Philips Medical Systems

DICOM CONFORMANCE STATEMENT

Intera 10.1

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1. INTRODUCTION

This chapter provides general information about the purpose, scope and contents of this Conformance Statement.

1.1.   Scope and Field of Application

The scope of this DICOM Conformance Statement is to facilitate data exchange with equipment of Philips Medical Systems. This document specifies the compliance to the DICOM standard (formally called the NEMA PS 3.X standards). It contains a short description of the applications involved and provides technical information about the data exchange capabilities of the equipment. The main elements describing these capabilities are: the supported DICOM Service Object Pair (SOP) Classes, Roles, Information Object Definitions (IOD) and Transfer Syntaxes.
The field of application is the integration of the Philips Medical Systems equipment into an environment of medical devices. This Conformance Statement should be read in conjunction with the DICOM standard and its addenda [DICOM].

1.2.   Intended Audience

This 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.

1.3.   Contents and Structure

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

1.4.   Used 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 and PS 3.4.
The word Philips in this document refers to Philips Medical Systems.

1.5.   References

[DICOM]   The Digital Imaging and Communications in Medicine

(DICOM) standard (NEMA PS 3.X):
National Electrical Manufacturers Association (NEMA)
Publication Sales 1300 N. 17th Street, Suite 1847
Rosslyn, Va. 22209, United States of America

1.6.   Important Note to the Reader

This 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 a 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 analyse 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 Conformance Statement.

Where Philips equipment is linked to non-Philips equipment, the first step is to compare the relevant Conformance Statements. If the 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).

1.7.   **General Acronyms and Abbreviations.**

The following acronyms and abbreviations are used in the document.

- ➢ ACC   American College of Cardiology
- ➢ AE   Application Entity
- ➢ ACR   American College of Radiology
- ➢ ANSI   American National Standard Institute
- ➢ DICOM   Digital Imaging and Communication in Medicine
- ➢ DIMSE   DICOM Message Service Element
- ➢ ELE   Explicit VR Little Endian
- ➢ EBE   Explicit VR Big Endian
- ➢ ILE   Implicit VR Little Endian
- ➢ IOD   Information Object Definition
- ➢ NEMA   National Electrical Manufacturers Association
- ➢ PDU   Protocol Data Unit
- ➢ RIS   Radiology Information System
- ➢ RWA   Real World Activity
- ➢ SCU   Service Class User
- ➢ SOP   Service Object Pair
- ➢ TCP/IP   Transmission Control Protocol/Internet protocol
- ➢ UID   Unique Identifier

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2. IMPLEMENTATION MODEL

The Intera (Gyroscan) system of Philips Medical Systems later referred as Intera is a MR image generating system.

The Intera (Gyroscan) is primarily intended for:
A DICOM Radiology Information System (RIS) interface to retrieve the Worklist of patients to be examined and to send an MPPS request to the RIS.
A DICOM Image Import function to receive DICOM MR images and image related data (originating from the same or other Intera systems) from a remote DICOM node.
A DICOM Image Export function to transfer DICOM MR or DICOM SC images and image related data from the Intera to a remote system. After the store request a Storage Commit request can be sent to the remote system.
A DICOM Image Print function to print MR images on a DICOM Network printer.
A DICOM Media export function write and read DICOM MOD's.

Supported DICOM functionality of the Intera:
Network SCU:
- Worklist Management
- Modality Performed Procedure Step
- Store images / grayscale softcopy presentation state and Private SOP Classes
- Storage Commit
- Query
- Move (retrieve)
- Verification
- Print

Network SCP:
- Store / Images / grayscale softcopy presentation state and Private SOP Classes
- Verification

DICOM Media:
- Read
- Write
- Update

These DICOM functions are described in this document.
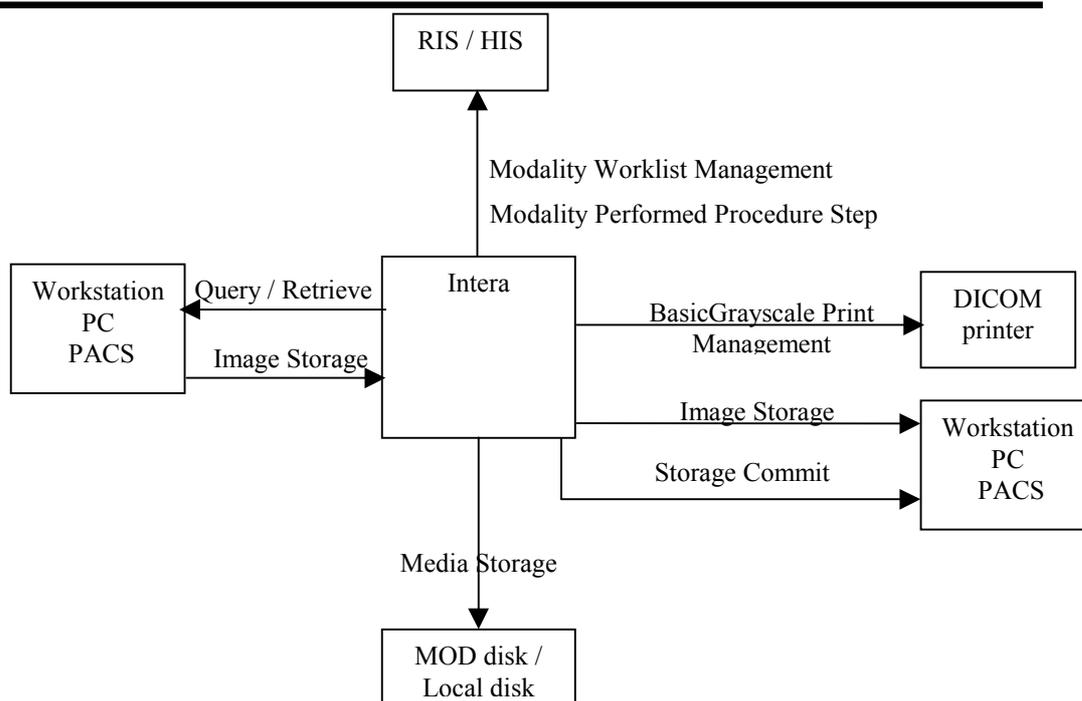
Figure 1. **Intera system in a DICOM network**

2.1. Application Data Flow Diagram

Intera is a system with two Application Entities (AE). The related Implementation Model is shown in Figure 2.

Before or after an acquisition a remote system can send related images of one or more of the scheduled patients to the Intera. The Intera can sent a query request for images to an archive. DICOM Instances (MR, SC Images, Private SOP Classes and grayscale softcopy presentation state) are imported for reference purposes only.

The Intera DICOM Modality Worklist function requests the Worklist from a DICOM Information System like a RIS. At the start and the end of the acquisition/ processing MPPS messages are sent to the RIS to inform the RIS of the status of the Examination

The created Images are converted into a DICOM message to be sent to the remote system or can be written onto a local disk or a MOD. After the storage to a remote archive the Intera can request a storage commitment.

The Intera DICOM Print function allows the Intera operator to sent/print images on a DICOM network printer.

A Secondary Capture Images can is created when the user uses the screen capture function.

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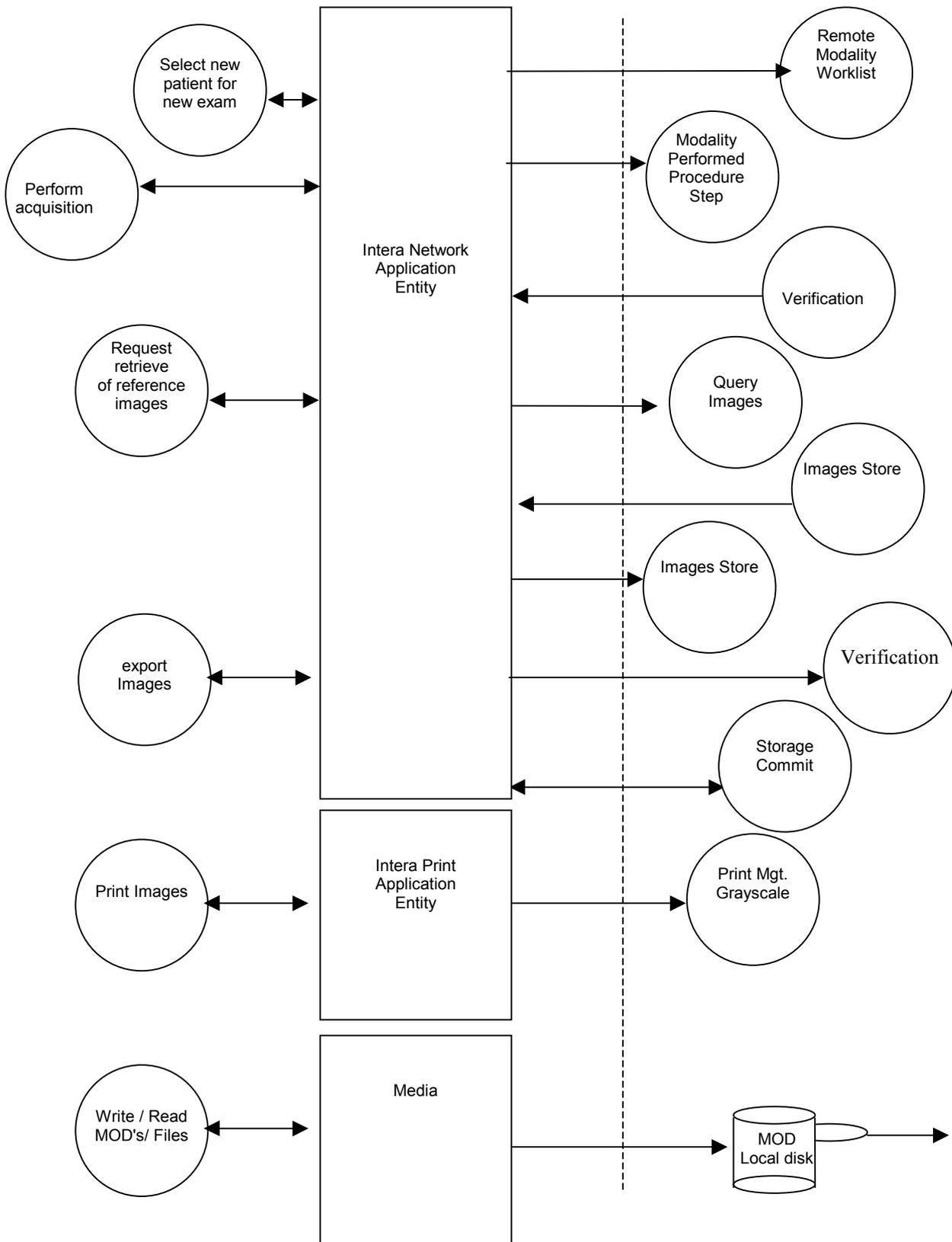
Figure 2. **Implementation Model Intera**

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2.2.   Functional definition of Application Entities

2.2.1.   Intera Network AE

2.2.1.1.   Worklist services

The Intera DICOM Modality Worklist function requests the Worklist from a DICOM Information System like a RIS with the Worklist Management service. The function is initiated on the Intera by the user selection of the "RIS worklist" function key.

At the start and at the end of the acquisition/ processing the Configured MPPS Node system is informed of the process of the selected procedure step by the Modality Performed Procedure Step (MPPS) service. The function is initiated at the start of a new examination (status is IN-PROGRESS). When the object has been archived and other administrative data has been updated the operator pushes the "ready" or "incomplete" button and Intera sends a new MPPS message with the status COMPLETED/ DISCONTINUED.

2.2.1.2.   Intera Import services

The Intera DICOM Image Import AE acts as a Service Class Provider (SCP) for the storage SOP classes and as SCU for the Q/R SOP classes: the Intera will respond to a remote request and store the images in the patient database. Imported images are to be used for reference only; when these are exported afterwards again no guarantee for consistency or completeness can be given.

2.2.1.3.   Intera Export services

The Intera operator can activate the DICOM Image Export function. The Intera DICOM Image Export AE acts as a Service Class User (SCU) of the Storage Service Class. The selected images and related object data are converted into a DICOM message to be sent to the remote system.

The images to be sent are selected from one or more examinations. At export the images will be sent to a user selected remote destination. The images transferred are intended for viewing purposes; planscan information can be calculated from reference images. Post-processing like MPR, MIP, 3D reconstruction and rendering are possible, depending on the capabilities of the workstation receiving the MR images; for more detailed interpretation a large amount of information is stored in private elements. These have to be discarded by another DICOM system when modifying/ processing the images. These DICOM nodes are then responsible for data consistency.

