Philips Medical Systems

DICOM

Conformance Statement

DSI R 5.2.3

Document Number **4522 220 87251**

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1. INTRODUCTION

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

1.1.   Scope and Field of Application

The scope of this DICOM Conformance Statement is to facilitate data exchange with equipment of Philips Medical Systems. This document specifies the compliance to the DICOM standard (formally called the NEMA PS 3.X standards). It contains a short description of the applications involved and provides technical information about the data exchange capabilities of the equipment. The main elements describing these capabilities are: the supported DICOM Service Object Pair (SOP) Classes, Roles, Information Object Definitions (IOD) and Transfer Syntaxes.

The field of application is the integration of the Philips Medical Systems equipment into an environment of medical devices. This Conformance Statement should be read in conjunction with the DICOM standard and its addenda [DICOM].

1.2.   Intended Audience

This Conformance Statement is intended for:

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

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

1.3.   Contents and Structure

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

1.4.   Used Definitions, Terms and Abbreviations

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

1.5.   References

1.5.1. [DICOM]   The Digital Imaging and Communications in Medicine

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

1.6.   **Important Note to the Reader**

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

➢   **Interoperability**

Interoperability refers to the ability of application functions, distributed over two or more systems, to work successfully together. The integration of medical devices into a IT environment may require application functions that are not specified within the scope of DICOM. Consequently, using only the information provided by this Conformance Statement does not guarantee interoperability of Philips equipment with non-Philips equipment.

It is the user's responsibility to analyze thoroughly the application requirements and to specify a solution that integrates Philips equipment with non-Philips equipment.

➢   **Validation**

Philips equipment has been carefully tested to assure that the actual implementation of the DICOM interface corresponds with this Conformance Statement.

Where Philips equipment is linked to non-Philips equipment, the first step is to compare the relevant Conformance Statements. If the Conformance Statements indicate that successful information exchange should be possible, additional validation tests will be necessary to ensure the functionality, performance, accuracy and stability of image and image related data. It is the responsibility of the user (or user's agent) to specify the appropriate test suite and to carry out the additional validation tests.

➢   **New versions of the DICOM Standard**

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

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

1.7.   **General Acronyms and Abbreviations.**

The following acronyms and abbreviations are used in the document.

- ➢ AE Application Entity
- ➢ ACR American College of Radiology
- ➢ ANSI American National Standard Institute
- ➢ CD-R CD Recordable
- ➢ DICOM Digital Imaging and Communication in Medicine
- ➢ DIMSE DICOM Message Service Element
- ➢ DIMSE-C DICOM Message Service Element-Composite
- ➢ DIMSE-N DICOM Message Service Element-Normalized
- ➢ ELE Explicit VR Little Endian
- ➢ EBE Explicit VR Big Endian
- ➢ GUI Graphic User Interface
- ➢ HIS Hospital Information System
- ➢ HL7 Health Level Seven
- ➢ ILE Implicit VR Little Endian
- ➢ IOD Information Object Definition
- ➢ ISIS Information System - Imaging System
- ➢ NEMA National Electrical Manufacturers Association
- ➢ PDU Protocol Data Unit
- ➢ RIS Radiology Information System
- ➢ RWA Real World Activity
- ➢ SC Secondary Capture
- ➢ SCP Service Class Provider
- ➢ SCU Service Class User
- ➢ SOP Service Object Pair
- ➢ TCP/IP Transmission Control Protocol/Internet protocol
- ➢ UID Unique Identifier
- ➢ WLM Worklist Management
- ➢ PACS Picture Archiving Communication System
- ➢ ATR Automatic Text Recognition

2. IMPLEMENTATION MODEL

The DSI (Digital Spot Imaging) is a digital fluorography modality. It is part of an X-ray system. The main functions are:

➢ image acquisition and display
➢ image review and processing
➢ image handling, storage and networking,
➢ administration of patient, physician and examination data.

