Trim	(2010,0140)	CS	WC, CONF	Enumerated values: NO, YES

Name	Tag	VR	Definition	Comment
Configuration Information	(2010,0150)	ST	WC, CONF	Contains a vendor specific Lookup-table (LUT); should be applied by the DICOM printer if LUT data is present.
Basic Film Box Relationship Module				
Referenced Film Session Sequence	(2010,0500)	SQ	W, AUTO	Parent Film Session.
> Referenced SOP Class UID	(0008,1150)	UI	W, AUTO	-
> Referenced SOP Instance UID	(0008,1155)	UI	W, AUTO	-

8.1.1.4. Basic Grayscale Image Box SOP Class

Table 58: Modules of the Basic Grayscale Image Box SOP Class

Information Entity	Module Name	Usage
Image	SOP Common Module	EMPTY
	Image Box Pixel Presentation Module	ALWAYS (N-SET)

Table 59: Created Basic Grayscale Image Box SOP Class Attributes

Name	Tag	VR	Definition	Comment
Image Box Pixel Presentation Module				
Image Position	(2020,0010)	US	W, AUTO	Enumerated value: 1
Polarity	(2020,0020)	CS	W, AUTO	Enumerated value: NORMAL
Basic Grayscale Image Sequence	(2020,0110)	SQ	W, AUTO	-
> Samples per Pixel	(0028,0002)	US	W, AUTO	Enumerated value: 1
> Photometric Interpretation	(0028,0004)	CS	W, AUTO	Enumerated value: MONOCHROME2
> Rows	(0028,0010)	US	W, IMPL	Depending on the selected printer type and film size.
> Columns	(0028,0011)	US	W, IMPL	Depending on the selected printer type and film size.
> Bits Allocated	(0028,0100)	US	W, AUTO	Enumerated values: 8, 16
> Bits Stored	(0028,0101)	US	W, IMPL	Enumerated values: 8, 12
> High Bit	(0028,0102)	US	W, AUTO	Enumerated values: 7, 11
> Pixel Representation	(0028,0103)	US	W, AUTO	Enumerated value: 0
> Pixel Data	(7FE0,0010)	OB OW	W, AUTO	-

8.1.1.5. Basic Color Image Box SOP Class

Table 60: Modules of the Basic Color Image Box SOP Class

Information Entity	Module Name	Usage
Image	SOP Common Module	EMPTY
	Image Box Pixel Presentation Module	ALWAYS (N-SET)

Table 61: Created Basic Color Image Box SOP Class Attributes

Name	Tag	VR	Definition	Comment
Image Box Pixel Presentation Module				
Image Position	(2020,0010)	US	W, AUTO	Enumerated value: 1
Polarity	(2020,0020)	CS	W, AUTO	Enumerated values: NORMAL, REVERSE
Basic Color Image Sequence	(2020,0111)	SQ	W, AUTO	-
> Samples per Pixel	(0028,0002)	US	W, AUTO	Enumerated value: 3
> Photometric Interpretation	(0028,0004)	CS	W, AUTO	Enumerated value: RGB
> Planar Configuration	(0028,0006)	US	W, IMPL	Enumerated values: 0 (pixel interleave), 1 (frame interleave)
> Rows	(0028,0010)	US	W, IMPL	Depending on the selected printer type and film size.
> Columns	(0028,0011)	US	W, IMPL	Depending on the selected printer type and film size.
> Bits Allocated	(0028,0100)	US	W, AUTO	Enumerated value: 8
> Bits Stored	(0028,0101)	US	W, IMPL	Enumerated value: 8
> High Bit	(0028,0102)	US	W, AUTO	Enumerated value: 7
> Pixel Representation	(0028,0103)	US	W, AUTO	Enumerated value: 0
> Pixel Data	(7FE0,0010)	OB OW	W, AUTO	-

8.1.1.6. Printer SOP Class**Table 62: Modules of the Printer SOP Class**

Information Entity	Module Name	Usage
Image	SOP Common Module	EMPTY
Printer	Printer Module	ALWAYS (N-GET)

Table 63: Created Printer SOP Class Attributes

Name	Tag	VR	Definition	Comment
Printer Module				
Printer Status	(2110,0010)	CS	W, AUTO	Polling is not supported. Enumerated values: FAILURE, NORMAL, WARNING
Printer Status Info	(2110,0020)	CS	W, AUTO	Defined term: NORMAL

8.1.1.7. Presentation LUT SOP Class**Table 64: Modules of the Presentation LUT SOP Class**

Information Entity	Module Name	Usage
Image	Presentation Module	ALWAYS
	SOP Common Module	EMPTY