2.2.1.4.   Verification

The Intera can handle verification request and can initiate such requests.

2.2.2. Intera Print AE

The Intera DICOM Print function allows the Intera operator to sent/print images on a DICOM network printer. The Intera DICOM Print AE acts as a Service Class User (SCU) of the Basic Grayscale Print Management Meta SOP Class. After selecting the images these can be sent to a DICOM network printer.

2.2.3. Media

The Intera has the function to Read, Write or Update MOD's and DICOM files written by the CT/MR application Profile. As an extension to this profile also grayscale softcopy presentation state objects can be written, updated and read form MOD's

2.3.   Sequencing of Real World Activities

Worklist
When a RIS interface is configured, the prepared worklist data can be requested by selecting the "from RIS" key on the Patient Administration Users Interface. It will request the Worklist of "Today" and "Tomorrow" for the specific Intera AE title.
After receiving the worklist data from the RIS the Intera will display the worklist on the users interface
The user can select a relevant patient record and add or modify missing or wrong data before the received patient data is stored in the Intera database. The Workslist contains the Requested Procedure Steps.

Prefetching Images
Before or after requesting a worklist a remote system can send related images of one or more of the scheduled patients to the Intera, for reference purposes. In this way prefetching of images can be performed.

If no RIS is configured or no connection is possible, data can be introduced manually into the users interface.

After preparation of the scanner and the patient, the operator will perform the requested, or on his own initiative modified, procedure steps.
Results may be MR Images and also screengrabs stored as Secondary Capture Images.

Export
The selected MR images and other objects can be sent (manually or by acquisition protocol) to a selected remote system.
The Intera can be configured to send grayscale softcopy presentation state for the selected series.

Print
After selecting the images these can be sent to a DICOM network printer.

Media
Storage on 2.3 GB MOD can be initiated by selecting the requested images and pressing the MOD destination button on the users interface.

Storage Commitment

After sending the images to an archive, the Intera can be configured to requests a storage commitment from the archive. After receiving the Storage Commitment, this is indicated on the Patient Administration Users Interface. After this the user may decide to delete the images locally.

Workslist, MPPS and Storage Commitment are part of the IHE Scheduled Workflow option package.

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3. AE SPECIFICATIONS

The Network capabilities of the system consists of two DICOM Application Entities:

- Intera Network AE
- Print AE

These are specified in section 3.1 to section 3.2.

The Media services are described in section 3.3

3.1.   Intera DICOM Network AE Specification

The Intera DICOM Network AE Specification Application Entity provides Standard Conformance to the DICOM V3.0 SOP classes as an SCU specified in Table 1.

Table 1.   Supported SOP Classes as SCU by the Intera DICOM Network AE Specification

SOP Class Name	UID
Verification	1.2.840.10008.1.1
Modality Worklist Management	1.2.840.10008.5.1.4.31
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3
Patient Root Query/Retrieve Info Model - FIND	1.2.840.10008.5.1.4.1.2.1.1
Patient Root Query/Retrieve Info Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2
Study Root Query/Retrieve Info Model - FIND	1.2.840.10008.5.1.4.1.2.2.1
Study Root Query/Retrieve Info Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1
MR Spectrum Storage	1.3.46.670589.11.0.0.12.1
MR Series Data Storage	1.3.46.670589.11.0.0.12.2
Storage Commit Push Model	1.2.840.10008.1.20.1.1

The MR Spectrum Storage and MR Series Data Storage SOP Classes are Specialized SOP Class.

DICOM STATES:
Specialized SOP Class: A SOP Class derived from a Standard SOP Class that has been specialized in an implementation by additional Type 1, 1C, 2, 2C, or 3 Attributes. The additional Attributes may either be drawn from the Data Dictionary in PS 3.6, or may be Private Attributes. Since the semantics of the related Standard SOP Class may be modified by the additional Attributes, a Specialized SOP Class utilizes a Privately Defined UID which differs from the UID for the related Standard SOP Class.

Private SOP Class: A SOP Class that is not defined in the DICOM Standard, but is published in an implementation's Conformance Statement.

The Intera DICOM Network AE Specification Application Entity provides Standard Conformance to the DICOM V3.0 SOP classes as a SCP specified in Table 2.

Table 2.   **Supported SOP Classes as SCP by the Intera DICOM Network AE Specification**

SOP Class Name	UID
Verification	1.2.840.10008.1.1
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1
MR Spectrum Storage	1.3.46.670589.11.0.0.12.1
MR Series Data Storage	1.3.46.670589.11.0.0.12.2

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3.1.1. Association Establishment Policies

3.1.1.1. General

The Intera DICOM Network AE Specification always proposes the following DICOM Application Context Name (ACN): 1.2.840.10008.3.1.1.1

The default maximum PDU size is set to unlimited. Maximum PDU size is configurable.

3.1.1.2. Number of Associations

The DICOM NETWORK AE server will attempt one association for each service as SCU at the time. For the SCP service also one association is supported.

3.1.1.3. Asynchronous Nature

The Intera NETWORK AE doesn't support asynchronous operations and will not perform asynchronous window negotiation.

3.1.1.4. Implementation Identifying Information

The Implementation Class UID:	**1.3.46.670589.11.0.0.51.4.2.1**
The implementation version name:	**" MR DICOM 2.1"**

3.1.2. Association Initiation Policy

3.1.2.1. The Intera DICOM Verification Request

3.1.2.1.1. Associated Real-World Activity

An association can be made to verify application level communication using the C-ECHO command.

3.1.2.1.2. Proposed Presentation Context

The Intera DICOM NETWORK AE will propose the following presentation context:

Table 3. Proposed Presentation Contexts for the Intera NETWORK AE

Abstract Syntax	UID	Transfer Syntax	UID List	Role	Extended Negotiation
Verification	1.2.840.10008.1.1	ILE	1.2.840.10008.1.2	SCU	None
Verification	1.2.840.10008.1.1	ELE	1.2.840.10008.1.2.1	SCU	None
Verification	1.2.840.10008.1.1	EBE	1.2.840.10008.1.2.2	SCU	None

3.1.2.1.3. SOP Specific Conformance Worklist SOP Classes

When a verification request is initiated to an unconfigured node the Intera doens't uses his own Implementation Class UID and version Name during the association. Instead of these values the Intera uses "EV/MIP 1.0" as Implementation Version Name and uses "1.3.46.670589.11.0.0.51.4.2.0" as Implementation class UID.

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3.1.2.2. The Intera DICOM Worklist Request

3.1.2.2.1. *Associated Real-World Activity*

The Worklist function will be accessible through the Intera User Interface. An association will be set-up to the configured remote system (usually a RIS). After receiving the Worklist the association is released.

3.1.2.2.2. *Proposed Presentation Context*

The Intera DICOM NETWORK AE will propose the following presentation context:

Table 4.   **Proposed Presentation Contexts for the Intera NETWORK AE**

Abstract Syntax	UID	Transfer Syntax	UID List	Role	Ext. Neg.
Modality Worklist Management	1.2.840.10008.5.1.4.31	ILE	1.2.840.10008.1.2	SCU	None
Modality Worklist Management	1.2.840.10008.5.1.4.31	ELE	1.2.840.10008.1.2.1	SCU	None
Modality Worklist Management	1.2.840.10008.5.1.4.31	EBE	1.2.840.10008.1.2.2	SCU	None

3.1.2.2.3. *SOP Specific Conformance Worklist SOP Classes*

Following are the status codes that are processed by the Intera NETWORK AE when received from a remote Modality Worklist SCP system:

Table 5.   **WLM STATUS**

Service Status	Status Codes	Further Meaning	Behaviour upon receiving Status Codes
Refused	A700	Out of resources	Processing of the matches and the association is terminated. A message appears on the User Interface.
Failed	A900	Identifier does not match SOP Class	The association is terminated and the status is logged into the system error log. A message appears on the User Interface.
	Cxxx	Unable to process	Processing of the matches and the association is terminated. A message appears on the User Interface.
Cancel	FE00	Matching terminated due to cancel	Processing of the matches and the association is terminated. A message appears on the User Interface.
All other status codes	xxxx		A message appears on the User Interface.
Success	0000	Matching is complete - No final identifier is supplied	The association is released and the matches received are stored.

In the following tables an overview of the WLM request attributes is given. Additional information is included in the note field.

Table 6.   **Modality Worklist Information Model - FIND SOP Class - C-FIND-RQ - Visit Status Module**

Attribute Name	Tag	Note
Current Patient Location	0038,0300	

Table 7.   **Modality Worklist Information Model - FIND SOP Class - C-FIND-RQ - Scheduled Procedure Step Module**

Attribute Name	Tag	Note
Scheduled Procedure Step Sequence	0040,0100	
>Modality	0008,0060	
>Requested Contrast Agent	0032,1070	
>Scheduled Station AE Title	0040,0001	Can be used as matching key.
>Scheduled Procedure Step Start Date	0040,0002	Can be used as matching key. Range matching: \<Today\> - \<Tomorrow\> Single Value Matching: \<Today\>, \<Tomorrow\>
>Scheduled Procedure Step Start Time	0040,0003	
>Scheduled Procedure Step End Date	0040,0004	
>Scheduled Procedure Step End Time	0040,0005	
>Scheduled Performing Physician's Name	0040,0006	
>Scheduled Procedure Step Description	0040,0007	
>Scheduled Action Item Code Sequence	0040,0008	
>>Code Value	0008,0100	
>>Coding Scheme Designator	0008,0102	
>>Coding Scheme Version	0008,0103	
>>Code Meaning	0008,0104	
>Scheduled Procedure Step ID	0040,0009	
>Scheduled Station Name	0040,0010	
>Scheduled Procedure Step Location	0040,0011	
>Pre-Medication	0040,0012	
>Scheduled Procedure Step Status	0040,0020	
>Comments on the Scheduled Procedure Step	0040,0400	

Table 8.   **Modality Worklist Information Model - FIND SOP Class - C-FIND-RQ - Requested Procedure Module**

Attribute Name	Tag	Note
Referenced Study Sequence	0008,1110	
>Referenced SOP Class UID	0008,1150	
>Referenced SOP Instance UID	0008,1155	
Study Instance UID	0020,000D	

Attribute Name	Tag	Note
Requested Procedure Description	0032,1060	
Requested Procedure Code Sequence	0032,1064	
>Code Value	0008,0100	
>Coding Scheme Designator	0008,0102	
>Coding Scheme Version	0008,0103	
>Code Meaning	0008,0104	
Requested Procedure ID	0040,1001	
Names of Intended Recipients of Results	0040,1010	
Requested Procedure Comments	0040,1400	

Table 9.   **Modality Worklist Information Model - FIND SOP Class - C-FIND-RQ - SOP Common Module**

Attribute Name	Tag	Note
Specific Character Set	0008,0005	

Table 10.   **Modality Worklist Information Model - FIND SOP Class - C-FIND-RQ - Patient Identification Module**

Attribute Name	Tag	Note
Patient's Name	0010,0010	
Patient ID	0010,0020	
Other Patient IDs	0010,1000	

Table 11.   **Modality Worklist Information Model - FIND SOP Class - C-FIND-RQ - Imaging Service Request Module**

Attribute Name	Tag	Note
Accession Number	0008,0050	
Referring Physician's Name	0008,0090	
Requesting Physician	0032,1032	
Requesting Service	0032,1033	
Imaging Service Request Comments	0040,2400	

Table 12.   **Modality Worklist Information Model - FIND SOP Class - C-FIND-RQ - Patient Demographic Module**

Attribute Name	Tag	Note
Patient's Birth Date	0010,0030	
Patient's Sex	0010,0040	
Patient's Weight	0010,1030	
Ethnic Group	0010,2160	
Patient Comments	0010,4000	

Table 13. **Modality Worklist Information Model - FIND SOP Class - C-FIND-RQ - Patient Medical Module**

Attribute Name	Tag	Note
Medical Alerts	0010,2000	
Additional Patient History	0010,21B0	
Pregnancy Status	0010,21C0	

3.1.2.3.   The Intera DICOM MPPS Request

3.1.2.3.1. *Associated Real-World Activity*

The Intera NETWORK AE initiates an association to the MPPS server when the first scan of the examination is initiated and sent a N-CREATE message with all appropriate information for the study. By pressing the "ready" or "incomplete" button an N-SET message is then sent with end dates and time, with a status COMPLETED/ DISCONTINUED.

