DICOM Conformance Statement

AI-Rad Companion Brain MR VA51x

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SIEMENS Healthineers

DICOM Conformance Statement Overview

AI-Rad Companion Brain MR is a cloud-based/on-premises(edge) application, which communicates indirectly with other DICOM nodes since it makes use of the network services provided by teamplay DICOM Hub.

AI-Rad Companion Brain MR:

- Displays images to a user (browser-based viewer application).
- Stores result DICOM data via teamplay DICOM Hub to one or several target DICOM node configured in teamplay DICOM Hub.

AI-Rad Companion Brain MR conforms to the DICOM Standard [2] and supports a subset of the storage SOP classes supported by teamplay DICOM Hub, as described in Table 1- Network Services.

Please refer to the DICOM Conformance Statements of teamplay DICOM Hub [1] for further information on the provided network services.

NOTE: This DICOM Conformance Statement is applicable for **AI-Rad Companion Brain MR** of version VA51x and later until superseded by a more recent document applicable to a more recent version.

Table 1: Network Services

SOP Classes	SOP Class UID	User of Service (SCU)		Provider of Service (SCP)	
SOP Classes created by AI-Rad Companion Brain MR					
		Create	**Send**	**Store**	**Display**
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Yes	No[1]	No[1]	Yes
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22	Yes	No[1]	No[1]	No
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	No[1]	No[1]	No
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Yes	No[1]	No[1]	No
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Yes	No[1]	No[1]	No
Enhanced Magnetic Resonance (MR) Color Image	1.2.840.10008.5.1.4.1.1.4.3	Yes	No[1]	No[1]	No
SOP Classes managed by AI-Rad Companion Brain MR					
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	No	No[1]	No[1]	Yes

1 Network communication is performed by teamplay DICOM hub[1] and teamplay receiver. Please refer to the DICOM Conformance Statements of teamplay DICOM Hub for further information.

Table 2: Media Services

Media Storage Application Profile	Write Files (FSC or FSU)	Read Files (FSR)
NOT APPLICABLE		

Table 3: Implementation Identifying Information

Name	Value
Implementation Class UID	1.3.12.2.1107.5.8.21
Implementation Version Name	AI-Rad Companion

1 Introduction

1.1 Revision History

Version	Date	Change
R1.0	16/12/2024	First version for VA51x Added New IOD "Enhanced Magnetic Resonance (MR) Color Image" for the result generation. Added New IOD "Enhanced MR Image Storage" for the input data type Added Observation UID to all the measurements in the Structured Report

1.2 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.

1.3 Remarks

The scope of this DICOM Conformance Statement is to facilitate integration between **AI-Rad Companion Brain MR** and other DICOM products. The Conformance Statement should be read and understood in conjunction with the DICOM Standard [2]. 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:

- The comparison of conformance statements is the first step towards assessing interconnectivity and interoperability between **AI-Rad Companion Brain MR** and other DICOM conformant equipment.
- Test procedures should be defined and executed to validate the required level of interoperability with specific compatible DICOM equipment, as established by the healthcare facility.
- Siemens Healthineers reserves the right to modify the design and specifications contained herein without prior notice. Please contact your local Siemens Healthineers representative for the most recent product information.

1.4 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:

AET	Application Entity Title
DICOM	Digital Imaging and Communications in Medicine
FSC	File Set Creator
FSR	File Set Reader
FSU	File Set Updater
IOD	DICOM Information Object Definition
ISO	International Standard Organization
N/A	Not Applicable
NEMA	National Electrical Manufacturers Association
SCU	DICOM Service Class User (DICOM client)
SCP	DICOM Service Class Provider (DICOM Server)
SOP	DICOM Service-Object Pair
SR	Structured Report
TID	Template ID
UID	Unique Identifier
UTF-8	Unicode Transformation Format-8
VR	Value Representation
WMH	White Matter Hyperintensities

1.5 References

[1] DICOM Conformance Statements of teamplay DICOM Hub – https://www.siemens-healthineers.com/en-in/services/it-standards/dicom-conformance-statements-digital-and-automation/teamplay

[2] NEMA PS3 / ISO 12052, Digital Imaging and Communications in Medicine (DICOM) Standard, National Electrical Manufacturers Association, Rosslyn, VA, USA (available free at https://www.dicomstandard.org/)

[3] AI-Rad Companion Data Privacy and Security White Paper – Based on on-demand request from the end users.

[4] Integrating the Healthcare Enterprise – IHE Radiology Technical Framework – http://www.ihe.net

2 Networking

Please refer to the latest version of DICOM Conformance Statement of teamplay DICOM Hub [1] for further information on the provided networking capabilities for AI-Rad Companion Brain MR.

AI-Rad Companion Brain MR only supports subset of transfer syntaxes supported by teamplay and the following table lists the supported transfer syntaxes.

Table 4: Supported Image Encoding

Abstract Syntax		Transfer Syntax	
SOP Classes	**SOP Class UID**	**Name List**	**UID List**
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Implicit VR Little Endian	1.2.840.10008.1.2
		Explicit VR Big Endian	1.2.840.10008.1.2.2
		Explicit VR Little Endian	1.2.840.10008.1.2.1
		JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70
		JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian	1.2.840.10008.1.2.1
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22	Explicit VR Little Endian	1.2.840.10008.1.2.1
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
Multi-frame True Color Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7.4	Explicit VR Little Endian	1.2.840.10008.1.2.1
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	Implicit VR Little Endian	1.2.840.10008.1.2
		Explicit VR Big Endian	1.2.840.10008.1.2.2
		Explicit VR Little Endian	1.2.840.10008.1.2.1
		JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70
		JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90

2.1 Configuration

A configuration can be done at the application level to generate the DICOM object results in any one below IODs. By default the system will generate the results in "MR Image IOD".

- MR Image IOD (SOP Class UID - 1.2.840.10008.5.1.4.1.1.4)
- Multi-frame True Color Secondary Capture Image IOD (SOP Class UID - 1.2.840.10008.5.1.4.1.1.7.4)
- Enhanced Magnetic Resonance (MR) Color Image IOD (SOP Class UID - 1.2.840.10008.5.1.4.1.1.4.3)

Based on the sites PACS DICOM conformance, the result generation shall be configured to the respective DICOM IOD.

Table 5: List of Results which shall be generated in the selected IOD

Result Type	Applicable for Manual or Auto Send to PACS workflow
Morphometry Fused Deviation Map in Coronal Orientation	Both
Morphometry Fused Deviation Map in Sagittal Orientation	Both
Morphometry Fused Deviation Map in Transversal Orientation	Both
Morphometry Fused Label Map in Coronal Orientation	Both
Morphometry Fused Label Map in Sagittal Orientation	Both
Morphometry Fused Label Map in Transversal Orientation	Both
MPRAGE Morphometry Pure Deviation Map	Auto Send
MPRAGE Morphometry Pure Label Map	Auto Send
WMH Fused Label Map in Coronal Orientation	Both
WMH Fused Label Map in Sagittal Orientation	Both
WMH Fused Label Map in Transversal Orientation	Both
WMH Fused Progression in Coronal Orientation	Both (Generated in follow-up cases)
WMH Fused Progression in Sagittal Orientation	Both (Generated in follow-up cases)
WMH Fused Progression in Transversal Orientation	Both (Generated in follow-up cases)
WMH Pure Label Map	Auto Send
WMH Pure Progression	Auto Send (Generated in follow-up cases)

The below results will always be generated in MR Image IOD irrespective of the configured IOD, since these images are gray scale images only.

- Distortion Corrected Images (in case of only DC Correction is done)
- WMH Registered FLAIR

3 Media Interchange

Please refer to the latest version of DICOM Conformance Statements of teamplay DICOM Hub [1] for further information on the provided Media Interchange for AI-Rad Companion Brain MR.