Table 65: Created Presentation LUT SOP Class Attributes

Name	Tag	VR	Definition	Comment
Presentation LUT Module				
Presentation LUT Shape	(2050,0020)	CS	W, AUTO	Enumerated value: IDENTITY

8.1.1.8. Secondary Capture Image Storage SOP Class

The ViewForum AE is able to copy storage objects into Secondary Capture objects. In this process any private attributes will be omitted. Table 67 lists the attributes assigned by the ViewForum AE (AUTO); **all other attributes are as copied from the original object.**

Table 66: Modules of the Secondary Capture Image Storage SOP Class

Information Entity	Module Name	Usage
Patient	Patient Module	ALWAYS
	Clinical Trial Subject Module	OPTIONAL
Study	General Study Module	ALWAYS
	Patient Study Module	OPTIONAL
	Clinical Trial Study Module	OPTIONAL
Series	General Series Module	ALWAYS
	Clinical Trial Series Module	OPTIONAL
Equipment	General Equipment Module	OPTIONAL
	SC Equipment	ALWAYS
Image	General Image Module	ALWAYS
	Image Pixel Module	ALWAYS
	SC Image Module	ALWAYS
	Overlay Plane Module	OPTIONAL
	Modality LUT Module	OPTIONAL
	VOI LUT Module	OPTIONAL
	SOP Common Module	ALWAYS

Table 67: Created Secondary Capture Image Storage SOP Class Attributes

Name	Tag	VR	Definition	Comment
SC Equipment Module				
Modality	(0008,0060)	CS	W, AUTO	Enumerated values: AU, BI, CD, CR, CT, DD, DG, DX, ECG, EPS, ES, GM, HC, HD, IO, IVUS, LS, MG, MR, NM, OT, PR, PT, PX, RF, RG, RTDOSE, RTIMAGE, RTPPLAN, RTRECORD, RTSTRUCT, SM, SR, ST, TG, US, XA, XC
Conversion Type	(0008,0064)	CS	W, AUTO	Enumerated value: WSD
SC Image Module				
Date of Secondary Capture	(0018,1012)	DA	W, AUTO	-
Time of Secondary Capture	(0018,1014)	TM	W, AUTO	-
SOP Common Module				
SOP Class UID	(0008,0016)	UI	W, AUTO	Enumerated value: 1.2.840.10008.5.1.1.7
SOP Instance UID	(0008,0018)	UI	W, AUTO	-

8.1.1.9. Grayscale Softcopy Presentation State Storage SOP Class

When the ViewForum AE imports a storage object without presentation state object then it will create a presentation object for this storage object, which it then can use for export (if negotiated).

If private presentation state information exists, then this will be used to create the presentation state object. Depending on the setup, the ViewForum AE may or may not add this private presentation state information on export.

Table 68: Modules of the Grayscale Softcopy Presentation State Storage SOP Class

Information Entity	Module Name	Usage
Patient	Patient Module	ALWAYS
	Clinical Trial Subject Module	NEVER
Study	General Study Module	ALWAYS
	Patient Study Module	NEVER
	Clinical Trial Study Module	NEVER
Series	General Series Module	ALWAYS
	Clinical Trial Series Module	NEVER
	Presentation Series Module	ALWAYS
Equipment	General Equipment Module	ALWAYS
Image	Mask Module	MAYBE; Required if the referenced image(s) are multi-frame and are to be subtracted
	Display Shutter Module	MAYBE; Required if a display shutter is to be applied to referenced image(s) and the Bitmap Display Shutter module is not present
	Bitmap Display Shutter Module	NOT; Required if a display shutter is to be applied to referenced image(s) and the Display Shutter module is not present
	Overlay Plane Module	MAYBE; Required if overlays are to be applied to referenced image(s) or the Bitmap Display Shutter module is present
	Displayed Area Module	ALWAYS
	Graphic Annotation Module	NOT; Required if graphic annotations are to be applied to referenced image(s)
	Spatial Transformation Module	NOT; Required if rotation or flipping is to be applied to referenced image(s)
	Graphic Layer Module	MAYBE; Required if graphic annotations or overlays or curves are to be applied to referenced image(s)
	Modality LUT Module	MAYBE; Required if a modality LUT is to be applied to referenced image(s)
	Softcopy Presentation LUT Module	ALWAYS
	Overlay/Curve Activation Module	MAYBE; Required if referenced image contains curve or overlay data that is to be displayed
	Softcopy VOI LUT Module	MAYBE; Required if a VOI LUT is to be applied to referenced image(s)
	Presentation State Module	ALWAYS
	SOP Common Module	ALWAYS

Table 69: Created Grayscale Softcopy Presentation State Storage SOP Class Attributes