3.1.2.3.2. *Proposed Presentation Context*

The Intera DICOM NETWORK AE will propose the following presentation context:

Table 14.   **Proposed Presentation Contexts for the Intera NETWORK AE**

Abstract Syntax	UID	Transfer Syntax	UID List	Role	Ext. Neg.
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3	ILE	1.2.840.10008.1.2	SCU	None
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3	ELE	1.2.840.10008.1.2.1	SCU	None
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3	EBE	1.2.840.10008.1.2.2	SCU	None

3.1.2.3.3. *SOP Specific Conformance MPPS SOP Classes*

The Intera DICOM NETWORK AE is provides standard conformance to the MPPS SOP Class.

This chapter specifies in detail the applied attributes in the N-CREATE and N-SET Service Element of this supported SOP Class.

Table 15.   **Modality Performed Procedure Step SOP Class - N-SET-RQ - Image Acquisition Results Module**

Attribute Name	Tag	Note
Performed Series Sequence	0040,0340	
>Retrieve AE Title	0008,0054	
>Series Description	0008,103E	
>Performing Physician's Name	0008,1050	
>Operator's Name	0008,1070	
>Referenced Image Sequence	0008,1140	
>>Referenced SOP Class UID	0008,1150	
>>Referenced SOP Instance UID	0008,1155	
>Protocol Name	0018,1030	
>Series Instance UID	0020,000E	
>Referenced Standalone SOP Instance Sequence	0040,0220	

Attribute Name	Tag	Note
>>Referenced SOP Class UID	0008,1150	
>>Referenced SOP Instance UID	0008,1155	

Table 16.   Modality Performed Procedure Step SOP Class - N-SET-RQ - Performed Procedure Step Information Module

Attribute Name	Tag	Note
Performed Procedure Step End Date	0040,0250	
Performed Procedure Step End Time	0040,0251	
Performed Procedure Step Status	0040,0252	Applied Value(s): COMPLETED, DISCONTINUED
Performed Procedure Step Description	0040,0254	
Performed Procedure Type Description	0040,0255	

Table 17.   Modality Performed Procedure Step SOP Class - N-SET-RQ - Extended attributes

Attribute Name	Tag	Note
Instance Creation Date	0008,0012	
Instance Creation Time	0008,0013	
Instance Creator UID	0008,0014	
SOP Class UID	0008,0016	
SOP Instance UID	0008,0018	

Table 18.   Modality Performed Procedure Step SOP Class - N-CREATE-RQ - SOP Common Module

Attribute Name	Tag	Note
Specific Character Set	0008,0005	

Table 19.   Modality Performed Procedure Step SOP Class - N-CREATE-RQ - Image Acquisition Results Module

Attribute Name	Tag	Note
Modality	0008,0060	
Study ID	0020,0010	
Performed Action Item Code Sequence	0040,0260	Attribute always empty.
Performed Series Sequence	0040,0340	
>Retrieve AE Title	0008,0054	
>Series Description	0008,103E	
>Performing Physician's Name	0008,1050	
>Operator's Name	0008,1070	
>Referenced Image Sequence	0008,1140	
>>Referenced SOP Class UID	0008,1150	
>>Referenced SOP Instance UID	0008,1155	
>Protocol Name	0018,1030	

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Attribute Name	Tag	Note
>Series Instance UID	0020,000E	
>Referenced Standalone SOP Instance Sequence	0040,0220	
>>Referenced SOP Class UID	0008,1150	
>>Referenced SOP Instance UID	0008,1155	

Table 20. **Modality Performed Procedure Step SOP Class - N-CREATE-RQ - Performed Procedure Step Information Module**

Attribute Name	Tag	Note
Procedure Code Sequence	0008,1032	Attribute always empty.
Performed Station AE Title	0040,0241	
Performed Station Name	0040,0242	
Performed Location	0040,0243	
Performed Procedure Step Start Date	0040,0244	
Performed Procedure Step Start Time	0040,0245	
Performed Procedure Step End Date	0040,0250	
Performed Procedure Step End Time	0040,0251	
Performed Procedure Step Status	0040,0252	Applied Value(s): IN PROGRESS
Performed Procedure Step ID	0040,0253	
Performed Procedure Step Description	0040,0254	
Performed Procedure Type Description	0040,0255	

Table 21. **Modality Performed Procedure Step SOP Class - N-CREATE-RQ - Performed Procedure Step Relationship Module**

Attribute Name	Tag	Note
Referenced Patient Sequence	0008,1120	
>Referenced SOP Class UID	0008,1150	
>Referenced SOP Instance UID	0008,1155	
Patient's Name	0010,0010	
Patient ID	0010,0020	
Patient's Birth Date	0010,0030	
Patient's Sex	0010,0040	
Scheduled Step Attribute Sequence	0040,0270	
>Accession Number	0008,0050	
>Referenced Study Sequence	0008,1110	
>>Referenced SOP Class UID	0008,1150	
>>Referenced SOP Instance UID	0008,1155	
>Study Instance UID	0020,000D	
>Requested Procedure Description	0032,1060	
>Scheduled Procedure Step Description	0040,0007	
>Scheduled Action Item Code Sequence	0040,0008	
>>Code Value	0008,0100	
>>Coding Scheme Designator	0008,0102	

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Attribute Name	Tag	Note
>>Coding Scheme Version	0008,0103	
>>Code Meaning	0008,0104	
>Scheduled Procedure Step ID	0040,0009	
>Requested Procedure ID	0040,1001	

Table 22.   Modality Performed Procedure Step SOP Class - N-CREATE-RQ - Extended attributes

Attribute Name	Tag	Note
Instance Creation Date	0008,0012	
Instance Creation Time	0008,0013	
Instance Creator UID	0008,0014	
SOP Class UID	0008,0016	
SOP Instance UID	0008,0018	

Table 23.   Modality Performed Procedure Step SOP Class - N-CREATE-RQ - Radiation Dose Module

Attribute Name	Tag	Note
Anatomic Structure, Space or Region Sequence	0008,2229	Attribute always empty.
Distance Source to Detector	0018,1110	Attribute always empty.
Image Area Dose Product	0018,115E	Attribute always empty.
Total Time of Fluoroscopy	0040,0300	Attribute always empty.
Total Number of Exposures	0040,0301	Attribute always empty.
Entrance Dose	0040,0302	Attribute always empty.
Exposed Area	0040,0303	Attribute always empty.
Comments on Radiation Dose	0040,0310	Attribute always empty.

Table 24.   Modality Performed Procedure Step SOP Class - N-CREATE-RQ - Billing And Material Management Code Module

Attribute Name	Tag	Note
Billing Procedure Step Sequence	0040,0320	Attribute always empty.
Film Consumption Sequence	0040,0321	Attribute always empty.
Billing Supplies and Devices Sequence	0040,0324	Attribute always empty.

3.1.2.4.   Query a remote database

3.1.2.4.1. Associated Real-World Activity

The operator queries a remote database by means of the filter tool in the Patient Administration facility. The Intera initiates an Association to the selected peer entity and uses it to send C-FIND requests (and receive the associated find replies).

3.1.2.4.2. Proposed Presentation Contexts

The Intera will propose the presentation contexts as given in the next Table.

Table 25.   Proposed Presentation Contexts for the Intera Import AE

Abstract Syntax	UID	Transfer Syntax	UID List	Role	Ext. Neg.
Supported Query/Retrieve Info Model - FIND	See table 1.	ILE	1.2.840.10008.1.2	SCU	None
Supported Query/Retrieve Info Model - FIND	See table 1.	ELE	1.2.840.10008.1.2.1	SCU	None
Supported Query/Retrieve Info Model - FIND	See table 1.	EBE	1.2.840.10008.1.2.2	SCU	None

3.1.2.4.3. C-FIND SCU Conformance

The Intera:
- Sends a universal queries, internally the information is filtered.
- Performs a query directly, wildcard matching and single value matching are supported.

The Intera system supports the following attributes as matching keys:

Table 26.   Supported Matching Keys

Attribute Name	Tag	Note
Patient's Name	0010,0010	
Patient ID	0010,0020	
Patient's Birth Date	0010,0030	
Study Instance UID	0020,000D	

Table 27.   Patient Root Query/Retrieve Information Model - FIND SOP Class - C-FIND-RQ - Patient Root Information Model

Attribute Name	Tag	Note
Specific Character Set	0008,0005	
Study Date	0008,0020	
Series Date	0008,0021	
Study Time	0008,0030	

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Attribute Name	Tag	Note
Series Time	0008,0031	
Accession Number	0008,0050	
Query/Retrieve Level	0008,0052	
Modality	0008,0060	
Series Description	0008,103E	
Patient's Name	0010,0010	
Patient ID	0010,0020	
Patient's Birth Date	0010,0030	
Patient's Sex	0010,0040	
Body Part Examined	0018,0015	
Protocol Name	0018,1030	
Study Instance UID	0020,000D	
Series Instance UID	0020,000E	
Study ID	0020,0010	
Series Number	0020,0011	
Number of Series Related Instances	0020,1209	
Performed Procedure Step Start Date	0040,0244	
Performed Procedure Step Status	0040,0252	
Performed Procedure Step Description	0040,0254	
Examination Source	2001,1063	

Table 28. **Study Root Query/Retrieve Information Model - FIND SOP Class - C-FIND-RQ - Study Root Information Model**

Attribute Name	Tag	Note
Specific Character Set	0008,0005	
Study Date	0008,0020	
Series Date	0008,0021	
Study Time	0008,0030	
Series Time	0008,0031	
Accession Number	0008,0050	
Query/Retrieve Level	0008,0052	
Modality	0008,0060	
Series Description	0008,103E	
Patient's Name	0010,0010	
Patient ID	0010,0020	
Patient's Birth Date	0010,0030	
Patient's Sex	0010,0040	
Body Part Examined	0018,0015	
Protocol Name	0018,1030	
Study Instance UID	0020,000D	
Series Instance UID	0020,000E	
Study ID	0020,0010	
Series Number	0020,0011	

Attribute Name	Tag	Note
Number of Series Related Instances	0020,1209	
Performed Procedure Step Start Date	0040,0244	
Performed Procedure Step Status	0040,0252	
Performed Procedure Step Description	0040,0254	
Examination Source	2001,1063	

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3.1.2.5. Retrieve Images from a Remote Database

3.1.2.5.1. *Associated Real-World Activity*

The operator is able to copy all/selected series in a patient/study (examination) folder from a remote database to the local database by means of the "Local Database" button in the Intera patient administration facility. The Intera initiates an Association to the selected peer entity and uses it to send C-MOVE requests (and receive the associated move replies). The Association is released when all selected images have been transmitted.

3.1.2.5.2. *Proposed Presentation Contexts*

The Intera will propose the presentation contexts as given in next Table.

Table 29. **Proposed Presentation Contexts for the Intera Import AE**

Abstract Syntax	UID	Transfer Syntax	UID List	Role	Ext. Neg.
Supported Query/Retrieve Info Model - MOVE	See table 1.	ILE	1.2.840.10008.1.2	SCU	None
Supported Query/Retrieve Info Model - MOVE	See table 1.	ELE	1.2.840.10008.1.2.1	SCU	None
Supported Query/Retrieve Info Model - MOVE	See table 1.	EBE	1.2.840.10008.1.2.2	SCU	None

3.1.2.5.3. *C-MOVE SCU Conformance*

The AE provides standard conformance.

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3.1.2.6.   Export of Images

3.1.2.6.1. Associated Real-World Activity

After selection of a remote station and after selection of one or more images, these images will be sent when initiating the Export command. Intera initiates one association to the selected remote entity and uses it to send the selected images via C-STORE requests (and receives the associated C-STORE Responses).

The association is released by the Intera after successful transfer of the images or when an error occurs.

3.1.2.6.2. Proposed Presentation Contexts

The Intera will propose the presentation contexts as given in the next Table.

Table 30.   Proposed Presentation Contexts for the Intera Export AE

Abstract Syntax	UID	Transfer Syntax	UID List	Role	Ext. Neg.
All Storage SOP Classes in table 1.	All Storage SOP Classes in table 1.	ILE	1.2.840.10008.1.2	SCU	None
All Storage SOP Classes in table 1.	All Storage SOP Classes in table 1.	ELE	1.2.840.10008.1.2.1	SCU	None
All Storage SOP Classes in table 1.	All Storage SOP Classes in table 1.	EBE	1.2.840.10008.1.2.2	SCU	None

3.1.2.6.3. Storage SCU Conformance

The Image Export AE provides standard conformance.
The images comprising a procedure will be sent with a single C-STORE request.