The main application areas are:

➢ R/F examinations
➢ vascular and non-vascular examinations
➢ angiography and tomography examinations
➢ interventional procedures

DSI Release 5.2.3 contains a DICOM Export function (to transfer DSI image data to a remote system) and a DICOM RIS interface (to retrieve an up-to-date Worklist from Radiology Information System). This Conformance Statement contains information about the DSI 5.2.3. For the combination of a DSI 5.2.3 with an EV (this is the DSI pro version) see the DSI pro Conformance Statement.
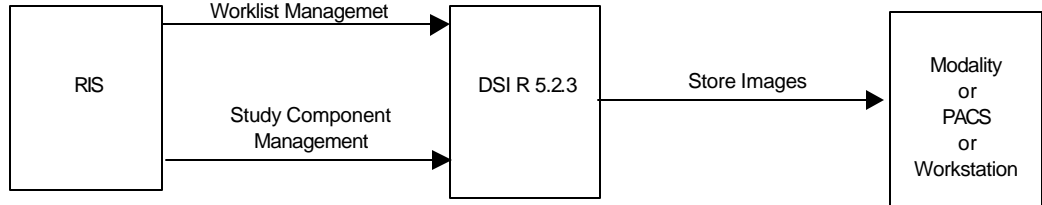

Figure 1.   **DSI R 5.2.3 in a DICOM network**

2.1.　　　　**Application Data Flow Diagram**

The DSI contains one Application Entity able to export DICOM images and handle Modality Worklists. The related Implementation Model is shown in Figure 2.
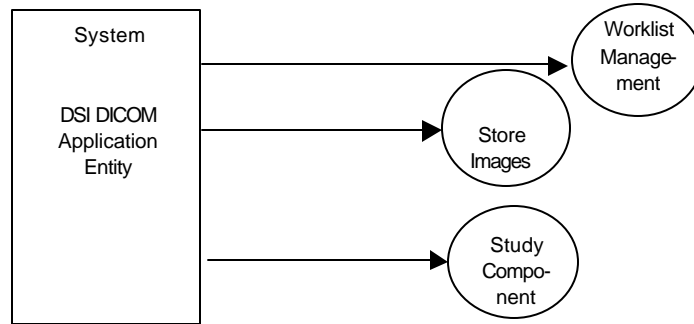
Figure 2.　　　　　**Implementation Model DSI R 5.2.3**

As documented in the PS 3.4, the arrows in the diagram on the previous page have the following meanings:

- An arrow pointing to the right indicates the local application entity initiates an association.

The DSI DICOM Export transfers a complete examination to a remote DICOM node. The transfer of a subset of images in an examination is possible. During the DICOM store operation it is possible to perform a cancel operation on the store.
Image data to be transferred are instances of the DICOM X-Ray Radiofluoroscopic (RF) or Secondary Capture (SC) classes. The following cases can be distinguished:

- The system is configured to supports both RF and SC classes.
  Result will be that all fluoroscopy and exposure images are exported as RF images and all other images (like external video) as SC images.
- I the system is configured to support SC class only. Result will be that all images are exported as SC images.
- If SCP system doesn't support RF images, the images are exported as SC images.

2.2.   Functional definition of Application Entities

2.2.1. DSI DICOM AE

The DSI DICOM Application Entity acts as a Service Class User (SCU) of the Storage Service Class. After invoking it will open an Association to the remote system. For each image to be transported a retrieve action from the DSI storage will take place followed by the conversion to a DICOM message to be transferred to the remote system.

The DSI DICOM Application Entity acts also as a Service Class User (SCU) of the Basic Worklist Management Service Class and the Study Component Management Service Class. After invoking it will open an Association to the remote system (usually a RIS) to request for the up-to-date modality Worklist.

2.3.   Sequencing of Real World Activities

The Request for Worklist should be done first, before a Study Component can be created.

Then the generated images may be exported. However, export of DICOM images is also possible without the Worklist and Study Component activities.

3. AE SPECIFICATIONS

DSI contains one Application Entity.

3.1. DSI DICOM AE

The DSI DICOM Application Entity provides Standard Conformance to the following DICOM 3.0 SOP classes as an SCU specified in Table 1.