Name	Tag	VR	Definition	Comment
Patient Module				
Patient's Name	(0010,0010)	PN	WWO, SPEC	-
Patient ID	(0010,0020)	LO	W, AUTO / SPEC	-
Patient's Birth Date	(0010,0030)	DA	WWO, SPEC	-
Patient's Sex	(0010,0040)	CS	WWO, SPEC	Enumerated values: F, M, O
General Study Module				
Study Date	(0008,0020)	DA	WWO, SPEC	-
Study Time	(0008,0030)	TM	WWO, SPEC	-
Accession Number	(0008,0050)	SH	WWO, SPEC	-
Referring Physician's Name	(0008,0090)	PN	WWO, SPEC	-
Study Instance UID	(0020,000D)	UI	W, SPEC	-
Study ID	(0020,0010)	SH	WWO, SPEC	-
General Series Module				
Series Date	(0008,0021)	DA	WWOC, SPEC	If available in source object.
Series Time	(0008,0031)	TM	WWOC, SPEC	If available in source object.
Series Instance UID	(0020,000E)	UI	W, AUTO	-
Series Number	(0020,0011)	IS	WWO, SPEC	-
Laterality	(0020,0060)	CS	WWOC, SPEC	If available in source object. Enumerated values: L, R
Presentation Series Module				
Modality	(0008,0060)	CS	W, AUTO	Enumerated value: PR
General Equipment Module				
Manufacturer	(0008,0070)	LO	WWO, SPEC	-
Manufacturer's Model Name	(0008,1090)	LO	WWOC, SPEC	If available in source object.
Software Versions	(0018,1020)	LO	W, AUTO	Concatination of source value and configured version value.
Mask Module				
Recommended Viewing Mode	(0028,1090)	CS	WWO, SPEC	Defined terms: NAT, SUB
Mask Subtraction Sequence	(0028,6100)	SQ	W, SPEC	-
> Mask Operation	(0028,6101)	CS	W, SPEC	Defined terms: AVG_SUB, NONE, TID
> Applicable Frame Range	(0028,6102)	US	WWOC, SPEC	If available in source object.
> Mask Frame Numbers	(0028,6110)	US	WC, SPEC	If available in source object.
> Contrast Frame Averaging	(0028,6112)	US	WWOC, SPEC	If available in source object.
> Mask Sub-pixel Shift	(0028,6114)	FL	WWOC, SPEC	If available in source object.

Name	Tag	VR	Definition	Comment
> TID Offset	(0028,6120)	SS	WWOC, SPEC	If available in source object.
> Mask Operation Explanation	(0028,6190)	ST	WWOC, SPEC	If available in source object.
Display Shutter Module				
Shutter Shape	(0018,1600)	CS	W, SPEC	Enumerated values: CIRCULAR, POLYGONAL, RECTANGULAR
Shutter Left Vertical Edge	(0018,1602)	IS	WC, SPEC	If available in source object.
Shutter Right Vertical Edge	(0018,1604)	IS	WC, SPEC	If available in source object.
Shutter Upper Horizontal Edge	(0018,1606)	IS	WC, SPEC	If available in source object.
Shutter Lower Horizontal Edge	(0018,1608)	IS	WC, SPEC	If available in source object.
Center of Circular Shutter	(0018,1610)	IS	WC, SPEC	If available in source object.
Radius of Circular Shutter	(0018,1612)	IS	WC, SPEC	If available in source object.
Vertices of the Polygonal Shutter	(0018,1620)	IS	WC, SPEC	If available in source object.
Overlay Plane Module				
Overlay Rows	(60xx,0010)	US	W, SPEC	-
Overlay Columns	(60xx,0011)	US	W, SPEC	-
Overlay Description	(60xx,0022)	LO	WWO, SPEC	Value in source object, or else empty.
Overlay Type	(60xx,0040)	CS	W, SPEC	Enumerated values: G, R
Overlay Subtype	(60xx,0045)	LO	WWO, SPEC	Value in source object, or else empty.
Overlay Origin	(60xx,0050)	SS	W, SPEC	Defined term: 1\1
Overlay Bits Allocated	(60xx,0100)	US	W, SPEC	Defined term: 1
Overlay Bit Position	(60xx,0102)	US	W, SPEC	Defined term: 0
ROI Area	(60xx,1301)	IS	WWO, SPEC	Value in source object, or else empty.
ROI Mean	(60xx,1302)	DS	WWO, SPEC	Value in source object, or else empty.
ROI Standard Deviation	(60xx,1303)	DS	WWO, SPEC	Value in source object, or else empty.
Overlay Label	(60xx,1500)	LO	WWO, SPEC	Value in source object, or else empty.
Overlay Data	(60xx,3000)	OB OW	WC, SPEC	If available in source object.
Displayed Area Module				
Displayed Area Selection Sequence	(0070,005A)	SQ	W, AUTO	-
> Displayed Area Top Left Hand Corner	(0070,0052)	SL	W, AUTO	Enumerated value: 1\1
> Displayed Area Bottom Right Hand Corner	(0070,0053)	SL	W, AUTO	Number of Rows and Columns.
> Presentation Size Mode	(0070,0100)	CS	W, AUTO	Enumerated value: SCALE TO FIT
Private Creator	(2001,0010)	LO	W, AUTO	Private.
Interpolation Method	(2001,103F)	CS	W, AUTO	Private.
Graphic Layer Module				
Graphic Layer Sequence	(0070,0060)	SQ	W, AUTO	-
> Graphic Layer	(0070,0002)	CS	W, AUTO	Enumerated value: Layer created on import
> Graphic Layer	(0070,0062)	IS	W, AUTO	Defined term: 1