Upon receiving a C-STORE response containing an Error or a Refused status the implementation will release the association. All of the images associated with a procedure will be considered by the Intera to have failed to transfer. The Intera Export AE has the ability to automatically recover from this situation and will attempt to send all the images at a later time.

The behaviour on successful and unsuccessful transfer of images is given in the table below.

Table 31.   C-STORE STATUS

Service Status	Codes	Further Meaning Status
Refused	A7xx	Message in console.
Error	A9xx	Message in console.
	Cxxx	Message in console.
Warning	B00x	Message in console.
Success	0000	Message in console.

If the Intera user makes changes in the default image settings and/or annotations, these settings and annotations can be exported as DICOM Standard grayscale softcopy presentation state if the Storage SCP supports this function.

On the export of such an image the Intera system first sets up an association to determine if the SCP supports the grayscale softcopy presentation state SOP Class. If the SCP supports this SOP Class the Intera will request the storage of both a grayscale softcopy presentation state object and a MR Image object. In annex 1 the supported attributes for the MR storage object service are listed, this list is only valid in case the SCP support the grayscale softcopy presentation state. Annex 2 gives an overview of the supported grayscale softcopy presentation state attributes. Annex 4 gives an overview of the supported Secondary Capture attributes.

If a MR Image is exported and the remote system doesn't support the MR Image SOP Class the Intera automatically converts the MR into a Secondary Capture Image.

If the SCP doesn't supports the grayscale softcopy presentation state service the Graphical information is added to the MR image object additional a new instance UID is generated for this MR image.. The supported attributes for this MR object with the graphical information is listed in annex 3.

In the following tables an overview is presented with the supported modules for each exported instance.

Table 32.   **Supported module for the MR SOP (SCP support grayscale softcopy presentation state)**

Module	Reference
Frame of Reference Module	See Annex 1
General Equipment Module	
General Image Module	
General Series Module	
General Study Module	
Image Pixel Module	
Image Plane Module	
MR Image Module	
Patient Module	
Patient Study Module	
Private Module	
SOP Common Module	

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Table 33.   **Supported module for the PS SOP (SCP support grayscale softcopy presentation state)**

Module	Reference
General Equipment Module	See Annex 2
General Series Module	
General Study Module	
Graphic Annotation Module	
Graphic Layer Module	
Modality LUT Module	
Patient Module	
Patient Study Module	
Presentation Series Module	
Presentation State Module	
Softcopy Presentation LUT Module	
Softcopy VOI LUT Module	
SOP Common Module	
Spatial Transformation Module	

Table 34.   **Supported module for the MR SOP (SCP doesn't support grayscale softcopy presentation state)**

Module	Reference
General Equipment Module	See Annex 3
General Image Module	
General Series Module	
General Study Module	
Image Pixel Module	
Image Plane Module	
MR Image Module	
Overlay Plane Module	
Patient Module	
Patient Study Module	
Private Module	
SOP Common Module	
VOI LUT Module	

Table 35.   Supported module for the SC SOP

Module	Reference
General Series Module	See Annex 4
General Equipment Module	
SC Image Equipment Module	
General Image Module	
Image Pixel Module	
SC Image Module	
SOP Common Module	

3.1.2.7. Storage commit request

3.1.2.7.1. Associated Real-World Activity

Upon transfer of images for a procedure to an archive, the Intera Storage Commitment AE initiates an association for the request of Storage Commitment on a remote Archive or Remote AE System. Upon completion of the N-ACTION, the association is released. In order to relate the N-ACTION to future updates the Transaction UID used is recorded. There are no timers related to the management of the association.

Upon receiving an N-ACTION response containing a Failure Status, the status will be logged to the system log file and the implementation will terminate the association.

For cases when the Storage Commitment SCP is not functioning (i.e. momentarily off-line), the Intera Storage Commitment implementation queues the N-ACTION request for future re transmission.

Upon receiving an N-EVENT-REPORT message containing failed requests, the "stored" field in the User Interface is set to "Failed".

The N-ACTION message is generated without operator interaction.

3.1.2.7.2. Proposed Presentation Contexts

The Intera will propose the presentation contexts as given in the next Table.

Table 36. Proposed Presentation Contexts for the Intera Export AE

Abstract Syntax	UID	Transfer Syntax	UID List	Role	Ext. Neg.
Storage Commitment SOP Class	1.2.840.10008.1.20.1.1	ILE	1.2.840.10008.1.2	SCU	None
Storage Commitment SOP Class	1.2.840.10008.1.20.1.1	ELE	1.2.840.10008.1.2.1	SCU	None
Storage Commitment SOP Class	1.2.840.10008.1.20.1.1	EBE	1.2.840.10008.1.2.2	SCU	None

3.1.2.7.3. Storage Commitment SCU Conformance

Storage Commitment is accomplished according to the real world activity described earlier. The Intera Storage Commitment AE provides Standard conformance to the Storage Commitment SOP Class.

There are no SOP class specific status codes defined by DICOM for the N-ACTION or the N-EVENT-REPORT, therefore, only general statuses from PS3.7 [DICOM] are used.

Table 37.   **Storage Commitment Push Model SOP Class - N-ACTION-RQ**

Attribute Name	Tag	Note
Referenced Study Component Sequence	0008,1111	
>Referenced SOP Class UID	0008,1150	
>Referenced SOP Instance UID	0008,1155	
Transaction UID	0008,1195	
Referenced SOP Sequence	0008,1199	
>Referenced SOP Class UID	0008,1150	
>Referenced SOP Instance UID	0008,1155	

3.1.3. Association Acceptance Policy

3.1.3.1. The Intera DICOM Verification Request

3.1.3.1.1. Associated Real-World Activity

An association can be made to verify application level communication using the C-ECHO command.

3.1.3.1.2. Proposed Presentation Context

The Intera DICOM Import AE will accept the following presentation context:

Table 38.   **Accepted Presentation Contexts for the Intera Import AE**

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

3.1.3.1.3. SOP Specific Conformance Verification SOP Classes

The Intera DICOM Import AE provides standard conformance to the Verification SOP Class.

3.1.3.2. The Intera DICOM Import Request

The Import AE accepts associations as a result of one Real-World activity: a remote station will request to store images on the Intera.

3.1.3.2.1. Associated Real-World Activity

After selection at a remote station and after selection of one or more images or after a Q/R Move request, these images can be sent to the Intera Import AE.

Import AE after successful transfer of the images or when an error occurs releases the association.

3.1.3.2.2. Proposed Presentation Context

The Intera DICOM Network AE will accept the following presentation context:

Table 39.   Accepted Presentation Contexts for the Intera Import AE

Abstract Syntax	UID	Transfer Syntax	UID List	Role	Ext. Neg.
All Storage SOP Classes in table 2	All Storage SOP Classes in table 2	ILE	1.2.840.10008.1.2	SCP	None
All Storage SOP Classes in table 2	All Storage SOP Classes in table 2	ELE	1.2.840.10008.1.2.1	SCP	None
All Storage SOP Classes in table 2	All Storage SOP Classes in table 2	EBE	1.2.840.10008.1.2.2	SCP	None

3.1.3.2.3. SOP Specific Conformance Storage SOP Classes

Only MR images made on an Intera are allowed to be imported again, these imported images are used for reference only, it is not intended to export them again. SC images can be imported at all times from any source.

3.1.3.3. Storage Commitment N-EVENT-REPORT

The Intera Export AE can accept requests for the storage Commitment N-EVENT-REPORT service. See section 3.1.2.7.

3.2.   Intera DICOM Print AE Specification

The Intera Print AE provides Conformance to the following DICOM 3.0 SOP class as an SCU:

Table 40.   **Supported SOP classes by the Intera Print AE as SCU**

SOP Class Name	UID	DIMSE
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	
> Printer SOP Class	1.2.840.10008.5.1.1.16	N-GET
> Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	N-CREATE
> Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	N-CREATE N-ACTION
> Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4	N-SET

3.2.1. Association Establishment Policies

3.2.1.1.   General

The Intera DICOM Network AE Specification always proposes the following DICOM Application Context Name (ACN): 1.2.840.10008.3.1.1.1

The Print AE has a fixed PDU size, this value is 64K.

3.2.1.2.   Number of Associations

Always one at the time. It releases the association with DICOM SCP if no operation is done on the association within 120 s. or by user cancellation.

3.2.1.3.   Asynchronous Nature

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

3.2.1.4.   Implementation Identifying Information

The Implementation Class UID:	2.16.124.113531.1.1.1
The implementation version name:	" MR PRINT 1.2"

3.2.2. Association Initiation Policy

When the application submits a print job designated for a listed print server to the AE, the AE will request an association with the configured print server. For every supported printer the Association Initiation Policy can be configured, a list of attribute values can be configured.

3.2.2.1.   The Intera DICOM Print request

3.2.2.1.1. Associated Real-World Activity

The Print AE request causes the AE to initiate an Association.

3.2.2.1.2. Proposed Presentation Context

The Intera DICOM Print AE will propose the following presentation context:

Table 41.   **Proposed Presentation Contexts for the Intera Print AE**

Abstract Syntax	UID	Transfer Syntax	UID List	Role	Ext. Neg.
Basic Grayscale Print Management SOP Class	1.2.840.10008.5.1.1.9	ILE	1.2.840.10008.1.2	SCU	None
Basic Grayscale Print Management SOP Class	1.2.840.10008.5.1.1.9	ELE	1.2.840.10008.1.2.1	SCU	None
Basic Grayscale Print Management SOP Class	1.2.840.10008.5.1.1.9	EBE	1.2.840.10008.1.2.2	SCU	None

3.2.2.1.3. *SOP Specific Conformance Printer SOP Classes*

The Intera does not support the N-EVENT-REPORT DIMSE Service for the Printer SOP Class. When the system receives an N-EVENT-REPORT FAILURE a deadlock situation between the printer and the Intera can occur.

The Intera does not detect the Printer Status FAILURE (N-GET). Instead of Releasing the Association the Print Job is continued.

Note:
Applied values other than mentioned below are NOT supported.

Table 42.   **Basic Film Box SOP Class - N-CREATE-RQ - Basic Film Box Presentation Module**

Attribute Name	Tag	Note
Image Display Format	2010,0010	Applied Value(s): COL, CUSTOM, CUSTOM\1, ROW, SLIDE, STANDARD, STANDARD\1,1, SUPERSLIDE
Film Orientation	2010,0040	Applied Value(s): PORTRAIT
Film Size ID	2010,0050	Applied Value(s): 10INX12IN, 10INX14IN, 11INX14IN, 14INX14IN, 14INX17IN, 24CMX24CM, 24CMX30CM, 8INX10IN
Magnification Type	2010,0060	Applied Value(s): CUBIC
Smoothing Type	2010,0080	
Border Density	2010,0100	Applied Value(s): BLACK
Empty Image Density	2010,0110	Applied Value(s): BLACK
Min Density	2010,0120	
Max Density	2010,0130	
Trim	2010,0140	Applied Value(s): NO
Configuration Information	2010,0150	

Table 43.   **Basic Film Box SOP Class - N-CREATE-RQ - Basic Film Box Relationship Module**

Attribute Name	Tag	Note
Referenced Film Session Sequence	2010,0500	Parent Film Session.
>Referenced SOP Class UID	0008,1150	
>Referenced SOP Instance UID	0008,1155	

Table 44.   **Basic Film Session SOP Class - N-CREATE-RQ - Basic Film Session Presentation Module**

Attribute Name	Tag	Note
Number of Copies	2000,0010	Between 1 and 99.
Print Priority	2000,0020	Applied Value(s): MED
Medium Type	2000,0030	Applied Value(s): BLUE FILM
Film Destination	2000,0040	Applied Value(s): MAGAZINE, PROCESSOR
Film Session Label	2000,0050	

Table 45.   **Basic Grayscale Image Box SOP Class - N-SET-RQ - Image Box Pixel Presentation Module**

Attribute Name	Tag	Note
Magnification Type	2010,0060	Applied Value(s): CUBIC
Smoothing Type	2010,0080	SCP specific.
Image Position	2020,0010	Applied Value(s): 1
Polarity	2020,0020	Applied Value(s): NORMAL
Preformatted Grayscale Image Sequence	2020,0110	
>Samples per Pixel	0028,0002	Applied Value(s): 1
>Photometric Interpretation	0028,0004	Applied Value(s): MONOCHROME2
>Rows	0028,0010	
>Columns	0028,0011	
>Bits Allocated	0028,0100	Applied Value(s): 8
>Bits Stored	0028,0101	Applied Value(s): 8
>High Bit	0028,0102	Applied Value(s): 7
>Pixel Representation	0028,0103	Applied Value(s): 0x0000
>Pixel Data	7FE0,0010	

Table 46.   **Printer SOP Class - N-EVENT-REPORT-RSP - Printer Module**

Attribute Name	Tag	Note
Printer Status Info	2110,0020	

Table 47.   **Printer SOP Class - N-GET-RQ - Printer Module**

Attribute Name	Tag	Note
Manufacturer	0008,0070	
Manufacturer's Model Name	0008,1090	
Device Serial Number	0018,1000	
Software Version(s)	0018,1020	
Printer Status	2110,0010	Applied Value(s): FAILURE, NORMAL, WARNING
Printer Status Info	2110,0020	Applied Value(s): FILM JAM, RECEIVER FULL, SUPPLY EMPTY, SUPPLY LOW
Printer Name	2110,0030	

3.2.3. Association Acceptance Policy

The Intera DICOM Print AE does not accept any associations.