4 Transformations of DICOM to CDA

NOT APPLICABLE

5 Support of Extended Character Sets

AI-Rad Companion Brain MR supports the following character sets as defined in the tables in this section.

Table 6: 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
Latin alphabet No. 5	ISO_IR 148	ISO_IR 148	Supplementary set
		ISO_IR 6	ISO 646
Cyrillic	ISO_IR 144	ISO_IR 6	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
Japanese	ISO_IR 13	ISO_IR 13	JIS X 0201: Katakana
		ISO_IR 14	JIS X 0201: Romaji
Thai	ISO_IR 166	ISO_IR 166	TIS 620-253 (1990)
		ISO_IR 6	ISO 646

Table 7: 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
Latin alphabet No. 5	ISO 2022 IR 148	ISO 2022	ESC 02/13 04/13	ISO-IR 148	Supplementary set
		ISO 2022	ESC 02/08 04/02	ISO-IR 6	ISO 646

Table 8: 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 9: 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 SCS (Special Character Sets) listed above are supported for incoming Data.

Three categories of character sets 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 does not conform to DICOM. As these kinds of inconsistencies cannot be recognized by the system, the IOD will not be rejected but the character data might be corrupted.

AI-Rad Companion Brain MR supports Kanji characters in the byte zone after 74 (79, 7A, 7B and 7C).

6 Attribute confidentiality profiles

6.1 De-identification

Please refer to the AI-Rad Companion Data Privacy and Security White Paper [3] for further information on the support of de-identification of attributes natively for AI-Rad Companion Cloud deployment. In case of edge (on-premises) deployment, no de-identification happens from teamplay.

7 Security

7.1 Security Profiles

AI-Rad Companion Brain MR does not support any specific security measures.

7.2 Association Level Security

NOT APPLICABLE

7.3 Application Level Security

NOT APPLICABLE

8 Annexes

The tables in these section uses a number of abbreviations.

The abbreviations used in the “Presence” column are:

VNAP	Value is Not Always Present. Attribute is sent zero length if no value is present.
ANAP	Attribute Not Always Present.
ALWAYS	Attribute and Value are always present.
EMPTY	Attribute is sent zero length.

The abbreviations used in the “Source” Column are:

MWL	The attribute value is copied from Modality Worklist.
USER	The attribute value is entered by the user.
AUTO	The attribute value is generated by the system.
CONFIG	The attribute value is obtained by configuration
COPY	The attribute value is copied from the source image

8.1 IOD Contents

8.1.1 Created SOP Instances

8.1.1.1 Enhanced Structured Report (SR)

Table 10: Enhanced SR IOD Modules

Information Entity	Module	Reference	Presence of Module
Patient	Patient	Table 11	ALWAYS
Study	General Study	Table 12	ALWAYS
	Patient Study	Table 13	ALWAYS
Series	SR Document Series	Table 14	ALWAYS
Equipment	General Equipment	Table 15	ALWAYS
Document	SR Document General	Table 16	ALWAYS
	SR Document Content	Table 17	ALWAYS
	SOP Common	Table 18	ALWAYS

Table 11 lists all Attributes that are supported in the Patient Module.

Table 11: Patient Module

Attribute	Tag	Source	Value	Presence	Comments
Patient`s Name	(0010,0010)	COPY	Copied from source image	VNAP	
Patient ID	(0010,0020)	COPY	Copied from source image	VNAP	
Patient`s Birth Date	(0010,0030)	COPY	Copied from source image	VNAP	
Patient`s Sex	(0010,0040)	COPY	Copied from source image	VNAP	
Issuer of Patient ID	(0010, 0021)	COPY	Copied from source image	ANAP	

Table 12 lists all Attributes that are supported in the General Study Module

Table 12: General Study Module

Attribute	Tag	Source	Value	Presence	Comments
Study Instance UID	(0020,000D)	COPY	Copied from source image	ALWAYS	
Study Date	(0008,0020)	COPY	Copied from source image	VNAP	
Study Time	(0008,0030)	COPY	Copied from source image	VNAP	
Referring Physician's Name	(0008,0090)	COPY	Copied from source image	VNAP	
Study ID	(0020,0010)	COPY	Copied from source image	VNAP	
Accession Number	(0008,0050)	COPY	Copied from source image	VNAP	
Study Description	(0008,1030)	COPY	Copied from source image	ANAP	

Table 13 lists all Attributes that are supported in the Patient Study Module

Table 13: Patient Study Module

Attribute	Tag	Source	Value	Presence	Comments
Patient`s Age	(0010,1010)	COPY	Copied from source image	ANAP	

Table 14 lists all Attributes that are supported in the SR Document Series Module

Table 14: SR Document Series Module

Attribute	Tag	Source	Value	Presence	Comments
Modality	(0008, 0060)	AUTO	SR	ALWAYS	
Series Instance UID	(0020, 000E)	AUTO	Unique identifier of the Series	ALWAYS	
Series Number	(0020, 0011)	AUTO	Refer **Table *21*: Series Number for Different results** for details on the series number value for different result types	ALWAYS	
Series Date	(0008,0021)	AUTO	Date the Series started.	ALWAYS	
Series Time	(0008,0031)	AUTO	Time the Series started.	ALWAYS	
Protocol Name	(0018, 1030)	COPY	Copied from source image	ANAP	
Series Description	(0018, 103E)	AUTO	Refer **Table *22*: Series Description for Different results**for details on the series number value for different result types	ALWAYS	
Referenced Performed Procedure Step Sequence	(0008,1111)	AUTO		EMPTY	

Table 15 lists all Attributes that are supported in the General Equipment Module

Table 15: General Equipment Module

Attribute	Tag	Source	Value	Presence	Comments
Manufacturer	(0008,0070)	AUTO	Siemens Healthineers	ALWAYS	
Manufacturer's Model Name	(0008,1090)	AUTO	AI-Rad Companion Brain MR	ALWAYS	
Device Serial Number	(0018,1000)	AUTO	Concatenated string composed of the AI-Rad Companion system IVK number and teamplay serial number. For example, 11294418-670307	ALWAYS	
Software Versions	(0018,1020)	AUTO	VXXXX where XXXX indicates the used version of AI-Rad Companion Brain MR. For Example: - VA51A.	ALWAYS	

Table 16 lists all Attributes that are supported in the SR Documents General Module

Table 16: SR Document General Module

Attribute	Tag	Source	Value	Presence	Comments
Instance Number	(0020,0013)	AUTO		ALWAYS	
Verification Flag	(0040, A493)	AUTO	UNVERIFIED	ALWAYS	
Completion Flag	(0040, A491)	AUTO	COMPLETE	ALWAYS	
Content Date	(0008,0023)	AUTO	The date the document content creation started.	ALWAYS	
Content Time	(0008,0033)	AUTO	The time the document content creation started.	ALWAYS	
Performed Procedure Code Sequence	(0040,A372)	AUTO		ALWAYS	
> Code Value	(0008,0100)	AUTO	24590-2	ALWAYS	
> Coding Scheme Designator	(0008,0102)	AUTO	LN	ALWAYS	LOINC code
> Code Meaning	(0008,0104)	AUTO	MR Brain	ALWAYS	
Current Requested Procedure Evidence Sequence	(0040,A375)	AUTO		ALWAYS	
> Study Instance UID	(0020,000D)	AUTO	Study instance UID of the referenced study	ALWAYS	
> Referenced Series Sequence	(0008,1115)	AUTO		ALWAYS	
>> Series Instance UID	(0020,000E)	AUTO	Series instance UID of the referenced series	ALWAYS	
>> Referenced SOP Sequence	(0008,1199)	AUTO		ALWAYS	
>>> Referenced SOP Class UID	(0008,1150)	AUTO	SOP Class UID of the referenced Instance	ALWAYS	
>>> Referenced SOP Instance UID	(0008,1155)	AUTO	SOP Instance UID of the referenced Instance	ALWAYS	

Table 17 lists all Attributes that are supported in the SR Document Content Module

Table 17: SR Document Content Module

Attribute	Tag	Source	Value	Presence	Comments
Value Type	(0040,A040)	AUTO	CONTAINER	ALWAYS	
Concept Name Code Sequence	(0040,A043)	AUTO		ALWAYS	
> Code Value	(0008,0100)	AUTO	126000	ALWAYS	
> Coding Scheme Designator	(0008,0102)	AUTO	DCM	ALWAYS	
> Code Meaning	(0008,0104)	AUTO	Imaging Measurement Report	ALWAYS	
Content Sequence	(0040,A730)	AUTO		ALWAYS	
>Refer to **Table 53** for details regarding SR document content module.					

