SIEMENS

MEMOSKOP-MOD

SP

DICOM Conformance Statement

V 3.0, 24-July-2001

Document ID: 30 99 970-EDS-01S-002

Siemens AG, Medical Solutions
Special Systems Division, D-91050 Erlangen, Germany

Table of Contents

0. Introduction

0.1. Purpose

This DICOM Conformance Statement is written in accordance with Part PS 3.3-1999 of the *Diagnostic Imaging & Communications in Medicine*[1] document.
This conformance statement describes the DICOM Interface of the Memoskop Image Storage System.
The DICOM Interface of the Memoskop Image Storage Systemacts as a File Set Creator, File Set Reader and File Set Updater for the Secondary Capture Image Storage SOP Class of the Media Storage Service Class.

0.2. Definitions, Abbreviations, and Acronyms

AE:	Application Entity.
AP:	Application Profile.
DICOM:	Digital Imaging and Communications in Medicine.
FSC:	File Set Creator.
FSR:	File Set Reader.
FSU:	File Set Updater.
IOD:	Information Object Definition.
MOD:	Magnetic-Optical Disk/Drive 90mm(3.5”).
RWA:	Real-World Activity.
SCP:	Service Class Provider.
SCU:	Service Class User.
SOP:	Service-Object Pair.
UID:	Unique Identifier.
IOD:	Information Object Definition.
MEMOSKOP:	Name of the Image Storage System MEMOSKOP (Type C/C-SUB/FAST) for X-Ray Units

0.3. References

[1] Digital Imaging and Communications in Medicine (DICOM), NEMA PS 3.3-13, 1999

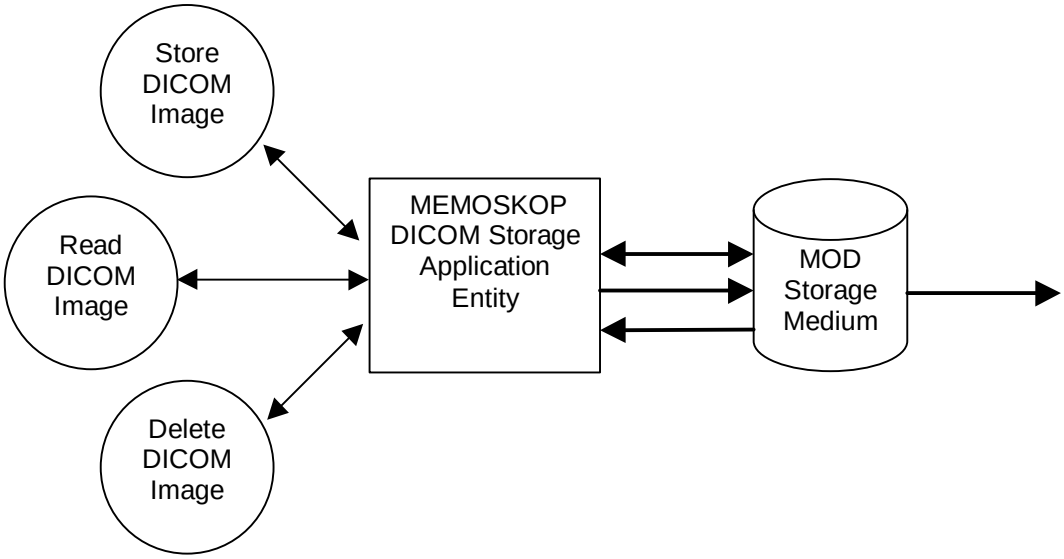
[2] Digital Imaging and Communications in Medicine (DICOM), NEMA Supplement 19 General Purpose CD-R Image Interchange Profile, Final Text, January 28,1997

[3] Digital Imaging and Communications in Medicine (DICOM), NEMA Supplement 27 Media Formats and Physical Media for Data Interchange New and Revised Magneto-Optical Disk Formats, Final Text, Sep 29th, 1997

1 Implementation Model

The MEMOSKOP creates and updates 90mm MOD media with various DICOM SOP instances. It uses the Secondary Capture Image IOD.