Name	Tag	VR	Definition	Comment
Softcopy Presentation LUT Module				
Presentation LUT Sequence	(2050,0010)	SQ	W, AUTO	-
> LUT Descriptor	(0028,3002)	SS	W, AUTO	-
> LUT Data	(0028,3006)	OW	W, AUTO	-
Overlay/Curve Activation Module				
Curve Activation Layer	(50xx,1001)	CS	WC, AUTO	Enumerated value: Layer created on import
Overlay Activation Layer	(60xx,1001)	CS	WC, AUTO	Enumerated value: Layer created on import
Softcopy VOI LUT Module				
Softcopy VOI LUT Sequence	(0028,3110)	SQ	W, SPEC	-
> Referenced Image Sequence	(0008,1140)	SQ	WC, SPEC	If available in source object.
>> Referenced SOP Class UID	(0008,1150)	UI	W, SPEC	-
>> Referenced SOP Instance UID	(0008,1155)	UI	W, SPEC	-
>> Referenced Frame Number	(0008,1160)	IS	WC, SPEC	If available in source object.
> Window Center	(0028,1050)	DS	WC, SPEC	If available in source object.
> Window Width	(0028,1051)	DS	WC, SPEC	If available in source object.
> Window Center & Width Explanation	(0028,1055)	LO	WWOC, SPEC	If available in source object.
> VOI LUT Sequence	(0028,3010)	SQ	WC, SPEC	If available in source object.
>> LUT Descriptor	(0028,3002)	SS US	W, SPEC	-
>> LUT Explanation	(0028,3003)	LO	WWOC, SPEC	If available in source object.
>> LUT Data	(0028,3006)	OW SS US	W, SPEC	-
Presentation State Module				
Referenced Series Sequence	(0008,1115)	SQ	W, AUTO	-
> Referenced Image Sequence	(0008,1140)	SQ	W, AUTO	-
>> Referenced SOP Class UID	(0008,1150)	UI	W, SPEC	-
>> Referenced SOP Instance UID	(0008,1155)	UI	W, SPEC	-
> Series Instance UID	(0020,000E)	UI	W, SPEC	-
Shutter Presentation Value	(0018,1622)	US	WC, AUTO	Enumerated value: 0
Instance Number	(0020,0013)	IS	W, AUTO	Unique number. Defined term: 1
Presentation Label	(0070,0080)	CS	W, AUTO	Enumerated value: NEW AT IMPORT
Presentation Description	(0070,0081)	LO	WO, AUTO	-
Presentation Creation Date	(0070,0082)	DA	W, AUTO	Current date.
Presentation Creation Time	(0070,0083)	TM	W, AUTO	Current time.
Presentation Creator's Name	(0070,0084)	PN	WO, AUTO	-
SOP Common Module				
SOP Class UID	(0008,0016)	UI	W, AUTO	Enumerated value: 1.2.840.10008.5.1.1.23
SOP Instance UID	(0008,0018)	UI	W, AUTO	-

8.1.1.10. Patient Root Query/Retrieve Information Model – FIND SOP Class

Table 70: Created Patient Root Query/Retrieve Information Model – FIND SOP Class Attributes