3.3.   Media Specification

The Intera provides Standard Conformance to the DICOM Media Storage Service and File Format (PS 3.10 [DICOM]) and the Media Storage Application Profiles (PS 3.11 [DICOM]) as far as the reading of uncompressed images on MOD medium is concerned.

The Intera supports **multi-patient** and **multi-session** (both for reading and writing) MOD disks.

The supported Application Profiles, their Roles and the Service Class (SC) options, all defined in DICOM terminology, are listed in Table 23.

Table 48.   Application Profile, Activities and Roles of the DICOM Media part of the Intera

Application Profile	Identifier	Real World Activity	Role	SC Option
MR MOD Image Interchange Profile	STD-CTMR	Display Directory of MOD disk	FSR	Interchange
	STD-CTMR	Write image(s) on MOD disk	FSC, FSU	Interchange
	STD-CTMR	Read image(s) from MOD disk	FSR	Interchange

The next table gives an overview of the supported SOP Classes that can be written to a 2.3 GB MOD disk via this Application Profile.

Table 49.   Supported SOP classes by the Media AE

SOP class Name	UID
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Greyscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1
MR Spectrum Storage	1.3.46.670589.11.0.0.12.1
MR Series Data Storage	1.3.46.670589.11.0.0.12.2

Note that the Grayscale Softcopy Presentation State object is not in the application profile but is written as an additional SOP class (extended Application profile).

3.3.1.   File Meta Information

The (Source) Application Entity Title is derived from the Network AE.

The Implementation Class UID and the Implementation Version Name in the File Meta Header are specified in section 3.1.

3.3.2. Media related Real-World Activities

3.3.2.1. RWA Display Directory

The Intera Media AE will act as a FSR when reading the directory of the medium. This will result in an overview of the patients, studies, series and images on the Intera User Interface.

3.3.2.1.1. *Application Profile(s) for this RWA*

See Table 29.

3.3.2.1.2. *Required and optionally DICOMDIR Keys*

Default all mandatory DICOM keys are written to the DICOMDIR file, if configured additional keys can be stored.

3.3.2.2. RWA Write images on MOD disk

The MEDIA AE will act as a FSC/FSU when writing all/selected images in a patient folder onto the MOD medium.

3.3.2.2.1. *Application Profile(s) for this RWA*

See Table 29 .

3.3.2.2.2. *Support for Attributes in the images*

The DICOMDIR file will be extended when new images are written. In case some attributes are not present in the images but are specified Mandatory in the DICOMDIR definition in DICOM Media, a dummy ID will be filled in.

Implementation remarks and restriction:
• When writing the DICOMDIR records the keys values are generated when no value of the corresponding attribute is supplied:
- PATIENT_ID
- STUDY_ID
- STUDY_INSTANCE_UID
- SERIES_NUMBER
- SERIES_INSTANCE_UID
- IMAGE_NUMBER
- SOP_INSTANCE_UID
• The mechanism of generating a value for PATIENT_ID creates each time a new value based on PATIENT_NAME for each new study written to the MOD, even if this study belongs to a patient recorded earlier.
• The default value for the Pixel Intensity Relationship (0028,1040) is set to DISP.
• A number of attributes (e.g., Window Width and Window Centre) can be formatted as floating point numbers.

3.3.2.2.3. *Supported DICOMDIR attributes*

Table 50. **DICOMDIR Attributes**

DICOMDIR Key	Attribute TAG	Attribute Name	Note
PATIENT	(0010,0001)	Patient Name	
PATIENT	(0010,0002)	Patient ID	
PATIENT	(0010,0003)	Patient's Birth Date	

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DICOMDIR Key	Attribute TAG	Attribute Name	Note
PATIENT	(0010,0003)	Patient's Birth Time	
PATIENT	(0010,0004)	Patient's Sex	
PATIENT	(0010,0100)	Other Patient IDs	
PATIENT	(0010,0100)	Other Patient Names	
PATIENT	(0010,0216)	Ethnic Group	
STUDY	(0008,8002)	Study Date	
STUDY	(0008,8003)	Study Time	
STUDY	(0008,8103)	Study Description	
STUDY	(0020,0000)	Study Instance UID	
STUDY	(0020,0001)	Study ID	
STUDY	(0008,8005)	Accession Number	
STUDY	(0040,0024)	Performed Procedure Step Start Date	
STUDY	(0040,0025)	Performed Procedure Step Status	
STUDY	(0040,0025)	Performed Procedure Step Description	
STUDY	(2001,1106)	Examination Source	
SERIES	(0008,8006)	Modality	
SERIES	(0020,0000)	SeriesInstanceUID	
SERIES	(0020,0001)	SeriesNumber	
SERIES	(0008,8002)	Series Date	
SERIES	(0008,8003)	Series Time	
SERIES	(0018,8103)	Protocol Name	
SERIES	(2001,1101)	MRSeriesNrOfEchoes	
SERIES	(2001,1101)	MRSeriesNrOfPhases	
SERIES	(2001,1101)	MRSeriesNrOfSlices	
SERIES	(2001,1101)	MRSeriesReconstructionNumber	
SERIES	(2001,1102)	MRSeriesScanningTechniqueDescription	
SERIES	(2001,1102)	MRSeriesEchoTimeDisplay	
SERIES	(2001,1105)	StackSequence	
SERIES	(2001,1106)	MRSeriesNrOfStacks	
SERIES	(2001,1107)	MRSeriesAcquisitionNumber	
SERIES	(2001,1108)	MRSeriesNrOfDynamicScans	
SERIES	(2005,5102)	MRSeriesNrOfChemicalShifts	
SERIES	(2005,5103)	MRSeriesRepetitionTime	
SERIES	(2005,5103)	MRSeriesDataType	
SERIES	(2005,5136)	MRVolumeSelection	
IMAGE	(0008,8000)	Image Type	
IMAGE	(0020,0001)	Instance Number	
IMAGE	(0020,0005)	Frame of Reference UID	
IMAGE	(0028,8001)	Rows	
IMAGE	(0028,8001)	Cols	

DICOMDIR Key	Attribute TAG	Attribute Name	Note
IMAGE	(0028,8003)	Pixel Spacing	
IMAGE	(0020,0032)	Image Position (Patient)	
IMAGE	(0020,0037)	Image Orientation (Patient)	
IMAGE	(0028,0004)	Photometric Interpretation	
IMAGE	(0028,0101)	Bits Stored	
IMAGE	(0028,0102)	High Bit	
PRESENTATION	(0020,0001)	InstanceNumber	
PRESENTATION	(0070,0008)	PresentationStateLabel	
PRESENTATION	(0070,0008)	PresentationStateCreationDate	
PRESENTATION	(0070,0008)	PresentationStateCreationTime	
PRESENTATION	(0008,8111)	ReferencedSeriesSequence	
PRESENTATION	(0070,0008)	PresentationStateDescription	
PRESENTATION	(0070,0008)	PresentationStateCreatorName	

3.3.2.3. RWA Read images from MOD disk

The Intera Media AE will act as a FSR when reading all/selected images from the MOD medium. Only images made on an Intera are allowed to be imported again, these imported images are used for reference only, it is not intended to export them again.

3.3.2.3.1. Application Profile(s) for this RWA

See Table 29 .

3.3.2.3.2. Support for Attributes in the images

The Mandatory Attributes of the DICOM images are required for the correct storage of the images in the Intera internal image database. For conformance see section 3.1.2.6.

3.3.3. Augmented Application Profile

As an addition to the STD-MRCT application profile grayscale softcopy presentation state, Secondary Capture and Private objects can be written, updated and read onto/ from a MOD.

4. COMMUNICATION PROFILES

Intera provides DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard. No OSI stack communications are provided with this implementation.

4.1.   TCP/IP Stack

Intera support Ethernet v2.0 and IEEE 802.3, 10/100 BASE-T the Intera XP version also supports 1000 BASE-T.

5. EXTENSIONS/SPECIALIZATIONS/PRIVATIZATIONS

The following Standard Extensions are applied for the MR Image Storage SOP Class. See also the overview of the applied MR Image IOD.

Table 51. **Applied Standard Extensions**

Module	Attribute	Note
Study Classification	Study Comments	
Modality LUT	Rescale Intercept	Present if configured. Must be applied when viewing the image.
	Rescale Slope	See note Rescale Intercept above.
	Rescale Type	See note Rescale Intercept above.
MR Module Private	see Table	

The Intera system supports private SOP Classes for the C-Store services these Private SOP Classes are listed in the following table.

Table 52. **Supported Private SOP Classes as SCU and SCP by the Intera**

SOP Class Name	UID
MR Spectrum Storage	1.3.46.670589.11.0.0.12.1
MR Series Data Storage	1.3.46.670589.11.0.0.12.2

In the next table lists of the received attributes that are shown on the User interface are given. In this list the mapping of the DICOM attribute to the UI name is provided.

Table 53. **Mapping between UI elements and DICOM attributes for the Modality Worklist**

Attribute Name	Tag	Note
Scheduled Procedure Step Sequence	(0040,0100)	Sequence attribute note required in UI
>Scheduled Procedure Step Start Date	(0040,0002)	Not visible
>Scheduled Procedure Step Start Time	(0040,0003)	Not visible
>Modality	(0008,0060)	Not visible
>Scheduled Procedure Step Description	(0040,0007)	Exam Name
Requested Procedure ID	(0040,1001)	Not visible
Accession Number	(0008,0050)	Accession Number
Referring Physician's Name	(0008,0090)	Physician
Patient's Name	(0010,0010)	Patient Name
Patient ID	(0010,0020)	Registration ID
Patients Birth Date	(0010,0030)	Date of Birth
Patient's Sex	(0010,0040)	Sex
Patient Weights	(0010,1030)	Patient Weights

Table 54. **Correlation of Dicom Object**

Nr.	Level	Tag	Attribute	BWLM	MPPS Create	MPPS Set	Store
1	Patient	0010,0010	Patient Name	X	X		X
2		0010,0020	Patient ID	X	X		X
3		0010,0030	Patient Birth Date	X	X		X
4		0010,0040	Patient Sex	X	X		X
5	Study	0008,0050	Accession Number	X	X		X
6		0020,000D	Study Instance UID	X	X		X
7		0032,1060	Request Procedure Description	X			
8		0040,1001	Request Procedure ID	X	X		X
9	Exam	0008,0100	Code Value	X			
10		0008,0102	Code Scheme Designator	X			
11		0008,0104	Code Meaning	X			
12		0040,0007	Scheduled Procedure Step Descr	X	X		X
13		0040,0009	Scheduled Procedure Step ID	X	X		X
14		0040,0280	Examination Comments		X	X	X
15	Series/ Image/ grayscale softcopy presentation state	0040,0340	Performed Series Sequence			X	
16		0008,1140	>Referenced Image Sequence			X	
17		0008,1150	>>Referenced SOP Class UID			X	0008, 0018
18		0008,1155	>>Referenced SOP Instance UID			X	0008, 0020
19		0040,0220	>Referenced Stand Alone SOP Inst. Seq for the grayscale softcopy presentation state Objects			X	
20		0008,1150	>>Referenced SOP Class UID			X	0008, 0018
21		0008,1155	>>Referenced SOP Instance UID			X	0008, 0020
22		0018,1030	>Series Protocol Name			X	X
23		0008,103E	>Series Description			X	X
24		0020,000E	>Series Instance UID			X	X

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6. CONFIGURATION

A Philips engineer configures the Intera system only.