1.1 Application Data Flow Diagram



The DICOM Storage Application of the MEMOSKOP can initialize the Media by acting as a FSC to create a new DICOM File-set on a 540MB MOD media. It initializes the DICOM File-set and writes the specified SOP instance on to the MOD. The SOP instances written will be limited to the instances that match the criteria of the Application Profile that is supported. When updating media, a pre-existing File-set will be updated with the selected SOP instances that match the supported Application Profiles.

1.2 Functional Definitions of Application Entities

The device has only one Application Entity: the Memoskop DICOM Storage Application.
The MEMOSKOP can perform these functions:

- It can initialize a piece of media, writing a new DICOM File-set onto the media.
- It can update a piece of media by adding new SOP instances to already existing DICOM File-set.
- It can update a piece of media by deleting SOP instances from a existing DICOM File-Set.
- It can read existing SOP instances from a piece of media

1.3 Sequencing of Real World Activities

There are no sequencing requirements.

1.4 File Meta Information for Implementation Class and Version

Implementation Class UID = ”1.3.12.2.1107.5.12.1”

2 AE Specifications

2.1 MEMOSKOP DICOM Storage Specification

The MEMOSKOP DICOM Storage provides standard conformance to DICOM Interchange Option of the Media Storage Service Class. The Application Profiles are listed in Table 2-1.

Table 2-1 Application Profiles, Activities, and Roles for Memoskop DICOM Storage

Application Profiles Supported	Real World Activity	Role	SC Option
AUG-SIREMOBIL-MOD540	Store DICOM Image	FSC,FSU	Interchange
	Delete DICOM Image	FSU	Interchange
	Read DICOM Image	FSR	Interchange

2.1.1 File Meta Information for the Application Entity

Source Application Entity Title is not used by this application.

2.1.2 Real-World Activities for this Application Entity

2.1.2.1 Real-World Activity: Store DICOM Image

The MEMOSKOP DICOM Storage Application acts as a FSC or FSU when requested to store images on the media.

The MEMOSKOP DICOM Storage Application will write the appropriate SOP Instances to the DICOMDIR on the media. If the DICOMDIR does not exist, one will be automatically created.

Application Profiles for the RWA: Store DICOM Image
For the list of Application Profiles, that invokes this AE for the Store DICOM Image RWA, See Table 2-1. There are no extensions or specialization's.

2.1.2.2 Real World Activity: Delete DICOM Image

The MEMOSKOP DICOM Storage Application acts as FSU when requested to delete images on the media.

The MEMOSKOP DICOM Storage Application will delete the appropriate SOP Instances from the media and update the DICOMDIR accordingly.

Application Profiles for the RWA: Delete DICOM Image
For the list of Application Profiles, that invokes this AE for the Delete DICOM Image RWA, See Table 2-1. There are no extensions or specialization's.

2.1.2.3 Real World Activity: Read DICOM Image

The MEMOSKOP DICOM Storage Application acts as FSR when requested to read images from the media.

The MEMOSKOP DICOM Storage Application will read the appropriate SOP Instances from the media and copy it to the local hard disk. It will reject SOP instances that were not stored by the MEMOSKOP DICOM Storage Application. It will also reject images that do not match the image acquiring frequency set on the local system.

Application Profiles for the RWA: Read DICOM Image
For the list of Application Profiles, that invokes this AE for the Read DICOM Image RWA, See Table 2-1. There are no extensions or specialization's.

3 Augmented and Private Profiles

3.1 Augmented Profiles

The MEMOSKOP DICOM Storage Application supports a single augmented Application Profile AUG-SIREMOBIL-MOD540

3.1.1 AUG-SIREMOBIL-MOD540

This Application Profile is an augmentation of the STD-GEN-CD Standard Application profile defined in DICOM Supplement 19[2]. The augmentations follows the description in DICOM Supplement 27[3] and adds support for the 540MB 90mm MOD.