Table 1. Supported SOP Classes as SCU by the DSI DICOM AE

SOP Class Name	UID
Secondary Capture Image Storage	1.2.840.10008.5.2.1.4.1.1.7
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2
Modality Worklist Information Model - FIND	1.2.840.10008.5.2.1.4.31
Study Component Management	1.2.840.10008.3.1.2.3.2

The DSI DICOM Application Entity does not support DICOM 3.0 SOP classes as a SCP.

3.1.1. Association Establishment Policies

3.1.1.1.   General

The maximum PDU size of DSI is fixed on 16K (is 16384 bytes). See also the important remark about the PDU size of the remote systems in chapter 6.

3.1.1.2.   Number of Associations

DSI will attempt to establish two Associations at a time. One Association for storage and one to receive the Worklist. DSI does not accept Associations.

3.1.1.3.   Asynchronous Nature

DSI does not support asynchronous operations and will not perform asynchronous window negotiation.

3.1.1.4.   Implementation Identifying Information

THE IMPLEMENTATION CLASS UID:	1.3.46.670589.6.1.1.5.2.3
THE IMPLEMENTATION VERSION NAME:	"DSI R523,021023"

3.1.2. Association Acceptance Policy

DSI initiates Associations as a result of the following events:
- The DSI operator requests for DICOM export, see section 3.1.2.1 on page 8;
- The DSI operator requests for the DSI Worklist, see section 3.1.2.2 on page 18;
- The DSI operator has selected a Worklist item from the received DSI Worklist
    (i.e. an examination to perform).

3.1.2.1. Export from DSI system

3.1.2.1.1. Associated Real-World Activity

The DSI operator is able to request for export of one examination or a list of examinations to a remote system. The complete examination or a subset is transferred to the remote system.

The DSI DICOM Export function will be accessible through the DSI F2 Copy page. With the F4 Config page the remote DICOM system is selected from a list of maximum of five configurable nodes.

The current transfer can be aborted by the DSI F2 Cancel function. DSI can't abort during exporting an image, the system will abort the job after the image is export correctly.
After the transfer the Association is released.

3.1.2.1.2. Proposed Presentation Contexts

DSI will propose the following presentation contexts:

Table 2.   **Proposed Presentation Contexts at Image Export**

Abstract Syntax Name	UID	Transfer Syntax	UID List	Role	Ext. Neg.
Secondary Capture Image Storage	1.2.840.10008.5.2.1.4.1.1.7	ILE ELE	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU SCU	None None
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	ILE ELE	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU SCU	None None

3.1.2.1.3. SOP Specific Conformance to Storage SOP Classes

DSI provides standard conformance.

Extended negotiation is not supported.

During the DICOM export of an exposure or fluoroscopy image as RF image the following image processing is performed by DSI: video invert, subtraction, pixel shift.

During the DICOM export of an exposure or fluoroscopy image as SC image the following image processing is performed by DSI: video invert, contrast, brightness, edge enhancement, subtraction, pixel shift.
During the DICOM export of an external video image as SC image the following image processing is performed by DSI: video invert, contrast, brightness, edge enhancement.

In case of a subtracted run the DICOM Export first stores the mask image, followed by the subtracted images from that run. No explicit indication is sent with the subtracted images, as to which image was used as the mask image. The image number in the run can be used as an implicit indication.

Other remarks:
- Images shown zoomed on the DIS are exported as normal (i.e. non zoomed) images. Annotations on zoomed images are not sent. DSI annotations on normal images are exported as Image Comments.
- The images are intended for viewing purpose only.

- The compatibility of image data re-imported (by media exchange) of the exported DICOM image data in an earlier stage is not defined.
- DSI logs certain events related to the DICOM export at three different levels, see the service manual of the DSI system.
- Measurement data is not exported.

During the selection and export of an examination, the user interface shows the status:
- Export flag   examination flagged for DICOM export
- Export busy   examination being exported
- Export done   examination exported successfully
- Export error   error while exporting examination
- Export cancel export of examination being cancelled
- Not exported   export of examination cancelled

DSI will stop the transfer of the image data and release the Association as soon as it receives an unsuccessful or warning C-STORE Response status, or when the Association is aborted by the remote system. The reason will logged, the user interface of the DSI console will show the status "Export Error".