Name	Tag	VR	Definition	Comment
Patient Level Query				
Specific Character Set	(0008,0005)	CS	WC, SPEC	Enumerated values: ISO_IR 100, ISO 2022 IR 100
Query/Retrieve Level	(0008,0052)	CS	W, USER	Enumerated value: PATIENT
Patient's Name	(0010,0010)	PN	WWO, USER	-
Patient ID	(0010,0020)	LO	WWO, USER	-
Patient's Birth Date	(0010,0030)	DA	WO, AUTO	-
Patient's Sex	(0010,0040)	CS	WO, AUTO	-
Study Level Query				
Specific Character Set	(0008,0005)	CS	WC, SPEC	Enumerated values: ISO_IR 100, ISO 2022 IR 100
Study Date	(0008,0020)	DA	WWO, USER	-
Study Time	(0008,0030)	TM	WO, AUTO	-
Accession Number	(0008,0050)	SH	WWO, USER	-
Query/Retrieve Level	(0008,0052)	CS	W, USER	Enumerated value: STUDY
Modalities in Study	(0008,0061)	CS	WWO, USER	-
Referring Physician's Name	(0008,0090)	PN	WO, AUTO	-
Study Description	(0008,1030)	LO	WO, AUTO	-
Patient ID	(0010,0020)	LO	W, SPEC	-
Study Instance UID	(0020,000D)	UI	W, USER	-
Study ID	(0020,0010)	SH	WWO, USER	-
Series Level Query				
Specific Character Set	(0008,0005)	CS	WC, SPEC	Enumerated values: ISO_IR 100, ISO 2022 IR 100
Query/Retrieve Level	(0008,0052)	CS	W, USER	Enumerated value: SERIES
Modality	(0008,0060)	CS	WO, AUTO	-
Performing Physician's Name	(0008,1050)	PN	WO, AUTO	-
Patient ID	(0010,0020)	LO	W, SPEC	-
Body Part Examined	(0018,0015)	CS	WO, AUTO	-
Protocol Name	(0018,1030)	LO	WO, AUTO	-
Study Instance UID	(0020,000D)	UI	W, SPEC	-
Series Instance UID	(0020,000E)	UI	W, USER	-
Series Number	(0020,0011)	IS	WO, AUTO	-

Name	Tag	VR	Definition	Comment
Performed Station Name	(0040,0242)	SH	WO, AUTO	-
Performed Procedure Step Start Date	(0040,0244)	DA	WO, AUTO	-
Performed Procedure Step ID	(0040,0253)	SH	WO, AUTO	-
Performed Procedure Type Description	(0040,0255)	LO	WO, AUTO	-
Image Level Query				
Specific Character Set	(0008,0005)	CS	WC, SPEC	Enumerated values: ISO_IR 100, ISO 2022 IR 100
SOP Class UID	(0008,0016)	UI	WO, AUTO	-
SOP Instance UID	(0008,0018)	UI	W, USER	-
Content Date	(0008,0023)	DA	WO, AUTO	-
Content Time	(0008,0033)	TM	WO, AUTO	-
Query/Retrieve Level	(0008,0052)	CS	W, USER	Enumerated value: IMAGE
Patient ID	(0010,0020)	LO	W, SPEC	-
Study Instance UID	(0020,000D)	UI	W, SPEC	-
Series Instance UID	(0020,000E)	UI	W, SPEC	-
Instance Number	(0020,0013)	IS	WO, AUTO	-

Refer to section 4.2.1.3.2.3 SOP Specific Conformance for SOP Classes for an overview of matching options.

8.1.1.11. Patient Root Query/Retrieve Information Model – MOVE SOP Class

Table 71: Created Patient Root Query/Retrieve Information Model – MOVE SOP Class Attributes

Name	Tag	VR	Definition	Comment
Patient Level Retrieve				
Query/Retrieve Level	(0008,0052)	CS	W, USER	Enumerated value: PATIENT
Patient ID	(0010,0020)	LO	W, USER	-
Study Level Query				
Query/Retrieve Level	(0008,0052)	CS	W, USER	Enumerated value: STUDY
Patient ID	(0010,0020)	LO	W, SPEC	-
Study Instance UID	(0020,000D)	UI	W, USER	-
Series Level Query				
Query/Retrieve Level	(0008,0052)	CS	W, USER	Enumerated value: SERIES
Patient ID	(0010,0020)	LO	W, SPEC	-
Study Instance UID	(0020,000D)	UI	W, SPEC	-
Series Instance UID	(0020,000E)	UI	W, USER	-
Image Level Query				
SOP Instance UID	(0008,0018)	UI	W, USER	-
Query/Retrieve Level	(0008,0052)	CS	W, USER	Enumerated value: IMAGE
Patient ID	(0010,0020)	LO	W, SPEC	-
Study Instance UID	(0020,000D)	UI	W, SPEC	-

Name	Tag	VR	Definition	Comment
Series Instance UID	(0020,000E)	UI	W, SPEC	-

8.1.1.12. Study Root Query/Retrieve Information Model – FIND SOP Class

Table 72: Created Study Root Query/Retrieve Information Model – FIND SOP Class Attributes