3.1.1.1 SOP Class Augmentations

The following IODs are part of the AUG-SIREMOBIL-MOD540. There are no requirements or restrictions on SOP options for these IODs beyond those in their standard definitions.

Table 3-1 - IODs and Transfer Syntaxes for AUG-SIREMOBIL-MOD540

Information Object Definition	SOP Class UID	Transfer Syntax	Transfer Syntax UID
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian Uncompressed	1.2.840.10008.1.2.1

Table 3-2 - SC Image IOD Module Table

Information Entity	Module	Usage
Patient	Patient	M
Study [1)]	General Study	M
Series [1)]	General Series	M
Equipment	General Equipment	U
	SC Equipment	M
Image	General Image	M
	Image Pixel	M
	Overlay Plane	U
	Modality LUT	U
	VOI LUT	U
	SOP Common	M

for more details see appendix

[1)] When storing patients to MOD the Study Instance UID, Series Instance UID and SOP Instance UID willl contain the timestamp at which the storage was done. This will result in double patients on the MOD when storing the same patient again because the UID´s mentioned above are not identical.

3.1.1.2 Directory Augmentations

The following type 3 keys change to type 2 in the PATIENT, SERIES and IMAGE directory records. These keys are required to be written using FSC or FSU.

Directory record	Tag	Attribute Name	Type
PATIENT record	(0010,0030)	Patient's Birth Date	2
	(0010,0040)	Patient's Sex	2
SERIES record	(0008,103E)	Series Description	2
IMAGE record	(0008,0008)	Image Type	2

There are no additional directory records, or options as part of this profile. None are required to be written using FSC.

3.1.1.3 Other Augmentations

None.

3.2 Private Profiles

None.

4 Extensions, Specializations, priviatizations of SOP Classes and transfer syntaxes

None.

5 Configuration

The MEMOSKOP DICOM Storage Application has a single MOD-drive configuration.

Table 5-1.Configuration Profiles

Disk Drive	Profile Supported
90mm MOD Drive	AUG-SIREMOBIL-MOD540

5.1 Configurable Parameters

The MEMOSKOP DICOM Interface has no configurable parameters.

6 Character Sets

The MEMOSKOP DICOM Storage Application supports the ISO 8859 Latin 1 (ISO-IR 100) character set as defined in PS3.5 [1].

7 Appendix

7.1 Patient Module Attributes

Attribute Name	Tag	Type	Attribute Description	Memoskop-Setting
Patient's Name	(0010,0010)	2	Patient's full legal name.	as entered on Memoskop patient data mask; includes Lastname and Firstname, separated by ^ (Caret) according to PN-definition;
Patient ID	(0010,0020)	2	Primary hospital identification number or code for the patient.	as entered on Memoskop patient data mask
Patient's Birth Date	(0010,0030)	2	Birth date of the patient.	as entered on Memoskop patient data mask
Patient's Sex	(0010,0040)	2	Sex of the named patient. Enumerated Values are: M = male F = female O = other	as entered on Memoskop patient data mask

7.2 General Study Module Attributes

Attribute Name	Tag	Type	Attribute Description	Memoskop-Setting
Study Instance UID	(0020,000D)	1	Unique identifier for the Study.	See description on side 8
Study Date	(0008,0020)	2	Date the Study started.	Date the Study was created on Imaging System
Study Time	(0008,0030)	2	Time the Study started.	Time the Study was created on Imaging System
Referring Physician's Name	(0008,0090)	2	Patient's referring physician	Length: zero
Study ID	(0020,0010)	2	User or equipment generated Study identifier.	counting value (1 .. n)
Accession Number	(0008,0050)	2	A RIS generated number which identifies the order for the Study.	as entered on Memoskop patient data mask
Study Description	(0008,1030)	3	Institution –generated description or classification of the Study (component) performed.	Complete patient folder 1..n Selected images 1..n