Table 18 lists all Attributes that are supported in the SOP Common Module

Table 18: SOP Common Module

Attribute	Tag	Source	Value	Presence	Comments
Specific Character Set	(0008,0005)	AUTO	ISO_IR 192	ANAP	
Instance Creation Date	(0008,0012)	AUTO	Date when series is created	ALWAYS	
Instance Creation Time	(0008,0013)	AUTO	Time when series is created	ALWAYS	
SOP Class UID	(0008,0016)	AUTO	SOP Class UID of the respective DICOM Object	ALWAYS	
SOP Instance UID	(0008,0018)	AUTO	Unique Identifier of the instance	ALWAYS	
Timezone Offset from UTC	(0008,0201)	AUTO	Copied from the original image. If not present then it is +0000	ALWAYS	
Instance Number	(0020,0013)	AUTO		ALWAYS	

8.1.1.2 Secondary Capture Image

Table 19: Secondary Capture IOD Modules

Information Entity	Module	Reference	Presence of Module
Patient	Patient	Table 11	ALWAYS
Study	General Study	Table 12	ALWAYS
	Patient Study	Table 13	ALWAYS
Series	General Series	Table 20	ALWAYS
Equipment	General Equipment	Table 15	ALWAYS
	SC Equipment	Table 23	ALWAYS
Image	General Image	Table 24	ALWAYS
	Image Pixel	Table 25	ALWAYS
	SC Image	Table 26	ALWAYS
	SOP Common	Table 18	ALWAYS

Table 20 lists all Attributes that are supported in the General Series Module

Table 20: General Series Modules

Attribute	Tag	Source	Value	Presence	Comments
Modality	(0008,0060)	AUTO	MR DOC SR	ALWAYS	
Series Instance UID	(0020,000E)	AUTO	Unique identifier of the series.	ALWAYS	
Series Number	(0020,0011)	AUTO	Refer **Table *21*: Series Number for Different results** for details on the series number value for different result types	ALWAYS	
Series Date	(0008,0021)	AUTO	Date when series is created	ALWAYS	
Series Time	(0008,0031)	AUTO	Time when series is created	ALWAYS	
Performing Physician's Name	(0008,1050)	AUTO	Copied from input image	ANAP	
Protocol Name	(0018,1030)	AUTO	Copied from input image	ANAP	
Series Description	(0008,103E)	AUTO	Refer **Table *22*: Series Description for Different results**for details on the series number value for different result types	ALWAYS	
Body Part Examined	(0018,0015)	AUTO	Copied from input image	ANAP	
Patient Position	(0018,5100)	AUTO	Copied from input image	ANAP	
Performed Procedure Step Start Date	(0040,0244)	AUTO	Date when series is created	ANAP	
Performed Procedure Step Start Time	(0040,0245)	AUTO	Time when series is created	ANAP	

Attribute	Tag	Source	Value	Presence	Comments
Request Attributes Sequence	(0040,0275)	AUTO	Copied from input image	ANAP	

Table 21: Series Number for Different results

Result Type	Series Number
Encapsulated PDF - Morphometry & WMH	2006
Encapsulated PDF - Morphometry alone	2006
Morphometry Fused Deviation Map in Coronal Orientation	2017
Morphometry Fused Deviation Map in Sagittal Orientation	2004
Morphometry Fused Deviation Map in Transversal Orientation	2018
Morphometry Fused Label Map in Coronal Orientation	2015
Morphometry Fused Label Map in Sagittal Orientation	2003
Morphometry Fused Label Map in Transversal Orientation	2016
MPRAGE Morphometry Pure Deviation Map	2002
MPRAGE Morphometry Pure Label Map	2001
Secondary Capture Results - Morphometry & WMH	2005
Secondary Capture Results - Morphometry alone	2005
Structured Report Results - Morphometry & WMH	2012
Structured Report Results - Morphometry alone	2012
WMH Fused Label Map in Coronal Orientation	2010
WMH Fused Label Map in Sagittal Orientation	2023
WMH Fused Label Map in Transversal Orientation	2024
WMH Fused Progression in Coronal Orientation	2021
WMH Fused Progression in Sagittal Orientation	2013
WMH Fused Progression in Transversal Orientation	2022
WMH Pure Label Map	2009
WMH Pure Progression	2014
WMH Registered FLAIR	2008

Table 22: Series Description for Different results

Result Type	Series Description
Encapsulated PDF - Morphometry & WMH	AIRC Brain MR - PDF Report
Encapsulated PDF - Morphometry alone	AIRC Brain MR - PDF Report
Morphometry Fused Deviation Map in Coronal Orientation	AIRC Brain MR - Fused Deviation Morpho Coronal
Morphometry Fused Deviation Map in Sagittal Orientation	AIRC Brain MR - Fused Deviation Morpho Sagittal
Morphometry Fused Deviation Map in Transversal Orientation	AIRC Brain MR - Fused Deviation Morpho Transversal

Result Type	Series Description
Morphometry Fused Label Map in Coronal Orientation	AIRC Brain MR - Fused Label Morpho Coronal
Morphometry Fused Label Map in Sagittal Orientation	AIRC Brain MR - Fused Label Morpho Sagittal
Morphometry Fused Label Map in Transversal Orientation	AIRC Brain MR - Fused Label Morpho Transversal
MPRAGE Morphometry Pure Deviation Map	AIRC Brain MR - Deviation Map Morpho
MPRAGE Morphometry Pure Label Map	AIRC Brain MR - Label Map Morpho
Secondary Capture Results - Morphometry & WMH	AIRC Brain MR - Report
Secondary Capture Results - Morphometry alone	AIRC Brain MR - Report
Structured Report Results - Morphometry & WMH	AIRC Brain MR - SR
Structured Report Results - Morphometry alone	AIRC Brain MR - SR
WMH Fused Label Map in Coronal Orientation	AIRC Brain MR - Fused Label WMH Coronal
WMH Fused Label Map in Sagittal Orientation	AIRC Brain MR - Fused Label WMH Sagittal
WMH Fused Label Map in Transversal Orientation	AIRC Brain MR - Fused Label WMH Transversal
WMH Fused Progression in Coronal Orientation	AIRC Brain MR - Fused Progression WMH Coronal
WMH Fused Progression in Sagittal Orientation	AIRC Brain MR - Fused Progression WMH Sagittal
WMH Fused Progression in Transversal Orientation	AIRC Brain MR - Fused Progression WMH Transversal
WMH Pure Label Map	AIRC Brain MR - Label WMH
WMH Pure Progression	AIRC Brain MR - Progression WMH
WMH Registered FLAIR	AIRC Brain MR - Registered FLAIR WMH

Table 23 lists all Attributes that are supported in the SC Equipment Module

Table 23: SC Equipment Modules

Attribute	Tag	Source	Value	Presence	Comments
Conversion Type	(0008,0064)	AUTO	SYN	ALWAYS	Synthetic Image