Name	Tag	VR	Definition	Comment
Study Level Query				
Specific Character Set	(0008,0005)	CS	WC, SPEC	Enumerated values: ISO_IR 100, ISO 2022 IR 100
Study Date	(0008,0020)	DA	WWO, USER	-
Study Time	(0008,0030)	TM	WO, AUTO	-
Accession Number	(0008,0050)	SH	WWO, USER	-
Query/Retrieve Level	(0008,0052)	CS	W, USER	Enumerated value: STUDY
Modalities in Study	(0008,0061)	CS	WWO, USER	-
Referring Physician's Name	(0008,0090)	PN	WO, AUTO	-
Study Description	(0008,1030)	LO	WO, AUTO	-
Patient's Name	(0010,0010)	PN	WWO, USER	-
Patient ID	(0010,0020)	LO	WWO, USER	-
Patient's Birth Date	(0010,0030)	DA	WO, AUTO	-
Patient's Sex	(0010,0040)	CS	WO, AUTO	-
Study Instance UID	(0020,000D)	UI	W, USER	-
Study ID	(0020,0010)	SH	WWO, USER	-
Series Level Query				
Specific Character Set	(0008,0005)	CS	WC, SPEC	Enumerated values: ISO_IR 100, ISO 2022 IR 100
Query/Retrieve Level	(0008,0052)	CS	W, USER	Enumerated value: SERIES
Modality	(0008,0060)	CS	WO, AUTO	-
Performing Physician's Name	(0008,1050)	PN	WO, AUTO	-
Body Part Examined	(0018,0015)	CS	WO, AUTO	-
Protocol Name	(0018,1030)	LO	WO, AUTO	-
Study Instance UID	(0020,000D)	UI	W, SPEC	-
Series Instance UID	(0020,000E)	UI	W, USER	-
Series Number	(0020,0011)	IS	WO, AUTO	-
Performed Station Name	(0040,0242)	SH	WO, AUTO	-
Performed Procedure Step Start Date	(0040,0244)	DA	WO, AUTO	-

Name	Tag	VR	Definition	Comment
Performed Procedure Step ID	(0040,0253)	SH	WO, AUTO	-
Performed Procedure Type Description	(0040,0255)	LO	WO, AUTO	-
Image Level Query				
Specific Character Set	(0008,0005)	CS	WC, SPEC	Enumerated values: ISO_IR 100, ISO 2022 IR 100
SOP Class UID	(0008,0016)	UI	WO, AUTO	-
SOP Instance UID	(0008,0018)	UI	W, USER	-
Content Date	(0008,0023)	DA	WO, AUTO	-
Content Time	(0008,0033)	TM	WO, AUTO	-
Query/Retrieve Level	(0008,0052)	CS	W, USER	Enumerated value: IMAGE
Study Instance UID	(0020,000D)	UI	W, SPEC	-
Series Instance UID	(0020,000E)	UI	W, SPEC	-
Instance Number	(0020,0013)	IS	WO, AUTO	-

Refer to section 4.2.1.3.2.3 SOP Specific Conformance for SOP Classes for an overview of matching options.

8.1.1.13. Study Root Query/Retrieve Information Model – MOVE SOP Class

Table 73: Created Study Root Query/Retrieve Information Model – MOVE SOP Class Attributes

Name	Tag	VR	Definition	Comment
Study Level Query				
Query/Retrieve Level	(0008,0052)	CS	W, USER	Enumerated value: STUDY
Study Instance UID	(0020,000D)	UI	W, USER	-
Series Level Query				
Query/Retrieve Level	(0008,0052)	CS	W, USER	Enumerated value: SERIES
Study Instance UID	(0020,000D)	UI	W, SPEC	-
Series Instance UID	(0020,000E)	UI	W, USER	-
Image Level Query				
SOP Instance UID	(0008,0018)	UI	W, USER	-
Query/Retrieve Level	(0008,0052)	CS	W, USER	Enumerated value: IMAGE
Study Instance UID	(0020,000D)	UI	W, SPEC	-
Series Instance UID	(0020,000E)	UI	W, SPEC	-

8.1.1.14. Patient/Study Only Query/Retrieve Information Model – FIND SOP Class

Table 74: Created Patient/Study Only Query/Retrieve Information Model – FIND SOP Class Attributes

Name	Tag	VR	Definition	Comment
Patient Level Query				
Specific Character Set	(0008,0005)	CS	WC, SPEC	Enumerated values: ISO_IR 100, ISO 2022 IR 100
Query/Retrieve Level	(0008,0052)	CS	W, USER	Enumerated value: PATIENT
Patient's Name	(0010,0010)	PN	WVO, USER	-
Patient ID	(0010,0020)	LO	WVO, USER	-
Patient's Birth Date	(0010,0030)	DA	WO, AUTO	-
Patient's Sex	(0010,0040)	CS	WO, AUTO	-
Study Level Query				
Specific Character Set	(0008,0005)	CS	WC, SPEC	Enumerated values: ISO_IR 100, ISO 2022 IR 100
Study Date	(0008,0020)	DA	WVO, USER	-
Study Time	(0008,0030)	TM	WO, AUTO	-
Accession Number	(0008,0050)	SH	WVO, USER	-
Query/Retrieve Level	(0008,0052)	CS	W, USER	Enumerated value: STUDY
Modalities in Study	(0008,0061)	CS	WVO, USER	-
Referring Physician's Name	(0008,0090)	PN	WO, AUTO	-
Study Description	(0008,1030)	LO	WO, AUTO	-
Patient ID	(0010,0020)	LO	W, SPEC	-
Study Instance UID	(0020,000D)	UI	W, USER	-

Refer to section 4.2.1.3.2.3 SOP Specific Conformance for SOP Classes for an overview of matching options.

