SIEMENS Healthineers

DICOM Conformance Statement

syngo® MR XA12S

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1 Conformance Statement Overview

syngo® MR conforms to the DICOM Standard and supports the network services as described in Table 1: Network Services and the media services as described in Table 2 - Media Services.

Table 1: Network Services

SOP Classes	SOP Class UID	User of Service (SCU)		Provider of Service (SCP)	
Verification					
Verification	1.2.840.10008.1.1	Yes		Yes	
SOP Classes managed by *syngo*® MR					
		Create	Send	Store	Display
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	No	Yes	Yes	Yes
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	No	Yes	Yes	Yes
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	No	Yes	Yes	Yes
Digital Mammography X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2	No	Yes	Yes	Yes
Digital Mammography X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	No	Yes	Yes	Yes
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	No	Yes	Yes	Yes
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	No	Yes	Yes	Yes
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	No	Yes	Yes	Yes
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Yes	Yes	Yes	Yes
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	Yes	Yes	Yes	Yes
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	Yes	Yes	Yes	Yes
Enhanced MR Color Image Storage	1.2.840.10008.5.1.4.1.1.4.3	Yes	Yes	Yes	Yes
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	No	Yes	Yes	Yes
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	Yes	Yes	Yes
Multi-frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	No	Yes	Yes	Yes
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	No	Yes	Yes	Yes
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	Yes	Yes	Yes	Yes
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Yes	Yes	Yes	Yes
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	No	Yes	Yes	No
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	No	Yes	Yes	No

SOP Classes	SOP Class UID	User of Service (SCU)		Provider of Service (SCP)	
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	No	Yes	Yes	No
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	No	Yes	Yes	No
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1	No	Yes	Yes	No
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	Yes	Yes	Yes	Yes
Color Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.2	No	Yes	Yes	No
Pseudo-Color Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.3	No	Yes	Yes	No
Blending Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.4	No	Yes	Yes	No
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	No	Yes	Yes	Yes
Enhanced XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1.1	No	Yes	Yes	Yes
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	No	Yes	Yes	Yes
Enhanced XRF Image Storage	1.2.840.10008.5.1.4.1.1.12.2.1	No	Yes	Yes	Yes
X-Ray 3D Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.13.1.1	No	Yes	Yes	Yes
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3	No	Yes	Yes	Yes
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66	Yes	Yes	Yes	No
Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.1	Yes	Yes	Yes	No
Spatial Fiducials Storage	1.2.840.10008.5.1.4.1.1.66.2	No	Yes	Yes	No
Deformable Spatial Registration SOP Class	1.2.840.10008.5.1.4.1.1.66.3	No	Yes	Yes	No
Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.4	Yes	Yes	Yes	Yes
Surface Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.5	No	Yes	Yes	No
Real World Value Mapping Storage	1.2.840.10008.5.1.4.1.1.67	Yes	Yes	Yes	No
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11	No	Yes	Yes	No
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22	Yes	Yes	Yes	No
Comprehensive SR Storage	1.2.840.10008.5.1.4.1.1.88.33	Yes	Yes	Yes	No
Procedure Log Storage Storage	1.2.840.10008.5.1.4.1.1.88.40	No	Yes	Yes	No
Mammography CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.50	No	Yes	Yes	No
Key Object Selection Document Storage	1.2.840.10008.5.1.4.1.1.88.59	No	Yes	Yes	No
X-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67	No	Yes	Yes	No
Encapsulated PDF Storage SOP Class	1.2.840.10008.5.1.4.1.1.104.1	Yes	Yes	Yes	Yes
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	No	Yes	Yes	Yes

SOP Classes	SOP Class UID	User of Service (SCU)		Provider of Service (SCP)	
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	No	Yes	Yes	Yes
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	No	Yes	Yes	No
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	No	Yes	Yes	No
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	No	Yes	Yes	No
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	No	Yes	Yes	No
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7	No	Yes	Yes	No
Transfer (Private SOP Class)					
Syngo Non-Image Storage		Yes		Yes	
Storage Commitment					
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	Yes		Yes	
Worklist Management					
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Yes		No	
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3	Yes		No	
Query/Retrieve					
Patient Root Q/R Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	Yes		Yes	
Patient Root Q/R - Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2	Yes		Yes	
Study Root Q/R - Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	Yes		Yes	
Study Root Q/R - Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.1	Yes		Yes	
Patient/Study Only Q/R - Information Model FIND	1.2.840.10008.5.1.4.1.2.2.1	Yes		Yes	
Patient/Study Only Q/R - Information Model MOVE	1.2.840.10008.5.1.4.1.2.3.2	Yes		Yes	
Print Management					
Basic Grayscale Print Management Meta		Yes		No	
Basic Color Print Management Meta		Yes		No	
Print Job		Yes		No	
Presentation LUT		Yes		No	

Table 2 - Media Services

Media Storage Application Profile	Write Files (FSC or FSU)	Read Files (FSR)
Compact Disk - Recordable		
STD-GEN-CD	Yes	Yes
AUG-GEN-CD	Yes	Yes
DVD		
AUG-GEN-DVD	Yes	Yes
AUG- GEN-DVD-J2K	Yes	Yes

STD-GEN-DVD	Yes	Yes
STD-GEN-DVD-J2K	Yes	Yes
USB		
AUG- GEN-USB-J2K	Yes	Yes
STD-GEN-USB-J2K	Yes	Yes

Table 3 - Implementation Identifying Information

Name	Value
Application Context Name	1.2.840.100008.3.1.1.1
Implementation Class UID	1.3.12.2.1107.5.2
Implementation Version Name	“ SYNGO_MR_XA12S"

2 Table of Contents

3 Introduction

3.1 Revision History

Version	Date	Change
syngo MR XA12S	2022-11-03	*syngo* MR XA12S version (predecessor *syngo* MR XA12M) New system support: MAGNETOM Mica

3.2 Scope and Field

This DICOM Conformance Statement refers to SIEMENS MR Products using software *syngo*® MR XA12S. The following table relates *syngo*® MR XA12S software versions to SIEMENS *syngo*® MR products.

Software Name	SIEMENS MR Product
syngo MR XA12S	MAGNETOM Amira
syngo MR XA12S	MAGNETOM Sempra
syngo MR XA12S	MAGNETOM Mica

The *syngo*® MR product is a "*syngo*®-speaking[a]" Imaging Modality or workstation. The *syngo*® MR product is designed to be integrated into an environment of medical DICOM-based devices.

3.3 Audience

This document is intended for hospital staff, health system integrators, software designers or implementers. It is assumed that the reader has a working understanding of DICOM.

3.4 Remarks

The scope of this DICOM Conformance Statement is to facilitate integration between *syngo*® MR and other DICOM products. The Conformance Statement should be read and understood in conjunction with the DICOM Standard [1]. DICOM by itself does not guarantee interoperability.

The Conformance Statement does, however, facilitate a first-level comparison for interoperability between different applications supporting compatible DICOM functionality.

This Conformance Statement is not supposed to replace validation with other DICOM equipment to ensure proper exchange of intended information. In fact, the user should be aware of the following important issues:

[a] *syngo* is a registered trademark of Siemens Shenzhen Magnetic Resonance Ltd

- The comparison of conformance statements is the first step towards assessing interconnectivity and interoperability between *syngo*® MR and other DICOM conformant equipment.
- Test procedures should be defined and executed to validate the required level of interoperability with specific compatible DICOM equipement, as established by the healthcare facility.

Siemens reserves the right to modify the design and specifications contained herein without prior notice. Please contact your local Siemens representative for the most recent product information.

3.5 Definitions, Terms and Abbreviations

Definitions, terms and abbreviations used in this document are defined within the different parts of the DICOM standard.

Additional Abbreviations and terms are as follows:

AE	DICOM Application Entity
AET	Application Entity Title
ASCII	American Standard Code for Information Interchange
CSE	Customer Service Engineer
DCS	DICOM Conformance Statement
DICOM	Digital Imaging and Communications in Medicine
FSC	File Set Creator
FSR	File Set Reader
FSU	File Set Updater
GSDF	Grayscale Standard Display Function
IOD	DICOM Information Object Definition
ISO	International Standard Organization
n. a.	not applicable
NEMA	National Electrical Manufacturers Association
O	Optional Key Attribute
PDU	DICOM Protocol Data Unit
R	Required Key Attribute
SCU	DICOM Service Class User (DICOM client)
SCP	DICOM Service Class Provider (DICOM Server)
SOP	DICOM Service-Object Pair
SPS	Scheduled Procedure Step
SR	Structured Report
TFT	Thin Film Transistor (Display)
TID	Template ID
U	Unique Key Attribute
UID	Unique Identifier
UTF-8	Unicode Transformation Format-8
VR	Value Representation

3.6 References

[NEMA PS3] Digital Imaging and Communications in Medicine (DICOM) Standard, available free at http://medical.nema.org/[b]

[IHE] Integrating the Healtcare Enterprise – IHE Radiology Technical Framework – www.ihe.net

- [b] The DICOM Standard is under continuous maintenance, the current official version is available at http://dicom.nema.org

4 Networking

4.1 Implementation Model

syngo® MR supports storing DICOM images to remote nodes like workstations or Archiving Systems. Using the Storage Commitment Service it can request safe keeping of previously stored instances from an Archiving system. Additionally the *syngo*® MR can query remode notes, retrieve and store selected instances from that node. Using the Modality Worklist service the *syngo*® MR can query a HIS/RIS for scheduled procedures. Performed procedure status and other procedure data can be returned to the HIS/RIS using the Modality Performed Procedure Step (MPPS) Service.

4.1.1 Application Data Flow

The following figure provides a functional overview of the *syngo*® MR Application Entities (AE). Relationships are shown between user-invoked activities (in the circles at the left of the AEs) and the associated real-world activities provided by DICOM service providers (in the circles at the right of the AEs)

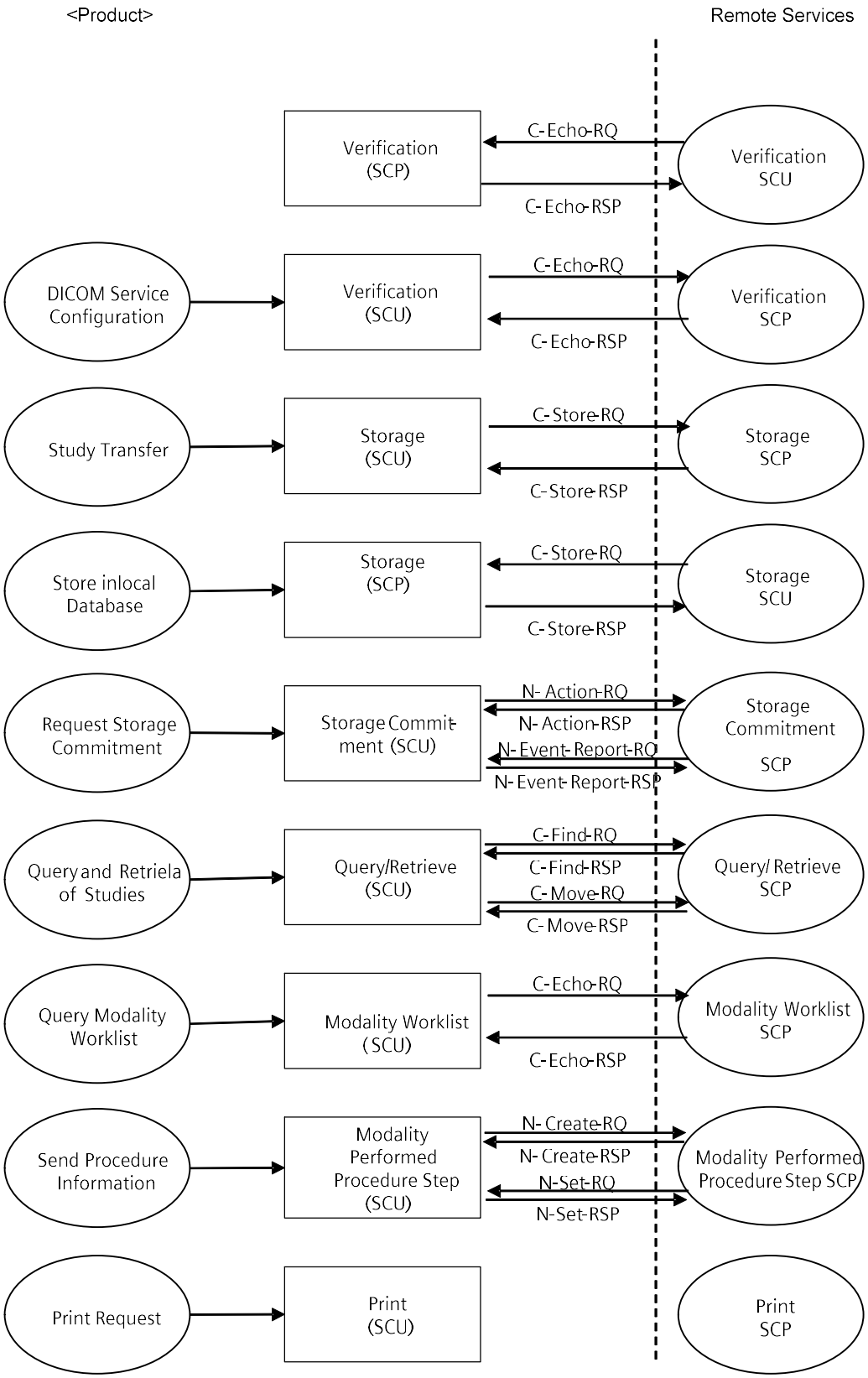

Figure 1: *syngo*® MR DICOM Data Flow diagram

4.1.2 Functional Definitions of Application Entities

The SCP components of the Application Entities of the *syngo*® MR operate as background server processes. They exist as soon as the system is powered up and wait for association requests. Upon accepting an association with a negotiated Presentation Context they start to receive and process the requests described in the following sections.

The SCU components of the Application Entity are invoked upon requests from the user interface or indirect by trigger from internal processes.

4.1.2.1 Functional Definition of Verification AE

syngo® MR supports the Verification service as a SCP and SCU. As a SCU, Verification can be activated from the Admin Portal during system configuration. As a SCP the product processes and responds to incoming

As a SCP of the Verification Service the *syngo*® MR processes and responds to incoming verification requests.

4.1.2.2 Functional Definition of Storage AE

The *syngo*® MR Storage SCU is invoked either directly by the user, by an auto-archive trigger or internally by the Query/Retrieve Application Entity that is responsible for processing retrieve requests. The job consists of data describing the composite objects selected for storage and the destination Application Entity Title. An association is negotiated with the destination Application Entity and the image data is transferred using the DIMSE C-STORE -Request. The transfer status is reported to the initiator of the Storage request.

The Storage SCP component of *syngo*® MR starts to receive the Composite Image Objects and import them into the database after accepting an association with a negotiated Presentation Context. The system can be configured in such a way, that Responses to the Storage Request are sent immediately after reception of the data, after persistent storage on the hard disc or after storage and indexing in the local database.

4.1.2.3 Functional Definition of the Storage Commitment AE

If configured, *syngo*® MR can serve as a SCU for the DICOM Storage Commitment service. Upon successful completion of a storage job, the system uses the DIMSE N-ACTION Request to request storage commitment from a remote DICOM storage commitment SCP. This can either be the same as the storage destination or a different system depending on the system configuration.Storage Commitment Requests are sent after a configurable delay after storing the objects.

4.1.2.4 Functional Definition of Query/Retrieve AE

syngo® MR supports DICOM Query/Retrieve as a SCU: The user can initiate a query to a remote node using the C-Find Request. After matching the specified keys, the remote Query /Retrieve SCP uses the C-Find Response to return the results of its search, which will be displayed to the user. Depending on user action the *syngo*® MR Query/Retrieve DICOM SCU sends a C-MOVE request to initiate a C-STORE sub-operation on the SCP to start an image transfer from remote Storage SCU (running on Query/Retrieve SCP) to the system's Storage SCP.

syngo® MR supports the following query models:

- Study Root Query Model.
- Patient Root Query Model
- Patient/Study Only Query Model

Furthermore the SCU services may issue relational queries, if supported by the remote Query/Retrieve SCP node and required by the querying Application.

The *syngo*® MR DICOM Query/Retrieve SCP accepts C-Find Request, queries the local database based on the provided matching keys and returns the matches using the C-FIND Response. Depending on further request from the remote Query/Retrieve SCU, *syngo*® MR responds to C-MOVE requests by initiating a C-STORE sub-operation to send image objects to the Storage SCP of the querying system.

4.1.2.5 Functional Definition of Modality Worklist AE

The *syngo*® MR Modality Worklist SCU issues DICOM Modality Worklist requests using C-FIND requests. The results in the C-FIND response are stored in internal database. The provided Patient and Procedure information is used for patient registration prior to starting an exam.

4.1.2.6 Functional Definition of Modality Performed Procedure Step SCU AE

The *syngo*® MR MPPS SCU uses the N-CREATE request to inform an Information System that a procedure step is IN PROGRESS.

syngo® MR MPPS SCU uses the N-SET request to inform the Information System about the finalization of the Procedure Step, using either a status of COMPLETED or DISCONTINUED.

4.1.2.7 Functional Definition of Print AE

The Print SCU of *syngo*® MR is invoked by the user interface to setup film-sheet layout and whenever an image is ready to be printed on film. The Print SCU will hold and maintain all data needed to compile a complete film-sheet from the data (images, layout, configuration) received. Whenever a film-sheet is ready to print the related data is used to supply the Information to the SOP Classes of the Print Management Service Class. A queue is maintained, in order to intermediately store several film-sheets in case of resource problems on printer. The SCU will only supply and require the mandatory SOP Classes of the Print Management Service Class.

4.1.3 Sequencing of Activities

This section describes the sequencing of Real-World Activities performed by *syngo*® MR Entities using a UML sequence diagram. Real-World Activities are depicted as vertical bars and arrows show the events exchanged between them.

4.1.3.1 System Configuration

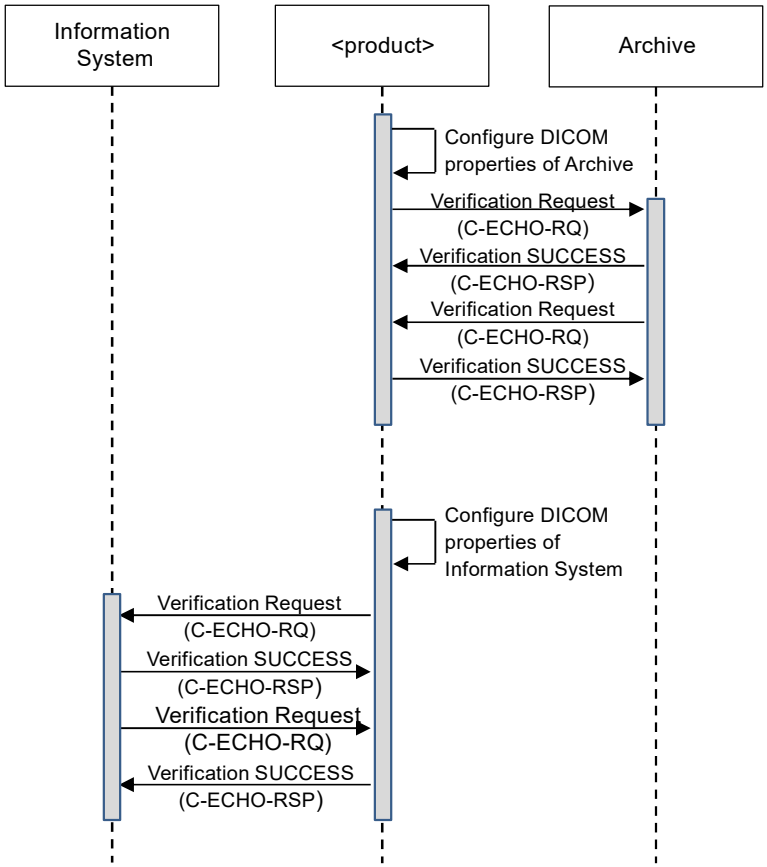

Figure 2: Sequence Diagram for Real World Activities - System Configuration

4.1.3.2 Acquisition Workflow

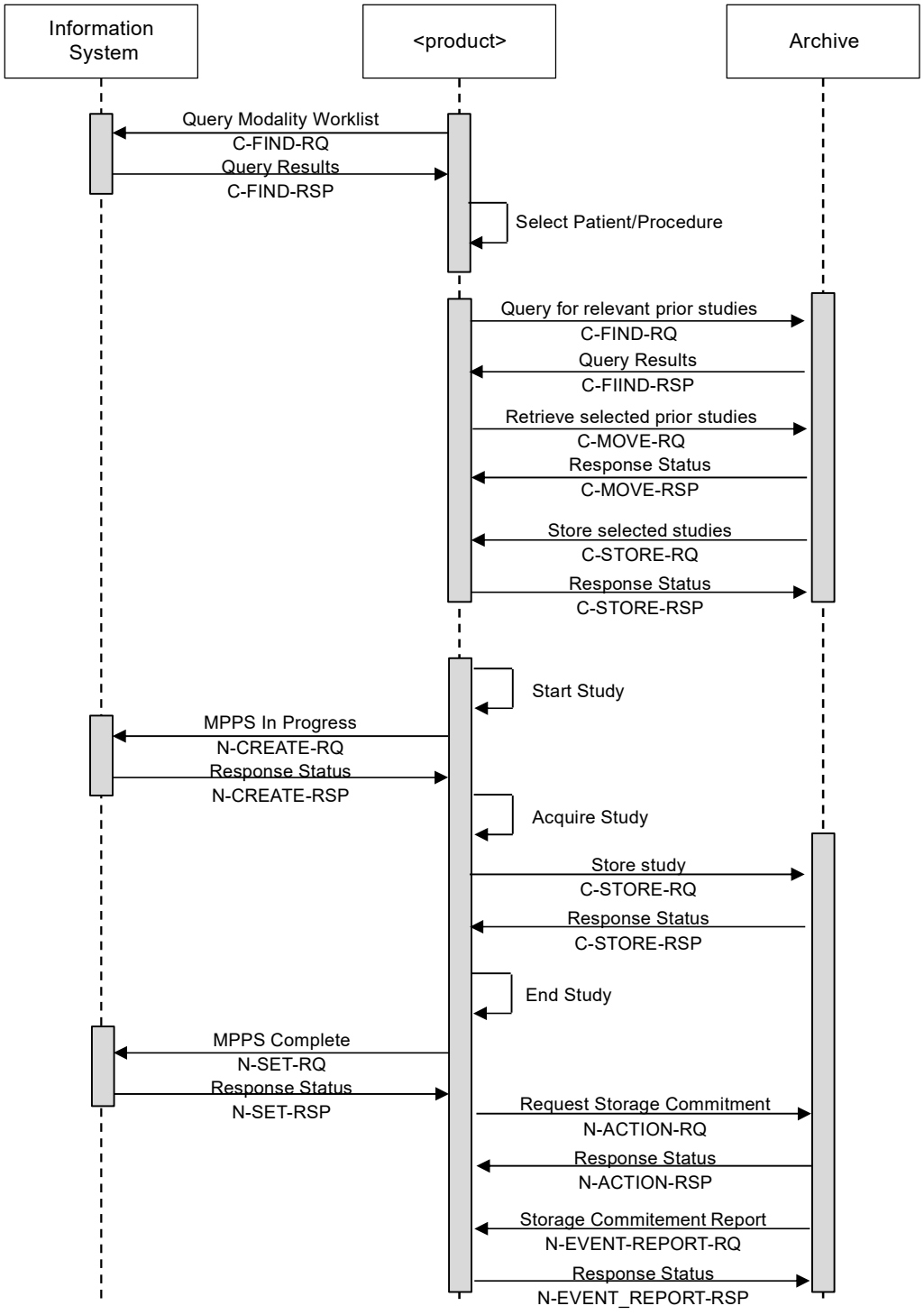

Figure 3: Sequence Diagram for Real World Activities -Acquisition workflow

4.2 Application Entity Specification

This section outlines the specifications for each of the Application Entities that are part of *syngo*® MR.