7.3 General Series Module Attributes

Attribute Name	Tag	Type	Attribute Description	Memoskop-Setting
Modality	(0008,0060)	1	Type of equipment that originally acquired the data used to create the images in this Series.	"RF"
Series Instance UID	(0020,000E)	1	Unique identifier of the Series.	See description on side 8
Series Number	(0020,0011)	2	A number that identifies this Series.	Counting value (1 .. n)
Series Date	(0008,0021)	3	Date the Series started.	Date the Series was created on Imaging System
Series Time	(0008,0031)	3	Time the Series started.	Time the Series was created on Imaging System
Series Description	(0008,103E)	3	User provided description of the Series	Native , Sub , Loop, Selected, “NULL”

7.4 General Equipment Module Attributes

Attribute Name	Tag	Type	Attribute Description	Memoskop-Setting
Manufacturer	(0008,0070)	2	Manufacturer of the equipment that produced the digital images.	SIEMENS
Institution Name	(0008,0080	3	Institution where the equipment is located that produced the digital images.	Hospital Name entered on Memoskop
Device Serial Number	(0018,1000)	3	Manufacturer’s serial number of the equipment that produced the digital images.	Serial number of MEMOSKOP
Software Versions	(0018,1020)	3	Manufacturer’s designation of software version of the equipment that produced the digital images.	Software Version of Imaging System

7.5 SC Image Equipment Module Attributes

Attribute Name	Tag	Type	Attribute Description	Memoskop-Setting
Conversion Type	(0008,0064)	1	Describes the kind of image conversion. Defined Terms are DV = Digitized Video DI = Digital Interface DF = Digitized Film WSD = Workstation	"DI"
Modality	(0008,0060)	3	Source equipment for the image.	RF

7.6 General Image Module Attributes

Attribute Name	Tag	Type	Attribute Description	Memoskop-Setting
Image Number	(0020,0013)	2	A number that identifies this image	counter-value (0 .. n)
Patient Orientation	(0020,0020)	2C	Patient direction of the rows and columns of the image. Required if image does not require Image Orientation (0020,0037) and Image Position (0020,0032). See C.7.6.1.1.1 for further explanation.	Length zero
Image Date	(0008,0023)	2C	The date the image pixel data creation started. Required if image is part of a series in which the images are temporally related.	Date the Image was created on Imaging System
Image Time	(0008,0033)	2C	The time the image pixel data creation started. Required if image is part of a series in which the images are temporally related.	Time the Image was created on Imaging System
Image Type	(0008,0008)	3	Image identification characteristics.	ORIGINAL\PRIMARY (for native) DERIVED\PRIMARY (for subtracted)

Image Comments	(0020,4000)	3	User-defined comments about the image.	*)

*) Structure of Image Comments:
Programname\Mode\Imagenumber\LUT\Scenename\Dose\Annotation_MaxRow\Annotation_MaxCol\Annotation_Line1Annotation_Line2....Annotation_LineMaxRow\FlipFlag\P/s

7.7 Image Pixel Module Attributes

Attribute Name	Tag	Type	Attribute Description	Memoskop-Setting
Samples per Pixel	(0028,0002)	1	Number of samples (planes) in this image.	1
Photometric Interpretation	(0028,0004)	1	Specifies the intended interpretation of the pixel data.	MONOCHROME2
Rows	(0028,0010)	1	Number of rows in the image.	512
Columns	(0028,0011)	1	Number of columns in the image	640
Bits Allocated	(0028,0100)	1	Number of bits allocated for each pixel sample. Each sample shall have the same number of bits allocated.	8 (for MOD Storage)
Bits Stored	(0028,0101)	1	Number of bits stored for each pixel sample. Each sample shall have the same number of bits stored.	8
High Bit	(0028,0102)	1	Most significant bit for pixel sample data. Each sample shall have the same high bit.	7
Pixel Representation	(0028,0103)	1	Data representation of the pixel samples. Each sample shall have the same pixel representation. Enumerated Values: 0000H = unsigned integer. 0001H = 2's complement	0000H
Pixel Data	(7FE0,0010)	1	A data stream of the pixel samples which comprise the Image.	raw image pixel data as they were stored on harddisk
Pixel Aspect Ratio	(0028,0034)	1C	Ratio of the real world spacing of the pixels in the image, specified by a numeric pair: row value (delimiter) column value. Required if the aspect ratio is not 1\1 and the Image Plane Module is not applicable to this Image.	10\11 (with 50 Hz) 100\91 (with 60 Hz)