8.1.1.15. Patient/Study Only Query/Retrieve Information Model – MOVE SOP Class

Table 75: Created Patient/Study Only Query/Retrieve Information Model – MOVE SOP Class Attributes

Name	Tag	VR	Definition	Comment
Patient Level Query				
Query/Retrieve Level	(0008,0052)	CS	W, USER	Enumerated value: PATIENT
Patient ID	(0010,0020)	LO	W, USER	-
Study Level Query				
Query/Retrieve Level	(0008,0052)	CS	W, USER	Enumerated value: STUDY
Patient ID	(0010,0020)	LO	W, SPEC	-
Study Instance UID	(0020,000D)	UI	W, USER	-

8.1.2. Usage of Attributes from Received IODs

No SOP class specific fields are required.

8.1.3. Attribute Mapping

Not applicable.

8.1.4. Coerced/Modified fields

In general, ViewForum will try and optimize the imported image data. This may involve the removal of redundant data, either or not due to the creation of a Presentation State object for the image data. This may also involve the creation of extra attributes. As it is not the intention of ViewForum to export this data as such, the SOP Instance UID shall not be changed.

If not available at import then ViewForum will create the additional attributes as listed in Table 76.

Table 76: Additional Attributes for Import Images

Name	Tag	Generated Value
Performed Procedure Step Start Date	(0040,0244)	Copied from (0008,0020) Study Date.
Performed Procedure Step Start Time	(0040,0245)	Copied from (0008,0030) Study Time.
Performed Procedure Step ID	(0040,0253)	Copied from (0020,0010) Study ID.
Performed Procedure Step Description	(0040,0254)	Copied from (0008,1030) Study Description.

If the SCU does not propose a presentation context for the Grayscale Softcopy Presentation State storage SOP class, then ViewForum will derive Presentation State data from the imported image data and store this data in a new series within the examination of the imported image.

However, if during import the image is accompanied by Presentation State data, the ViewForum database shall avoid data overlap by only storing the relevant data from the first object received; either the first image or its Presentation State!

Thus it will omit data received by succeeding objects concerning the optional attributes (VT=3) listed in Table 77, and clear all mandatory attributes (VT=2) listed in Table 78.

Table 77: Omitted Attributes for Import Images

Attribute Name	Attribute Tag
Patient Module	
Referenced Patient Sequence	(0008,1120)
Patient's Birth Time	(0010,0032)
Other Patient Ids	(0010,1000)
Other Patient Names	(0010,1001)
Ethnic Group	(0010,2160)
Patient Comments	(0010,4000)
General Study Module	
Referring Physician Identification Sequence	(0008,0096)
Study Description	(0008,1030)
Procedure Code Sequence	(0008,1032)
Physician(s) of Record	(0008,1048)
Physician(s) of Record Identification Sequence	(0008,1049)
Name of Physician(s) Reading Study	(0008,1060)
Physician(s) Reading Study Identification Sequence	(0008,1062)
Referenced Study Sequence	(0008,1110)