4.2.1 Verification AE Specification

4.2.1.1 SOP Classes

The Verification AE of *syngo*® MR provides standard conformance to the Verification SOP Class listed in “Table 1: Network Services” section "Verification" in the “Conformance Statement Overview”.

4.2.1.2 Association Policy

The *syngo*® MR Admin Portal attempts to open an association for verification request whenever the "Echo" function is activated.

Table 4: Association Policies

Application Context Name	1.2.840.10008.3.1.1.1
PDU size	32 kB [1]
Maximum number of simultaneous associations as an association acceptor	12[1]
Maximum number of simultaneous associations as an association initiator	unlimited

4.2.1.2.1 Asynchronous Nature

syngo® MR supports asynchronous communication (multiple outstanding transactions over a single association). On the SCU side the Window size proposed is infinite. On the SCP Side any size is supported.

Table 5: Asynchronous Nature as an Association Initiator

Maximum number of outstanding asynchronous transactions	10

4.2.1.2.2 Implementation Identifying Information

For Implementation Identifying Information please refer to “Table 3 - Implementation Identifying Information” in the “Conformance Statement Overview”.

4.2.1.3 Association Initiation Policy

4.2.1.3.1 Activity – “Send Verification” Request

4.2.1.3.1.1 Description and Sequencing of Activity

syngo® MR serves as a SCU of the Verification Service Class. A C-ECHO request is initiated by the Admin Portal whenever "Verification" is requested. If an association to a remote Application Entity is successfully established, Verification with the configured AET is requested via the open association. If the C-ECHO Response from the remote Application contains a status other than "Success" this will be indicated to the user and the association is closed.

[1] Default, the value is configurable

4.2.1.3.1.2 Proposed Presentation Contexts

Table 6 - Presentation Context Table "Verification" below lists the supported presentation contexts for verification requests.

Table 6 - Presentation Context Table "Verification"

Presentation Context Table – "Verification"					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

4.2.1.3.1.3 SOP Specific Conformance – Verification SCU

The application conforms to the definition of the Verification SCU in accordance to the DICOM Standard.

4.2.1.4 Association Acceptance Policy

4.2.1.4.1 Activity – "Receive Verification Request"

4.2.1.4.1.1 Description and Sequencing of Activity

syngo® MR serves as a SCP of the Verification Service Class. If the Verification SCP accepts an association, it will respond to C-ECHOC requests. If the Called AE Title does not match any preconfigured AE Title shared by SCP, the association will be rejected.

4.2.1.4.1.2 Accepted Presentation Contexts

The *syngo*® MR DICOM application will accept Presentation Contexts as shown in the following table:

Table 7 - Presentation Context Table "Verification"

Presentation Context Table – "Verification"					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

4.2.1.4.1.3 SOP Specific Conformance – Verification SCP

The ECHO-SCP provides standard conformance to the Verification Service Class.

4.2.2 Storage AE Specification

4.2.2.1 SOP Classes

The Storage AE provides Standard Conformance to the the SOP Classes listed in “Table 1: Network Services” section "SOP Classes Created by *syngo*® MR" and "SOP Classes Managed by *syngo*® MR" in the “Conformance Statement Overview”.

4.2.2.2 Association Policy

Table 8: Association Policies

Application Context Name	1.2.840.10008.3.1.1.1
PDU size	32 kB [1]
Maximum number of simultaneous associations as an association acceptor	12[1]
Maximum number of simultaneous associations as an association initiator	unlimited

syngo® MR contains a limitation of 512 kB for the maximum PDU size. By default, the maximum PDU size is set to 32kB.

The maximum number of simultaneous receiving associations (SCP) is configurable at run time, based on the system resources available. By default, the maximum number of associations is set to 12.

There is no inherent limit to the number of outgoing associations (SCU), other than limits imposed by the computer operating system.

4.2.2.2.1 Asynchronous Nature

syngo® MR supports asynchronous communication (multiple outstanding transactions over a single association). On the SCU side the Window size proposed is infinite. On the SCP Side any non-infinite maximum size will be accepted.

Table 9: Asynchronous Nature as an Association Initiator

Maximum number of outstanding asynchronous transactions	10

4.2.2.2.2 Implementation Identifying Information

For Implementation Identifying Information please refer to “Table 3 - Implementation Identifying Information” in the “Conformance Statement Overview”.

4.2.2.3 Association Initiation Policy

4.2.2.3.1 Activity – “Send Storage Request”

4.2.2.3.1.1 Description and Sequencing of Activities

syngo® MR serves as a SCU of the Storage Service Class. The Storage SCU is triggered by the transfer job queue or by an external retrieve request. An association request is sent to the destination AE. Upon successful negotiation of a Presentation Context, the transfer is started. Objects will be transferred sequentially on the same open association

[1] Default, the value is configurable

syngo® MR does not provide any automated retry mechanism.

4.2.2.3.1.2 Proposed Presentation Contexts

For all Image Objects listed in Table 1 in the Conformance Statement Overview the Transfer Syntaxes marked with “yes” in the Image Objects Column of the table below are supported.

For all Non-Image Objects listed in Table 1 in the Conformance Statement Overview the Transfer Syntaxes marked with “yes” in the Non-Image Objects Column of the table below are supported.

For a distinction between Image and Non-Image Objects please refer to the DICOM Standard PS3.3 Section A.1.4 “Overview of the Composite IOD Module Content”.

Table 10: Proposed Presentation Contexts for Storage

UID value	Transfer Syntax	Image Objects	Non-Image Objects
1.2.840.10008.1.2	Implicit Value Representation Little Endian native	yes	yes
1.2.840.10008.1.2.1	Explicit Value Representation Little Endian native	yes	yes
1.2.840.10008.1.2.2	Explicit Value Representation Big Endian	yes	yes
1.2.840.10008.1.2.4.50	JPEG Baseline (Process 1) lossy compressed	yes	no
1.2.840.10008.1.2.4.51	JPEG Extended (Process 2 & 4) lossy compressed	yes	no
1.2.840.10008.1.2.4.70	JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14) lossless compressed	yes	no
1.2.840.10008.1.2.4.90	JPEG 2000 Image Compression (Lossless Only) compressed	yes	no
1.2.840.10008.1.2.4.91	JPEG 2000 Image Compression lossy compressed	yes	no
1.2.840.10008.1.2.5	RLE Lossless compressed	yes	no

Depending on the configuration, the Storage SCU will choose a compressed or uncompressed Transfer Syntax among those accepted by the SCP. The Transfer Syntax chosen is the preferred one among the compressed and uncompressed ones. The preference order is the order of occurrence in the configuration. It is possible to configure for a specific node, which Transfer Syntax shall be used and which one shall be excluded. The configuration can even be extended, based on the combination of SOP Classes and supported Transfer Syntaxes.

An instance will be JPEG lossless (Process 1 and Process 2+4) compressed only if it fulfills the following criteria:

- is an image and not already compressed
- Photometric Interpretation (0028,0004) is MONOCHROME or RGB or YBR_FULL or YBR_FULL_422
- Bits Allocated (0028,0100) equal to 16'D or 8'D
- Bits Stored (0028,0101) is >8
- High Bit (0028,0102) equal to Bits Stored (0028,0101) - 1
- Pixel Representation (0028,0103) equal to 0'D

An instance will be JPEG lossy compressed only if it fulfills the following criteria:

- is an image and not already compressed
- photometric interpretation (0028,0004) is MONOCHROME or RGB
- Bits Allocated (0028,0100) equal to 16'D or 8'D
- Bits Stored (0028,0101) equal to 12'D or 8'D
- High Bit (0028,0102) equal to Bits Stored (0028,0101) - 1
- Pixel Representation (0028,0103) equal to 0'D

An instance will be JPEG 2000 lossless compressed only if it fulfills the following criteria:

- is an image and not already compressed
- Photometric interpretation (0028,0004) not MONOCHROME or RGB or YBR_FULL or YBR_FULL_422
- Bits Allocated (0028,0100) not 16'D or 8'D

An instance will be JPEG 2000 lossy compressed only if it fulfills the following criteria:

- is an image and not already compressed
- Photometric interpretation (0028,0004) is MONOCHROME or RGB
- Bits Stored (0028,0101) equal to 12'D or 8'D

There is no extended negotiation as an SCU.

4.2.2.3.1.3 SOP specific Conformance for SOP classes

syngo® MR will not add or change private attributes by default, even in case objects are compressed or the image header is updated according to the IHE Patient Information Reconciliation Profile.

The behavior of *syngo*® MR when encountering status codes in a C-STORE response is summarized in Table 11:

Table 11: DICOM Command Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Error	Any other DIMSE Error Status	0xXXXX	Send is continued till the end. Log message is created.
Success	Image is successfully stored	0000	If configured, Storage Commitment is requested for successfully stored instances

Table 12 below indicates the behavior if exceptions occur:

Table 12: DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	Log message is created (Timeout configurable; default 30s)
Association Aborted	Send is failed. Log message is created.

4.2.2.4 Association Acceptance Policy

4.2.2.4.1 Activity – "Receive Storage Request"

4.2.2.4.1.1 Description and Sequencing of Activities

syngo® MR serves as a SCP of the Storage Service Class. The storage SCP accepts incoming C-Store Request from any configured AE Title, receives supported objects transmitted on that association and stores them in the local database.

4.2.2.4.1.2 Accepted Presentation Contexts

For all supported Transfer Objects (see "Table 1: Network Services" section "SOP Classes Created by *syngo*® MR" and "SOP Classes Managed by *syngo*® MR" in the "Conformance Statement Overview".) the appropriate Transfer Syntaxes are supported.

Generally all Presentation Contexts are accepted as long as they contain at least one suitable Transfer Syntax. All other Presentation Contexts are rejected.

There is no Extended Negotiation as an SCP

4.2.2.4.1.3 SOP-specific Conformance Statement for Storage SOP classes

syngo® MR conforms to the Full Storage Class at Level 2.

In case of a successful C-STORE operation, the image has successfully been written on disk either in Explicit Little Endian format or in the compression format received.

The Storage AE of *syngo*® MR returns the status "success" when the data is stored to disk and a minimal image header validation has been performed.

The following header attributes must be available and filled:

- SOP Class UID,
- Study Instance UID,
- Series Instance UID and
- SOP Instance UID.

Table 13 below list the status codes that *syngo*® MR can return:

Table 13: Storage C-STORE Response Status

Service Status	Further Meaning	Error Code	Reason

Success	success	0000	Image received correctly (success notification is done after receiving, before indexing and storing)
Failure	Out-of-resource	A700	No resource left in the Short Term Storage
Failure	Unable to Process	Cxxx	Error during instance reception
Failure	Data set does not match SOP Class	A9xx	The data set is not conform to the SOP Class contained in the resource.

Restriction: successful operation does not guarantee storage of header data in the database.

4.2.2.4.1.4 Other SOP specific behavior

If an image is received that is already stored in the database - identified by the SOP Instance UID - the new image will be ignored. The existing instance is not superseded.

4.2.3 Storage Commitment AE Specification

4.2.3.1 SOP Classes

The Storage Commitment AE of *syngo*® MR provides standard conformance to the SOP Class listed in “Table 1: Network Services” section "Storage Commitment" in the “Conformance Statement Overview”.

4.2.3.2 Association Policy

Table 14: Association Policies

Application Context Name	1.2.840.10008.3.1.1.1
PDU size	32 kB [1]
Maximum number of simultaneous associations as an association acceptor	12[1]
Maximum number of simultaneous associations as an association initiator	unlimited

syngo® MR contains a limitation of 512 kB for the maximum PDU size. By default, the maximum PDU size is set to 32kB.

The maximum number of simultaneous receiving associations (SCP) is configurable at run time, based on the system resources available. By default, the maximum number of associations is set to 12.

There is no inherent limit to the number of outgoing associations (SCU), other than limits imposed by the computer operating system.

4.2.3.2.1 Asynchronous Nature

syngo® MR supports asynchronous communication (multiple outstanding transactions over a single association). On the SCU side the Window size proposed is infinite. On the SCP Side any non-infinite maximum size will be accepted.

Table 15: Asynchronous Nature as an Association Initiator

Maximum number of outstanding asynchronous transactions	10

4.2.3.2.2 Implementation Identifying Information

For Implementation Identifying Information please refer to “Table 3 - Implementation Identifying Information” in the “Conformance Statement Overview”.

4.2.3.3 Association Initiation Policy

4.2.3.3.1 Activity “Send Initial Storage Commitment”

4.2.3.3.1.1 Description and Sequencing of Activities

syngo® MR serves as a SCU of the Storage Commitment Service Class. After successful transfer of Imaging Objects to a configured Archive, the Storage Comitment SCU initiates an N-Action Request,if Storage Commitment is configured. This request will be sent on a different association than the storage request.

[1] Default, the value is configurable

The Storage Commitment Request will be sent out with a delay, in order to ensure that the remote node properly indexes received instances. The delay time is configureable with a default delay of 10 minutes.

The system may issue one N-ACTION Request for a complete set (bundle) of instances or issue one N-ACTION-Request per instance. This behavior is configurable; the default value is “bundled”.

syngo® MR will accept the N-Event-Report-Request on the same association if sent immediately after the N-ACTION-Response. However it will not wait for it. The association is closed after three seconds.

4.2.3.3.1.2 Proposed Presentation Contexts

Table 16 below lists the supported presentation contexts for storage comitment.

Table 16: Proposed Presentation Contexts for Storage Commitment

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name List**	**UID List**		
Storage Commitment Push Model	1.2.840.10008.1.20.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

4.2.3.3.1.3 SOP specific Conformance for SOP classes

The behavior of *syngo*® MR when encountering status codes in an N-ACTION response is summarized in Table 17:

Table 17: DICOM Command Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Error	Any failure that occurs	Any none null Code	Failure reported to user; corresponding object(s) will be marked as “Archived failed”
Success	All Instances are available on the remote node	0000	Success reported to user; in case failures exist, the corresponding instances will be marked as “Archived failed”

Table 18: DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	Failure reported to user (Timeout configurable; default 30s); the request will be retried
Association Aborted	Failure reported to user; the request will be retried

4.2.3.4 Association Acceptance Policy

4.2.3.4.1 Activity "Receive Reply to Initial Storage Commitment"

4.2.3.4.1.1 Description and Sequencing of Activities

syngo® MR supports the reverse role negotiation of the Storage Commitment Service Class as SCU. If the N-ACTION request was not answered in 3 seconds, it closes the association. It accepts incoming N-EVENT-REPORT Request in a new association.

4.2.3.4.1.2 Accepted Presentation Contexts

The *syngo*® MR DICOM application supports the presentation contexts listed in the following table for the Storage Commitment Service Class.

Table 19 - Presentation Context Table "Update Flag Information"

Presentation Context Table – "Update Flag Information"				
Abstract Syntax	**Transfer Syntax**		**Role**	**Ext. Neg.**
Description	**Name List**	**UID List**		
1.2.840.10008.1.20.1 Storage Commitment Push Model	Explicit VR Little Endian Explicit VR Big Endian Implicit VR Little Endian	1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2	SCP	None

4.2.3.4.1.3 SOP-specific Conformance Statement for Storage SOP classes

The behavior of *syngo*® MR when encountering status codes in an N-EVENT-REPORT response is summarized in the following table:

Table 20: DICOM Command Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Error	Storage Commitment Reply ignored.	Any none null Code	Storage Commitment will be repeated.
Success	Storage Commitment Reply noticed.	0000	Success reported to user.

4.2.4 Query/Retrieve AE Specification

4.2.4.1 SOP Classes

The Query/Retrieve AE provides Standard Conformance to the the SOP Classes listed in “Table 1: Network Services” section "Query/Retrieve” in the “Conformance Statement Overview”.

4.2.4.2 Association Policy

Table 21: Association Policies

Application Context Name	1.2.840.10008.3.1.1.1
PDU size	32 kB [1]
Maximum number of simultaneous associations as an association acceptor	12[1]
Maximum number of simultaneous associations as an association initiator	unlimited

syngo® MR contains a limitation of 512 kB for the maximum PDU size. By default, the maximum PDU size is set to 32kB.

The maximum number of simultaneous receiving associations (SCP) is configurable at run time, based on the system resources available. By default, the maximum number of associations is set to 12.

There is no inherent limit to the number of outgoing associations (SCU), other than limits imposed by the computer operating system.

4.2.4.2.1 Asynchronous Nature

syngo® MR supports asynchronous communication (multiple outstanding transactions over a single association). On the SCU side the Window size proposed is infinite. On the SCP Side any non-infinite maximum size will be accepted.

Table 22: Asynchronous Nature as an Association Initiator

Maximum number of outstanding asynchronous transactions	10

4.2.4.2.2 Implementation Identifying Information

For Implementation Identifying Information please refer to “Table 3 - Implementation Identifying Information” in the “Conformance Statement Overview”.

4.2.4.3 Association Initiation Policy

4.2.4.3.1 Activity “Querying a Remote Node” for Instances

4.2.4.3.1.1 Description and Sequencing of Activities

syngo® MR serves as a SCU for the following SOP Classes

[1] Default, the value is configurable

- Patient Root Q/R Information Model - FIND SOP Class
- Study Root Q/R Information Model –FIND SOP Class
- Patient/Study only Q/R Information Model – FIND SOP Class.

Using the attributes specified by the user as Query Keys (in accordance with the query model) the Query SCU iniates a C-FIND Request and display the responses to the user.

4.2.4.3.1.2 Proposed Presentation Contexts

syngo® MR will propose Presentation Contexts as shown in the following table:

Table 23: Proposed Presentation Contexts for Query

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name List**	**UID List**		
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	Yes
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
Study Root Query/ Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	Yes
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
Patient/Study Only Query/ Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.3.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	No
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

Table 24: Extended Negotiation as an SCU

Name	UID	Extended Negotiation
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	Relational Query will be negotiated if necessary as defined in DICOM PS3.4.
Study Root Query/ Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Relational Query will be negotiated if necessary as defined in DICOM PS3.4.