The IP address and AE Titles of the Intera are configurable. All are allowed to be equal. The listening port is for the DICOM Import Server is configurable.

6.1.   AE Title/Presentation Address

6.1.1. Configurable remote AE Titles and Presentation Addresses

The following information of remote systems (acting as Service Class Provider) must be configured on the Intera:
- The AE title. Default character Repertoire excluding control characters LF, FF, CR and ESC, maximum 16 bytes.
- The host name and IP addresses.
- The port number at which the remote system accepts association requests.
- Configurable remote DICOM capabilities overrule/ restrict the negotiable ones (transfer syntaxes, SCU/SCP SOP's)
- Logging of object contents for trouble shooting
- Group Length attributes included
- Export Pure DICOM only (Export without Private attributes)
- Is remote system an archive? If yes then also the storage commit node name and storage commit maximum reply waiting time have to be configured.
- The multi-day Range Query on the Worklist
- Combine MR rescaling

6.1.2. Configurable local parameters

- The maximum PDU size is configurable. Values can be freely chosen. The maximum for Import and Export, WLM, MPPS, Q/R and storage Commitment is unlimited, the PDU size for Print is fixed.
- AE Titles
- The host name and IP addresses.
- Institution Name, Table 3-23, (0008,0080).

6.2.   AE Title/Presentation Address mapping for Print

A DICOM print server is identified by a "printer name" with associated parameters such as AE title, host name and port number. The IP address corresponding to a given host name is determined using the name look up database mechanisms provided on the hosting platform.

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7. SUPPORT OF EXTENDED CHARACTER SETS

Intera supports Extended Character Set "ISO_IR 100" that is the Latin alphabet No 1, supplementary set.

If the RIS Worklist contains characters that are not ISO_IR 100 characters, the system will send a C-Cancel_RQ to RIS and a "RIS ERROR" message will be displayed. The Intera will reject the RIS import.

For Print the server provides no support for extended character sets in the communication with DICOM SCP's.

8. REMARKS

The conditional Contrast Module is not implemented.
Protocol Name (0018,1030) can be filled by the operator to contain the information relevant for MR. Future developments in user-interface with scanner controlled injectors will provide more detailed contrast information.

ANNEX 1. Overview applied MR Image IOD (in case SCP supports PS)

The details of the applied modules are given in the tables below. The situation that an attribute is present conditionally/optionally or that an attribute may contain a zero length value is indicated too. Conditions and Defined/Enumerated Values of DICOM 3.0 are applicable but are not shown in the tables. The specified attributes are present and filled except for what is specified in the notes.

Table 55.   MR Image Storage SOP Class - General Study Module

Attribute Name	Tag	Note
Study Date	0008,0020	Received from RIS or entered by the operator.
Study Time	0008,0030	Received from RIS or generated by the Intera system.
Accession Number	0008,0050	Received from RIS, entered by the operator or has zero length.
Referring Physician's Name	0008,0090	Received from RIS, entered by the operator or has zero length.
Study Description	0008,1030	Received from RIS as Scheduled Procedure Step Description) or entered by the operator (visible as Exam Name).
Study Instance UID	0020,000D	Received from RIS or generated by the Intera system.
Study ID	0020,0010	Received from RIS or entered by the operator.

Table 56.   MR Image Storage SOP Class - General Equipment Module

Attribute Name	Tag	Note
Manufacturer	0008,0070	Applied Value(s): Philips Medical Systems
Institution Name	0008,0080	Configured on the system.
Station Name	0008,1010	Same as the Host Name.
Manufacturer's Model Name	0008,1090	Applied Value(s): Intera
Device Serial Number	0018,1000	Applied Value(s): SRN
Software Version(s)	0018,1020	The release text of the original Image.
Pixel Padding Value	0028,0120	

Table 57.   MR Image Storage SOP Class - Image Pixel Module

Attribute Name	Tag	Note
Rows	0028,0010	
Columns	0028,0011	
Pixel Aspect Ratio	0028,0034	
Bits Stored	0028,0101	
High Bit	0028,0102	
Pixel Representation	0028,0103	
Pixel Data	7FE0,0010	

Table 58.   MR Image Storage SOP Class - Frame of Reference Module

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Attribute Name	Tag	Note
Frame of Reference UID	0020,0052	
Position Reference Indicator	0020,1040	Always Empty.

Table 59.   MR Image Storage SOP Class - Image Plane Module

Attribute Name	Tag	Note
Slice Thickness	0018,0050	
Image Position (Patient)	0020,0032	
Image Orientation (Patient)	0020,0037	
Pixel Spacing	0028,0030	

Table 60.   MR Image Storage SOP Class - Mr Image Module

Attribute Name	Tag	Note
Image Type	0008,0008	See table
Scanning Sequence	0018,0020	
Sequence Variant	0018,0021	
Scan Options	0018,0022	
MR Acquisition Type	0018,0023	
Repetition Time	0018,0080	
Echo Time	0018,0081	
Inversion Time	0018,0082	Attribute is always Present
Number of Averages	0018,0083	
Imaging Frequency	0018,0084	
Imaged Nucleus	0018,0085	
Echo Number(s)	0018,0086	
Magnetic Field Strength	0018,0087	
Spacing Between Slices	0018,0088	
Number of Phase Encoding Steps	0018,0089	
Echo Train Length	0018,0091	
Percent Sampling	0018,0093	
Percent Phase Field of View	0018,0094	
Trigger Time	0018,1060	
Low R-R Value	0018,1081	
High R-R Value	0018,1082	
Intervals Acquired	0018,1083	
Intervals Rejected	0018,1084	
Heart Rate	0018,1088	
Reconstruction Diameter	0018,1100	Diameter in mm. of the region from within which data were used in creating the reconstruction of the image. Data may exist outside this region and portions of the patient may exist outside this region.
Receiving Coil	0018,1250	
Transmitting Coil	0018,1251	
Acquisition Matrix	0018,1310	

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Attribute Name	Tag	Note
In-plane Phase Encoding Direction	0018,1312	
Flip Angle	0018,1314	
Temporal Position Identifier	0020,0100	
Number of Temporal Positions	0020,0105	
Samples per Pixel	0028,0002	
Photometric Interpretation	0028,0004	
Bits Allocated	0028,0100	

Table 61.   MR Image Storage SOP Class - General Series Module

Attribute Name	Tag	Note
Series Date	0008,0021	
Series Time	0008,0031	
Modality	0008,0060	
Series Description	0008,103E	
Referenced Study Component Sequence	0008,1111	
Protocol Name	0018,1030	
Patient Position	0018,5100	Attribute is always Present
Series Instance UID	0020,000E	Generated by Intera system.
Series Number	0020,0011	Created dynamically at export. Contains the concatenation of the acquisition number and the private reconstruction number.
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	
Request Attributes Sequence	0040,0275	Only send if received from RIS.
>Scheduled Procedure Step Description	0040,0007	Only send if received from RIS.
>Scheduled Procedure Step ID	0040,0009	
>Requested Procedure ID	0040,1001	Only send if received from RIS.
Comments on the Performed Procedure Steps	0040,0280	

Table 62.   MR Image Storage SOP Class - SOP Common Module

Attribute Name	Tag	Note
Specific Character Set	0008,0005	
Instance Creation Date	0008,0012	
Instance Creation Time	0008,0013	
Instance Creator UID	0008,0014	
SOP Class UID	0008,0016	
SOP Instance UID	0008,0018	

Table 63.   MR Image Storage SOP Class - Patient Study Module

Attribute Name	Tag	Note

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Attribute Name	Tag	Note
Patient's Weight	0010,1030	Weight of the Patient, in kilograms.

Table 64.   MR Image Storage SOP Class - General Image Module

Attribute Name	Tag	Note
Content Date	0008,0023	Present if image is part of a dynamic scan.
Content Time	0008,0033	
Referenced Image Sequence	0008,1140	
>Referenced SOP Class UID	0008,1150	
>Referenced SOP Instance UID	0008,1155	
Acquisition Number	0020,0012	Is visible on the UI as Scan Number.
Instance Number	0020,0013	
Patient Orientation	0020,0020	Attribute Always Empty.
Image Comments	0020,4000	

Table 65.   MR Image Storage SOP Class - Patient Module

Attribute Name	Tag	Note
Patient's Name	0010,0010	The characters '=' and '\' are not used. Received from RIS or entered by the operator.
Patient ID	0010,0020	Received from RIS or entered by the operator (Registration Number on UI).
Patient's Birth Date	0010,0030	Received from RIS or entered by the operator.
Patient's Sex	0010,0040	Received from RIS or entered by the operator.
Patient Comments	0010,4000	

Table 66.   MR Image Storage SOP Class -Private Group

Attribute Name	Tag	Note
Requested Contrast Agent	0032,1070	VR = LO, VM = 1
Study Comments	0032,4000	VR = LT, VM = 1
Scheduled Procedure Step Description	0040,0007	VR = LO, VM = 1
Scheduled Procedure Step ID	0040,0009	VR = SH, VM = 1
Performed Station AE Title	0040,0241	VR = AE, VM = 1
Performed Station Name	0040,0242	VR = SH, VM = 1
Performed Procedure Step End Date	0040,0250	VR = DA, VM = 1
Performed Procedure Step End Time	0040,0251	VR = TM, VM = 1
Performed Procedure Step Status	0040,0252	VR = CS, VM = 1
Performed Procedure Type Description	0040,0255	VR = LO, VM = 1
Requested Procedure ID	0040,1001	VR = SH, VM = 1
Private Creator Group 2001	2001,0010	VR = LO, VM = 1
Chemical Shift	2001,1001	VR = FL, VM = 1
Chemical Shift Number MR	2001,1002	VR = IS, VM = 1
Diffusion B-Factor	2001,1003	VR = FL, VM = 1
Diffusion Direction	2001,1004	VR = CS, VM = 1
Image Enhanced	2001,1006	VR = CS, VM = 1
Image Type ED ES	2001,1007	VR = CS, VM = 1

Attribute Name	Tag	Note
Phase Number	2001,1008	VR = IS, VM = 1
Slice Number MR	2001,100A	VR = IS, VM = 1
Slice Orientation	2001,100B	VR = CS, VM = 1
Diffusion Echo Time	2001,1011	VR = FL, VM = 1
Dynamic Series	2001,1012	VR = CS, VM = 1
EPI Factor	2001,1013	VR = SL, VM = 1
Number of Echoes	2001,1014	VR = SL, VM = 1
Number of Locations	2001,1015	VR = SS, VM = 1
Number of PC Directions	2001,1016	VR = SS, VM = 1
Number of Phases MR	2001,1017	VR = SL, VM = 1
Number of Slices MR	2001,1018	VR = SL, VM = 1
Partial Matrix Scanned	2001,1019	VR = CS, VM = 1
PC Velocity	2001,101A	VR = FL, VM = 1-n
Prepulse Delay	2001,101B	VR = FL, VM = 1
Prepulse Type	2001,101C	VR = CS, VM = 1
Reconstruction Number MR	2001,101D	VR = IS, VM = 1
Respiration Sync	2001,101F	VR = CS, VM = 1
SPIR	2001,1021	VR = CS, VM = 1
Water Fat Shift	2001,1022	VR = FL, VM = 1
Stack Sequence	2001,105F	VR = SQ, VM = 1
>Private Creator Group 2001	2001,0010	VR = LO, VM = 1
>Number of Stack Slices	2001,102D	VR = SS, VM = 1
>Stack Radial Angle	2001,1032	VR = FL, VM = 1-n
>Stack Radial Axis	2001,1033	VR = CS, VM = 1-n
>Stack Slice Number	2001,1035	VR = SS, VM = 1-n
>Stack Type	2001,1036	VR = CS, VM = 1-n
Number of Stacks	2001,1060	VR = SL, VM = 1
Private Creator Group 2005	2005,0010	VR = LO, VM = 1
Syncra Scan Type	2005,10A1	VR = CS, VM = 1

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Table 67.   **Valid combinations of Image Type applied values**