7.8 Overlay Plane Module Attributes

Attribute Name	Tag	Type	Attribute Description	Memoskop-Setting
Rows	(6000,0010)	1	Number of rows in Overlay.	512
Columns	(6000,0011)	1	Number of columns in Overlay.	640
Overlay Type	(6000,0040)	1	Indicates whether this overlay represents a region of interest or other graphics. Enumerated Values: G = Graphics R = ROI.	G
Origin	(6000,0050)	1	Location of first overlay point with respect to pixels in the image, given as row and column.	1,1
Bits Allocated	(6000,0100)	1	Number of bits allocated in the overlay	1
Bit Position	(6000,0102)	1	Bit in which overlay is stored	0
Overlay Data	(6000,3000)	1C	Overlay data shall be contained in this Attribute or imbedded with the image pixel data in Group 7FE0. Required if overlay data are in this Group. See C.9.2.1.1 for further explanation	as displayed on MEMOSKOP

7.9 Modality LUT Module Attributes

Attribute Name	Tag	Type	Attribute Description	Memoskop-Setting
Modality LUT Sequence	(0028,3000)	3	Defines a sequence of Modality LUTs.	add currently active Memoskop-Display-LUT for single image storage; for storage of whole patient image-set use the linear Display-LUT
>LUT Descriptor	(0028,3002)	1C	Specifies the format of the LUT Data in this Sequence. See C.11.1.1 for further explanation. Required if the Modality LUT Sequence(0028,3000) is sent.	add currently active Memoskop-Display-LUT for single image storage; for storage of whole patient image-set use the linear Display-LUT
>LUT Explanation	(0028,3003)	3	Free form text explanation of the meaning of the LUT.	add currently active Memoskop-Display-LUT for single image storage; for storage of whole patient image-set use the linear Display-LUT
>Modality LUT Type	(0028,3004)	1C	Specifies the output values of this Modality LUT. See C.11.1.1 for further explanation. Required if the Modality LUT Sequence(0028,3000) is sent.	add currently active Memoskop-Display-LUT for single image storage; for storage of whole patient image-set use the linear Display-LUT
>LUT Data	(0028,3006)	1C	LUT Data in this Sequence. If padding is required to complete a full word, the padding value shall be 0. Required if the Modality LUT Sequence(0028,3000) is sent.	add currently active Memoskop-Display-LUT for single image storage; for storage of whole patient image-set use the linear Display-LUT

7.10 VOI LUT Module Attributes

Attribute Name	Tag	Type	Attribute Description	Memoskop-Setting
Window Center	(0028,1050)	3	Window Center for display.	128
Window Width	(0028,1051)	1C	Window Width for display. Required if Window Center (0028,1050) is sent.	255 MSFAST 256 MEMOSKOP C/C-SUB

7.11 SOP Common Module Attributes

Attribute Name	Tag	Type	Attribute Description	Memoskop-Setting
SOP Class UID	(0008,0016)	1	Uniquely identifies the SOP Class.	"1.2.840.10008.5.1.4.1.1.7"
SOP Instance UID	(0008,0018)	1	Uniquely identifies the SOP Instance.	"1.3.12.2.1107.5.12.1.serial_number.YYYYMMDDhhmmssnnnnnn" see also description on side 8
Specific Character Set	(0008,0005)	1C	Character Set that expands or replaces the Basic Graphic Set . Required if an expanded or replacement character set is used.	ISO_IR 100
Instance Creation Date	(0008,0012)	3	Date the SOP Instance was created.	Storage Date to MOD
Instance Creation Time	(0008,0013)	3	Time the SOP Instance was created.	Storage Time to MOD
Instance Creator UID	(0008,0014)	3	Uniquely identifies device which created the SOP Instance.	"1.3.12.2.1107.5.12.1"