4.2.4.3.1.3 SOP Specific Conformance Statement to Query SOP classes

syngo® MR checks for the following status codes in the Query SCP's C-FIND-Response:

Table 25: DICOM Command Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Failure	e.g. Out of Resources; Cancellation; Identifier does not match SOP Class; Unable to process	Any none null Code	Failure reported to user
Pending	All optional keys are supported the same manner as Required Keys.	FF00	Pending state is indicated to user
	Matching Operation continues; some of the optional keys were not supported the same way as the required keys	FF01	Pending state is indicated to user
Success	Query has been performed successfully.	0000	Success reported to user

Table 26: DICOM Command Communication Failure Behavior

exception	Behavior
Timeout	Failure reported to user (Timeout configurable; default 30s)
Association Aborted	Failure reported to user

syngo® MR supports the following query levels:

- Study
- Series

Matching Keys on Instance Level is not supported by the *syngo*® MR SCU.

The following table lists the various attributes at Study and Series levels, which can be used for hierarchical queries as well as return values for display. The display capabilities are highly configurable and “yes” indicates that it is possible to configure display of the data:

A “yes” in the UI column will indicate that the attribute may be visualized when browsing the Query results with the Browser. The Browser display is additionally influenced by the related Browser configuration

Table 27: Attributes supported for instance Query - SCU

Attribute Name	Tag	Type	User input	UI
Study Level				
Patient's Name	(0010,0010)	O	enter value	yes
Patient ID	(0010,0020)	O	enter value	yes
Patient’s Birth Date	(0010,0030)	O	enter value	yes
Patient's Birth Time	(0010,0032)	O	enter value	yes
Patient’s Sex	(0010,0040)	O	enter value	yes
Accession Number	(0008,0050)	O	enter value	yes
Study ID	(0020,0010)	O	enter value	yes
Study Instance UID	(0020,000D)	U	enter value	yes
Study Date	(0008,0020)	O	enter value	yes
Study Time	(0008,0030)	O	enter value	yes
Referring Physician' s Name	(0008,0090)	O	enter value	yes

Attribute Name	Tag	Type	User input	UI
Study Description	(0008,1030)	O	enter value	yes
Number of Study related Instances	(0020,1208)	O	-	yes
Modalities in Study	(0008,0061)	O	enter value	yes
Number of Study Related Series	(0020,1206)	O	-	yes
Series Level				
Modality	(0008,0060)	O	enter value	yes
Series Date	(0008,0021)	O	enter value	yes
Series Time	(0008,0031)	O	enter value	yes
Number of Series related Instances	(0020,1209)	O	-	yes
Series Number	(0020,0011)	O	enter value	yes
Series Description	(0008,103E)	O	enter value	yes
Request Attributes Sequence \ Requested Procedure ID	(0040,0275) \ (0040,1001)	O	enter value	yes
Request Attributes Sequence \ Scheduled Procedure Step ID	(0040,0275) \ (0040,0009)	O	enter value	yes
Performed Procedure Step Start Date	(0040,0244)	O	enter value	yes
Performed Procedure Step Start Time	(0040,0245)	O	enter value	yes
Series Instance UID	(0020,000E)	U	-	yes

4.2.4.3.1 Activity "Retrieve Instances from a remote node"

4.2.4.3.1.1 Description and Sequencing of Activities

syngo® MR serves as a SCU for the following SOP Classes

- Patient Root Q/R Information Model - MOVE SOP Class
- Study Root Q/R Information Model – MOVE SOP Class
- Patient/Study only Q/R Information Model – MOVE SOP Class.

The C-MOVE-Request is used to retrieve the selected imaging objects. The Retrieve AE supports the query model Study Root.

4.2.4.3.1.2 Proposed Presentation Contexts

syngo® MR will propose Presentation Contexts as shown in the following table:

Table 28: Proposed Presentation Contexts for Retrieve and Activity "MOVE SCU"

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name List**	**UID List**		
Study Root Query/Retrieve Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	No
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

4.2.4.3.1.3 SOP Specific Conformance Statement for Move SCU Classes

The presentation context is negotiated at association establishment time. When the C-MOVE-Request is processed, the Move Destination attribute (receiver of images) is ignored. However the Move Destination AE must conform to the DICOM conventions (value representation AE).

The behavior of *syngo*® MR when encountering status codes in a C-MOVE response is summarized in Table 29

Table 29: DICOM Command Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Error	e.g. Out of Resources; Cancellation; Identifier does not match SOP Class; Unable to process; Move destination unknown	Any none null Code	Failure reported to user
Pending	Move Operation continues	FF00	Operation continues in background
Success	Move has been performed successfully.	0000	Success reported to user

Table 30: DICOM Command Communication Failure Behavior

exception	Behavior
Timeout	Failure reported to user (Timeout configurable; default 30s)
Association Aborted	Failure reported to user

4.2.4.4 Association Acceptance Policy

syngo® MR does not provide SCP functionality.

4.2.5 Modality Worklist AE Specification

4.2.5.1 SOP Classes

The Modality Worklist AE provides Standard Conformance to the the SOP Classes listed in “Table 1: Network Services” section “Worklist Management" in the “Conformance Statement Overview”.

4.2.5.2 Association Policy

Table 31: Association Policies

Application Context Name	1.2.840.10008.3.1.1.1
PDU size	32 kB [1]
Maximum number of simultaneous associations as an association acceptor	12[1]
Maximum number of simultaneous associations as an association initiator	unlimited

syngo® MR contains a limitation of 512 kB for the maximum PDU size. By default, the maximum PDU size is set to 32kB.

The maximum number of simultaneous receiving associations (SCP) is configurable at run time, based on the system resources available. By default, the maximum number of associations is set to 12.

There is no inherent limit to the number of outgoing associations (SCU), other than limits imposed by the computer operating system.

4.2.5.2.1 Asynchronous Nature

syngo® MR supports asynchronous communication (multiple outstanding transactions over a single association). On the SCU side the Window size proposed is infinite. On the SCP Side any non-infinite maximum size will be accepted.

Table 32: Asynchronous Nature as an Association Initiator

Maximum number of outstanding asynchronous transactions	10

4.2.5.2.2 Implementation Identifying Information

For Implementation Identifying Information please refer to “Table 3 - Implementation Identifying Information” in the “Conformance Statement Overview”.

4.2.5.3 Association Initiation Policy

4.2.5.3.1 Activity “Querying a Remote Node” for Modality Worklist

4.2.5.3.1.1 Description and Sequencing of Activities

syngo® MR serves as a SCU of the Modality Worklist service. It performs worklist queries by issueing a C-FIND request at regular intervals. In addition a worklist request can be triggered manually.

[1] Default, the value is configurable

4.2.5.3.1.2 Proposed Presentation Contexts

syngo® MR will propose Presentation Contexts as shown in the following table:

Table 33: Proposed Presentation Contexts for Worklist

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name List**	**UID List**		
Modality Worklist-FIND	1.2.840.10008.5.1.4.31	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	No
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

4.2.5.3.1.3 SOP Specific Conformance for SOP Classes

Search Key Attributes of the Worklist C-FIND

syngo® MR Modality Worklist SCU supports “broad worklist queries” with all required search keys. The following tables describe the “broad query” search keys that the SCU supports. The list is configurable in ‘DICOM Modality Worklist Query’.

Table 34: Broad Query search keys

Attribute Name	Tag	Matching Key Type	Query Value
Scheduled Procedure Step			
Scheduled Procedure Step Sequence	(0040,0100)	R	
>Modality	(0008,0060)	R	“*” or <configured Modality>
>Scheduled Station AE Title	(0040,0001)	R	<own AET> or “*”[c]
>Scheduled Procedure Step Start Date	(0040,0002)	R	Range from UI[d]
>Scheduled Procedure Step Description	(0040,0007)	O	
>Scheduled Station Name	(0040,0010)	O	
>Scheduled Procedure Step Location	(0040,0011)	O	
>Scheduled Procedure Step Status	(0040,0020)	O	
>Scheduled Performing Physician’s Name	(0040,0006)	O	
>Scheduled Protocol Code Sequence	(0040,0008)	O	

[c] This depends on user configuration (Administration Portal->Technical Configuration->DICOM Nodes->Local DICOM Node->Worklist) if the "own AET" is provided or not.
[d] A time window can be configured by defining how many days to look into the past and into the future (Administration Portal-> Technical Configuration->DICOM Nodes->Local DICOM Node->Worklist)

Attribute Name	Tag	Matching Key Type	Query Value
>>Code Value	(0008,0100)	O	
Requested Procedure Description	(0032,1060)	O	
Requested Procedure Priority	(0040,1003)	O	
Patient Transport Arrangements	(0040,1004)	O	
Requested Procedure Comments	(0040,1400)	O	
Requested Procedure Code Sequence	(0032,1064)	O	
>Code Value	(0008,0100)	O	
Requesting Physician	(0032,1032)	O	
Referring Physicians Name	(0008,0090)	O	
Current Patient Location	(0038,0300)	O	
Pregnancy Status	(0010, 21C0)	O	
Medical Alerts	(0010,2000)	O	
Allergies	(0010,2110)	O	

Return Key Attributes of the Modality Worklist C-FIND

The *syngo*® MR Modality Worklist SCU supports worklist queries with return key attributes of all types. The following tables describe the return keys that the SCU supports.

An “x” in the **UI** column indicates that the attribute may be visualized when browsing the Worklist results with the Browser. The Browser display is additionally influenced by the related Browser configuration.

Table 35: Modality Worklist C-Find Return keys

Attribute Name	Tag	Return Key Type	UI	Notes
SOP Common				
Specific Character Set	(0008,0005)	1C	-	
Scheduled Procedure Step				
Scheduled Procedure Step Sequence	(0040,0100)	1		
>Modality	(0008,0060)	1	x	
>Scheduled Station AE Title	(0040,0001)	1		“Scheduled Station AE Title” is taken as default for “Performed Station AE Title”
>Scheduled Procedure Step Start Date	(0040,0002)	1	-	
>Scheduled Procedure Step Start Time	(0040,0003)	1	-	
>Scheduled Procedure Step End Date	(0040,0004)	3	-	
>Scheduled Procedure Step End Time	(0040,0005)	3	-	
>Scheduled Performing Physician’s Name	(0040,0006)	1	x	“Scheduled Performing Physician’s Name” is taken as default for “Performing Physician’s Name”
>Scheduled Procedure Step Description	(0040,0007)	1C	x	“Scheduled Procedure Step Description” is taken as default for “Performed

Attribute Name	Tag	Return Key Type	UI	Notes
				Procedure Step Description”
>Scheduled Protocol Code Sequence **	(0040,0008)	1C	-	Uses universal sequence match “Scheduled Protocol Code Sequence” is taken as default for “Performed Protocol Code Sequence”
>>Code Value	(0008,0100)	1C	-	
>>Coding Scheme Designator	(0008,0102)	1C	-	
>>Coding Scheme Version	(0008,0103)	3	-	
>>Code Meaning	(0008,0104)	3	-	
>Scheduled Procedure Step ID	(0040,0009)	1	x	“Scheduled Procedure Step ID” is taken as default for “Performed Procedure Step ID”
>Scheduled Station Name	(0040,0010)	2	x	
>Scheduled Procedure Step Location	(0040,0011)	2	-	“Scheduled Procedure Step Location” is taken as default for “Performed Location”
>Scheduled Procedure Step Status	(0040,0020)	3	-	
>Comments on the Scheduled Procedure Step	(0040,0400)	3	-	
Requested Procedure				
Study Date	(0008,0020)	3	x	
Study Time	(0008,0030)	3	x	
Referenced Study Sequence **	(0008,1110)	2	-	Uses universal sequence match
>Referenced SOP Class UID	(0008,1150)	1C	-	
>Referenced SOP Instance UID	(0008,1155)	1C	-	
Study Instance UID	(0020,000D)	1	-	
Requested Procedure Description	(0032,1060)	1C	x	
Requested Procedure Code Sequence **	(0032,1064)	1C	-	Uses universal sequence match “Requested Procedure Code Sequence” is taken as default for “Procedure Code Sequence”
>Code Value	(0008,0100)	1C	-	
>Coding Scheme Designator	(0008,0102)	1C	-	
>Coding Scheme Version	(0008,0103)	3	-	
>Code Meaning	(0008,0104)	3	-	
Requested Procedure ID	(0040,1001)	1	x	“Requested Procedure ID” is taken as default for “Study ID”
Reason for the Requested Procedure	(0040,1002)	3	-	
Requested Procedure Priority	(0040,1003)	2	x	
Patient Transport Arrangements	(0040,1004)	2	-	
Confidentiality Code	(0040,1008)	3	-	
Reporting Priority	(0040,1009)	3	x	
Names of intended Recipients of Results	(0040,1010)	3	-	
Requested Procedure Comments	(0040,1400)	3	-	
Imaging Service Request				
Accession Number	(0008,0050)	2	x	
Referring Physician’s Name	(0008,0090)	2	x	

Attribute Name	Tag	Return Key Type	UI	Notes
Requesting Physician	(0032,1032)	2	x	
Requesting Service	(0032,1033)	3	-	
Issuing Date of Imaging Service Request	(0040,2004)	3	-	
Issuing Time of Imaging Service Request	(0040,2005)	3	-	
Placer Order Number / Imaging Service Request *	(0040,2016)	3	-	Old tag (0040,2006) is retired and not used.
Filler Order Number / Imaging Service Request *	(0040,2017)	3	-	Old tag (0040,2007) is retired and not used.
Order entered by …	(0040,2008)	3	-	
Order Enterer's location	(0040,2009)	3	-	
Order Callback Phone Number	(0040,2010)	3	-	
Imaging Service Request Comments	(0040,2400)	3	-	
Visit Identification				
Admission ID	(0038,0010)	2	x	
Issuer of Admission ID	(0038,0011)	3	-	
Visit Status				
Current Patient Location	(0038,0300)	2	x	
Visit Admission				
Admitting Diagnosis Description	(0008,1080)	3	x	
Admitting Date	(0038,0020)	3	-	
Patient Identification				
Patient's Name	(0010,0010)	1	x	
Patient ID	(0010,0020)	1	x	
Issuer of Patient ID	(0010,0021)	3	x	
Other Patient IDs	(0010,1000)	3	x	
Other Patient Names	(0010,1001)	3	x	
Patient's Birth Name	(0010,1005)	3	-	
Patient Demographic				
Patient's Birth Date	(0010,0030)	2	x	
Patient's Birth Time	(0010,0032)	3	x	
Patient's Sex	(0010,0040)	2	x	
Patient's Insurance Plan Code Sequence **	(0010,0050)	3	-	Uses universal sequence match
>Code Value	(0008,0100)	1C	-	
>Coding Scheme Designator	(0008,0102)	1C	-	
>Coding Scheme Version	(0008,0103)	3	-	
>Code Meaning	(0008,0104)	3	-	
Patient's Age	(0010,1010)	3	-	
Patient's Size	(0010,1020)	3	x	
Patient's Weight	(0010,1030)	2	x	
Patient's Address	(0010,1040)	3	x	
Military Rank	(0010,1080)	3	x	
Branch of Service	(0010,1081)	3	-	
Ethnic Group	(0010,2160)	3	x	
Patient Comments	(0010,4000)	3	x	
Patient Medical				
Medical Alerts	(0010,2000)	2	x	
Allergies	(0010,2110)	2	x	
Pregnancy Status	(0010,21C0)	2	x	
Smoking Status	(0010,21A0)	3		
Last Menstrual Date	(0010,21D0)	3		
Additional Patient History	(0010,21B0)	3		
Special Needs	(0038,0050)	2	x	

The behavior of *syngo*® MR when encountering status codes in a C-FIND response is summarized in Table 36:

Table 36: DICOM Command Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Error	e.g. Out of Resources; Cancellation; Identifier does not match SOP Class; Unable to process	Any none null Code	Failure reported to user
Pending	All optional keys are supported the same manner as Required Keys.	FF00	Pending state is indicated to user
	Matching Operation continues; some of the optional keys were not supported the same way as the required keys	FF01	Pending state is indicated to user
Success	Query has been performed successfully.	0000	Success reported to user

Table 37: DICOM Command Communication Failure Behavior

exception	Behavior
Timeout	Failure reported to user (Timeout configurable; default 30s)
Association Aborted	Failure reported to user

4.2.5.4 Association Acceptance Policy

syngo® MR does not provide the functionality of a SCP of the Modality Worklist – Find SOP Class.

4.2.6 Modality Performed Procedure Step AE Specification

4.2.6.1 SOP Classes

The Modality Performed Procedure Step AE provides Standard Conformance to the the SOP Classes listed in “Table 1: Network Services” section “Worklist Management" in the “Conformance Statement Overview”.

4.2.6.2 Association Policy

Table 38: Association Policies

Application Context Name	1.2.840.10008.3.1.1.1
PDU size	32 kB [1]
Maximum number of simultaneous associations as an association acceptor	12[1]
Maximum number of simultaneous associations as an association initiator	unlimited

syngo® MR contains a limitation of 512 kB for the maximum PDU size. By default, the maximum PDU size is set to 32kB.

The maximum number of simultaneous receiving associations (SCP) is configurable at run time, based on the system resources available. By default, the maximum number of associations is set to 12.

There is no inherent limit to the number of outgoing associations (SCU), other than limits imposed by the computer operating system.

4.2.6.2.1 Asynchronous Nature

syngo® MR supports asynchronous communication (multiple outstanding transactions over a single association). On the SCU side the Window size proposed is infinite. On the SCP Side any non-infinite maximum size will be accepted.

Table 39: Asynchronous Nature as an Association Initiator

Maximum number of outstanding asynchronous transactions	10

4.2.6.2.2 Implementation Identifying Information

For Implementation Identifying Information please refer to “Table 3 - Implementation Identifying Information” in the “Conformance Statement Overview”.

4.2.6.3 Association Initiation Policy

4.2.6.3.1 Activity “Create Modality Performed Procedure Step”

4.2.6.3.1.1 Description and Sequencing of Activities

syngo® MR serves as a SCU of the Modality Performed Procedure Step SOP Class. It sends N-CREATE request to inform the Information System that a Procedure Step has been started.

[1] Default, the value is configurable

4.2.6.3.1.2 Accepted Presentation Contexts

syngo® MR proposes Presentation Contexts as shown in the following table:

Table 40: Acceptable Presentation Contexts Activity "Create MPPS"

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name List**	**UID List**		
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

4.2.6.3.1.3 SOP specific Conformance for MPPS SOP class

The behavior of *syngo*® MR when encountering status codes in an N-CREATE-RSP response is summarized in Table 41:

Table 41: MPPS N-CREATE Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Error	MPPS creation request could not be processed.	Any none null Code	MPPS is not created.
Success	MPPS creation request processed successfully.	0000	MPPS is created.

4.2.6.3.2 Activity "Update Modality Performed Procedure Step"

4.2.6.3.2.1 Description and Sequencing of Activities

When the procedure step has been finished, *syngo*® MR sends N-SET request to inform the Information System about the finalization of the procedure step (completed or discontinued).

4.2.6.3.2.2 Proposed Presentation Contexts

syngo® MR proposes Presentation Contexts as shown in the following table:

Table 42: Acceptable Presentation Contexts Activity "Update MPPS"

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name List**	**UID List**		
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

4.2.6.3.2.3 SOP specific Conformance for MPPS SOP class

The behavior of *syngo*® MR when encountering status codes in an N-SET-RSP response is summarized in Table 43:

Table 43: MPPS N-SET Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Error	MPPS update request could not be processed.	Any none null Code	MPPS is not updated.
Success	MPPS update request could processed successfully.	0000	MPPS is updated.

4.2.6.4 Association Acceptance Policy

syngo® MR does not provide the functionality of a SCP of the Modality Performed Procedure Step SOP Class.

4.2.7 Print AE Specification

4.2.7.1 SOP Classes

4.2.7.2 Association Policy

4.2.7.3 Association Initiation Policy

4.2.7.4 Association Acceptance Policy

4.2.8 Print SCU Specification

4.2.8.1 SOP Classes

For SOP Classes supported, please refer to “Table 1: Network Services” section “Print Management” in the “Conformance Statement Overview”.

4.2.8.2 Association Policies

4.2.8.2.1 General

Whenever a film-sheet is completely set up and printed by command or automated rule, the job is prepared for processing. As soon as the queue is ready to process the job, it is activated and worked according to the processing data. The Print application will initiate an association to the print destination and process the printing.

The default PDU size used will be used.

4.2.8.2.2 Number of Associations

The *syngo*® MR DICOM application initiates one association at a time for each different print device configured.

4.2.8.2.3 Asynchronous Nature

The *syngo*® MR DICOM print application does not support asynchronous communication (multiple outstanding transactions over a single association).

4.2.8.2.4 Implementation Identifying Information

For Implementation Identifying Information please refer to “Table 3 - Implementation Identifying Information” in the “Conformance Statement Overview”.

4.2.8.3 Association Initiation Policy

Triggered by the Print job queue the Print Management SCU establishes an association by using the DICOM association services. An N-GET request determines the printer status prior to printing. If the printer status is “normal”, the print job is started.

After the last film is printed from queue, the Print application will leave open the association for another 60 seconds. If a new film job is ready for printing within this time-limit, the job will be immediately processed over the still open association. If there is no new job, the association is closed.