Table 24 lists all Attributes that are supported in the General Image Module

Table 24: General Image Modules

Attribute	Tag	Source	Value	Presence	Comments
Instance Number	(0020,0013)	AUTO		ALWAYS	
Patient Orientation	(0020,0020)	AUTO	Copied from input image.	ANAP	
Content Date	(0008, 0023)	AUTO	Date when the instance is created.	ALWAYS	

Attribute	Tag	Source	Value	Presence	Comments
Content Time	(0008,0033)	AUTO	Time when the instance is created.	ALWAYS	
Image Type	(0008,0008)	AUTO	Refer Table 33	ALWAYS	

Table 25 lists all Attributes that are supported in the Image Pixel Description Macro Attributes

Table 25: Image Pixel Description Macro Attributes

Attribute	Tag	Source	Value	Presence	Comments
Samples per Pixel	(0028,0002)	AUTO	1 or 3	ALWAYS	
Photometric Interpretation	(0028,0004)	AUTO	MONOCHROME2 or RGB	ALWAYS	
Planar Configuration	(0028,0006)	AUTO	0 or 1	ANAP	
Rows	(0028,0010)	AUTO		ALWAYS	
Columns	(0028,0011)	AUTO		ALWAYS	
Bits Allocated	(0028,0100)	AUTO	8	ALWAYS	
Bits Stored	(0028,0101)	AUTO	8	ALWAYS	
High Bit	(0028,0102)	AUTO	7	ALWAYS	
Pixel Representation	(0028,0103)	AUTO	0	ALWAYS	
Pixel Data	(7FE0,0010)	AUTO	A data stream of the pixel samples that comprise the Image	ALWAYS	

Table 26 lists all Attributes that are supported in the SC Image Module

Table 26: SC Image Modules

Attribute	Tag	Source	Value	Presence	Comments
Date of Secondary Capture	(0018,1012)	AUTO	The date the Secondary Capture Image was captured.	ALWAYS	
Time of Secondary Capture	(0018,1014)	AUTO	The time the Secondary Capture Image was captured.	ALWAYS	
Pixel Spacing	(0028,0030)	AUTO	Copied from input image	ANAP	

8.1.1.3 Encapsulated PDF

Table 27: Encapsulated PDF Storage IOD Modules

Information Entity	Module	Reference	Presence of Module
Patient	Patient	Table 11	ALWAYS
Study	General Study	Table 12	ALWAYS
	Patient Study	Table 13	ALWAYS
Series	Encapsulated Document Series	Table 28	ALWAYS
Equipment	General Equipment	Table 15	ALWAYS
	SC Equipment	Table 23	ALWAYS
Encapsulated Document	Encapsulated Document	Table 29	ALWAYS
	SOP Common	Table 18	ALWAYS

Table *28* lists all Attributes that are supported in the Encapsulated Document Series Module

Table 28: Encapsulated Document Series Modules

Attribute	Tag	Source	Value	Presence	Comments
Modality	(0008,0060)	AUTO	DOC	ALWAYS	Document Type
Series Instance UID	(0020,000E)	AUTO	Unique identifier of the Series.	ALWAYS	
Series Number	(0020,0011)	AUTO	Refer **Table *21*: Series Number for Different results** for details on the series number value for different result types	ALWAYS	

Table *29* lists all Attributes that are supported in the Encapsulated Document Module

Table 29: Encapsulated Document Modules

Attribute	Tag	Source	Value	Presence	Comments
Instance Number	(0020,0013)	AUTO		ALWAYS	
Content Date	(0008,0023)	AUTO	The date on which the document is generated	ALWAYS	
Content Time	(0008,0033)	AUTO	The time on which the document is generated	ALWAYS	
Acquisition DateTime	(0008,002A)	AUTO	The date and time on which the document is generated	ALWAYS	
Burned In Annotation	(0028,0301)	AUTO	YES	ALWAYS	
Document Title	(0042,0010)	AUTO	BrainMR_PDFReport	EMPTY	
Concept Name Code Sequence	(0040,A043)	AUTO		EMPTY	
MIME Type of Encapsulated Document	(0042,0012)	AUTO	application/pdf	ALWAYS	
Encapsulated Document	(0042,0011)	AUTO	Encapsulated Document stream	ALWAYS	

8.1.1.4 MR Image

Table 30: MR Image Storage IOD Modules

Information Entity	Module	Reference	Presence of Module
Patient	Patient	Table 11	ALWAYS
Study	General Study	Table 12	ALWAYS
	Patient Study	Table 13	ALWAYS
Series	General Series	Table 20	ALWAYS
Frame of Reference	Frame of Reference	Table **31**	ALWAYS
Equipment	General Equipment	Table 15	ALWAYS
Image	General Image	Table 24	ALWAYS
	Image Plane	Table 32	ALWAYS
	Image Pixel	Table 25	ALWAYS
	MR Image		ALWAYS
	SOP Common	Table 18	ALWAYS

Note:

1. Colors superimposed algorithm results are encoded in the following result series for the MR Image Storage (1.2.840.10008.5.1.4.1.1.4) IOD
    1) Morphometry Fused Deviation Map in Coronal Orientation
    2) Morphometry Fused Deviation Map in Sagittal Orientation
    3) Morphometry Fused Deviation Map in Transversal Orientation
    4) Morphometry Fused Label Map in Coronal Orientation
    5) Morphometry Fused Label Map in Sagittal Orientation
    6) Morphometry Fused Label Map in Transversal Orientation
    7) MPRAGE Morphometry Pure Deviation Map
    8) MPRAGE Morphometry Pure Label Map
    9) WMH Fused Label Map in Coronal Orientation
    10) WMH Fused Label Map in Sagittal Orientation
    11) WMH Fused Label Map in Transversal Orientation
    12) WMH Fused Progression in Coronal Orientation
    13) WMH Fused Progression in Sagittal Orientation
    14) WMH Fused Progression in Transversal Orientation
    15) WMH Pure Label Map
    16) WMH Pure Progression
    17) WMH Registered FLAIR

2. The objects deviating the DICOM Standard for the MR Image Storage IOD using the following attribute values are
    1) (0028,0002) Samples per pixel as 3
    2) (0028,0004) Photometric Interpretation as "RGB"
    3) (0028,0100) Bits Allocated as 8

Table 31: Frame of Reference Module Attributes

Attribute	Tag	Source	Value	Presence	Comments
Frame of Reference UID	(0020,0052)	COPY	Copied from source image	ANAP	
Position Reference Indicator	(0020,1040)	COPY	Copied from source image	ANAP	

Table 32: Image Plane Module Attributes

Attribute	Tag	Source	Value	Presence	Comments
Pixel Spacing	(0028,0030)	COPY	Copied from source image	ALWAYS	
Image Orientation (Patient)	(0020,0037)	COPY	Copied from source image	ALWAYS	
Image Position (Patient)	(0020,0032)	COPY	Copied from source image	ALWAYS	
Slice Thickness	(0018,0050)	COPY	Copied from source image	ALWAYS	
Slice Location	(0020,1041)	COPY	Copied from source image	EMPTY	