Attribute Name	Attribute Tag
Patient Study Module	
Admitting Diagnoses Description	(0008,1080)
Admitting Diagnoses Code Sequence	(0008,1084)
Patient's Age	(0010,1010)
Patient's Size	(0010,1020)
Patient's Weight	(0010,1030)
Occupation	(0010,2180)
Additional Patient History	(0010,21B0)
Clinical Trial Study Module	
Clinical Trial Time Point Description	(0012,0051)
General Series Module	
Series Date	(0008,0021)
Series Time	(0008,0031)
Series Description	(0008,103E)
Performing Physicians' Name	(0008,1050)
Performing Physician Identification Sequence	(0008,1052)
Operators' Name	(0008,1070)
Operators Identification Sequence	(0008,1072)
Referenced Performed Procedure Step Sequence	(0008,1111)
Body Part Examined	(0018,0015)
Protocol Name	(0018,1030)
Smallest Pixel Value in Series	(0028.0108)
Largest Pixel Value in Series	(0028.0109)
Performed Procedure Step Start Date	(0040,0244)
Performed Procedure Step Start Time	(0040,0245)
Performed Procedure Step ID	(0040,0253)
Performed Procedure Step Description	(0040,0254)
Performed Protocol Code Sequence	(0040,0260)
Request Attributes Sequence	(0040,0275)
Comments on the Performed Procedure Step	(0040,0280)
General Equipment Module	
Institution Name	(0008,0080)
Institution Address	(0008,0081)
Station Name	(0008,1010)
Institutional Department Name	(0008,1040)
Manufacturer's Model Name	(0008,1090)
Device Serial Number	(0018,1000)
Software Versions	(0018,1020)
Spatial Resolution	(0018,1050)
Date of Last Calibration	(0018,1200)
Time of Last Calibration	(0018,1201)
Pixel Padding Value	(0028,0120)
Display Shutter Module	
Shutter Presentation Value	(0018,1622)
Overlay Plane Module	
Overlay Description	(60xx,0022)
Overlay Subtype	(60xx,0045)
ROI Area	(60xx,1301)
ROI Mean	(60xx,1302)
ROI Standard Deviation	(60xx,1303)
Overlay Label	(60xx,1500)
SOP Common Module	
Instance Creation Date	(0008,0012)
Instance Creation Time	(0008,0013)

Attribute Name	Attribute Tag
Instance Creator UID	(0008,0014)
Coding Scheme Identification Sequence	(0008,0110)
Timezone Offset From UTC	(0008,0201)
Contributing Equipment Sequence	(0018,A001)
Instance Number	(0020,0013)
SOP Instance Status	(0100,0410)
SOP Authorization Date and Time	(0100,0420)
SOP Authorization Comment	(0100,0424)
Authorization Equipment Certification Number	(0100,0426)
MAC Parameters Sequence	(4FFE,0001)
Digital Signatures Sequence	(FFFA,FFFA)

Table 78: Cleared Attributes for Import Images

Attribute Name	Attribute Tag
Patient Module	
Patient's Name	(0010,0010)
Patient ID	(0010,0020)
Patient's Birth Date	(0010,0030)
Patient's Sex	(0010,0040)
Clinical Trial Subject Module	
Clinical Trial Protocol Name	(0012,0021)
Clinical Trial Site ID	(0012,0030)
Clinical Trial Site Name	(0012,0031)
General Study Module	
Study Date	(0008,0020)
Study Time	(0008,0030)
Accession Number	(0008,0050)
Referring Physician's Name	(0008,0090)
Study ID	(0020,0010)
Clinical Trial Study Module	
Clinical Trial Time Point ID	(0012,0050)
General Series Module	
Patient Position	(0018,5100)
Series Number	(0020,0011)
Laterality	(0020,0060)
Clinical Trial Series Module	
Clinical Trial Coordinating Center Name	(0012,0060)
General Equipment Module	
Manufacturer	(0008,0070)
Mask Module	
Recommended Viewing Mode	(0028,1090)
Overlay/Curve Activation Module	
Curve Activation Layer	(50xx,1001)
Overlay Activation Layer	(60xx,1001)

ViewForum allows the operator to modify attributes of the stored images; see Table 79. ViewForum does not modify the pixel values of the stored images. Modified images retain their original Study, Series and Image UID.

Table 79: Modifiable Attributes

Attribute Name	Attribute Tag
Patient	
Patient's Name	(0010,0010)
Patient ID	(0010,0020)
Patient's Birth Date	(0010,0030)
Patient's Sex	(0010,0040)
Medical Alerts	(0010,2000)
Contrast Allergies	(0010,2110)
Patient Comments	(0010,4000)
Study	
Accession Number	(0008,0050)
Referring Physician's Name	(0008,0090)
Study Description	(0008,1030)
Physician(s) of Record	(0008,1048)
Name of Physician(s) Reading Study	(0008,1060)
Admitting Diagnoses Description	(0008,1080)
Patient's Age	(0010,1010)
Occupation	(0010,2180)
Additional Patient History	(0010,21B0)
Examination	
Performed Station Name	(0040,0242)
Performed Location	(0040,0243)
Performed Procedure Step Description	(0040,0254)
Performed Procedure Type Description	(0040,0255)
Comments on the Performed Procedure Step	(0040,0280)
Series	
-	-

8.2. Data Dictionary of Private Attributes

Not applicable.

8.3. Coded Terminology and Templates

The value for Code Meaning will be displayed for all code sequences. No local lexicon is provided to look up alternative code meanings.

8.4. Grayscale Image consistency

The high-resolution display monitor attached to the product can be calibrated by using the service tool together with a light probe. See the [VFRB] for details on the calibration procedure.

8.5. Standard Extended/Specialized/Private SOPs

Not applicable.

8.6. Private Transfer Syntaxes

None.