During the “idle-time” (no open association to printer) the Print application will issue a cyclic camera status request (using N-GET of the Printer SOP Class) every 5 minutes.

4.2.8.3.1 Activity - Print Film

4.2.8.3.1.1 Description and Sequencing of Activity

The film sheet is internally processed, converted to a Standard/1-1 page and then the page image is sent. Status is controlled by awaiting any N-EVENT message through the transfer until the last image or film-sheet is sent.

If the response from the remote application contains a status other than Success or Warning the association is aborted.

4.2.8.3.1.2 Proposed Presentation Context

The *syngo*® MR DICOM application will propose Presentation Contexts as shown in the following table:

Table 44 - Presentation Context Table "Print Film"

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name List**	**UID List**		
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None
Print Job SOP Class	1.2.840.10008.5.1.1.14	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None
Presentation LUT SOP Class	1.2.840.10008.5.1.1.23	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None

4.2.8.3.1.3 SOP Specific Conformance

The *syngo*® MR DICOM print management SCU conforms to the DICOM Basic Grayscale Print Management Meta SOP Class and to Basic Color Print Management Meta SOP Class.

The application uses a setting platform to define the properties of the connected DICOM SCP, e.g.:

- supported film sizes of the connected DICOM SCP
- supported film formats of the DICOM SCP
- LUT type to be attached.

The printing is suspended in the case of a failure return status of the SCP or when the user cancels the job.

Basic Film Session SOP Class

The Basic Film Session information object definition describes all the user-defined parameters, which are common for all the films of a film session. The Basic Film Session refers to one or more Basic Film Boxes that are printed on one hardcopy printer.

The *syngo*® MR DICOM print management SCU supports the following DIMSE Service elements for the Basic Film Session SOP Class as SCU:

- N-CREATE
- N-DELETE

The Basic Film Session SOP Class N-CREATE-RQ (SCU) uses the following attributes:

Table 45 - Basic Film Session N-CREATE attributes

Attribute Name	Tag	Usage SCU	Supported Values
Number of Copies	(2000,0010)	U	"1"
Medium Type	(2000,0030)	U	BLUE FILM CLEAR FILM PAPER

U = User Option

The number of copies sent to the DICOM Printer is always 1, the job is sent n times for n copies.

The affected SOP Instance UID received with N-CREATE-RSP message will be kept internally and used for later requests (e.g. N-DELETE-RQ) on the Basic Film Session – see below:

Attribute Name	Tag	Source of Information
Requested SOP Instance UID	(0000,1000) →(0000,1001)	Affected SOP Instance UID of N-CREATE-RSP on Basic Film Session

The N-DELETE-RQ on the Basic Film Session SOP Class is used to remove the complete Basic Film Session SOP Instance hierarchy.

The Basic Film Session SOP Class interprets the following status codes (from N-CREATE-RSP, N-DELETE-RSP messages):

Table 46 - Basic Film Session Status Codes

Service Status	Meaning	Error Codes
Failure	Film session SOP instances hierarchy does not contain film box SOP instances	C600
	Unable to create print job, print queue is full	C601
	Image size is larger than images box size	C603
Warning	Memory allocation not supported	B600
	Film session printing is not supported	B601
	Film box does not contain image box (empty page)	B602
Success	Film belonging to the film session are accepted for printing	0000

Basic Film Box SOP Class

The Basic Film Box information object definition describes all the user-defined parameter of one film of the film session. The Basic Film Box information description defines the presentation parameters, which are common for all images on a given sheet of film.

The Basic Film Box refers to one or more Image Boxes.

Supported Service Elements as SCU are:

- N-CREATE
- N-ACTION
- N-DELETE

The Basic Film Box SOP Class N-CREATE-RQ message uses the following attributes (the actual values for each attribute depend on DICOM printer configuration within the *syngo*® MR DICOM print management SCU):

Table 47 - Basic Film Box N-CREATE attributes

Attribute Name	Tag	Usage SCU	Supported Values
Image Display Format	(2010,0010)	M	STANDARD\1,1
Referenced Film Session Sequence	(2010,0500)	M	n. a.
> Referenced SOP Class UID	(0008,1150)	M	1.2.840.10008.5.1.1.1
> Referenced SOP Instance UID	(0008,1155)	M	
Film Orientation	(2010,0040)	M	PORTRAIT
Film Size ID	(2010,0050)	M	8INX10IN, 10INX12IN, 10INX14IN, 11INX14IN,, 14INX14IN, 14INX17IN, 24CMX24CM, 24CMX30CM
Magnification Type	(2010,0060)	M	BILINEAR, CUBIC, NONE, REPLICATE
Border Density	(2010,0100)	U	BLACK, WHITE
Max Density	(2010,0130)	U	> 0
Min Density	(2010,0120)	U	50 > value > 0
Illumination	(2010,015E)	U	> 0 Required if Presentation LUT is present.
Reflective Ambient Light	(2010,0160)	U	> 0 Required if Presentation LUT is present.
Referenced Presentation LUT Sequence	(2050,0500)	U	

M = Mandatory, **U** = User Option

The N-CREATE-RSP message from the Print SCP includes the Referenced Image Box Sequence with SOP Class/Instance UID pairs which will be kept internally and used for the subsequent Basic Image Box SOP Class N-SET-RQ messages.

When all Image Boxes (including parameters) for the film-sheet have been set, the DICOM print manager will issue a N-ACTION-RQ message with the SOP Instance UID of the Basic Film Box and the Action Type ID of 1.

The affected SOP Instance UID received with N-CREATE-RSP message will be kept internally and used for later requests (N-ACTION-RQ and N-DELETE-RQ) on the Basic Film Box - see below:

Attribute Name	Tag	Source of Information
Requested SOP Instance UID	(0000,1000) →(0000,1001)	Affected SOP Instance UID of N-CREATE-RSP on Basic Film Box

The Basic Film Box SOP Class interprets the following status codes:

Table 48 - Basic Film Box Status Codes

Service Status	Meaning	Error Codes
Failure	Unable to create print job, print queue is full	C601
	Image size is larger than images box size	C603

Service Status	Meaning	Error Codes
Warning	Film box does not contain image box (empty page)	B603
	Requested MinDensity or MaxDensity outside of Printer's operating range	B605
Success	Film accepted for printing	0000

Basic Grayscale Image Box SOP Class

The Basic Grayscale Image Box information object definition is the presentation of an image and image related data in the image area of a film. The Basic Grayscale Image Box information describes the presentation parameters and image pixel data, which apply to a single image of a sheet of film.

The Grayscale Image Box SOP Class uses only the N-SET-RQ with the following attributes:

Table 49 - Basic Grayscale Image Box N-SET attributes

Attribute Name	Tag	Usage SCU	Supported Values
Image Position	(2020,0010)	M	1
Basic Grayscale Image Sequence	(2020,0110)	M	n.a.
> Samples per Pixel	(0028,0002)	M	1
> Photometric Interpretation	(0028,0004)	M	MONOCHROME2
> Rows	(0028,0010)	M	<Printer/Film config>
> Columns	(0028,0011)	M	<Printer/Film config>
> Pixel Aspect Ratio	(0028,0034)	M	(1:1)
> Bits Allocated	(0028,0100)	M	8, 16
> Bits Stored	(0028,0101)	M	8, 12
> High Bit	(0028,0102)	M	7, 11
> Pixel Representation	(0028,0103)	M	0
> Pixel Data	(7FE0,0010)	M	

M = Mandatory

The Grayscale Image Box SOP Class interprets the following status codes:

Table 50 - Basic Grayscale Image Box Status Codes

Service Status	Meaning	Error Codes
Failure	Image contains more pixel than printer can print in Image Box	C603
	Insufficient memory in printer to store the image	C605
Warning	Requested MinDensity or MaxDensity outside of Printer's operating range	B605
Success		0000

Basic Color Image Box SOP Class

The Basic Color Image Box information object definition is the presentation of an image and image related data in the image area of a film. The Basic Color Image Box information describes the presentation parameters and image pixel data, which apply to a single image of a sheet of film.

The Color Image Box SOP Class uses only the N-SET-RQ with the following attributes:

Table 51 - Basic Color Image Box N-SET attributes

Attribute Name	Tag	Usage SCU	Supported Values
Image Position	(2020,0010)	M	1
Basic Color Image Sequence	(2020,0111)	M	n.a.
> Samples per Pixel	(0028,0002)	M	3

Attribute Name	Tag	Usage SCU	Supported Values
> Photometric Interpretation	(0028,0004)	M	RGB
>Planar Configuration	(0028,0006)	M	1
> Rows	(0028,0010)	M	<Printer/Film config>
> Columns	(0028,0011)	M	<Printer/Film config>
> Pixel Aspect Ratio	(0028,0034)	M	(1:1)
> Bits Allocated	(0028,0100)	M	8
> Bits Stored	(0028,0101)	M	8,
> High Bit	(0028,0102)	M	7
> Pixel Representation	(0028,0103)	M	0
> Pixel Data	(7FE0,0010)	M	

M = Mandatory

The Color Image Box SOP Class interprets the following status codes:

Table 52 - Basic Color Image Box Status Codes

Service Status	Meaning	Error Codes
Failure	Image contains more pixel than printer can print in Image Box	C603
	Insufficient memory in printer to store the image	C605
Warning	Requested MinDensity or MaxDensity outside of Printer's operating range	B605
Success		0000

Presentation LUT SOP Class

The Presentation LUT tailors image hardcopy printing for specific modalities, applications and user preferences.

The output of the Presentation LUT is Presentation Values (P-Values). P-Values are approximately related to human perceptual response. They are intended to facilitate common input for hardcopy. P-Values are intended to be independent of the specific class or characteristics of the hardcopy device.

The Presentation LUT SOP Class uses only the N-CREATE-RQ with the following attributes:

Table 53 - Presentation LUT N-CREATE attribute

Attribute Name	Tag	Usage SCU	Supported Values
Presentation LUT Shape	(2050,0020)	U	IDENTITY

U = User Option

The affected SOP Instance UID received with N-CREATE-RSP message will be kept internally and is used for later requests on the Basic Film Box (N-CREATE-RQ) and on the Presentation LUT (N-DELETE-RQ) - see below:

Attribute Name	Tag	Source of Information
Requested SOP Instance UID	(0000,1000) →(0000,1001)	Affected SOP Instance UID of N-CREATE-RSP on Presentation LUT

The Presentation LUT SOP Class interprets the following status codes:

Table 54 - Presentation LUT Status Codes

Service Status	Meaning	Codes
Success	Presentation LUT successfully created	0000
Warning	Requested MinDensity or MaxDensity outside of printer's operating range. The printer will use its respective minimum or maximum density value instead.	B605

Printer SOP Class

The Printer SOP Class allows to monitor the status of the hardcopy printer in a synchronous and an asynchronous way.

The SCU uses the mandatory N-EVENT Report DIMSE service to monitor the changes of the printer status in an asynchronous way.

The following returned information is supported:

Table 55 - Used Printer N-EVENT Report attributes

Event-type Name	Event	Attributes	Tag	Usage SCU
Normal	1			
Warning	2	Printer Status Info	(2110,0020)	U
Failure	3	Printer Status Info	(2110,0020)	U

U = User Option

Table 56 - Mandatory Printer N-GET-RSP, N-EVENT-REPORT-RQ attributes

Attribute Name	Tag	Usage SCP	Supported Values
Printer Status	(2110,0010)	M	NORMAL, FAILURE, WARNING
Printer Status Info	(2110,0020)	M	See tables in Annex for details.

M = Mandatory

Note: For a detailed description on how *syngo*® MR reacts on different printer status messages, please refer to the appropriate Annex section.

Printer Job SOP Class

The Print Job SOP Class allows to monitor the execution of the print process.

The *syngo*® MR DICOM Print Management application supports the optional N-EVENT-REPORT DIMSE Service to receive the changes of the Print Job Status in an asynchronous way.

It can receive Events from the Print SCP asynchronously:

- N-EVENT-REPORT

Note: The underlying *syngo* DICOM Print AE does not support receiving of N-EVENT-REPORT messages from camera during open print sessions. This is typically configurable in the camera setup.

The following information is supported:

Table 57 - Used Print Job N-EVENT Report attributes

Event-type Name	Event	Attributes	Tag	Usage SCU
Normal	1	Execution Status Info	(2100,0030)	U
		Print Job ID	(2100,0010)	-- (Print Queue Management SOP Class not supported)

Event-type Name	Event	Attributes	Tag	Usage SCU
		Film Session Label	(2000,0050)	U
		Printer Name	(2110,0030)	U
Printing	2	Execution Status Info	(2100,0030)	U
		Print Job ID	(2100,0010)	-- (Print Queue Management SOP Class not supported)
		Film Session Label	(2000,0050)	U
		Printer Name	(2110,0030)	U
Done	3	Execution Status Info	(2100,0030)	U
		Print Job ID	(2100,0010)	-- (Print Queue Management SOP Class not supported)
		Film Session Label	(2000,0050)	U
		Printer Name	(2110,0030)	U
Failure	4	Execution Status Info	(2100,0030)	U
		Print Job ID	(2100,0010)	-- (Print Queue Management SOP Class not supported)
		Film Session Label	(2000,0050)	U
		Printer Name	(2110,0030)	U

U = User Option

Note: For a detailed description on how *syngo*® MR reacts on different printer status messages, please refer to the appropriate Annex section".

4.2.8.3.2 Activity - Show Device Status

4.2.8.3.2.1 Description and Sequencing of Activity

With no printing activity ongoing ("idle time"), the *syngo*® MR DICOM Print SCU application will cyclically request the printer status to update the related printer state in the Printing UI.

4.2.8.3.2.2 Proposed Presentation Context

The *syngo*® MR DICOM application will propose Presentation Contexts as shown in the following table:

Table 58 - Presentation Context Table "Show Device Status"

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Printer SOP Class	1.2.840.10008.5.1.1.16	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None

4.2.8.3.2.3 SOP Specific Conformance

The Printer SOP Class allows to monitor the status of the hardcopy printer in a synchronous and an asynchronous way.

The Print SCU AE application will cyclically “ask” the Printer (SCP) for its status synchronously:

- N-GET as SCU

The following information is supported:

Table 59 - Used Printer N-EVENT Report attributes

Event-type Name	Event	Attributes	Tag	Usage SCU
Normal	1			
Warning	2	Printer Status Info	(2110,0020)	U
Failure	3	Printer Status Info	(2110,0020)	U

U = User Option

<modify If detailed status displays of the DICOM Print SCU are described in the Annex, add a reference to the Annex section below

Table 60 - Mandatory Printer N-GET-RSP, N-EVENT-REPORT-RQ attributes

Attribute Name	Tag	Usage SCP	Supported Values
Printer Status	(2110,0010)	M	NORMAL, FAILURE, WARNING
Printer Status Info	(2110,0020)	M	See tables in Annex for details.

M = Mandatory

Note: For a detailed description on how *syngo*® MR reacts on different printer status messages, please refer to the Annex section….

>

4.2.8.4 Association Acceptance Policy

The *syngo*® MR DICOM application does not support Print Management Services as an SCP.

4.3 Network Interfaces

4.3.1 Physical Network Interface

syngo® MR provides DICOM 3.0 TCP/IP network communication support as defined in Part 8 of the DICOM Standard. The network communication is independent from the physical medium over which TCP/IP executes; it inherits this from the Windows OS system upon which it executes.

4.3.2 Additional Protocols

none

4.3.3 IPv4 and IPv6 Support

IPv4 and IPv6 are supported. Regarding IPv6 please note, that the complete networking infrastructure in the hospital (firewalls, DNS-Servers …) must support IPv6 in order to get a functioning communication.

4.4 Configuration

4.4.1 AE Title/Presentation Address Mapping

AE Titles shall be unique within the hospital. A common way to achieve that is to use the hostname as part of the AE Titles. The string can be up to 16 characters and must not contain any extended characters. Only 7-bit ASCII characters (excluding Control Characters) are allowed according to the DICOM Standard.

4.4.1.1 Local AE Titles

syngo® MR allows configuring AETitles, Ports and Services in any wished way. Default delivery is that all services are using the same AE title and only one port number. In case the connected systems cannot handle this default, the customer service engineer is able to configure for each service its own AE title and Port number.

Parameter	Configurable	Default Value
Default AE title	Yes	hostname in uppercase characters; limited to 16 characters
Default Port	Yes	104

4.4.1.2 Remote AE Title/Presentation Address Mapping

4.4.1.2.1 Remote Association Initiators

All relevant remote applications that may setup DICOM associations towards *syngo*® MR need to be configured in *syngo*® MR, before the association can be established. This behavior is configurable but it is recommended, not to change this behavior.

The mapping of external AE Titles to TCP/IP addresses and ports is configurable and initially set at the time of installation by Installation Personnel. Changes can later on also be performed by the local system administrator. The Application Entity Titles and supported transfer syntaxes need to be known for configuration.

To enable a fast and efficient configuration possibility Siemens will deliver templates for known configuration examples, so that the behavior (usage of one AE title, default port numbers, supported services) is determined already through the template.

Remote Application Entities can be configured without restarting the process.

4.4.1.2.2 Remote SCP's

For remote applications that shall be able to accept DICOM associations from *syngo*® MR, the following information needs to be available:

- Application Entity Title
- Host Name / IP address on which the remote application service runs
- Port number on which the remote application accepts association requests.

The remote system will be indicated in the UI of *syngo*® MR with a logical name, that is also entered when configuring the node in the administration UI.

To enable a fast and efficient configuration possibility Siemens will deliver templates for known configuration examples, so that the behavior (usage of one AE title, default port numbers, supported services) is determined already through the template.

Remote Application Entities can be configured without restarting the process.

4.4.2 Parameters

The next table lists configuration parameters, which are true for all Application Entities.

Table 61: Parameter List

Parameter	Configurable	Default Value
max PDU size	Yes	32768 Bytes
time-out for accepting/rejecting an association request	Yes	30 s
time-out for responding to an association open/close request	Yes	30 s
time-out for accepting a message over network	Yes	30 s
time-out for waiting for data between TCP/IP-packets	Yes	5 s
time-outs for waiting for a Service Request/Response message from the remote node (Storage SCP/SCU)	Yes	30 s
time-outs for waiting for a Service Request/Response message from the remote node (Query/Retrieve SCP/SCU)	Yes	30 s
time-out for waiting for a C-MOVE-RSP	No	1200 s
number of image collection before saving to database	Yes	20
max matches query limit	Yes	100
max number of parallel receiving associations	Yes	12

5 Media Interchange

5.1 Implementation Model

5.1.1 Application Data Flow Diagram

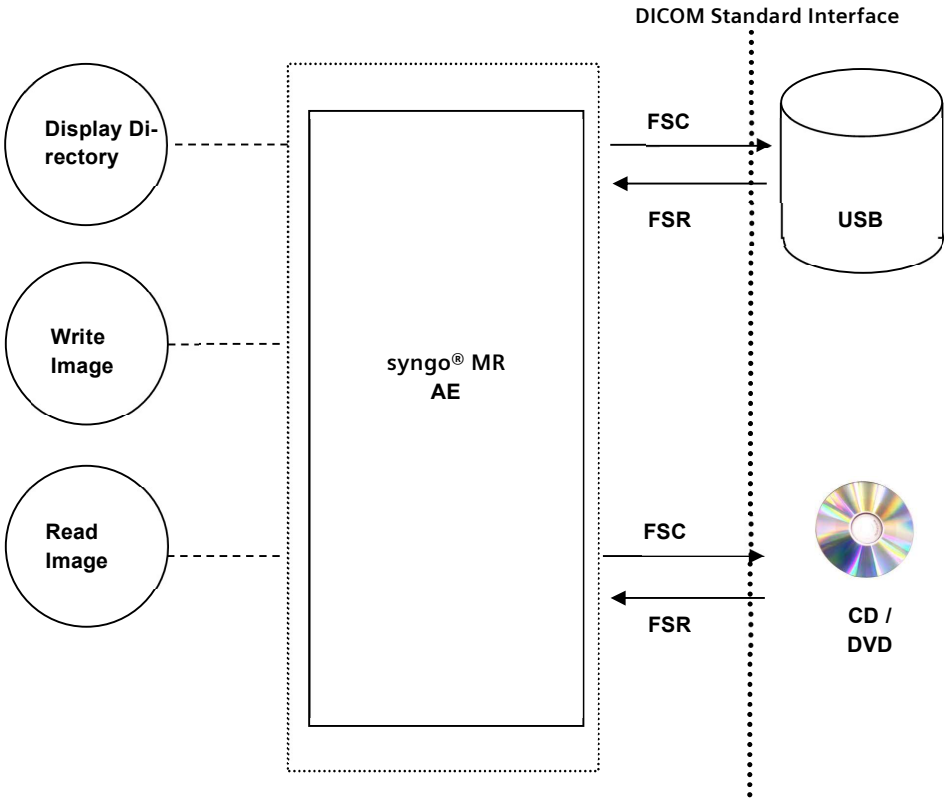

Figure 4: Media Interchange Application Data Flow Diagram

syngo® MR provides the functionality to Import or Export DICOM Instances from and to the File System. During export, a DICOMDIR may also be generated (user selection). A complete ISO Image ready-to-burn can also be generated. All SOP Classes defined in Table 1are supported for the Import/Export functionality.