Table 33: MR Image Module Attributes

Attribute	Tag	Source	Value	Presence	Comments
Image Type	(0008,0008)	AUTO	The value can be any one of the below based on the output image type • DERIVED\SECONDARY\OTHER\DEV\MORPHO • DERIVED\SECONDARY\OTHER\FUSEDMAP\MORPHO\CORONAL • DERIVED\SECONDARY\OTHER\FUSEDMAP\MORPHO\SAGITTAL • DERIVED\SECONDARY\OTHER\FUSEDMAP\MORPHO\TRANSVERSAL • DERIVED\SECONDARY\OTHER\LABEL\MORPHO • DERIVED\SECONDARY\OTHER\WMH\DISTRIBUTION_MAP • DERIVED\SECONDARY\OTHER\WMH\FUSED_DM_WMH\CORONAL • DERIVED\SECONDARY\OTHER\WMH\FUSED_DM_WMH\SAGITTAL • DERIVED\SECONDARY\OTHER\WMH\FUSED_DM_WMH\TRANSVERSAL • DERIVED\SECONDARY\OTHER\WMH\FUSED_PM_WMH\CORONAL • DERIVED\SECONDARY\OTHER\WMH\FUSED_PM_WMH\SAGITTAL • DERIVED\SECONDARY\OTHER\WMH\FUSED_PM_WMH\TRANSVERSAL • DERIVED\SECONDARY\OTHER\WMH\PROGRESSION_MAP_WMH • DERIVED\SECONDARY\OTHER\WMH\REGISTERED_FLAIR	ALWAYS	
Samples per Pixel	(0028,0002)	AUTO	The value can be any one of the below based on the output image type • 3 – In case Photometric Interpretation of the image is RGB • 1 – In case Photometric Interpretation of the image is MONOCHROME2	ALWAYS	
Photometric Interpretation	(0028,0004)	AUTO	The value can be any one of the below based on the output image type • RGB • MONOCHROME2	ALWAYS	

Attribute	Tag	Source	Value	Presence	Comments
Bits Allocated	(0028,0100)	AUTO	The value can be any one of the below based on the output image type • 8 – For all colored images generated by the application • For registered FLAIR series it will be based on the input MPRAGE series.	ALWAYS	
Scan Options	(0018,0022)	AUTO		EMPTY	
MR Acquisition Type	(0018,0023)	AUTO	3D	ALWAYS	

8.1.1.5 Multi-frame True Color Secondary Capture Image

Table 34: Multi-frame True Color Secondary Capture Image IOD Modules

Information Entity	Module	Reference	Presence of Module
Patient	Patient	Table 11	ALWAYS
Study	General Study	Table 12	ALWAYS
	Patient Study	Table 13	ALWAYS
Series	General Series	Table 20	ALWAYS
Equipment	General Equipment	Table 15	ALWAYS
	SC Equipment	Table 23	ALWAYS
Image	General Image	Table 24	ALWAYS
	Image Pixel	Table 25	ALWAYS
	Multi-frame	Table 35	ALWAYS
	Multi-frame Functional Groups	Table 36	ALWAYS
	SC Multi-frame Image	Table 37	ALWAYS
	SC Multi-frame Vector	Table 38	ALWAYS
	SOP Common	Table 18	ALWAYS

Table 35: Multi-frame Module Attributes

Attribute	Tag	Source	Value	Presence	Comments
Number of Frames	(0028,0008)	AUTO	Number of frames in the Multi-frame Image.	ALWAYS	
Frame Increment Pointer	(0028,0009)	AUTO	(0018,2001)	ALWAYS	

Table 36: Multi-frame Functional Groups Module Attributes

Attribute	Tag	Source	Value	Presence	Comments
Shared Functional Groups Sequence	(5200,9229)	AUTO		ALWAYS	
> Pixel Measures Sequence	(0028,9110)	AUTO		ALWAYS	
>> Pixel Spacing	(0028,0030)	AUTO		ALWAYS	
>> Slice Thickness	(0018,0050)	AUTO	1	ALWAYS	
Per-frame Functional Groups Sequence	(5200,9230)	AUTO		ALWAYS	
> Plane Position Sequence	(0020,9113)	AUTO		ALWAYS	
>> Image Position (Patient)	(0020,0032)	AUTO	The x, y, and z coordinates of the upper left hand corner (center of the first voxel transmitted) of the frame, in mm.	ALWAYS	

Attribute	Tag	Source	Value	Presence	Comments
> Plane Orientation Sequence	(0020,9116)	AUTO		ALWAYS	
>> Image Orientation (Patient)	(0020,0037)	AUTO		ALWAYS	

Table 37: SC Multi-frame Image Module Attributes

Attribute	Tag	Source	Value	Presence	Comments
Burned In Annotation	(0028,0301)	AUTO	NO	ALWAYS	
Frame Increment Pointer	(0028,0009)	AUTO	(0018,2001)	ALWAYS	

Table 38: SC Multi-frame Vector Module Attributes

Attribute	Tag	Source	Value	Presence	Comments
Page Number Vector	(0018,2001)	AUTO	List of input series image number from which each frame of this series is derived	ALWAYS	

8.1.1.6 Enhanced Magnetic Resonance (MR) Color Image

Table 39: Enhanced Magnetic Resonance (MR) Color Image IOD Modules

Information Entity	Module	Reference	Presence of Module
Patient	Patient	Table 11	ALWAYS
Study	General Study	Table 12	ALWAYS
	Patient Study	Table 13	ALWAYS
Series	General Series	Table 20	ALWAYS
	MR Series	Table 40	ALWAYS
Frame of Reference	Frame of Reference	Table 41	
Equipment	General Equipment	Table 15	ALWAYS
	Enhanced General Equipment	Table 42	ALWAYS
Image	Image Pixel	Table 25	ALWAYS
	Multi-frame Functional Groups	Table 43	ALWAYS
	Multi-frame Dimension	Table 44	ALWAYS
	Acquisition Context	Table 45	ALWAYS
	Enhanced MR Image	Table 46	ALWAYS
	SOP Common	Table 18	ALWAYS

Table 40: MR Series Module Attributes

Attribute	Tag	Source	Value	Presence	Comments
Modality	(0008,0060)	AUTO	MR	ALWAYS	

Table 41: Frame of Reference Module Attributes

Attribute	Tag	Source	Value	Presence	Comments
Frame of Reference UID	(0020,0052)	AUTO	Unique UID generated by the system	ALWAYS	
Position Reference Indicator	(0020,1040)	AUTO		EMPTY	

Table 42: Enhanced General Equipment Module Attributes

Attribute	Tag	Source	Value	Presence	Comments
Manufacturer	(0008,0070)	AUTO	Siemens Healthineers	ALWAYS	
Manufacturer's Model Name	(0008,1090)	AUTO	AI-Rad Companion Brain MR	ALWAYS	
Device Serial Number	(0018,1000)	AUTO	Concatenated string composed of the AI-Rad Companion system IVK number and teamplay serial number. For example, 11294418-670307	ALWAYS	
Software Versions	(0018,1020)	AUTO	VXXXX where XXXX indicates the used version of AI-Rad Companion Brain MR. For Example: - VA51A.	ALWAYS	

Table 43: Enhanced MR Multi-frame Functional Groups Module Attributes

Attribute	Tag	Source	Value	Presence	Comments
Shared Functional Groups Sequence	(5200,9229)	AUTO		ALWAYS	
> MR Image Frame Type Sequence	(0018,9226)	AUTO		ALWAYS	
>> Frame Type	(0008,9007)	AUTO	DERIVED \ PRIMARY \ VOLUME \ MASKED	ALWAYS	
>> Pixel Presentation	(0008,9205)	AUTO	TRUE_COLOR	ALWAYS	
>> Volumetric Properties	(0008,9206)	AUTO	VOLUME	ALWAYS	
>> Volume Based Calculation Technique	(0008,9207)	AUTO	VOLUME_RENDER	ALWAYS	
>> Complex Image Component	(0008,9208)	AUTO	MAGNITUDE	ALWAYS	
>> Acquisition Contrast	(0008,9209)	AUTO	UNKNOWN	ALWAYS	
Per-frame Functional Groups Sequence	(5200,9230)	AUTO		ALWAYS	
> Derivation Image Sequence	(0008,9124)	AUTO		ALWAYS	
>> Derivation Description	(0008,2111)	AUTO	Images resulting from processing through AIRAD Companion MR extension	ALWAYS	
>> Source Image Sequence	(0008,2112)	AUTO		ALWAYS	
>>> Referenced SOP Class UID	(0008,1150)	AUTO	SOP Class UID of the Input Image	ALWAYS	