Image Type Value (1)	Image Type Value (2)	Image Type Value (3)	Image Type Value (4)	Image Type value (5)	Scanning Sequence (1)
ORIGINAL	PRIMARY	R_SE	R	SE	SE
ORIGINAL	PRIMARY	M_SE	M	SE	SE
ORIGINAL	PRIMARY	PHASE MAP	P	SE	SE
ORIGINAL	PRIMARY	R_IR	R	IR	IR
ORIGINAL	PRIMARY	I_IR	I	IR	IR
ORIGINAL	PRIMARY	M_IR	M	IR	IR
ORIGINAL	PRIMARY	PHASE MAP	P	IR	IR
ORIGINAL	PRIMARY	OTHER	CR	IR	IR
DERIVED	PRIMARY	T0	T0	DERIVED	RM
ORIGINAL	PRIMARY	T1 MAP	T1	US	RM
ORIGINAL	PRIMARY	T2 MAP	T2	US	RM
ORIGINAL	PRIMARY	DENSITY MAP	RHO	US	RM
ORIGINAL	PRIMARY	R_FFE	R	FFE	GR
ORIGINAL	PRIMARY	I_FFE	I	FFE	GR
ORIGINAL	PRIMARY	M_FFE	M	FFE	GR
ORIGINAL	PRIMARY	PHASE MAP	P	FFE	GR
ORIGINAL	PRIMARY	R_SI	R	SI	RM
ORIGINAL	PRIMARY	I_SI	I	SI	RM
ORIGINAL	PRIMARY	M_SI	M	SI	RM
ORIGINAL	PRIMARY	M_PCA	M	PCA	GR
ORIGINAL	PRIMARY	VELOCITY MAP	P	PCA	GR
DERIVED	PRIMARY	DERIVED	DERIVED	DERIVED	RM
DERIVED	PRIMARY	R	R	DERIVED	RM
DERIVED	PRIMARY	I	I	DERIVED	RM
DERIVED	PRIMARY	M	M	DERIVED	RM
DERIVED	PRIMARY	PHASE MAP	P	DERIVED	RM
DERIVED	PRIMARY	DIFFUSION MAP	ADC	DERIVED	RM
DERIVED	PRIMARY	RCBV	RCBV	DERIVED	RM
DERIVED	PRIMARY	RCBF	RCBF	DERIVED	RM
DERIVED	PRIMARY	MTT	MTT	DERIVED	RM
DERIVED	PRIMARY	TTP	TTP	DERIVED	RM
DERIVED	PRIMARY	FA	FA	DERIVED	RM

ANNEX 2. Overview applied Presentation State IOD (in case SCP support PS)

The details of the applied modules are given in the tables below. The situation that an attribute is present conditionally/optionally or that an attribute may contain a zero length value is indicated too. Conditions and Defined/Enumerated Values of DICOM 3.0 are applicable but are not shown in the tables. The specified attributes are present and filled except for what is specified in the notes.

Table 68.   Softcopy Presentation State Storage SOP Class - Softcopy VOI LUT Module

Attribute Name	Tag	Note
Softcopy VOI LUT Sequence	0028,3110	
>Referenced Image Sequence	0008,1140	
>>Referenced SOP Class UID	0008,1150	Uniquely identifies the referenced SOP Class. Required if Referenced Image Sequence (0008,1140) is sent.
>>Referenced SOP Instance UID	0008,1155	Uniquely identifies the referenced SOP Instance. Required if Referenced Image Sequence (0008,1140) is sent.
>Window Center	0028,1050	
>Window Width	0028,1051	
>Window Center & Width Explanation	0028,1055	

Table 69.   Softcopy Presentation State Storage SOP Class - General Study Module

Attribute Name	Tag	Note
Study Date	0008,0020	Received from RIS or entered by the operator.
Study Time	0008,0030	Received from RIS or generated by the Intera system.
Accession Number	0008,0050	Received from RIS, entered by the operator or has zero length.
Referring Physician's Name	0008,0090	Received from RIS, entered by the operator or has zero length.
Study Description	0008,1030	Received from RIS as Scheduled Procedure Step Description) or entered by the operator (visible as Exam Name).
Study Instance UID	0020,000D	Received from RIS or generated by the Intera system.
Study ID	0020,0010	Received from RIS or entered by the operator.

Table 70.   Softcopy Presentation State Storage SOP Class - General Equipment Module

Attribute Name	Tag	Note
Manufacturer	0008,0070	Applied Value(s): Philips Medical Systems
Institution Name	0008,0080	Configured on the system.
Station Name	0008,1010	Same as the Host Name.
Manufacturer's Model Name	0008,1090	Manufacturers model number of the equipment that produced the digital images. Applied

Attribute Name	Tag	Note
		Value(s): Intera
Device Serial Number	0018,1000	
Software Version(s)	0018,1020	
Pixel Padding Value	0028,0120	

Table 71.   Softcopy Presentation State Storage SOP Class - Spatial Transformation Module

Attribute Name	Tag	Note
Image Horizontal Flip	0070,0041	
Image Rotation	0070,0042	

Table 72.   Softcopy Presentation State Storage SOP Class - Softcopy Presentation LUT Module

Attribute Name	Tag	Note
Presentation LUT Shape	2050,0020	

Table 73.   Softcopy Presentation State Storage SOP Class - Presentation State Module

Attribute Name	Tag	Note
Referenced Series Sequence	0008,1115	
>Retrieve AE Title	0008,0054	
>Referenced Image Sequence	0008,1140	
>>Referenced SOP Class UID	0008,1150	
>>Referenced SOP Instance UID	0008,1155	
>Series Instance UID	0020,000E	
>Storage Media File-Set ID	0088,0130	
>Storage Media File-Set UID	0088,0140	
Instance Number	0020,0013	
Presentation Label	0070,0080	
Presentation Description	0070,0081	
Presentation Creation Date	0070,0082	
Presentation Creation Time	0070,0083	

Table 74.   Softcopy Presentation State Storage SOP Class - Presentation Series Module

Attribute Name	Tag	Note
Modality	0008,0060	

Table 75.   Softcopy Presentation State Storage SOP Class - Graphic Layer Module

Attribute Name	Tag	Note
Graphic Layer Sequence	0070,0060	
>Graphic Layer	0070,0002	
>Graphic Layer Order	0070,0062	
>Graphic Layer Recommended Display Grayscale Value	0070,0066	

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Attribute Name	Tag	Note
>Graphic Layer Description	0070,0068	

Table 76.   **Softcopy Presentation State Storage SOP Class - General Series Module**

Attribute Name	Tag	Note
Series Date	0008,0021	
Series Time	0008,0031	
Series Description	0008,103E	
Referenced Study Component Sequence	0008,1111	
Protocol Name	0018,1030	
Series Instance UID	0020,000E	Generated by Intera system.
Series Number	0020,0011	
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	
Request Attributes Sequence	0040,0275	Only send if received from RIS.
>Scheduled Procedure Step Description	0040,0007	Only send if received from RIS.
>Scheduled Procedure Step ID	0040,0009	Only send if received from RIS.
>Requested Procedure ID	0040,1001	Only send if received from RIS.
Comments on the Performed Procedure Steps	0040,0280	

Table 77.   **Softcopy Presentation State Storage SOP Class - SOP Common Module**

Attribute Name	Tag	Note
Specific Character Set	0008,0005	
Instance Creation Date	0008,0012	
Instance Creation Time	0008,0013	
Instance Creator UID	0008,0014	
SOP Class UID	0008,0016	
SOP Instance UID	0008,0018	

Table 78.   **Softcopy Presentation State Storage SOP Class - Graphic Annotation Module**

Attribute Name	Tag	Note
Graphic Annotation Sequence	0070,0001	
>Referenced Image Sequence	0008,1140	
>>Referenced SOP Class UID	0008,1150	Uniquely identifies the referenced SOP Class. Required if Referenced Image Sequence (0008,1140) is sent.
>>Referenced SOP Instance UID	0008,1155	Uniquely identifies the referenced SOP Instance. Required if Referenced Image Sequence (0008,1140) is sent.

Table 79.   **Softcopy Presentation State Storage SOP Class - Modality LUT Module**

Attribute Name	Tag	Note
Rescale Intercept	0028,1052	
Rescale Slope	0028,1053	
Rescale Type	0028,1054	

Table 80. Softcopy Presentation State Storage SOP Class - Patient Study Module

Attribute Name	Tag	Note
Patient's Weight	0010,1030	Weight of the Patient, in kilograms.

Table 81. Softcopy Presentation State Storage SOP Class - Patient Module

Attribute Name	Tag	Note
Patient's Name	0010,0010	The characters '=' and '\' are not used. Received from RIS or entered by the operator.
Patient ID	0010,0020	Received from RIS or entered by the operator (Registration Number on UI).
Patient's Birth Date	0010,0030	Received from RIS or entered by the operator.
Patient's Sex	0010,0040	Received from RIS or entered by the operator.
Patient Comments	0010,4000	

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ANNEX 3. Overview applied MR Image IOD (if remote Storage SCP doesn't support Presentation State)

The details of the applied modules are given in the tables below. The situation that an attribute is present conditionally/optionally or that an attribute may contain a zero length value is indicated too. Conditions and Defined/Enumerated Values of DICOM 3.0 are applicable but are not shown in the tables. The specified attributes are present and filled except for what is specified in the notes.

Table 82.   MR Image Storage SOP Class - General Study Module

Attribute Name	Tag	Note
Study Date	0008,0020	Received from RIS or entered by the operator.
Study Time	0008,0030	Received from RIS or generated by the Intera system.
Accession Number	0008,0050	Received from RIS, entered by the operator or has zero length.
Referring Physician's Name	0008,0090	Received from RIS, entered by the operator or has zero length.
Study Description	0008,1030	Received from RIS as Scheduled Procedure Step Description) or entered by the operator (visible as Exam Name).
Study Instance UID	0020,000D	Received from RIS or generated by the Intera system.
Study ID	0020,0010	Received from RIS or entered by the operator.

Table 83.   MR Image Storage SOP Class - General Equipment Module

Attribute Name	Tag	Note
Manufacturer	0008,0070	Applied Value(s): Philips Medical Systems
Institution Name	0008,0080	Configured on the system.
Station Name	0008,1010	Same as the Host Name.
Manufacturer's Model Name	0008,1090	Applied Value(s): Intera
Device Serial Number	0018,1000	Applied Value(s): SRN
Software Version(s)	0018,1020	The release text of the original Image.
Pixel Padding Value	0028,0120	

Table 84.   MR Image Storage SOP Class - Voi LUT Module

Attribute Name	Tag	Note
Window Center	0028,1050	
Window Width	0028,1051	

Table 85.   MR Image Storage SOP Class - Image Pixel Module

Attribute Name	Tag	Note
Rows	0028,0010	
Columns	0028,0011	

Attribute Name	Tag	Note
Pixel Aspect Ratio	0028,0034	Required if the aspect ratio is not 11 and the Image Plane Module is not applicable to this Image.
Bits Stored	0028,0101	
High Bit	0028,0102	
Pixel Representation	0028,0103	
Pixel Data	7FE0,0010	

Table 86.   MR Image Storage SOP Class - Frame of Reference Module

Attribute Name	Tag	Note
Frame of Reference UID	0020,0052	
Position Reference Indicator	0020,1040	Always Empty.