5.1.2 Functional definitions of AEs

The *syngo*® MR application is capable of

- creating a new File-set in the File System (Export to ...)
- importing SOP Instances from the medium onto local storage
- writing the File-sets DICOMDIR information into the file system and joining it to an ISO image.

5.1.3 Sequencing of Real-World Activities

Whenever data is written to an external media, *syngo*® MR creates a DICOMDIR from the selected data and creates an ISO image of the selected data on the local hard disk. Depending on the selected data and options (selected media size, with or without compression) either General Purpose CD profile or DVD-J2K profile are used.

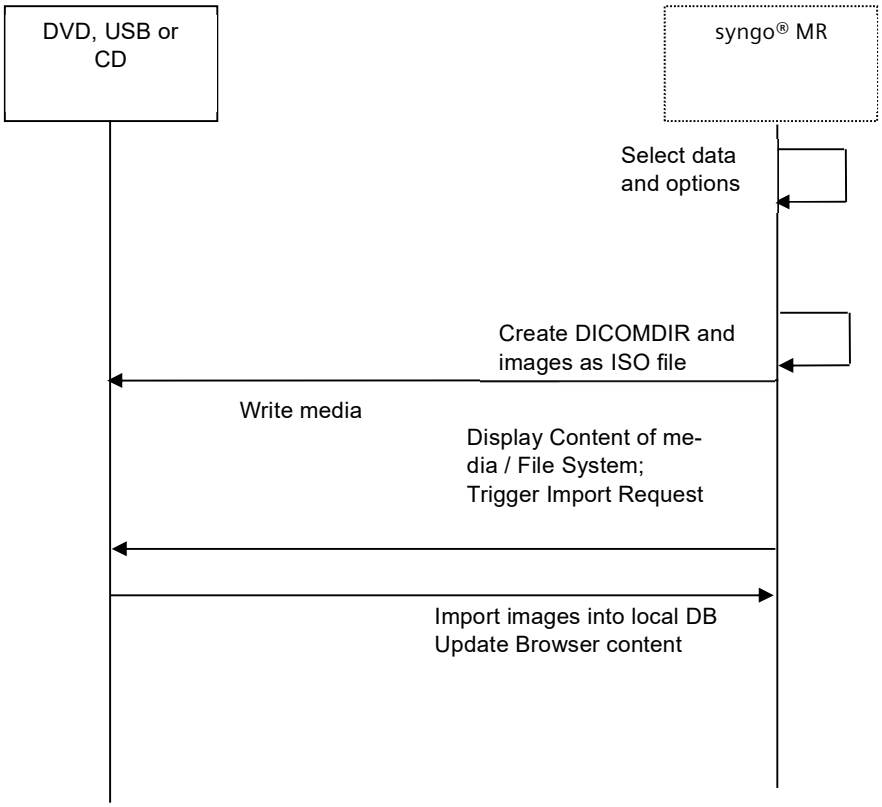

Figure 5: Sequence diagram – Media creation

5.1.4 File Meta Information for Implementation Class and Version

This section describes the values assigned to the File Meta Information attributes that pertain to the Implementation Class and Version. The implementation Class UID and the Implementation Version name in the File Meta Header are the same as the values specified for networking.

Table 62: Implementation Class/Version Name - Media Interchange

File Meta Information Version	0001
Implementation Class UID	1.3.12.2.1107.5.8.15.10.20090701
Implementation Version Name	

5.2 AE SPECIFICATIONS

5.2.1 Media Storage AE – Specification

syngo® MR provides conformance to the following Application Profiles as an FSC as well as an FSR. The FSU role is only supported only on a non-optical storage device (e.g. USB stick).

In addition augmented conformance is provided to store extra data attributes important for the full feature support of the *syngo*®-based products. Details are listed below:

Table 63: Media - Application Profiles and Real-World Activities

Application Profiles Supported	Real-World Activity	Role	Service Class Option
AUG-GEN-CD	Browse Directory Information Import into Application Export to local Archive Media	FSR , FSC , FSU	Interchange
AUG-GEN-DVD			
AUG- GEN-DVD-J2K			
AUG- GEN-USB-J2K			
STD-GEN-CD	Browse Directory Information Import into Application Export to local Archive Media	FSR , FSC , FSU	Interchange
STD-GEN-DVD			
STD-GEN-DVD-J2K			
STD-GEN-USB-J2K			

5.2.1.1 Real-World Activities

5.2.1.1.1 Activity “Browse Directory Information”

syngo® MR acts as FSR using the interchange option when requested to read the media directory.

syngo® MR will read the DICOMDIR and insert those directory entries that are valid for the application profiles supported, into a local database. The database then is used for browsing media contents.

Note: The “Icon Image Sequence” is also supported in DICOMDIR. But only those Icon Images with “Bits Allocated” (0028,0100) equal to 8 and size of 64x64 or 128x128 pixels are imported into database and are visible in the Browser.

5.2.1.1.2 Real World Activity “Import into Application”

syngo® MR application acts as FSR using the interchange option when requested to read SOP Instances from the medium into the application.

The SOP Instance selected from the media directory will be copied into the running Application. Only SOP Instances, that are valid for the application profile supported and supported by *syngo*® MR can be retrieved from media.

5.2.1.1.3 Real-World Activity “Export to local Archive Media”

The *syngo*® MR application acts as FSU (for media with existing DICOM file-set) or FSC (media not initialized) using the interchange option when requested to copy SOP Instances from the local storage to local Archive Medium. The activity as FSU is only possible as long as the local burning SW of *syngo*® MR has not already processed the generated ISO file.

The *syngo*® MR application will receive a list of SOP Instances to be copied to the local archive medium. Depending on the profile selected (Standard: uncompressed, with DICOMDIR; Patient: compressed with DICOMDIR) the SOP Instances will be taken and an ISO file is being generated that includes the DICOMDIR and the corresponding objects.

It is then up to the *syngo*® MR local configuration (if equipped with a local media burner) to burn the ISO file to the appropriate media.

5.2.1.2 SOP Classes and Transfer Syntaxes

These Application Profiles are based on the Media Storage Service Class with the Interchange Option. *syngo*® MR provides Standard Conformance to the the SOP Classes listed in “Table 1: Network Services” section "SOP Classes Created by *syngo*® MR" and "SOP Classes Managed by *syngo*® MR" in the “Conformance Statement Overview”.

Using the Application Profiles supporting compression (AUG- GEN-DVD-J2K, AUG- GEN-USB-J2K, STD-GEN-DVD-J2K, STD-GEN-USB-J2K) the following Transfer Syntaxes are supported:

Table 64: Transfer Syntaxes for STD-GEN-DVD-J2K and STD-GEN-USB-J2K

UID value	Transfer Syntax	Image Objects	Non-Image Objects
1.2.840.10008.1.2.1	Explicit Value Representation Little Endian native	yes	yes
1.2.840.10008.1.2.4.50	JPEG Baseline (Process 1) lossy compressed	yes	no
1.2.840.10008.1.2.4.51	JPEG Extended (Process 2 & 4) lossy compressed	yes	no
1.2.840.10008.1.2.4.70	JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14) lossless compressed	yes	no

UID value	Transfer Syntax	Image Objects	Non-Image Objects
1.2.840.10008.1.2.4.90	JPEG 2000 Image Compression (Lossless Only) compressed	yes	no
1.2.840.10008.1.2.4.91	JPEG 2000 Image Compression lossy compressed	yes	no
1.2.840.10008.1.2.5	RLE Lossless compressed	yes	no

Using the Application Profiles that do not support compression (AUG- GEN-DVD, AUG- GEN-USB, STD-GEN-DVD, STD-GEN-USB) only Explicit Value Representation Little Endian (1.2.840.10008.1.2.1) is supported.

5.3 AUGMENTED AND PRIVATE APPLICATION PROFILES

5.3.1 Augmented Application Profiles

The standard application profiles are augmented with private object Siemens CSA Non-Image.

Table 65: Private SOP Classes and Transfer Syntaxes for Augmented Media Profiles

Information Object Definition	SOP Class UID	Transfer Syntax UID	FSC	FSR
CSA Non-Image Storage	1.3.12.2.1107.5.9.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	O	M

The Siemens non-image is typically used for raw data and 3D private data.

5.4 MEDIA CONFIGURATION

none

6 Support of Extended Character Sets

The *syngo*® MR DICOM application supports the following character sets as defined in the four tables below:

Table 66: Single-Byte Character Sets without Code Extension

Character Set Description	Defined Term	ISO registration number	Character Set
Default repertoire	none	ISO_IR 6	ISO 646:
Latin alphabet No. 1	ISO_IR 100	ISO_IR 100	Supplementary set
		ISO_IR 6	ISO 646:
Latin alphabet No. 2	ISO_IR 101	ISO_IR 101	Supplementary set
		ISO_IR 6	ISO 646
Latin alphabet No. 3	ISO_IR 109	ISO_IR 109	Supplementary set
		ISO_IR 6	ISO 646
Latin alphabet No. 4	ISO_IR 110	ISO_IR 110	Supplementary set
		ISO_IR 6	ISO 646
Cyrillic	ISO_IR 144	ISO_IR 144	Supplementary set
		ISO_IR 6	ISO 646
Arabic	ISO_IR 127	ISO_IR 127	Supplementary set
		ISO_IR 6	ISO 646
Greek	ISO_IR 126	ISO_IR 126	Supplementary set
		ISO_IR 6	ISO 646
Hebrew	ISO_IR 138	ISO_IR 138	Supplementary set
		ISO_IR 6	ISO 646
Latin alphabet No. 5	ISO_IR 148	ISO_IR 148	Supplementary set
		ISO_IR 6	ISO 646
Japanese	ISO_IR 13	ISO_IR 13	JIS X 0201: Katakana
		ISO_IR 14	JIS X 0201: Romaji
Thai	ISO_IR166	ISO_IR166	TIS 620-253 (1990)
		ISO_IR 6	ISO 646

Table 67: Single-Byte Characters Sets with Code Extension

Character Set Description	Defined Term	Standard for Code Extension	ESC sequence	ISO registration number	Character Set
Default repertoire	ISO 2022 IR 6	ISO 2022	ESC 02/08 04/02	ISO-IR 6	ISO 646
Latin alphabet No.1	ISO 2022 IR 100	ISO 2022	ESC 02/13 04/01	ISO-IR 100	Supplementary set
		ISO 2022	ESC 02/08 04/02	ISO-IR 6	ISO 646
Latin alphabet No.2	ISO 2022 IR 101	ISO 2022	ESC 02/13 04/02	ISO-IR 101	Supplementary set
		ISO 2022	ESC 02/08 04/02	ISO-IR 6	ISO 646
Latin alphabet No.3	ISO 2022 IR 109	ISO 2022	ESC 02/13 04/03	ISO-IR 109	Supplementary set

	ISO 2022	ESC 02/08 04/02	ISO-IR 6	ISO 646
Latin alphabet No.4 ISO 2022 IR 110	ISO 2022	ESC 02/13 04/04	ISO-IR 110	Supplementary set
	ISO 2022	ESC 02/08 04/02	ISO-IR 6	ISO 646

Multi-Byte Character Sets without Code Extension

Table 68: Multi-Byte Character Sets without Code Extension

Character Set Description	Defined Term	ISO registration number	Character Set
Unicode	ISO_IR 192	ISO 10646	Unicode in UTF-8
Chinese	GB18030	GB18030	GB 18030-2000 (China Association for Standardization)

Table 69: Multi-Byte Character Sets with Code Extension

Character Set Description	Defined Term	Standard for Code Extension	ESC sequence	ISO registration number	Character Set
Japanese	ISO 2022 IR 159	ISO 2022	ESC 02/04 02/08 04/04	ISO-IR 159	JIS X 0212: Supplementary Kanji set
Korean	ISO 2022 IR 149	ISO 2022	ESC 02/04 02/09 04/03	ISO-IR 149	KS X 1001: Hangul and Hanja

All Special Character Sets (SCS) listed above are supported for incoming Data. When creating new Instances, the system will use the default SCS (or SCS List) configured on the machine.

When there is a mismatch between the given character set in attribute (0008,0005) and the characters in an IOD received by the system, then the following measures are taken to make the characters DICOM conform:

- Convert each illegal character to a '?'.

There are three categories of character sets which have to be differentiated because of their different encoding formats:

- Conventional ISO character sets: ISO_IR 6, ISO 2022 IR 6, ISO_IR 100, etc.
  → encoded in ISO 2022
- ISO_IR 192 → encoded in UTF-8
- GB18030 → encoded in GB18030

It is not possible to recognize the following mismatches automatically on receiving or importing:

- An attribute value is encoded in ISO_IR 192 ←→ (0008,0005) contains a conventional ISO character set as primary character set
- An attribute value is encoded in GB18030 ←→ (0008,0005) contains a conventional ISO character set as primary character set
- An attribute value is encoded in ISO 2022 ←→ (0008,0005) contains ISO_IR 192
- An attribute value is encoded in ISO 2022 ←→ (0008,0005) contains GB18030

An IOD that contains one of the above mentioned inconsistencies is not DICOM conform. As these kinds of inconsistencies cannot be recognized by the system, the IOD will not be rejected but the character data might be corrupted.

syngo® MR supports Kanji characters in the byte zones after 74 (79, 7A, 7B and 7C).

7 Attribute confidentiality profiles

7.1 De-identification

The *syngo*® MR application can de-identify attributes, when exporting to Media. Three different levels of de-identifcation are supportedl. The user needs to select the appropriate de-identification level during export.

For full and reduced anonymization private attributes are not included in anonymized Studies. For service anonymization all private attributes are included in anonymized Studies.

Note: reduced anonymization applies the following options: Retain UIDs , Patient Chars, Long. Full Dates

In the following table for attributes marked with:

- 'Yes' - data are anonymized
- 'No' - data are kept

Table 70: Application Level Confidentiality Profile Attributes (standard tags)

DICOM Tag	Attribute Name	Full	Re-duced	Service
(0000,1000)	Affected SOP Instance UID	Yes	No	No
(0000,1001)	Requested SOP Instance UID	Yes	No	No
(0002,0003)	Media Storage SOP Instance UID	Yes	No	No
(0004,1511)	Referenced SOP Instance UID in File	Yes	No	No
(0008,0014)	Instance Creator UID	Yes	No	No
(0008,0015)	Instance Coercion DateTime	Yes	No	No
(0008,0018)	SOP Instance UID	Yes	No	Yes
(0008,0020)	Study Date	Yes	No	No
(0008,0021)	Series Date	Yes	No	No
(0008,0022)	Acquisition Date	Yes	No	No
(0008,0023)	Content Date	Yes	No	No
(0008,0024)	Overlay Date	Yes	No	No
(0008,0025)	Curve Date	Yes	No	No
(0008,002A)	Acquisition DateTime	Yes	No	No
(0008,0030)	Study Time	Yes	No	No
(0008,0031)	Series Time	Yes	No	No
(0008,0032)	Acquisition Time	Yes	No	No
(0008,0033)	Content Time	Yes	No	No
(0008,0034)	Overlay Time	Yes	No	No
(0008,0035)	Curve Time	Yes	No	No
(0008,0050)	Accession Number	Yes	Yes	No
(0008,0058)	Failed SOP Instance UID List	Yes	No	No
(0008,0080)	Institution Name	Yes	Yes	No
(0008,0081)	Institution Address	Yes	Yes	No
(0008,0082)	Institution Code Sequence	Yes	Yes	No
(0008,0090)	Referring Physician's Name	Yes	Yes	Yes
(0008,0092)	Referring Physician's Address	Yes	Yes	Yes
(0008,0094)	Referring Physician's Telephone Numbers	Yes	Yes	Yes
(0008,0096)	Referring Physician's Identification Sequence	Yes	Yes	No
(0008,010D)	Context Group Extension Creator UID	Yes	No	No
(0008,0201)	Timezone Offset From UTC	Yes	No	No
(0008,1010)	Station Name	Yes	Yes	Yes
(0008,1030)	Study Description	Yes	Yes	No
(0008,103E)	Series Description	Yes	Yes	No
(0008,1040)	Institutional Department Name	Yes	Yes	No

DICOM Tag	Attribute Name	Full	Re-duced	Service
(0008,1048)	Physician(s) of Record	Yes	Yes	Yes
(0008,1049)	Physician(s) of Record Identification Sequence	Yes	Yes	No
(0008,1050)	Performing Physicians' Name	Yes	Yes	Yes
(0008,1052)	Performing Physicians' Identification Sequence	Yes	Yes	No
(0008,1060)	Name of Physician(s) Reading Study	Yes	Yes	Yes
(0008,1062)	Physician Reading Study Identification Sequence	Yes	Yes	No
(0008,1070)	Operators' Name	Yes	Yes	Yes
(0008,1072)	Operators' Identification Sequence	Yes	Yes	No
(0008,1080)	Admitting Diagnoses Description	Yes	Yes	No
(0008,1084)	Admitting Diagnoses Code Sequence	Yes	Yes	No
(0008,1110)	Referenced Study Sequence	Yes	No	No
(0008,1111)	Referenced Performed Procedure Step Sequence	Yes	No	No
(0008,1120)	Referenced Patient Sequence	Yes	Yes	No
(0008,1140)	Referenced Image Sequence	Yes	No	No
(0008,1155)	Referenced SOP Instance UID	Yes	No	No
(0008,1195)	Transaction UID	Yes	No	No
(0008,2111)	Derivation Description	Yes	No	No
(0008,2112)	Source Image Sequence	Yes	No	No
(0008,3010)	Irradiation Event UID	Yes	No	No
(0008,4000)	Identifying Comments	Yes	Yes	No
(0008,9123)	Creator Version UID	Yes	No	No
(0010,0010)	Patient's Name	Yes	Yes	Yes
(0010,0020)	Patient ID	Yes	Yes	Yes
(0010,0021)	Issuer of Patient ID	Yes	Yes	No
(0010,0030)	Patient's Birth Date	Yes	Yes	No
(0010,0032)	Patient's Birth Time	Yes	Yes	No
(0010,0040)	Patient's Sex	Yes	No	No
(0010,0050)	Patient's Insurance Plan Code Sequence	Yes	Yes	No
(0010,0101)	Patient's Primary Language Code Sequence	Yes	Yes	No
(0010,0102)	Patient's Primary Language Modifier Code Sequence	Yes	Yes	No
(0010,1000)	Other Patient IDs	Yes	Yes	Yes
(0010,1001)	Other Patient Names	Yes	Yes	Yes
(0010,1002)	Other Patient IDs Sequence	Yes	Yes	No
(0010,1005)	Patient's Birth Name	Yes	Yes	Yes
(0010,1010)	Patient's Age	Yes	No	No
(0010,1020)	Patient's Size	Yes	No	No
(0010,1030)	Patient's Weight	Yes	No	No
(0010,1040)	Patient Address	Yes	Yes	Yes
(0010,1050)	Insurance Plan Identification	Yes	Yes	No
(0010,1060)	Patient's Mother's Birth Name	Yes	Yes	Yes
(0010,1080)	Military Rank	Yes	Yes	No
(0010,1081)	Branch of Service	Yes	Yes	No
(0010,1090)	Medical Record Locator	Yes	Yes	No
(0010,1100)	Referenced Patient Photo Sequence	Yes	Yes	No
(0010,2000)	Medical Alerts	Yes	Yes	No
(0010,2110)	Allergies	Yes	Yes	No
(0010,2150)	Country of Residence	Yes	Yes	No
(0010,2152)	Region of Residence	Yes	Yes	No
(0010,2154)	Patient's Telephone Number	Yes	Yes	Yes
(0010,2160)	Ethnic Group	Yes	No	No
(0010,2180)	Occupation	Yes	Yes	No
(0010,21A0)	Smoking Status	Yes	No	No
(0010,21B0)	Additional Patient's History	Yes	Yes	Yes
(0010,21C0)	Pregnancy Status	Yes	No	No
(0010,21D0)	Last Menstrual Date	Yes	No	No
(0010,21F0)	Patient's Religious Preference	Yes	Yes	No