Attribute	Tag	Source	Value	Presence	Comments
>>> Referenced SOP Instance UID	(0008,1155)	AUTO	First Image's SOP Instance UID of the Input Image	ALWAYS	
>>> Purpose of Reference Code Sequence	(0040,A170)	AUTO		ALWAYS	
>>>> Code Value	(0008,0100)	AUTO	121322	ALWAYS	
>>>> Coding Scheme Designator	(0008,0102)	AUTO	DCM	ALWAYS	
>>>> Code Meaning	(0008,0104)	AUTO	Source image for image processing operation	ALWAYS	
>> Derivation Code Sequence	(0008,9215)	AUTO		ALWAYS	
>> Code Value	(0008,0100)	AUTO	113076	ALWAYS	
>> Coding Scheme Designator	(0008,0102)	AUTO	DCM	ALWAYS	
>> Code Meaning	(0008,0104)	AUTO	Segmentation	ALWAYS	
>> Frame Content Sequence	(0020,9111)	AUTO		ALWAYS	
>>> Frame Acquisition Date Time	(0018,9074)	AUTO	Date and Time on which the image is generated	ALWAYS	
>>> Stack ID	(0020,9056)	AUTO		ALWAYS	
>>> In-Stack Position Number	(0020,9057)	AUTO		ALWAYS	
>>> Temporal Position Index	(0020,9128)	AUTO		ALWAYS	
>>> Frame Acquisition Number	(0020,9156)	AUTO		ALWAYS	
>>> Dimension Index Values	(0020,9157)	AUTO		ALWAYS	
>> Plane Position Sequence	(0020,9113)	AUTO		ALWAYS	
>>> Image Position (Patient)	(0020,0032)	AUTO		ALWAYS	
>> Plane Orientation Sequence	(0020,9116)	AUTO		ALWAYS	
>>> Image Orientation (Patient)	(0020,0037)	AUTO		ALWAYS	
>> Pixel Measures Sequence	(0028,9110)	AUTO		ALWAYS	
>>> Slice Thickness	(0018,0050)	AUTO		ALWAYS	
>>> Pixel Spacing	(0028,0030)	AUTO		ALWAYS	

Table 44: Multi-frame Dimension Module Attributes

Attribute	Tag	Source	Value	Presence	Comments
Dimension Organization Sequence	(0020,9221)	AUTO		ALWAYS	
>Dimension Organization UID	(0020,9164)	AUTO	Unique UID generated by the system	ALWAYS	
Dimension Index Sequence	(0020,9222)	AUTO		ALWAYS	
>Dimension Organization UID	(0020,9164)	AUTO	Unique UID generated by the system	ALWAYS	
>Dimension Index Pointer	(0020,9165)	AUTO	(0020,9056), (0020,9057)	ALWAYS	
>Functional Group Pointer	(0020,9167)	AUTO	(0020,9111)	ALWAYS	

Table 45: Acquisition Context Module Attributes

Attribute	Tag	Source	Value	Presence	Comments
Acquisition Context Sequence	(0040,0555)	AUTO		EMPTY	

Table 46: Enhanced MR Image Module Attributes

Attribute	Tag	Source	Value	Presence	Comments
Image Type	(0008,0008)	AUTO	Refer Table 33	ALWAYS	
PixelPresentation	(0008,9205)	AUTO	TRUE_COLOR	ALWAYS	
VolumetricProperties	(0008,9206)	AUTO	VOLUME	ALWAYS	
VolumeBasedCalculationTechnique	(0008,9207)	AUTO	VOLUME_RENDER	ALWAYS	
Samples per Pixel	(0028,0002)	AUTO	3	ALWAYS	
Photometric Interpretation	(0028,0004)	AUTO	RGB	ALWAYS	
Bits Allocated	(0028,0100)	AUTO	8	ALWAYS	
Bits Stored	(0028,0101)	AUTO	8	ALWAYS	
High Bit	(0028,0102)	AUTO	7	ALWAYS	
Pixel Representation	(0028,0103)	AUTO	0	ALWAYS	
Refer Table 25: Image Pixel Description Macro Attributes					

8.1.2 Usage of Attributes from Received IODs

NOT APPLICABLE

8.1.3 Attribute Mapping

NOT APPLICABLE

8.1.4 Coerced/Modified Fields

NOT APPLICABLE

8.2 Data Dictionary of Private Attributes

The following tables list all private attributes created by AI-Rad Companion Brain MR which may be included in the generated instances.

Table 47: Private Coded Entry Attributes

Tag	Attribute	Source	Value Type	Presence	Comments
(0021, xxD0)	SIEMENS MR NEURO	AlgoVersion	LO	1	Character string
(0021, xxD1)	SIEMENS MR NEURO	NormativeRangePercentile	DS	1	A decimal string shall contain the characters range between 0-1
(0021, xxD3)	SIEMENS MR NEURO	LMBlendFactor	DS	1	A decimal string shall contain the characters range between 0-1
(0021, xxD4)	SIEMENS MR NEURO	DMBlendFactor	DS	1	A decimal string shall contain the characters range between 0-1
(0021, xx01)	SIEMENS MR SDR 01	CreatorIdentifier	LO	1	Character string
(0021, xx02)	SIEMENS MR SDR 01	ApplicationIdentifier	LO	1	Character string

8.3 Coded Terminology and Templates

8.3.1 Context Groups

This section describes the codes used in the application generated Enhanced SR objects.

Table 48: CID 7021. Measurement Report Document Titles

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
DCM	126000	Imaging Measurement Report

Table 49: CID 7000. Diagnostic Imaging Report Document Titles

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
LN	24590-2	MR Brain

Table 50: CID 4030. CT, MR and PET Anatomy Imaged

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)	Tracking Identifier
SCT	12738006	Brain	Brain_Morpho
SCT	113305005	Cerebellum	CEREBELLUM_GM_WM

Table 51: CID 7140. Brain Structures for Volumetric Measurements

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)	Tracking Identifier
SCT	40146001	Cerebral Gray Matter	CorticalGM
DCM	110701	White Matter T1 Hypointensity	WMAb
SCT	11000004	Caudate nucleus	Caudate R_Caudate L_Caudate
SCT	14738005	Globus pallidus	Pallidum R_Pallidum L_Pallidum
SCT	5366008	Hippocampus	Hippocampus RHippocampus LHippocampus
SCT	66720007	Lateral Ventricle	RVentricle LVentricle
SCT	49841001	Third Ventricle	ThirdVentricle
SCT	35918002	Fourth Ventricle	FourthVentricle
99SHSAIRC	BRAINMR1005	Gray matter of frontal lobe	FRONTAL_LEFT_GM
99SHSAIRC	BRAINMR1006	Gray matter of parietal lobe	PARIETAL_LEFT_GM
99SHSAIRC	BRAINMR1007	Gray matter of occipital lobe	OCCIPITAL_RIGHT_GM OCCIPITAL_LEFT_GM
99SHSAIRC	BRAINMR1008	Gray matter of temporal lobe	TEMPORAL_RIGHT_GM TEMPORAL_LEFT_GM
99SHSAIRC	BRAINMR1009	Cingulate gyrus	CINGULATE_RIGHT_GM CINGULATE_LEFT_GM
RADLEX	RID17001	White matter of frontal lobe	FRONTAL_RIGHT_WM FRONTAL_LEFT_WM
RADLEX	RID17004	White matter of parietal lobe	PARIETAL_RIGHT_WM PARIETAL_LEFT_WM
RADLEX	RID17010	White matter of occipital lobe	OCCIPITAL_RIGHT_WM OCCIPITAL_LEFT_WM
RADLEX	RID17007	White matter of temporal lobe	TEMPORAL_RIGHT_WM TEMPORAL_LEFT_WM
DCM	110702	White Matter T2 Hyperintensity	
RADLEX	RID6384	Periventricular	Periventricular