Table 87.   MR Image Storage SOP Class - Image Plane Module

Attribute Name	Tag	Note
Slice Thickness	0018,0050	
Image Position (Patient)	0020,0032	
Image Orientation (Patient)	0020,0037	
Pixel Spacing	0028,0030	

Table 88.   MR Image Storage SOP Class - MR Image Module

Attribute Name	Tag	Note
Image Type	0008,0008	See table
Scanning Sequence	0018,0020	
Sequence Variant	0018,0021	
Scan Options	0018,0022	
MR Acquisition Type	0018,0023	
Repetition Time	0018,0080	
Echo Time	0018,0081	
Inversion Time	0018,0082	Attribute is always Present
Number of Averages	0018,0083	
Imaging Frequency	0018,0084	
Imaged Nucleus	0018,0085	
Echo Number(s)	0018,0086	
Magnetic Field Strength	0018,0087	
Spacing Between Slices	0018,0088	
Number of Phase Encoding Steps	0018,0089	
Echo Train Length	0018,0091	
Percent Sampling	0018,0093	
Percent Phase Field of View	0018,0094	
Trigger Time	0018,1060	
Low R-R Value	0018,1081	
High R-R Value	0018,1082	

Attribute Name	Tag	Note
Intervals Acquired	0018,1083	
Intervals Rejected	0018,1084	
Heart Rate	0018,1088	
Reconstruction Diameter	0018,1100	Diameter in mm. of the region from within which data were used in creating the reconstruction of the image. Data may exist outside this region and portions of the patient may exist outside this region.
Receiving Coil	0018,1250	
Transmitting Coil	0018,1251	
Acquisition Matrix	0018,1310	
In-plane Phase Encoding Direction	0018,1312	
Flip Angle	0018,1314	
Temporal Position Identifier	0020,0100	
Number of Temporal Positions	0020,0105	
Samples per Pixel	0028,0002	
Photometric Interpretation	0028,0004	
Bits Allocated	0028,0100	

Table 89.   MR Image Storage SOP Class - Overlay Plane Module

Attribute Name	Tag	Note
Overlay Rows	6000,0010	
Overlay Columns	6000,0011	
Overlay Description	6000,0022	
Overlay Type	6000,0040	
Overlay Subtype	6000,0045	
Overlay Origin	6000,0050	
Overlay Bits Allocated	6000,0100	
Overlay Bit Position	6000,0102	
ROI Area	6000,1301	
ROI Mean	6000,1302	
ROI Standard Deviation	6000,1303	
Overlay Label	6000,1500	
Overlay Data	6000,3000	

Table 90.   MR Image Storage SOP Class - General Series Module

Attribute Name	Tag	Note
Series Date	0008,0021	
Series Time	0008,0031	
Modality	0008,0060	
Series Description	0008,103E	
Referenced Study Component Sequence	0008,1111	
Protocol Name	0018,1030	
Patient Position	0018,5100	Attribute is always Present

Attribute Name	Tag	Note
Series Instance UID	0020,000E	Generated by Intera system.
Series Number	0020,0011	Created dynamically at export. Contains the concatenation of the acquisition number and the private reconstruction number.
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	
Request Attributes Sequence	0040,0275	Only send if received from RIS.
>Scheduled Procedure Step Description	0040,0007	Only send if received from RIS.
>Scheduled Procedure Step ID	0040,0009	
>Requested Procedure ID	0040,1001	Only send if received from RIS.
Comments on the Performed Procedure Steps	0040,0280	

Table 91.   MR Image Storage SOP Class - SOP Common Module

Attribute Name	Tag	Note
Specific Character Set	0008,0005	
Instance Creation Date	0008,0012	
Instance Creation Time	0008,0013	
Instance Creator UID	0008,0014	
SOP Class UID	0008,0016	
SOP Instance UID	0008,0018	

Table 92.   MR Image Storage SOP Class - Patient Study Module

Attribute Name	Tag	Note
Patient's Weight	0010,1030	Weight of the Patient, in kilograms.

Table 93.   MR Image Storage SOP Class - General Image Module

Attribute Name	Tag	Note
Content Date	0008,0023	Present if image is part of a dynamic scan.
Content Time	0008,0033	
Referenced Image Sequence	0008,1140	
>Referenced SOP Class UID	0008,1150	
>Referenced SOP Instance UID	0008,1155	
Acquisition Number	0020,0012	Is visible on the UI as Scan Number.
Instance Number	0020,0013	
Patient Orientation	0020,0020	Attribute Always Empty.
Image Comments	0020,4000	

Table 94.   MR Image Storage SOP Class - Patient Module

Attribute Name	Tag	Note

Attribute Name	Tag	Note
Patient's Name	0010,0010	The characters '=' and '\' are not used. Received from RIS or entered by the operator.
Patient ID	0010,0020	Received from RIS or entered by the operator (Registration Number on UI).
Patient's Birth Date	0010,0030	Received from RIS or entered by the operator.
Patient's Sex	0010,0040	Received from RIS or entered by the operator.
Patient Comments	0010,4000	

Table 95.   **MR Image Storage SOP Class -Private Group**

Attribute Name	Tag	Note
Referenced SOP Class UID	0008,1150	VR = UI, VM = 1
Referenced SOP Instance UID	0008,1155	VR = UI, VM = 1
Requested Contrast Agent	0032,1070	VR = LO, VM = 1
Study Comments	0032,4000	VR = LT, VM = 1
Scheduled Procedure Step Description	0040,0007	VR = LO, VM = 1
Scheduled Procedure Step ID	0040,0009	VR = SH, VM = 1
Performed Station AE Title	0040,0241	VR = AE, VM = 1
Performed Station Name	0040,0242	VR = SH, VM = 1
Performed Procedure Step End Date	0040,0250	VR = DA, VM = 1
Performed Procedure Step End Time	0040,0251	VR = TM, VM = 1
Performed Procedure Step Status	0040,0252	VR = CS, VM = 1
Performed Procedure Type Description	0040,0255	VR = LO, VM = 1
Requested Procedure ID	0040,1001	VR = SH, VM = 1
Private Creator Group 2001	2001,0010	VR = LO, VM = 1
Chemical Shift	2001,1001	VR = FL, VM = 1
Chemical Shift Number MR	2001,1002	VR = IS, VM = 1
Diffusion B-Factor	2001,1003	VR = FL, VM = 1
Diffusion Direction	2001,1004	VR = CS, VM = 1
Image Enhanced	2001,1006	VR = CS, VM = 1
Image Type ED ES	2001,1007	VR = CS, VM = 1
Phase Number	2001,1008	VR = IS, VM = 1
Slice Number MR	2001,100A	VR = IS, VM = 1
Slice Orientation	2001,100B	VR = CS, VM = 1
Diffusion Echo Time	2001,1011	VR = FL, VM = 1
Dynamic Series	2001,1012	VR = CS, VM = 1
EPI Factor	2001,1013	VR = SL, VM = 1
Number of Echoes	2001,1014	VR = SL, VM = 1
Number of Locations	2001,1015	VR = SS, VM = 1
Number of PC Directions	2001,1016	VR = SS, VM = 1
Number of Phases MR	2001,1017	VR = SL, VM = 1
Number of Slices MR	2001,1018	VR = SL, VM = 1
Partial Matrix Scanned	2001,1019	VR = CS, VM = 1
PC Velocity	2001,101A	VR = FL, VM = 1
Prepulse Delay	2001,101B	VR = FL, VM = 1-n
Prepulse Type	2001,101C	VR = CS, VM = 1

Attribute Name	Tag	Note
Reconstruction Number MR	2001,101D	VR = IS, VM = 1
Respiration Sync	2001,101F	VR = CS, VM = 1
SPIR	2001,1021	VR = CS, VM = 1
Water Fat Shift	2001,1022	VR = FL, VM = 1
Stack Sequence	2001,105F	VR = SQ, VM = 1
>Private Creator Group 2001	2001,0010	VR = LO, VM = 1
>Number of Stack Slices	2001,102D	VR = SS, VM = 1
>Stack Radial Angle	2001,1032	VR = FL, VM = 1-n
>Stack Radial Axis	2001,1033	VR = CS, VM = 1-n
>Stack Slice Number	2001,1035	VR = SS, VM = 1-n
>Stack Type	2001,1036	VR = CS, VM = 1-n
Number of Stacks	2001,1060	VR = SL, VM = 1
Private Creator Group 2005	2005,0010	VR = LO, VM = 1
Syncra Scan Type	2005,10A1	VR = CS, VM = 1

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Table 96.   **Valid combinations of Image Type applied values**

Image Type Value (1)	Image Type Value (2)	Image Type value (3)	Image Type Value (4)	Image Type value (5)	Scanning Sequence
ORIGINAL	PRIMARY	R_SE	R	SE	SE
ORIGINAL	PRIMARY	M_SE	M	SE	SE
ORIGINAL	PRIMARY	PHASE MAP	P	SE	SE
ORIGINAL	PRIMARY	R_IR	R	IR	IR
ORIGINAL	PRIMARY	I_IR	I	IR	IR
ORIGINAL	PRIMARY	M_IR	M	IR	IR
ORIGINAL	PRIMARY	PHASE MAP	P	IR	IR
ORIGINAL	PRIMARY	OTHER	CR	IR	IR
DERIVED	PRIMARY	T0	T0	DERIVED	RM
ORIGINAL	PRIMARY	T1 MAP	T1	US	RM
ORIGINAL	PRIMARY	T2 MAP	T2	US	RM
ORIGINAL	PRIMARY	DENSITY MAP	RHO	US	RM
ORIGINAL	PRIMARY	R_FFE	R	FFE	GR
ORIGINAL	PRIMARY	I_FFE	I	FFE	GR
ORIGINAL	PRIMARY	M_FFE	M	FFE	GR
ORIGINAL	PRIMARY	PHASE MAP	P	FFE	GR
ORIGINAL	PRIMARY	R_SI	R	SI	RM
ORIGINAL	PRIMARY	I_SI	I	SI	RM
ORIGINAL	PRIMARY	M_SI	M	SI	RM
ORIGINAL	PRIMARY	M_PCA	M	PCA	GR
ORIGINAL	PRIMARY	VELOCITY MAP	P	PCA	GR
DERIVED	PRIMARY	DERIVED	DERIVED	DERIVED	RM
DERIVED	PRIMARY	R	R	DERIVED	RM
DERIVED	PRIMARY	I	I	DERIVED	RM
DERIVED	PRIMARY	M	M	DERIVED	RM
DERIVED	PRIMARY	PHASE MAP	P	DERIVED	RM
DERIVED	PRIMARY	DIFFUSION MAP	ADC	DERIVED	RM
DERIVED	PRIMARY	RCBV	RCBV	DERIVED	RM
DERIVED	PRIMARY	RCBF	RCBF	DERIVED	RM
DERIVED	PRIMARY	MTT	MTT	DERIVED	RM
DERIVED	PRIMARY	TTP	TTP	DERIVED	RM
DERIVED	PRIMARY	FA	FA	DERIVED	RM

ANNEX 4. Overview applied SC Image IOD

Table 97. **Secondary Capture Image Storage SOP Class - Sc Image Module**

Attribute Name	Tag	Note
Date of Secondary Capture	0018,1012	
Time of Secondary Capture	0018,1014	

Table 98. **Secondary Capture Image Storage SOP Class - General Equipment Module**

Attribute Name	Tag	Note
Manufacturer	0008,0070	
Institution Name	0008,0080	
Institution Address	0008,0081	
Station Name	0008,1010	
Institutional Department Name	0008,1040	
Manufacturer's Model Name	0008,1090	Manufacturers model number of the equipment that produced the digital images.
Device Serial Number	0018,1000	
Software Version(s)	0018,1020	

Table 99. **Secondary Capture Image Storage SOP Class - Sc Image Equipment Module**

Attribute Name	Tag	Note
Modality	0008,0060	
Conversion Type	0008,0064	
Secondary Capture Device ID	0018,1010	
Secondary Capture Device Manufacturer	0018,1016	
Secondary Capture Device Manufacturer's Model Name	0018,1018	
Secondary Capture Device Software Version(s)	0018,1019	
Video Image Format Acquired	0018,1022	
Digital Image Format Acquired	0018,1023	

Table 100. **Secondary Capture Image Storage SOP Class - General Series Module**

Attribute Name	Tag	Note
Series Date	0008,0021	
Series Time	0008,0031	
Series Description	0008,103E	
Performing Physician's Name	0008,1050	Name of the Physicians administering the Series.
Operator's Name	0008,1070	Technologist(s) supporting the series.
Body Part Examined	0018,0015	

Attribute Name	Tag	Note
Protocol Name	0018,1030	
Series Instance UID	0020,000E	
Series Number	0020,0011	

Table 101. **Secondary Capture Image Storage SOP Class - SOP Common Module**

Attribute Name	Tag	Note
Specific Character Set	0008,0005	
Instance Creation Date	0008,0012	
Instance Creation Time	0008,0013	
Instance Creator UID	0008,0014	
SOP Class UID	0008,0016	
SOP Instance UID	0008,0018	

Table 102. **Secondary Capture Image Storage SOP Class - General Image Module**

Attribute Name	Tag	Note
Content Date	0008,0023	
Content Time	0008,0033	
Acquisition Number	0020,0012	
Instance Number	0020,0013	
Patient Orientation	0020,0020	Attribute Always Empty.
Images in Acquisition	0020,1002	
Lossy Image Compression	0028,2110	

Table 103. **Secondary Capture Image Storage SOP Class - Image Pixel Module**

Attribute Name	Tag	Note
Samples per Pixel	0028,0002	
Photometric Interpretation	0028,0004	
Planar Configuration	0028,0006	Attribute is always Present
Rows	0028,0010	
Columns	0028,0011	
Pixel Aspect Ratio	0028,0034	
Bits Allocated	0028,0100	
Bits Stored	0028,0101	
High Bit	0028,0102	
Pixel Representation	0028,0103	
Pixel Data	7FE0,0010	