DICOM Tag	Attribute Name	Full	Re-duced	Service
(0010,2203)	Patient Sex Neutered	Yes	No	No
(0010,2297)	Responsible Person	Yes	Yes	No
(0010,2299)	Responsible Organization	Yes	Yes	No
(0010,4000)	Patient Comments	Yes	Yes	Yes
(0018,0010)	Contrast Bolus Agent	Yes	Yes	No
(0018,1000)	Device Serial Number	Yes	Yes	No
(0018,1002)	Device UID	Yes	No	No
(0018,1004)	Plate ID	Yes	Yes	No
(0018,1005)	Generator ID	Yes	Yes	No
(0018,1007)	Cassette ID	Yes	Yes	No
(0018,1008)	Gantry ID	Yes	Yes	No
(0018,1030)	Protocol Name	Yes	Yes	No
(0018,1400)	Acquisition Device Processing Description	Yes	Yes	No
(0018,2042)	Target UID	Yes	No	No
(0018,4000)	Acquisition Comments	Yes	Yes	No
(0018,700A)	Detector ID	Yes	Yes	No
(0018,9424)	Acquisition Protocol Description	Yes	Yes	No
(0018,9516)	Start Acquisition DateTime	Yes	No	No
(0018,9517)	End Acquisition DateTime	Yes	No	No
(0018,A003)	Contribution Description	Yes	Yes	No
(0020,000D)	Study Instance UID	Yes	No	Yes
(0020,000E)	Series Instance UID	Yes	No	Yes
(0020,0010)	Study ID	Yes	Yes	No
(0020,0052)	Frame of Reference UID	Yes	No	No
(0020,0200)	Synchronization Frame of Reference UID	Yes	No	No
(0020,3401)	Modifying Device ID	Yes	Yes	No
(0020,3404)	Modifying Device Manufacturer	Yes	Yes	No
(0020,3406)	Modified Image Description	Yes	Yes	No
(0020,4000)	Image Comments	Yes	Yes	No
(0020,9158)	Frame Comments	Yes	Yes	No
(0020,9161)	Concatenation UID	Yes	No	No
(0020,9164)	Dimension Organization UID	Yes	No	No
(0028,1199)	Palette Color Lookup Table UID	Yes	No	No
(0028,1214)	Large Palette Color Lookup Table UID	Yes	No	No
(0028,4000)	Image Presentation Comments	Yes	Yes	No
(0032,0012)	Study ID Issuer	Yes	Yes	No
(0032,1020)	Scheduled Study Location	Yes	Yes	No
(0032,1021)	Scheduled Study Location AE Title	Yes	Yes	No
(0032,1030)	Reason for Study	Yes	Yes	No
(0032,1032)	Requesting Physician	Yes	Yes	No
(0032,1033)	Requesting Service	Yes	Yes	No
(0032,1060)	Requested Procedure Description	Yes	Yes	No
(0032,1070)	Requested Contrast Agent	Yes	Yes	No
(0032,4000)	Study Comments	Yes	Yes	No
(0038,0004)	Referenced Patient Alias Sequence	Yes	Yes	No
(0038,0010)	Admission ID	Yes	Yes	No
(0038,0011)	Issuer of Admission ID	Yes	Yes	No
(0038,001E)	Scheduled Patient Institution Residence	Yes	Yes	No
(0038,0020)	Admitting Date	Yes	No	No
(0038,0021)	Admitting Time	Yes	No	No
(0038,0040)	Discharge Diagnosis Description	Yes	Yes	No
(0038,0050)	Special Needs	Yes	Yes	No
(0038,0060)	Service Episode ID	Yes	Yes	No
(0038,0061)	Issuer of Service Episode ID	Yes	Yes	No
(0038,0062)	Service Episode Description	Yes	Yes	No
(0038,0300)	Current Patient Location	Yes	Yes	No

DICOM Tag	Attribute Name	Full	Re-duced	Service
(0038,0400)	Patient's Institution Residence	Yes	Yes	No
(0038,0500)	Patient State	Yes	Yes	No
(0038,4000)	Visit Comments	Yes	Yes	No
(0040,0001)	Scheduled Station AE Title	Yes	Yes	No
(0040,0002)	Scheduled Procedure Step Start Date	Yes	No	No
(0040,0003)	Scheduled Procedure Step Start Time	Yes	No	No
(0040,0004)	Scheduled Procedure Step End Date	Yes	No	No
(0040,0005)	Scheduled Procedure Step End Time	Yes	No	No
(0040,0006)	Scheduled Performing Physician Name	Yes	Yes	No
(0040,0007)	Scheduled Procedure Step Description	Yes	Yes	No
(0040,000B)	Scheduled Performing Physician Identification Sequence	Yes	Yes	No
(0040,0010)	Scheduled Station Name	Yes	Yes	No
(0040,0011)	Scheduled Procedure Step Location	Yes	Yes	No
(0040,0012)	Pre-Medication	Yes	Yes	No
(0040,0241)	Performed Station AE Title	Yes	Yes	No
(0040,0242)	Performed Station Name	Yes	Yes	No
(0040,0243)	Performed Location	Yes	Yes	No
(0040,0244)	Performed Procedure Step Start Date	Yes	No	No
(0040,0245)	Performed Procedure Step Start Time	Yes	No	No
(0040,0248)	Performed Station Name Code Sequence	Yes	Yes	No
(0040,0250)	Performed Procedure Step End Date	Yes	No	No
(0040,0251)	Performed Procedure Step End Time	Yes	No	No
(0040,0253)	Performed Procedure Step ID	Yes	Yes	No
(0040,0254)	Performed Procedure Step Description	Yes	Yes	No
(0040,0275)	Request Attributes Sequence	Yes	Yes	No
(0040,0280)	Comments on Performed Procedure Step	Yes	Yes	No
(0040,0555)	Acquisition Context Sequence	Yes	Yes	No
(0040,1001)	Requested Procedure ID	Yes	Yes	No
(0040,1004)	Patient Transport Arrangements	Yes	Yes	No
(0040,1005)	Requested Procedure Location	Yes	Yes	No
(0040,1010)	Names of Intended Recipient of Results	Yes	Yes	No
(0040,1011)	Intended Recipients of Results Identification Sequence	Yes	Yes	No
(0040,1101)	Person Identification Code Sequence	Yes	Yes	No
(0040,1102)	Person Address	Yes	Yes	No
(0040,1103)	Person Telephone Numbers	Yes	Yes	No
(0040,1400)	Requested Procedure Comments	Yes	Yes	No
(0040,2001)	Reason for Imaging Service Request	Yes	Yes	No
(0040,2008)	Order Entered By	Yes	Yes	No
(0040,2009)	Order Enterer Location	Yes	Yes	No
(0040,2010)	Order Callback Phone Number	Yes	Yes	No
(0040,2016)	Placer Order Number of Imaging Service Request	Yes	Yes	No
(0040,2017)	Filler Order Number of Imaging Service Request	Yes	Yes	No
(0040,2400)	Imaging Service Request Comments	Yes	Yes	No
(0040,3001)	Confidentiality Constraint on Patient Data Description	Yes	Yes	No
(0040,4005)	Scheduled Procedure Step Start DateTime	Yes	No	No
(0040,4010)	Scheduled Procedure Step Modification DateTime	Yes	No	No
(0040,4011)	Expected Completion Date Time	Yes	No	No
(0040,4023)	Referenced General Purpose Scheduled Procedure Step Transaction UID	Yes	No	No
(0040,4025)	Scheduled Station Name Code Sequence	Yes	Yes	No
(0040,4027)	Scheduled Station Geographic Location Code Sequence	Yes	Yes	No
(0040,4030)	Performed Station Geographic Location Code Sequence	Yes	Yes	No
(0040,4034)	Scheduled Human Performers Sequence	Yes	Yes	No
(0040,4035)	Actual Human Performers Sequence	Yes	Yes	No
(0040,4036)	Human Performers Organization	Yes	Yes	No
(0040,4037)	Human Performers Name	Yes	Yes	No

DICOM Tag	Attribute Name	Full	Re-duced	Service
(0040,4050)	Performed Procedure Step Start DateTime	Yes	No	No
(0040,4051)	Performed Procedure Step End DateTime	Yes	No	No
(0040,4052)	Procedure Step Cancellation DateTime	Yes	No	No
(0040,A027)	Verifying Organization	Yes	Yes	No
(0040,A073)	Verifying Observer Sequence	Yes	Yes	No
(0040,A075)	Verifying Observer Name	Yes	Yes	No
(0040,A078)	Author Observer Sequence	Yes	Yes	No
(0040,A07A)	Participant Sequence	Yes	Yes	No
(0040,A07C)	Custodial Organization Sequence	Yes	Yes	No
(0040,A088)	Verifying Observer Identification Code Sequence	Yes	Yes	No
(0040,A123)	Person Name	Yes	Yes	No
(0040,A124)	UID	Yes	Yes	No
(0040,A171)	Observation UID	Yes	No	No
(0040,A172)	Referenced Observation UID (Trial)	Yes	No	No
(0040,A192)	Observation Date (Trial)	Yes	No	No
(0040,A193)	Observation Time (Trial)	Yes	No	No
(0040,A307)	Current Observer (Trial)	Yes	Yes	No
(0040,A352)	Verbal Source (Trial)	Yes	Yes	No
(0040,A353)	Address (Trial)	Yes	Yes	No
(0040,A354)	Telephone Number (Trial)	Yes	Yes	No
(0040,A358)	Verbal Source Identifier Code Sequence (Trial)	Yes	Yes	No
(0040,A402)	Observation Subject UID (Trial)	Yes	No	No
(0040,A730)	Content Sequence	Yes	Yes	No
(0040,DB0C)	Template Extension Organization UID	Yes	No	No
(0040,DB0D)	Template Extension Creator UID	Yes	No	No
(0070,0001)	Graphic Annotation Sequence	Yes	Yes	No
(0070,0084)	Content Creator's Name	Yes	Yes	No
(0070,0086)	Content Creator's Identification Code Sequence	Yes	Yes	No
(0070,031A)	Fiducial UID	Yes	No	No
(0088,0140)	Storage Media Fileset UID	Yes	No	No
(0088,0200)	Icon Image Sequence	Yes	Yes	No
(0088,0904)	Topic Title	Yes	Yes	No
(0088,0906)	Topic Subject	Yes	Yes	No
(0088,0910)	Topic Author	Yes	Yes	No
(0088,0912)	Topic Keywords	Yes	Yes	No
(0400,0100)	Digital Signature UID	Yes	Yes	No
(0400,0402)	Referenced Digital Signature Sequence	Yes	Yes	No
(0400,0403)	Referenced SOP Instance MAC Sequence	Yes	Yes	No
(0400,0404)	MAC	Yes	Yes	No
(0400,0550)	Modified Attributes Sequence	Yes	Yes	No
(0400,0561)	Original Attributes Sequence	Yes	Yes	No
(2030,0020)	Text String	Yes	Yes	No
(3006,0024)	Referenced Frame of Reference UID	Yes	No	No
(3006,00C2)	Related Frame of Reference UID	Yes	No	No
(3008,0105)	Source Serial Number	No	No	No
(300A,0013)	Dose Reference UID	Yes	No	No
(300E,0008)	Reviewer Name	Yes	Yes	No
(4000,0010)	Arbitrary	Yes	Yes	No
(4000,4000)	Text Comments	Yes	Yes	No
(4008,0042)	Results ID Issuer	Yes	Yes	No
(4008,0102)	Interpretation Recorder	Yes	Yes	No
(4008,010A)	Interpretation Transcriber	Yes	Yes	No
(4008,010B)	Interpretation Text	Yes	Yes	No
(4008,010C)	Interpretation Author	Yes	Yes	No
(4008,0111)	Interpretation Approver Sequence	Yes	Yes	No
(4008,0114)	Physician Approving Interpretation	Yes	Yes	No

DICOM Tag	Attribute Name	Full	Re-duced	Service
(4008,0115)	Interpretation Diagnosis Description	Yes	Yes	No
(4008,0118)	Results Distribution List Sequence	Yes	Yes	No
(4008,0119)	Distribution Name	Yes	Yes	No
(4008,011A)	Distribution Address	Yes	Yes	No
(4008,0202)	Interpretation ID Issuer	Yes	Yes	No
(4008,0300)	Impressions	Yes	Yes	No
(4008,4000)	Results Comments	Yes	Yes	No
(50xx,xxxx)	Curve Data	Yes	Yes	No
(60xx,0100)	Overlay Bits Allocated	Yes	Yes	No
(60xx,0102)	Overlay Bit Position	Yes	Yes	No
(60xx,3000)	Overlay Data	Yes	Yes	No
(60xx,4000)	Overlay Comments	Yes	Yes	No
(FFFA,FFFA)	Digital Signatures Sequence	Yes	Yes	No
(FFFC,FFFC)	Data Set Trailing Padding	Yes	Yes	No

Table 71: Application Level Confidentiality Profile Attributes (private tags)

DICOM Tag	Attribute Name	Full	Reduced	Ser-vice
(0019, SIEMENS CT VA0 COAD, 90)	Osteo offset	Yes	No	No
(0019, SIEMENS CT VA0 COAD, 92)	Osteo Regression Line Slope	Yes	No	No
(0019, SIEMENS CT VA0 COAD, 93)	Osteo Regression Line Intercept	Yes	No	No
(0019, SIEMENS CT VA0 COAD, 96)	Osteo Phantom Number	Yes	No	No
(0043, GEMS_PARM_01, 1E)	GE Delta Start Time	Yes	No	No
(0029, SIEMENS CSA ENVELOPE, 10)	Syngo Report Data	Yes	No	No
(0029, SIEMENS CSA ENVELOPE, 11)	Syngo Report Presentation	Yes	No	No
(0029, SIEMENS CSA HEADER, 08)	Modality Image Header Type	Yes	No	No
(0029, SIEMENS CSA HEADER, 09)	Modality Image Header Version	Yes	No	No
(0029, SIEMENS CSA HEADER, 10)	Modality Image Header Info	Yes	No	No
(0029, SIEMENS CSA HEADER, 18)	Modality Series Header Type	Yes	No	No
(0029, SIEMENS CSA HEADER, 19)	Modality Series Header Version	Yes	No	No
(0029, SIEMENS CSA HEADER, 20)	Modality Series Header Info	Yes	No	No
(0029, SIEMENS MEDCOM HEADER, 40)	Application Header Sequence	Yes	No	No
(0029, SIEMENS MEDCOM HEADER, 41)	Application Header Type	Yes	No	No
(0029, SIEMENS MEDCOM HEADER, 42)	Application Header ID	Yes	No	No
(0029, SIEMENS MEDCOM HEADER, 43)	Application Header Version	Yes	No	No
(0029, SIEMENS MEDCOM HEADER, 44)	Application Header Info	Yes	No	No
(0029, SIEMENS CT APPL DATASET, 00)	Dual Energy Algorithm Parame-ters	Yes	No	No
(0029, SIEMENS CT APPL ALG PARAMS, 20)	Perfusion Result Set Id	Yes	No	No

8 Security

8.1 Security Profiles

Time Synchronization Profiles: *syngo*® MR acts as an NTP Client in the Maintain Time Transaction.

8.2 Association Level Security

It is possible to configure whether the SCP will only answer to known AETs or to any AET.

8.3 Application Level Security

- User must login with own password
- For configuration and Maintenance, Service Technician must login with a separate password.

9 Annexes

9.1 IOD Contents

9.1.1 Enhanced MR Image IOD

This chapter describes the DICOM attributes of Enhanced MR Image Instances performed by the MR acquisition.

9.1.1.1 Patient Module

Attribute Name	Tag	Supported Values
Patient's Name	(0010,0010)	RIS defined or set by creator
Patient ID	(0010,0020)	RIS defined or set by creator
Issuer of Patient ID	(0010,0021)	RIS defined
Patient's Birth Date	(0010,0030)	RIS defined or set by creator
Patient`s Birth Time	(0010,0032)	RIS defined or set by creator
Patient's Sex	(0010,0040)	RIS defined or set by creator
Other Patient IDs	(0010,1000)	RIS defined or set by creator
Other Patient Names	(0010,1001)	RIS defined or set by creator
Ethnic Group	(0010,2160)	RIS defined or set by creator
Patient Comments	(0010,4000)	RIS defined or set by creator
Other Patient Names	(0010,1001)	RIS defined or set by creator
Patient Identity Removed	(0012,0062)	set by creator

9.1.1.2 General Study Module

Attribute Name	Tag	Supported Values
Study Instance UID	(0020,000D)	RIS defined or set by creator
Study Date	(0008,0020)	set by creator
Study Time	(0008,0030)	set by creator
Referring Physician's Name	(0008,0090)	RIS defined or set by creator
Study ID	(0020,0010)	set by creator
Accession Number	(0008,0050)	RIS defined or set by creator
Study Description	(0008,1030)	set by creator
Procedure Code Sequence	(0008,1032)	RIS defined
>Code Value	(0008,0100)	RIS defined
>Code Scheme Designator	(0008,0102)	RIS defined
>Code Meaning	(0008,0104)	RIS defined

9.1.1.3 Patient Study Module

Attribute Name	Tag	Supported Values
Patient's Age	(0010,1010)	RIS defined or set by creator
Patient's Size	(0010,1020)	RIS defined or set by creator
Patient's Weight	(0010,1030)	RIS defined or set by creator

9.1.1.4 General Series Module

Attribute Name	Tag	Supported Values
Modality	(0008,0060)	MR
Series Instance UID	(0020,000E)	set by creator
Series Number	(0020,0011)	set by creator
Series Date	(0008,0021)	set by creator
Series Time	(0008,0031)	set by creator
Performing Physicians' Name	(0008,1050)	RIS defined or set by creator
Protocol Name	(0018,1030)	set by creator
Series Description	(0008,103E)	set by creator
Referenced Performed Procedure Step Sequence	(0008,1111)	set by creator
>Referenced SOP Class UID	(0008,1150)	set by creator
>Referenced SOP Instance UID	(0008,1155)	set by creator
Body Part Examined	(0018,0015)	set by creator
Patient Position	(0018,5100)	set by creator
Request Attributes Sequence	(0040,0275)	RIS defined
>Requested Procedure ID	(0040,1001)	RIS defined
>Accession Number	(0008,0050)	RIS defined
>Study Instance UID	(0020,000D)	RIS defined
>Requested Procedure Description	(0032,1060)	RIS defined
>Scheduled Procedure Step ID	(0040,0009)	RIS defined
>Scheduled Procedure Step Description	(0040,0007)	RIS defined
> Referenced Study Sequence	(0008,1110)	RIS defined
>> Referenced SOP Class UID	(0008,1150)	RIS defined
>> Referenced SOP Instance UID	(0008,1155)	RIS defined
> Requested Procedure Code Sequence	(0032,1064)	RIS defined
>> Code Value	(0008,0100)	RIS defined
>> Code Scheme Designator	(0008,0102)	RIS defined
>> Code Meaning	(0008,0104)	RIS defined
> Scheduled Protocol Code Sequence	(0040,0008)	RIS defined
>> Code Value	(0008,0100)	RIS defined
>> Code Scheme Designator	(0008,0102)	RIS defined
>> Code Meaning	(0008,0104)	RIS defined
Performed Procedure Step ID	(0040,0253)	set by creator
Performed Procedure Step Start Date	(0040,0244)	set by creator
Performed Procedure Step Start Time	(0040,0245)	set by creator
Performed Procedure Step Description	(0040,0254)	set by creator

9.1.1.5 MR Series Module

Attribute Name	Tag	Supported Values
Modality	(0008,0060)	MR

9.1.1.6 Frame of Reference Module

Attribute Name	Tag	Supported Values
Frame of Reference UID	(0020,0052)	set by creator
Position Reference Indicator	(0020,1040)	empty

9.1.1.7 General Equipment Module

Attribute Name	Tag	Supported Values
Manufacturer	(0008,0070)	Siemens
Institution Name	(0008,0080)	RIS defined or set by creator
Institution Address	(0008,0081)	RIS defined set by creator
Manufacturer's Model Name	(0008,1090)	set by creator
Device Serial Number	(0018,1000)	set by creator
Software Versions	(0018,1020)	set by creator

9.1.1.8 Enhanced General Equipment Module

Attribute Name	Tag	
Manufacturer	(0008,0070)	Siemens

9.1.1.9 Image Pixel Module

Attribute Name	Tag	Supported Values
Samples per Pixel	(0028,0002)	1
Photometric Interpretation	(0028,0004)	MONOCHROME2
Rows	(0028,0010)	set by creator
Columns	(0028,0011)	set by creator
Bits Allocated	(0028,0100)	16
Bits Stored	(0028,0101)	12
High Bit	(0028,0102)	11
Pixel Representation	(0028,0103)	0
Pixel Data	(7FE0,0010)	set by creator
Smallest Image Pixel Value	(0028,0106)	set by creator
Largest Image Pixel Value	(0028,0107)	set by creator

9.1.1.10 Enhanced Contrast/Bolus Module

Attribute Name	Tag	Supported Values
Contrast/Bolus Agent Sequence	(0018,0012)	set by creator
>Code Value	(0008,0100)	set by creator
>Code Scheme Designator	(0008,0102)	set by creator
>Code Meaning	(0008,0104)	set by creator
>Contrast/Bolus Agent Number	(0018,9337)	1
>Contrast/Bolus Administration Route Sequence	(0018,0014)	set by creator
>>Code Value	(0008,0100)	set by creator
>>Code Scheme Designator	(0008,0102)	set by creator
>>Code Meaning	(0008,0104)	set by creator
>Contrast/Bolus Ingredient Code Sequence	(0018,9338)	set by creator
>>Code Value	(0008,0100)	set by creator
>>Code Scheme Designator	(0008,0102)	set by creator
>>Code Meaning	(0008,0104)	set by creator
>Contrast/Bolus Volume	(0018,1041)	set by creator
>Contrast/Bolus Ingredient Concentration	(0018,1049)	set by creator