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)	Tracking Identifier
99SHSAIRC	BRAINMR1010	Juxtacortical	Juxtacortical
RADLEX	RID6381	Infratentorial	Infratentorial
99SHSAIRC	BRAINMR1011	Deep white matter	Deep White Matter

Table 52: CID 7153. CNS Segmentation Types

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)	Tracking Identifier
SCT	389081007	Gray Matter	GM
SCT	389080008	White Matter	WM
SCT	65216001	Cerebrospinal Fluid	CSF
SCT	42695009	Thalamus	Thalamus R_Thalamus L_Thalamus
SCT	89278009	Putamen	Putamen R_Putamen L_Putamen
SCT	36169008	Insula	RINSULA LINSULA
SCT	61962009	Mesencephalon	MESENCEPHALON
RADLEX	RID6728	Pons	PONS
RADLEX	RID6681	Medulla Oblongata	MEDULLA
SCT	88442005	Corpus Callosum	CC_AREA
RADLEX	RID5720	New	NEW
SCT	260376009	Enlarged	ENLARGED

8.3.2 Template Specifications

Table 53: TID 1500 Measurement Report for Comprehensive DICOM SR – AI-Rad Companion Brain MR

Nesting Level	Relationship Type	Value Type	Concept Name	Values	TID
		CONTAINER	EV (126000, DCM, “Imaging Measurement Report”)		1500
>	CONTAINS	CODE	EV (111017, DCM, “CAD Processing and Findings Summary”)	(111242, DCM, "All algorithms succeeded; with findings") (111244, DCM, "Not all algorithms succeeded; with findings") (111245, DCM ,"No algorithms succeeded; without findings")	4001
>	CONTAINS	CODE	EV (111064, DCM, “Summary of Detections”)	(111222, DCM, "Succeeded") (111223, DCM, "Partially Succeeded") (111224, DCM, "Failed")	4000
>>	INFERRED FROM	CONTAINER	EV (111063, DCM, “Successful Detections”)	This is added in case of algorithem successfull run.	4015
>>>	CONTAINS	CODE	EV (111022, DCM, “Detection Performed”)	("BRAINMR1015", "99SHSAIRC", "AI-Rad Companion Brain Morphometry") ("BRAINMR1016", "99SHSAIRC", "AI-Rad Companion White Matter Hyperintensities")	4017
>>>>	HAS PROPERTIES	TEXT	EV ("111001", "DCM", "Algorithm Name")	Morphometry WMH	
>>>>	HAS PROPERTIES	TEXT	EV ("111003", "DCM", "Algorithm Version")	Example : 36.1 4.1.11	
>>	INFERRED FROM	CONTAINER	EV (111025, DCM, “Failed Detections”)	This is added when the algorithem fails.	4015
>>>	CONTAINS	CODE	EV (111022, DCM, “Detection Performed”)	("BRAINMR1015", "99SHSAIRC", "AI-Rad Companion Brain Morphometry") ("BRAINMR1016", "99SHSAIRC", "AI-Rad Companion White Matter Hyperintensities")	
>>>>	HAS PROPERTIES	TEXT	EV ("111001", "DCM", "Algorithm Name")	Morphometry WMH	
>>>>	HAS PROPERTIES	TEXT	EV ("111003", "DCM", "Algorithm Version")	Example : 36.1 4.1.11	
>	CONTAINS	CONTAINER	EV (C0034375, UMLS, “Qualitative Evaluations”)	This container is filled only when there is an algo failure.	1500
>>	CONTAINS	TEXT	EV ("BRAINMR1018", "99SHSAIRC", "Morphometry Failure Reason") And/or		

Nesting Level	Relationship Type	Value Type	Concept Name	Values	TID
			("BRAINMR1017", "99SHSAIRC", "WMH Failure Reason")		
Imaging Measurements					
>	CONTAINS	CONTAINER	EV (126010, DCM, “Imaging Measurements“)		1500
>>		UIDREF	Observation UID[1]	Uniquely generated	SR IOD
Segmentation & Image Quality					
>>	CONTAINS	CONTAINER	EV (125007, DCM, “Measurement Group”)		1411
>>>		UIDREF	Observation UID[1]	Uniquely generated	SR IOD
>>>	HAS OBS CONTEXT	TEXT	DT (112039, DCM, “Tracking Identifier”)	QUALITY_SEGMENTATION	1411
>>>	HAS OBS CONTEXT	UIDREF	EV (112040, DCM, “Tracking Unique Identifier”)	Uniquely generated	1411
>>>	CONTAINS	TEXT	DT(BRAINMR1002, 99SHSAIRC, “Segmentation quality“)	ACCEPTABLE NOT_ACCEPTABLE NOT_ASSESSED	
>>>>		UIDREF	Observation UID[1]	Uniquely generated	SR IOD
>>>	CONTAINS	NUM	DT(111029, DCM, “Image Quality Rating“)	Value ranging from 1 to 10 (1,UCUM,"no units“)	
>>>>		UIDREF	Observation UID[1]	Uniquely generated	SR IOD
>>>>	HAS PROPERTIES	NUM	EV (385524004, SCT, "Normal Range Lower Limit")	Value ranging from 1 to 100 (1,UCUM,"no units“)	312
>>>>>		UIDREF	Observation UID[1]	Uniquely generated	SR IOD
>>>>	HAS PROPERTIES	NUM	EV (371933006,SCT,"Normal Range Upper Limit")	Value ranging from 1 to 100 (1,UCUM,"no units“)	312
>>>>>		UIDREF	Observation UID[1]	Uniquely generated	SR IOD
>>>	HAS PROPERTIES	TEXT	EV (111001, DCM, “Algorithm Name”)	Morphometry	4019
>>>	HAS PROPERTIES	TEXT	EV (111003, DCM, “Algorithm Version”)	36.1	4019
WM Asymmetry quality					
>>	CONTAINS	CONTAINER	EV (125007, DCM, “Measurement Group”)		1411
>>>		UIDREF	Observation UID[1]	Uniquely generated	SR IOD
>>>	HAS OBS CONTEXT	TEXT	DT (112039, DCM, “Tracking Identifier”)	QUALITY_WM_ASYMMETRY	1411
>>>	HAS OBS CONTEXT	UIDREF	EV (112040, DCM, “Tracking Unique Identifier”)	Uniquely generated	1411
>>>	CONTAINS	TEXT	EV(BRAINMR1003, 99SHSAIRC, “WM Asymmetry quality“)	ACCEPTABLE NOT_ACCEPTABLE NOT_ASSESSED	
>>>	HAS PROPERTIES	TEXT	EV (111001, DCM, “Algorithm Name”)	Morphometry	4019

Nesting Level	Relationship Type	Value Type	Concept Name	Values	TID
>>>	HAS PROPERTIES	TEXT	EV (111003, DCM, “Algorithm Version”)	36.1	4019
Image quality analysis					
>>	CONTAINS	CONTAINER	EV (125007, DCM, “Measurement Group”)		1411
>>>		UIDREF	Observation UID[1]	Uniquely generated	SR IOD
>>>	HAS OBS CONTEXT	TEXT	DT (112039, DCM, “Tracking Identifier”)	QUALITY_IMAGE	1411
>>>	HAS OBS CONTEXT	UIDREF	EV (112040, DCM, “Tracking Unique Identifier”)	Uniquely generated	1411
>>>	CONTAINS	TEXT	EV(BRAINMR1001, 99SHSAIRC, “ Image quality analysis”)	ACCEPTABLE NOT_ACCEPTABLE NOT_ASSESSED	
>>>	HAS PROPERTIES	TEXT	EV (111001, DCM, “Algorithm Name”)	Morphometry	4019
>>>	HAS PROPERTIES	TEXT	EV (111003, DCM, “Algorithm Version”)	36.1	4019
Brain Structures & Segmentation Types					
>>	CONTAINS	CONTAINER	EV (125007, DCM, “Measurement Group”)		1411
>>>		UIDREF	Observation UID[1]	Uniquely generated	SR IOD
>>>	HAS OBS CONTEXT	TEXT	DT (112039, DCM, “Tracking Identifier”)	Refer *Table 50: CID 4030. CT, MR and PET Anatomy Imaged* *Table 51: CID 7140. Brain Structures for Volumetric Measurements* *Table 52: CID 7153. CNS Segmentation Types*	1411
>>>	HAS OBS CONTEXT	UIDREF	EV (112040, DCM, “Tracking Unique Identifier”)	Uniquely generated	1411
>>>	HAS CONCEPT MOD	CODE	EV (363698007, SCT, "Finding Site")	Refer *Table 50: CID 4030. CT, MR and PET Anatomy Imaged* *Table 51: CID 7140. Brain Structures for Volumetric Measurements* *Table 52: CID 7153. CNS Segmentation Types*	
>>>>		UIDREF	Observation UID[1]	Uniquely generated	SR IOD
>>>	HAS CONCEPT MOD	CODE	EV(272741003,SCT, "Laterality")	("7771000", "SCT", "Left") ("24028007", "SCT", "Right") ("51440002", "SCT", "Bilateral")	300
>>>>		UIDREF	Observation UID[1]	Uniquely generated	SR IOD
>>>	CONTAINS	UIDREF	EV (121232, DCM, “Source series for segmentation”)	Series Instance UID of the source series.	1411

Nesting Level	Relationship Type	Value Type	Concept Name	Values	TID
>>>	CONTAINS	IMAGE	EV (130401, DCM, "Visual explanation")		1501
>>>>		UIDREF	Observation UID[1]	Uniquely generated	SR IOD
>>>>			ReferencedSOPSequence		
>>>>>		UID	Referenced SOP Class UID		
>>>>>		UID	Referenced SOP Instance UID		
>>>	CONTAINS	NUM	(C25335, NCIt, Volume)	Value ranging from 1 to 100 (ml, UCUM, Milliliter)	
>>>>		UIDREF	Observation UID[1]	Uniquely generated	SR IOD
>>>>>	HAS PROPERTIES	CODE	EV(121402, DCM, "Normality")	(17621005, SCT, Normal) (263654008, SCT, Abnormal)	310 CID 222
>>>>>>		UIDREF	Observation UID[1]	Uniquely generated	SR IOD
>>>>>>	HAS CONCEPT MOD	TEXT	EV(121051, DCM, "Equivalent Meaning of Value")	Text value	1211
>>>>>	HAS PROPERTIES	TEXT	EV(121415, DCM, "Percentile Ranking of measurement")	Text value	310
>>>>>>		UIDREF	Observation UID[1]	Uniquely generated	SR IOD
>>>	CONTAINS	NUM	(RID5046, RADLEX, Atrophy)	Value ranging from 1 to 100 (%, UCUM, Percent)	
>>>>		UIDREF	Observation UID[1]	Uniquely generated	SR IOD
>>>	HAS PROPERTIES	TEXT	EV (111001, DCM, "Algorithm Name")	Morphometry WMH	4019
>>>	HAS PROPERTIES	TEXT	EV (111003, DCM, "Algorithm Version")	36.1 4.1.11	4019
>>>	CONTAINS	TEXT	EV(121106, DCM, "Comment")		
>	HAS CONCEPT MOD	CODE	EV (121049, DCM, "Language of Content Item and Descendants")	("eng", "RFC5646", "English")	1204
>>	HAS CONCEPT MOD	CODE	EV (121046, DCM "Country of Language")	(US,ISO3166_1,"United States")	1204
>	HAS OBS CONTEXT	CODE	EV (121005, DCM, "Observer Type")	(121007,DCM,"Device")	1002
>	HAS OBS CONTEXT	UIDREF	EV (121012, DCM, "Device Observer UID")	Uniquely generated	1004
>	HAS OBS CONTEXT	TEXT	EV (121014, DCM, "Device Observer Manufacturer")	Siemens Healthineers	1004
>	HAS OBS CONTEXT	TEXT	EV (121015, DCM, "Device Observer Model Name")	AI Rad Companion Brain MR	1004
>	HAS CONCEPT MOD	CODE	EV (121058, DCM, "Procedure reported")	(24590-2, LN, "MR Brain")	1500
>	CONTAINS	CONTAINER	EV (111028, DCM, "Image Library")		1600
>>	CONTAINS	CONTAINER	EV (126200, DCM, "Image Library Group")		1600

Nesting Level	Relationship Type	Value Type	Concept Name	Values	TID
>>>	CONTAINS	IMAGE	EV (130401, DCM, "Visual explanation")		1501
>>>>		UIDREF	Observation UID[1]	Uniquely generated	SR IOD
>>>>			ReferencedSOPSequence		
>>>>>		UID	Referenced SOP Class UID		
>>>>>		UID	Referenced SOP Instance UID		
>>>>	HAS ACQ CONTEXT	CODE	EV (121139, DCM, “Modality”)	(MR, DCM, "Magnetic Resonance")	1602
>>>>	HAS ACQ CONTEXT	DATE	EV (111060, DCM, “Study Date”)	Copied from Original image	1602
>>>>	HAS ACQ CONTEXT	TIME	EV (111061, DCM, “Study Time”)	Copied from Original image	1602

Note:

1) Observation UID (0040,A171) is attribute in the representation of that Content Item. Hence relationship type is empty.

8.3.3 Private Code definitions

Table 54: Private Code definitions

Code Value	Code Meaning	Coding Scheme Designator
BRAINMR1001	Image quality analysis	99SHSAIRC
BRAINMR1002	Segmentation quality	99SHSAIRC
BRAINMR1003	WM Asymmetry quality	99SHSAIRC
BRAINMR1004	The four ventricles of the brain	99SHSAIRC
BRAINMR1005	Gray matter of frontal lobe	99SHSAIRC
BRAINMR1006	Gray matter of parietal lobe	99SHSAIRC
BRAINMR1007	Gray matter of occipital lobe	99SHSAIRC
BRAINMR1008	Gray matter of temporal lobe	99SHSAIRC
BRAINMR1009	Cingulate gyrus	99SHSAIRC
BRAINMR1010	Juxtacortical	99SHSAIRC
BRAINMR1011	Deep white matter	99SHSAIRC
BRAINMR1012	Not found	99SHSAIRC
BRAINMR1013	Review status by human	99SHSAIRC
BRAINMR1014	Severity	99SHSAIRC
BRAINMR1015	AI-Rad Companion Brain Morphometry	99SHSAIRC
BRAINMR1016	AI-Rad Companion White Matter Hyperintensities	99SHSAIRC
BRAINMR1017	WMH Failure Reason	99SHSAIRC
BRAINMR1018	Morphometry Failure Reason	99SHSAIRC

8.4 Grayscale Image Consistency

NOT APPLICABLE

8.5 Standard Extended / Specialized / Private SOP Classes

NOT APPLICABLE

8.6 Private Transfer Syntaxes

NOT APPLICABLE

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