9.1.1.11 Multi-frame Functional Groups Module

Attribute Name	Tag	Supported Values
Instance Number	(0020,0013)	set by creator
Content Date	(0008,0023)	set by creator
Content Time	(0008,0033)	set by creator
Number of Frames	(0028,0008)	set by creator

9.1.1.12 Multi-frame Dimension Module

Attribute Name	Tag	Supported Values
Dimension Organization Sequence	(0020,9221)	set by creator
Dimension Index Sequence	(0020,9222)	set by creator

9.1.1.13 Enhanced MR Image Functional Groups

Functional Group Macro	Attribute Name	Tag	Supported Values
Pixel Measures	Pixel Measures Sequence	(0028,9110)	set by creator
	>Pixel Spacing	(0018,0030)	set by creator
	>Slice Thickness	(0028,0050)	set by creator
Frame Content	Frame Content Sequence	(0020,9111)	set by creator
	>Frame Acquisition Number	(0020,9156)	set by creator
	>Frame Reference Date Time	(0018,9151)	set by creator
	>Frame Acquisition Date Time	(0018,9074)	set by creator
	>Frame Acquisition Duration	(0018,9220)	set by creator
	>Dimension Index Values	(0020,9157)	set by creator
	>Temporal Position Index	(0020,9128)	set by creator
	>Stack ID	(0020,9056)	set by creator
	>In-Stack Position Number	(0020,9057)	set by creator
	>Frame Comments	(0020,9158)	set by creator
Plane Position	Plane Position Sequence	(0020,9113)	set by creator
	>Image Position (Patient)	(0020,0032)	set by creator
Plane Orientation	Plane Orientation Sequence	(0020,9116)	set by creator
	>Image Orientation (Patient)	(0020,0037)	set by creator
Referenced Image	Referenced Image Sequence	(0008,1140)	set by creator
	>Referenced SOP Class UID	(0008,1150)	set by creator
	>Referenced SOP Instance UID	(0008,1155)	set by creator
	>Referenced Frame Number	(0008,1160)	set by creator
	>Purpose of Referenced Code Sequence	(0040,A170)	set by creator
	>>Code Value	(0008,0100)	e.g. 121311
	>>Coding Scheme Designator	(0008,0102)	e.g. DCM
	>>Code Meaning	(0008,0104)	e.g. Localizer
Derivation Image	Derivation Image Sequence	(0008,9124)	set by creator
	>Derivation Code Sequence	(0008,9215)	set by creator
	>>Code Value	(0008,0100)	set by creator
	>>Coding Scheme Designator	(0008,0102)	set by creator
	>>Code Meaning	(0008,0104)	set by creator
	>Source Image Sequence	(0008,2112)	set by creator
	>>Referenced SOP Class UID	(0008,1150)	set by creator
	>>Referenced SOP Instance UID	(0008,1155)	set by creator

	>>Referenced Frame Number	(0008,1160)	set by creator
	>>Purpose of Referenced Code Sequence	(0040,A170)	set by creator
	>>>Code Value	(0008,0100)	set by creator
	>>>Coding Scheme Designator	(0008,0102)	set by creator
	>>>Code Meaning	(0008,0104)	set by creator
Cardiac Synchronization	Cardiac Synchronization Sequence	(0018,9118)	set by creator
	>Nominal Percentage of Cardiac Phase	(0020,9241)	set by creator
	>Nominal Cardiac Trigger Delay Time	(0020,9153)	set by creator
	>Actual Cardiac Trigger Delay Time	(0020,9252)	set by creator
	>Nominal Cardiac Trigger Time Prior to R-peak	(0020,9154)	set by creator
	>Actual Cardiac Trigger Time Prior to R-peak	(0020,9155)	set by creator
	>Intervals Acquired	(0018,1083)	set by creator
	>Intervals Rejected	(0018,1084)	set by creator
	>Heart Rate	(0018,1088)	set by creator
	>R-R Interval Time Nominal	(0020,9251)	set by creator
	>Low R-R Value	(0018,1081)	set by creator
	>High R-R Value	(0018,1082)	set by creator
Frame Anatomy	Frame Anatomy Sequence	(0020,9071)	set by creator
	>Frame Laterality	(0020,9072)	set by creator
	>Anatomic Region Sequence	(0008,2218)	set by creator
	>>Code Value	(0008,0100)	set by creator
	>>Coding Scheme Designator	(0008,0102)	set by creator
	>>Code Meaning	(0008,0104)	set by creator
Pixel Value Transformation	Pixel Value Transformation Sequence	(0028,9145)	set by creator
	>Rescale Intercept	(0028,1052)	set by creator
	>Rescale Slope	(0028,1053)	set by creator
	>Rescale Type	(0028,1054)	set by creator
Frame VOI LUT	Frame VOI LUT Sequence	(0028,9132)	set by creator
	>Window Center	(0028,1050)	set by creator
	>Window Width	(0028,1051)	set by creator
Real World Value Mapping	Real World Value Mapping Sequence	(0040,9096)	set by creator
	>Real World Value Intercept	(0040,9224)	set by creator
	>Real World Value Slope	(0040,9225)	set by creator
	>Measurement Units Code Sequence	(0040,08EA)	set by creator
	>>Code Value	(0008,0100)	set by creator
	>>Coding Scheme Designator	(0008,0102)	set by creator
	>>Code Meaning	(0008,0104)	set by creator
Contrast/Bolus Usage	Contrast/Bolus Usage Sequence	(0018,9341)	set by creator
	>Contrast/Bolus Agent Number	(0018,9337)	1
	>Contrast/Bolus Agent Administered	(0018,9342)	set by creator
	>Contrast/Bolus Agent Detected	(0018,9343)	set by creator
	>Contrast/Bolus Agent Phase	(0018,9344)	set by creator
MR Image Frame Type	MR Image Frame Type Sequence	(0018,9226)	set by creator
	>Frame Type	(0008,9007)	set by creator
	>Pixel Presentation	(0008,9205)	set by creator
	>Volumetric Properties	(0008,9206)	set by creator
	>Volume Based Calculation Technique	(0008,9207)	set by creator
	>Complex Image Component	(0008,9208)	set by creator
	>Acquisition Contrast	(0008,9209)	set by creator
	>Functional Settling Phase Frames Present	(0018,9622)	set by creator
MR Timing and Related Parameters	MR Timing and Related Parameters Sequence	(0018,9112)	set by creator
	>Repetition Time	(0018,0080)	set by creator
	>Flip Angle	(0018,1314)	set by creator

	>Echo Train Length	(0018,0091)	set by creator
	>RF Echo Train Length	(0018,9240)	set by creator
	>Gradient Echo Train Length	(0018,9241)	set by creator
	>Specific Absorption Rate Sequence	(0018,9239)	set by creator
	>>Specific Absorption Rate Definition	(0018,9179)	set by creator
	>>Specific Absorption Rate Value	(0018,9181)	set by creator
	>Gradient Output Type	(0018,9180)	set by creator
	>Gradient Output	(0018,9182)	set by creator
	>Operation Mode Sequence	(0018,9176)	set by creator
	>>Operating Mode Type	(0018,9177)	set by creator
	>>Operating Mode	(0018,9178)	set by creator
MR FOV/Geometry	MR FOV/Geometry Sequence	(0018,9125)	set by creator
	>In-plane Phase Encoding Direction	(0018,1312)	set by creator
	>MR Acquisition Frequency Encoding Steps	(0018,9058)	set by creator
	>MR Acquisition Phase Encoding Steps in-plane	(0018,9231)	set by creator
	>MR Acquisition Phase Encoding Steps out-of-plane	(0018,9232)	set by creator
	>Percent Sampling	(0018,0093)	set by creator
	>Percent Phase Field of View	(0018,0094)	set by creator
MR Echo	MR Echo Sequence	(0018,9114)	set by creator
	>Effective Echo Time	(0018,9082)	set by creator
MR Modifier	MR Modifier Sequence	(0018,9115)	set by creator
	>Inversion Recovery	(0018,9009)	set by creator
	>Inversion Times	(0018,9079)	set by creator
	>Flow Compensation	(0018,9010)	set by creator
	>Flow Compensation Direction	(0018,9183)	set by creator
	>Spoiling	(0018,9016)	set by creator
	>T2 Preparation	(0018,9021)	set by creator
	>Spectrally Selected Excitation	(0018,9026)	set by creator
	>Spatial Pre-saturation	(0018,9027)	set by creator
	>Partial Fourier	(0018,9081)	set by creator
	>Partial Fourier Direction	(0018,9036)	set by creator
	>Parallel Acquisition	(0018,9077)	set by creator
	>Parallel Acquisition Technique	(0018,9078)	set by creator
	>Parallel Reduction Factor In-plane	(0018,9069)	set by creator
	>Parallel Reduction Factor out-of-plane	(0018,9155)	set by creator
MR Imaging Modifier	MR Imaging Modifier Sequence	(0018,9006)	set by creator
	>Magnetization Transfer	(0018,9020)	set by creator
	>Blood Signal Nulling	(0018,9022)	set by creator
	>Tagging	(0018,9028)	set by creator
	>Tag Spacing First Dimension	(0018,9030)	set by creator
	>Tag Spacing Second Dimension	(0018,9218)	set by creator
	>Tag Angle First Axis	(0018,9019)	set by creator
	>Tag Angle Second Axis	(0018,9219)	set by creator
	>Tag Thickness	(0018,9035)	set by creator
	>Tagging Delay	(0018,9184)	set by creator
	>Transmitter Frequency	(0018,9098)	set by creator
	>Pixel Bandwidth	(0018,0095)	set by creator
MR Receive Coil	MR Receive Coil Sequence	(0018,9042)	set by creator
	>Receive Coil Name	(0018,1250)	set by creator
	>Receive Coil Manufacturer Name	(0018,9041)	set by creator
	>Receive Coil Type	(0018,9043)	set by creator
	>Quadrature Receive Coil	(0018,9044)	set by creator
	>Multi-Coil Definition Sequence	(0018,9045)	set by creator

	>>Multi-Coil Element Name	(0018,9047)	set by creator
	>>Multi-Coil Element Used	(0018,9048)	set by creator
MR Transmit Coil	MR Transmit Coil Sequence	(0018,9049)	set by creator
	>Transmit Coil Name	(0018,1251)	set by creator
	>Transmit Coil Manufacturer Name	(0018,9050)	set by creator
	>Transmit Coil Type	(0018,9051)	set by creator
MR Diffusion	MR Diffusion Sequence	(0018,9117)	set by creator
	>Diffusion b-value	(0018,9087)	set by creator
	>Diffusion Directionality	(0018,9075)	set by creator
	>Diffusion Gradient Direction Sequence	(0018,9076)	set by creator
	>>Diffusion Gradient Orientation	(0018,9089)	set by creator
	>Diffusion b-matrix Sequence	(0018,9601)	set by creator
	>>Diffusion b-value XX	(0018,9602)	set by creator
	>>Diffusion b-value XY	(0018,9603)	set by creator
	>>Diffusion b-value XZ	(0018,9604)	set by creator
	>>Diffusion b-value YY	(0018,9605)	set by creator
	>>Diffusion b-value YZ	(0018,9606)	set by creator
	>>Diffusion b-value ZZ	(0018,9607)	set by creator
MR Averages	MR Averages Sequence	(0018,9119)	set by creator
	>Number of Averages	(0018,0083)	set by creator
MR Velocity Encoding	MR Velocity Encoding Sequence	(0018,9197)	set by creator
	>Velocity Encoding Direction	(0018,9090)	set by creator
	>Velocity Encoding Minimum Value	(0018,9091)	set by creator
	>Velocity Encoding Maximum Value	(0018,9217)	set by creator
MR Arterial Spin Labeling	MR Arterial Spin Labeling Sequence	(0018,9251)	set by Creator
	>ASL Technique Description	(0018,9252)	set by Creator
	>ASL Context	(0018,9257)	set by Creator
	>ASL Slab Sequence	(0018,9260)	set by Creator
	>>ASL Slab Number	(0018,9253)	set by Creator
	>>ASL Slab Thickness	(0018,9254)	set by Creator
	>>ASL Slab Orientation	(0018,9255)	set by Creator
	>>ASL Mid Slab Position	(0018,9256)	set by Creator
	>>ASL Pulse Train Duration	(0018,9258)	set by Creator
	>ASL Crusher Flag	(0018,9259)	set by Creator
	>ASL Crusher Flow Limit	(0018,925A)	set by Creator
	>ASL Crusher Description	(0018,925B)	set by Creator
	>ASLBolus Cut-off Flag	(0018,925C)	set by Creator
	>ASLBolus Cut-off Timing Sequence	(0018,925D)	set by Creator
	>>ASL Bolus Cut-off Delay Time	(0018,925F)	set by Creator
	>>ASL Bolus Cut-off Tequnique	(0018,925E)	set by Creator

9.1.1.14 Cardiac Synchronization Module

Attribute Name	Tag	Supported Values
Cardiac Synchronization Technique	(0018,9037)	set by creator
Cardiac Signal Source	(0018,9085)	set by creator
Cardiac RR Interval Specified	(0018,9070)	set by creator
Low R-R Value	(0018,1081)	set by creator
High R-R Value	(0018,1082)	set by creator
Intervals Acquired	(0018,1083)	set by creator
Intervals Rejected	(0018,1084)	set by creator

9.1.1.15 Respiratory Synchronization Nodule

Attribute Name	Tag	Supported Values
Respiratory Motion Compensation Technique	(0018,9170)	set by creator

9.1.1.16 Bulk Motion Synchronization Module

Annex A: Attribute Name	Annex B: Tag	Annex C: Supported Values
Bulk Motion Compensation Technique	(0018,9172)	set by creator
Bulk Motion Signal Source	(0018,9173)	set by creator

9.1.1.17 Supplemental Palette Color Lookup Table Module

Annex D: Attribute Name	Annex E: Tag	Annex F: Supported Values
Red Palette Color Lookup Table Descriptor	(0028,1101)	set by creator
Green Palette Color Lookup Table Descriptor	(0028,1102)	set by creator
Blue Palette Color Lookup Table Descriptor	(0028,1103)	set by creator
Red Palette Color Lookup Table Data	(0028,1201)	set by creator
Green Palette Color Lookup Table Data	(0028,1202)	set by creator
Blue Palette Color Lookup Table Data	(0028,1203)	set by creator

9.1.1.18 Acquisition Context Module

Attribute Name	Tag	Supported Values
Acquisition Context Sequence	(0040,0555)	TID 99_3100

9.1.1.18.1 MR Acquisition Context TID 99_3100

The MR Acquisition Context TID 99_3100 is used in the Acquisition Context Sequence (0040,0555) of Enhanced MR Images.

Type: Extensible

	NL	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1		CODE	EV (A-52, 99SMS_CTMR, “MR Technique")	1	M		DCID(A-200)

9.1.1.18.2 MR Technique Context Group A-200

Type: Extensible

Coding Scheme Designator (0008,0102)	Coding Scheme Version (0008,0103)	Code Value (0008,0100)	Code Meaning (0008,0104)
99SMS_CTMR	1.0	A-200	GRASP
99SMS_CTMR	1.0	A-202	FastView
99SMS_CTMR	1.0	A-204	Angio

99SMS_CTMR	1.0	A-206	BOLD

9.1.1.19 Enhanced MR Image Module

Attribute Name	Tag	Supported Values
Acquisition Number	(0020,0012)	set by creator
Acquisition Date Time	(0008,002A)	set by creator
Acquisition Duration	(0018,9073)	set by creator
Content Qualification	(0018,9004)	set by creator
Resonant Nucleus	(0018,9100)	set by creator
k-space Filtering	(0018,9064)	set by creator
Magnetic Field Strength	(0018,0087)	set by creator
Applicable Safety Standard Agency	(0018,9174)	set by creator
Image Comments	(0020,4000)	set by creator
Image Type	(0008,0008)	set by creator
Pixel Presentation	(0008,9205)	set by creator
Volumetric Properties	(0008,9206)	set by creator
Volume Based Calculation Technique	(0008,9207)	set by creator
Complex Image Component	(0008,9208)	set by creator
Acquisition Contrast	(0008,9209)	set by creator
Samples per Pixel	(0028,0002)	1
Photometric Interpretation	(0028,0004)	MONOCHROME2
Bits Allocated	(0028,0100)	16
Bits Stored	(0028,0101)	12
High Bit	(0028,0102)	11
Pixel Representation	(0028,0103)	0
Burned In Annotation	(0028,0301)	NO
Lossy Image Compression	(0028,2110)	00
Presentation LUT Shape	(2050.0020)	IDENTITY

9.1.1.20 MR Pulse Sequence Module

Attribute Name	Tag	Supported Values
Pulse Sequence Name	(0018,9005)	set by creator
MR Acquisition Type	(0018,0023)	set by creator
Echo Pulse Sequence	(0018,9008)	set by creator
Multiple Spin Echo	(0018,9011)	set by creator
Multi-planar Excitation	(0018,9012)	set by creator
Phase Contrast	(0018,9014)	set by creator
Time of Flight Contrast	(0018,9015)	set by creator
Steady State Pulse Sequence	(0018,9017)	set by creator
Echo Planar Pulse Sequence	(0018,9018)	set by creator
Saturation Recovery	(0018,9024)	set by creator
Spectral Selected Suppression	(0018,9025)	set by creator
Oversampling Phase	(0018,9029)	set by creator
Geometry of k-Space	(0018,9032)	set by creator
Rectilinear Phase Encode Reordering	(0018,9034)	set by creator
Segmented k-Space	(0018,9033)	set by creator
Coverage of k-Space	(0018,9094)	set by creator
Number of k-Space Trajectories	(0018,9093)	set by creator

9.1.1.21 SOP Common Module

Attribute Name	Tag	Supported Values
SOP Class UID	(0008,0016)	Enhanced MR Storage SOP Class UID
SOP Instance UID	(0008,0018)	set by creator
Specific Character Set	(0008,0005)	set by creator
Instance Creation Date	(0008,0012)	date the SOP instance was created
Instance Creation Time	(0008,0013)	time the SOP instance was created

9.1.2 Enhanced MR Color Image IOD

The Enhanced MR Color Image IOD supports the same DICOM attributes as the Enhanced MR Image IOD with the exception of the Photometric Interpretation which is RGB.

9.1.2.1 Image Pixel Module

Attribute Name	Tag	Supported Values
Samples per Pixel	(0028,0002)	3
Photometric Interpretation	(0028,0004)	RGB
Rows	(0028,0010)	set by creator
Columns	(0028,0011)	set by creator
Bits Allocated	(0028,0100)	8
Bits Stored	(0028,0101)	8
High Bit	(0028,0102)	7
Pixel Representation	(0028,0103)	0

9.1.3 MR Spectroscopy IOD

This chapter describes the DICOM attributes of MR Spectroscopy Instances performed by the MR acquisition.

9.1.3.1 Patient Module

Attribute Name	Tag	Supported Values
Patient's Name	(0010,0010)	RIS defined or set by creator
Patient ID	(0010,0020)	RIS defined or set by creator
Issuer of Patient ID	(0010,0021)	RIS defined
Patient's Birth Date	(0010,0030)	RIS defined or set by creator
Patient`s Birth Time	(0010,0032)	RIS defined or set by creator
Patient's Sex	(0010,0040)	RIS defined or set by creator
Other Patient IDs	(0010,1000)	RIS defined or set by creator
Other Patient Names	(0010,1001)	RIS defined or set by creator
Ethnic Group	(0010,2160)	RIS defined or set by creator
Patient Comments	(0010,4000)	RIS defined or set by creator
Other Patient Names	(0010,1001)	RIS defined or set by creator
Patient Identity Removed	(0012,0062)	set by creator

9.1.3.2 General Study Module

Attribute Name	Tag	Supported Values
Study Instance UID	(0020,000D)	RIS defined or set by creator
Study Date	(0008,0020)	set by creator
Study Time	(0008,0030)	set by creator
Referring Physician's Name	(0008,0090)	RIS defined or set by creator
Study ID	(0020,0010)	set by creator
Accession Number	(0008,0050)	RIS defined or set by creator
Study Description	(0008,1030)	set by creator
Procedure Code Sequence	(0008,1032)	RIS defined
>Code Value	(0008,0100)	RIS defined
>Code Scheme Designator	(0008,0102)	RIS defined
>Code Meaning	(0008,0104)	RIS defined

9.1.3.3 Patient Study Module

Attribute Name	Tag	Supported Values
Patient's Age	(0010,1010)	RIS defined or set by creator
Patient's Size	(0010,1020)	RIS defined or set by creator
Patient's Weight	(0010,1030)	RIS defined or set by creator

9.1.3.4 General Series Module

Attribute Name	Tag	Supported Values
Modality	(0008,0060)	MR
Series Instance UID	(0020,000E)	set by creator
Series Number	(0020,0011)	set by creator
Series Date	(0008,0021)	set by creator
Series Time	(0008,0031)	set by creator
Performing Physicians' Name	(0008,1050)	RIS defined or set by creator
Protocol Name	(0018,1030)	set by creator
Series Description	(0008,103E)	set by creator
Referenced Performed Procedure Step Sequence	(0008,1111)	set by creator
>Referenced SOP Class UID	(0008,1150)	set by creator
>Referenced SOP Instance UID	(0008,1155)	set by creator
Body Part Examined	(0018,0015)	set by creator
Patient Position	(0018,5100)	set by creator
Request Attributes Sequence	(0040,0275)	RIS defined
>Requested Procedure ID	(0040,1001)	RIS defined
>Accession Number	(0008,0050)	RIS defined
>Study Instance UID	(0020,000D)	RIS defined
>Requested Procedure Description	(0032,1060)	RIS defined
>Scheduled Procedure Step ID	(0040,0009)	RIS defined
>Scheduled Procedure Step Description	(0040,0007)	RIS defined
> Referenced Study Sequence	(0008,1110)	RIS defined
>> Referenced SOP Class UID	(0008,1150)	RIS defined
>> Referenced SOP Instance UID	(0008,1155)	RIS defined
> Requested Procedure Code Sequence	(0032,1064)	RIS defined
>> Code Value	(0008,0100)	RIS defined

>> Code Scheme Designator	(0008,0102)	RIS defined
>> Code Meaning	(0008,0104)	RIS defined
> Scheduled Protocol Code Sequence	(0040,0008)	RIS defined
>> Code Value	(0008,0100)	RIS defined
>> Code Scheme Designator	(0008,0102)	RIS defined
>> Code Meaning	(0008,0104)	RIS defined
Performed Procedure Step ID	(0040,0253)	set by creator
Performed Procedure Step Start Date	(0040,0244)	set by creator
Performed Procedure Step Start Time	(0040,0245)	set by creator
Performed Procedure Step Description	(0040,0254)	set by creator

9.1.3.5 MR Series Module

Attribute Name	Tag	Supported Values
Modality	(0008,0060)	MR

9.1.3.6 Frame of Reference Module

Attribute Name	Tag	Supported Values
Frame of Reference UID	(0020,0052)	set by creator
Position Reference Indicator	(0020,1040)	empty

9.1.3.7 General Equipment Module

Attribute Name	Tag	Supported Values
Manufacturer	(0008,0070)	Siemens Shenzhen Magnetic Resonance Ltd
Institution Name	(0008,0080)	set by creator
Institution Address	(0008,0081)	set by creator
Manufacturer's Model Name	(0008,1090)	set by creator
Device Serial Number	(0018,1000)	set by creator
Software Versions	(0018,1020)	set by creator

9.1.3.8 Enhanced General Equipment Module

Attribute Name	Tag	Supported Values
Manufacturer	(0008,0070)	Siemens Shenzhen Magnetic Resonance Ltd

9.1.3.9 Enhanced Contrast/Bolus Module

Attribute Name	Tag	Supported Values
Contrast/Bolus Agent Sequence	(0018,0012)	set by creator
>Code Value	(0008,0100)	set by creator
>Code Scheme Designator	(0008,0102)	set by creator
>Code Meaning	(0008,0104)	set by creator
>Contrast/Bolus Agent Number	(0018,9337)	1
>Contrast/Bolus Administration Route Sequence	(0018,0014)	set by creator
>>Code Value	(0008,0100)	set by creator
>>Code Scheme Designator	(0008,0102)	set by creator
>>Code Meaning	(0008,0104)	set by creator
>Contrast/Bolus Ingredient Code Sequence	(0018,9338)	set by creator

>>Code Value	(0008,0100)	set by creator
>>Code Scheme Designator	(0008,0102)	set by creator
>>Code Meaning	(0008,0104)	set by creator
>Contrast/Bolus Volume	(0018,1041)	set by creator
>Contrast/Bolus Ingredient Concentration	(0018,1049)	set by creator

9.1.3.10 Multi-frame Functional Groups Module

Attribute Name	Tag	Supported Values
Instance Number	(0020,0013)	set by creator
Content Date	(0008,0023)	set by creator
Content Time	(0008,0033)	set by creator

9.1.3.11 Multi-frame Dimension Module

Attribute Name	Tag	Supported Values
Dimension Organization Sequence	(0020,9221)	set by creator
Dimension Index Sequence	(0020,9222)	set by creator

9.1.3.12 MR Spectroscopy Functional Groups

Functional Group Macro	Attribute Name	Tag	Supported Values
Pixel Measures	Pixel Measures Sequence	(0028,9110)	set by creator
	>Pixel Spacing	(0018,0030)	set by creator
	>Slice Thickness	(0028,0050)	set by creator
Frame Content	Frame Content Sequence	(0020,9111)	set by creator
	>Frame Acquisition Number	(0020,9156)	set by creator
	>Frame Reference Date Time	(0018,9151)	set by creator
	>Frame Acquisition Date Time	(0018,9074)	set by creator
	>Frame Acquisition Duration	(0018,9220)	set by creator
	>Dimension Index Values	(0020,9157)	set by creator
	>Temporal Position Index	(0020,9128)	set by creator
	>Stack ID	(0020,9056)	set by creator
	>In-Stack Position Number	(0020,9057)	set by creator
	>Frame Comments	(0020,9158)	set by creator
Plane Position	Plane Position Sequence	(0020,9113)	set by creator
	>Image Position (Patient)	(0020,0032)	set by creator
Plane Orientation	Plane Orientation Sequence	(0020,9116)	set by creator
	>Image Orientation (Patient)	(0020,0037)	set by creator
Referenced Image	Referenced Image Sequence	(0008,1140)	set by creator
	>Referenced SOP Class UID	(0008,1150)	set by creator
	>Referenced SOP Instance UID	(0008,1155)	set by creator
	>Referenced Frame Number	(0008,1160)	set by creator
	>Purpose of Referenced Code Sequence	(0040,A170)	set by creator
	>>Code Value	(0008,0100)	set by creator
	>>Coding Scheme Designator	(0008,0102)	set by creator
	>>Code Meaning	(0008,0104)	set by creator
Derivation Image	Derivation Image Sequence	(0008,9124)	set by creator
	>Derivation Code Sequence	(0008,9215)	set by creator
	>>Code Value	(0008,0100)	set by creator
	>>Coding Scheme Designator	(0008,0102)	set by creator

	>>Code Meaning	(0008,0104)	set by creator
	>Source Image Sequence	(0008,2112)	set by creator
	>>Referenced SOP Class UID	(0008,1150)	set by creator
	>>Referenced SOP Instance UID	(0008,1155)	set by creator
	>>Referenced Frame Number	(0008,1160)	set by creator
	>>Purpose of Referenced Code Sequence	(0040,A170)	set by creator
	>>>Code Value	(0008,0100)	set by creator
	>>>Coding Scheme Designator	(0008,0102)	set by creator
	>>>Code Meaning	(0008,0104)	set by creator
Frame Anatomy	Frame Anatomy Sequence	(0020,9071)	set by creator
	>Frame Laterality	(0020,9072)	set by creator
	>Anatomic Region Sequence	(0008,2218)	set by creator
	>>Code Value	(0008,0100)	set by creator
	>>Coding Scheme Designator	(0008,0102)	set by creator
	>>Code Meaning	(0008,0104)	set by creator
Contrast/Bolus Usage	Contrast/Bolus Usage Sequence	(0018,9341)	set by creator
	>Contrast/Bolus Agent Number	(0018,9337)	1
	>Contrast/Bolus Agent Administered	(0018,9342)	set by creator
	>Contrast/Bolus Agent Detected	(0018,9343)	set by creator
	>Contrast/Bolus Agent Phase	(0018,9344)	set by creator
MR Spectroscopy Frame Type	MR Spectroscopy Frame Type Sequence	(0018,9227)	set by creator
	>Frame Type	(0008,9007)	set by creator
	>Volumetric Properties	(0008,9206)	set by creator
	>Volume Based Calculation Technique	(0008,9207)	set by creator
	>Complex Image Component	(0008,9208)	set by creator
	>Acquisition Contrast	(0008,9209)	set by creator
MR Timing and Related Parameters	MR Timing and Related Parameters Sequence	(0018,9112)	set by creator
	>Repetition Time	(0018,0080)	set by creator
	>Flip Angle	(0018,1314)	set by creator
	>Echo Train Length	(0018,0091)	set by creator
	>RF Echo Train Length	(0018,9240)	set by creator
	>Gradient Echo Train Length	(0018,9241)	set by creator
	>Specific Absorption Rate Sequence	(0018,9239)	set by creator
	>>Specific Absorption Rate Definition	(0018,9179)	set by creator
	>>Specific Absorption Rate Value	(0018,9181)	set by creator
	>Gradient Output Type	(0018,9180)	set by creator
	>Gradient Output	(0018,9182)	set by creator
	>Operation Mode Sequence	(0018,9176)	set by creator
	>>Operating Mode Type	(0018,9177)	set by creator
	>>Operating Mode	(0018,9178)	set by creator
MR Spectroscopy FOV/Geometry	MR Spectroscopy FOV/Geometry Sequence	(0018,9103)	set by creator
	>Spectroscopy Acquisition Data Columns	(0018,9127)	set by creator
	>Spectroscopy Acquisition Phase Rows	(0018,9095)	set by creator
	>Spectroscopy Acquisition Phase Columns	(0018,9234)	set by creator
	>Spectroscopy Acquisition Out-of-Plane Phase Steps	(0018,9159)	set by creator
	>Percent Sampling	(0018,0093)	set by creator
	>Percent Phase Field of View	(0018,0094)	set by creator
MR Echo	MR Echo Sequence	(0018,9114)	set by creator
	>Effective Echo Time	(0018,9082)	set by creator
MR Modifier	MR Modifier Sequence	(0018,9115)	set by creator
	>Inversion Recovery	(0018,9009)	set by creator
	>Inversion Times	(0018,9079)	set by creator
	>Flow Compensation	(0018,9010)	set by creator

	>Flow Compensation Direction	(0018,9183)	set by creator
	>Spoiling	(0018,9016)	set by creator
	>T2 Preparation	(0018,9021)	set by creator
	>Spectrally Selected Excitation	(0018,9026)	set by creator
	>Spatial Pre-saturation	(0018,9027)	set by creator
	>Partial Fourier	(0018,9081)	set by creator
	>Partial Fourier Direction	(0018,9036)	set by creator
	>Parallel Acquisition	(0018,9077)	set by creator
	>Parallel Acquisition Technique	(0018,9078)	set by creator
	>Parallel Reduction Factor In-plane	(0018,9069)	set by creator
	>Parallel Reduction Factor out-of-plane	(0018,9155)	set by creator
MR Receive Coil	MR Receive Coil Sequence	(0018,9042)	set by creator
	>Receive Coil Name	(0018,1250)	set by creator
	>Receive Coil Manufacturer Name	(0018,9041)	set by creator
	>Receive Coil Type	(0018,9043)	set by creator
	>Quadrature Receive Coil	(0018,9044)	set by creator
	>Multi-Coil Definition Sequence	(0018,9045)	set by creator
	>>Multi-Coil Element Name	(0018,9047)	set by creator
	>>Multi-Coil Element Used	(0018,9048)	set by creator
MR Transmit Coil	MR Transmit Coil Sequence	(0018,9049)	set by creator
	>Transmit Coil Name	(0018,1251)	set by creator
	>Transmit Coil Manufacturer Name	(0018,9050)	set by creator
	>Transmit Coil Type	(0018,9051)	set by creator
MR Diffusion	MR Diffusion Sequence	(0018,9117)	set by creator
	>Diffusion b-value	(0018,9087)	set by creator
	>Diffusion Directionality	(0018,9075)	set by creator
	>Diffusion Gradient Direction Sequence	(0018,9076)	set by creator
	>>Diffusion Gradient Orientation	(0018,9089)	set by creator
	>Diffusion b-matrix Sequence	(0018,9601)	set by creator
	>>Diffusion b-value XX	(0018,9602)	set by creator
	>>Diffusion b-value XY	(0018,9603)	set by creator
	>>Diffusion b-value XZ	(0018,9604)	set by creator
	>>Diffusion b-value YY	(0018,9605)	set by creator
	>>Diffusion b-value YZ	(0018,9606)	set by creator
	>>Diffusion b-value ZZ	(0018,9607)	set by creator
MR Averages	MR Averages Sequence	(0018,9119)	set by creator
	>Number of Averages	(0018,0083)	set by creator
MR Velocity Encoding	MR Velocity Encoding Sequence	(0018,9197)	set by creator
	>Velocity Encoding Direction	(0018,9090)	set by creator
	>Velocity Encoding Minimum Value	(0018,9091)	set by creator
	>Velocity Encoding Maximum Value	(0018,9217)	set by creator

9.1.3.13 Cardiac Synchronization Module

Attribute Name	Tag	Supported Values
Cardiac Synchronization Technique	(0018,9037)	set by creator
Cardiac Signal Source	(0018,9085)	set by creator
Cardiac RR Interval Specified	(0018,9070)	set by creator
Low R-R Value	(0018,1081)	set by creator
High R-R Value	(0018,1082)	set by creator
Intervals Acquired	(0018,1083)	set by creator
Intervals Rejected	(0018,1084)	set by creator

9.1.3.14 Respiratory Synchronization Module

Attribute Name	Tag	Supported Values
Respiratory Motion Compensation Technique	(0018,9170)	set by creator

9.1.3.15 Bulk Motion Synchronization Module

Attribute Name	Tag	Supported Values
Bulk Motion Compensation Technique	(0018,9172)	set by creator
Bulk Motion Signal Source	(0018,9173)	set by creator

9.1.3.16 Acquisition Context Module

Attribute Name	Tag	Supported Values
Acquisition Context Sequence	(0040,0555)	empty

9.1.3.17 MR Spectroscopy Module

Attribute Name	Tag	Supported Values
Acquisition Number	(0020,0012)	set by creator
Acquisition Date Time	(0018,002A)	set by creator
Acquisition Duration	(0018,9073)	set by creator
Referenced Raw Data Sequence	(0008,9121)	set by creator
Content Qualification	(0018,9004)	PRODUCT
Resonant Nucleus	(0018,9100)	set by creator
k-space Filtering	(0018,9064)	set by creator
Magnetic Field Strength	(0018,0087)	set by creator
Applicable Safety Standard Agency	(0018,9174)	set by creator
Image Comments	(0020,4000)	set by creator
Image Type	(0008,0008)	set by creator
Volumetric Properties	(0008,9206)	set by creator
Volume Based Calculation Technique	(0008,9207)	set by creator
Complex Image Component	(0008,9208)	set by creator
Acquisition Contrast	(0008,9209)	set by creator
Transmitter Frequency	(0018,9098)	set by creator
Spectral Width	(0018,9052)	set by creator
Chemical Shift Reference	(0018,9053)	set by creator
Volume Localisation Technique	(0018,9054)	set by creator
Volume Localization Sequence	(0018,9126)	set by creator
>Slab Thickness	(0018,9104)	set by creator
>Slab Orientation	(0018,9105)	set by creator
>Mid SlabPosition	(0018,9106)	set by creator
De-coupling	(0018,9059)	set by creator
De-coupling Nucleus	(0018,9060)	set by creator
De-coupling Frequency	(0018,9061)	set by creator
De-coupling Method	(0018,9062)	set by creator
De-coupling Chemical Shift Reference	(0018,9063)	set by creator
Time Domain Filtering	(0018,9065)	set by creator
Number Of Zero Fills	(0018,9066)	set by creator
Baseline Correction	(0018,9067)	set by creator

Frequency Correction	(0018,9101)	set by creator
First Order Phase Correction	(0018,9198)	set by creator
Water Referenced Phase Correction	(0018,9199)	set by creator
Water Reference Acquisition	(0018,9297)	set by creator
Referenced Instance Sequence	(0008,114A)	set by creator
>Purpose of Reference Code Sequence	(0040,A170)	set by creator

9.1.3.18 MR Spectroscopy Pulse Sequence Module

Attribute Name	Tag	Supported Values
Pulse Sequence Name	(0018,9005)	set by creator
MR Spectroscopy Acquisition Type	(0018,9200)	set by creator
Echo Pulse Sequence	(0018,9008)	set by creator
Multi Spin Echo	(0018,9011)	set by creator
Multi-planar Excitation	(0018,9012)	set by creator
Steady State Pulse Sequence	(0018,9017)	set by creator
Echo Planar Pulse Sequence	(0018,9018)	set by creator
Spectrally Selected Suppression	(0018,9025)	set by creator
Geometry of k-Space Traversal	(0018,9032)	set by creator
Rectilinear Phase Encode Reordering	(0018,9034)	set by creator
Segmented k-Space Traversal	(0018,9033)	set by creator
Coverage of k-Space	(0018,9094)	set by creator
Number of k-Space Trajectories	(0018,9093)	set by creator
Echo Peak Position	(0018,9298)	set by creator

9.1.3.19 MR Spectroscopy Data Module

Attribute Name	Tag	Supported Values
Rows	(0028,0010)	set by creator
Columns	(0028,0011)	set by creator
Data Point Rows	(0028,9001)	set by creator
Data Point Columns	(0028,9002)	set by creator
Data Representation	(0028,9108)	set by creator
Signal Domain Columns	(0028,9003)	set by creator
Signal Domains Rows	(0028,9235)	set by creator
First Order Phase Correction Angle	(5600,0010)	set by creator
Spectroscopy Data	(5600,0020)	set by creator

9.1.3.20 SOP Common Module

Attribute Name	Tag	Supported Values
SOP Class UID	(0008,0016)	MR Spectroscopy SOP Class UID
SOP Instance UID	(0008,0018)	set by creator
Specific Character Set	(0008,0005)	set by creator
Instance Creation Date	(0008,0012)	date the SOP instance was created
Instance Creation Time	(0008,0013)	time the SOP instance was created

9.1.4 Raw Data

Neuro Diffusion Tensor Imaging data are encoded in the Raw Data SOP Class.

9.1.5 Evidence Documents

Evidence Documents will be created by applications e.g. cardiac analysis to store evaluated results. The Evidence Documents are encoded in the SR Enhanced SOP Class.

9.1.5.1 Evidence Document Templates

The finding related results of applications are stored into the Content Sequence of a Structured Evidence Document. The Content Items of a Content Sequence are specified in Structured Reporting Templates.

Examples of Structured Reporting Templates are:

- BI-RADS reporting
- Cardiac reporting
- PI-RADS 2 reporting
- PhoenixZip documentation.

9.2 Data Dictionary of Private Attributes

The following table Table 72: Private Data Element Dictionary lists all private attributes created by *syngo*® MR which may be included in the generated instances. These private attributes may be deprecated or replaced with standard attributes in the future.

Table 72: Private Data Element Dictionary

DICOM Tag	Name	VR	VM
(0027,SIEMENS SYNGO ENHANCED IDATASET API,01)	Business Unit Code	CS	1
(0027,SIEMENS SYNGO ENHANCED IDATASET API,02)	Application Type	LO	1
(0027,SIEMENS SYNGO ENHANCED IDATASET API,03)	Application Attributes Sequence	SQ	1
(0029,SIEMENS SYNGO FUNCTION ASSIGNMENT,01)	Data Reference	LO	1
(0009,SIEMENS SYNGO INDEX SERVICE,20)	Object Insertion Date	DA	1
(0009,SIEMENS SYNGO INDEX SERVICE,A0)	Sender System Device Name	LO	1
(0029,SIEMENS SYNGO VOLUME,12)	Slices	US	1
(0029,SIEMENS SYNGO VOLUME,14)	Volume Histogram	OB	1
(0029,SIEMENS SYNGO VOLUME,18)	Volume Level	IS	1
(0029,SIEMENS SYNGO VOLUME,30)	Voxel Spacing	DS	3
(0029,SIEMENS SYNGO VOLUME,32)	Volume Position (Patient)	DS	3
(0029,SIEMENS SYNGO VOLUME,37)	Volume Orientation (Patient)	DS	9

DICOM Tag	Name	VR	VM
(0029,SIEMENS SYNGO VOLUME,40)	Resampling Flag	CS	1
(0029,SIEMENS SYNGO VOLUME,42)	Normalization Flag	CS	1
(0029,SIEMENS SYNGO VOLUME,44)	SubVolume Sequence	SQ	1-n
(0071,SIEMENS SYNGO REGISTRATION,20)	Registered Image Sequence	SQ	1
(0071,SIEMENS SYNGO REGISTRATION,21)	Registration Is Validated Flag	CS	1
(0071,SIEMENS SYNGO REGISTRATION,20)	Registered Image Sequence	SQ	1
(0071,SIEMENS SYNGO REGISTRATION,21)	Registration Is Validated Flag	CS	1
(7FDF,SIEMENS SYNGO DATA PADDING,FC)	Pixel Data Leading Padding	OB	1

Interpretation of the DICOM Tags from the above table:
(gggg, pp,ee) -> (gggg, ppee)
gggg - odd group number
pp - private creator identification code
ee - private element

9.3 Grayscale Image Consistency

The high resolution TFT display monitor option of *syngo*® MR comes with a DICOM Grayscale Standard Display Function (GSDF) compliant factory pre-setting. A typical working environment setup is assumed for ambient light.

Annex A: Index of Tables

Annex B: Table of Figures

Legal Manufacturer

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