If a RIS connection is present, Patient and Study related information will be retrieved by DSI from the RIS and will be put in the image headers of the exported images.

The UIDs in the composite images are generated when the related Study, Series and Image are created. The Image UIDs will be different if processing took place. The Study UID may be retrieved from the RIS via the Worklist

3.1.2.1.3.1.   .**Overview of the applied X-Ray Fluoroscopy (RF) Image IOD**

Table 3-3 lists the applied optional modules and attributes in the RF images.

Table 3.   App**lied optional** M**odules and Attributes of the RF Image IOD**

IE	Module	Conditional Attributes	Optional Attributes
Patient	Patient		-
Study	General Study		Study Description
Series	General Series	Laterality.	Series Date, Series Time, Performing Physician's Name, Protocol Name
Equipment	General Equipment		Institution Name, Station Name, Manufacturer's Model name, Device Serial Number, Software Version(s)
Image	General Image Image Pixel Display Shutter (applied optional Module) X-Ray Image X-Ray Acquisition VOI LUT (applied optional Module) SOP Common	Image Date, Image Time, Patient Orientation Shutter Left Vertical Edge, Shutter Right Vertical Edge, Shutter Upper Horizontal Edge, Shutter Lower Horizontal Edge, Center of Circular Shutter, Radius of Circular Shutter. Exposure Window Width	Acquisition Date, Acquisition Time, Acquisition Number, Image Comments - - - - Window Center Specific Character Set

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The modules selected from the IOD module table of DICOM 3.0 are given in the table below.

Table 4.   Applied Modules in the RF IOD

Information Entity	Module
Patient	Patient
Study	General Study
Series	General Series
Equipment	General Equipment
Image	General Image Image Pixel Display Shutter X-Ray Image X-Ray Acquisition VOI LUT SOP Common

The details of these applied modules are given in the tables in Annex 2.

3.1.2.1.3.2.   Overview of the applied Secondary Capture (SC) Image IOD

Table 3-16 lists the applied optional modules and attributes in the SC images.

Table 5.   Applied optional Modules and Attributes of the SC Image IO

IE	Module	Conditional Attributes	Optional Attributes
Patient	Patient		-
Study	General Study		Study Description
Series	General Series	Laterality	Series Date, Series Time, Performing Physician's Name, Protocol Name
Equipment	SC Equipment		Secondary Capture Device Manufacturer, Secondary Capture Device Manufacturer's Model Name, Secondary Capture Software Version(s)
Image	General Image Image Pixel SC Image SOP Common	Image Date, Image Time, Patient Orientation.	Acquisition Date, Acquisition Time, Acquisition Number, Image Comments - Date of Secondary Capture, Time of Secondary Capture Specific Character Set

The modules selected from the IOD module table of DICOM 3.0 are given in the table below.

Table 6.   Applied Modules in the SC IOD

Information Entity	Module
Patient	Patient
Study	General Study
Series	General Series
Equipment	SC Equipment

Information Entity	**Module**
Image	General Image
	Image Pixel
	SC Image
	VOI LUT
	SOP Common

The details of these applied modules are given in the tables in Annex 1.

3.1.2.2. Request for a Modality Worklist

3.1.2.2.1. Associated Real-World Activity

This DSI function will be triggered at request of the operator. An Association will be set-up to the pre-configured remote system (the RIS). After receiving the Worklist the Association is released.

3.1.2.2.2. Proposed Presentation Contexts

DSI will propose the following presentation contexts:

Table 7.   **Proposed Presentation Contexts for Request for Modality Worklist**

Abstract Syntax Name	UID	Transfer Syntax	UID List	Role	Ext. Neg.
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	ILE ELE	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU SCU	None None

3.1.2.2.3. SOP Specific Conformance to Modality Worklist Management

DSI provides standard conformance.

No optional Matching keys are supported (i.e. no optional Matching Keys will be present in the C-FIND Requests).

No optional Return Keys are supported (i.e. no optional Return Keys will be present in the C-FIND Requests).

If more than 42 worklist items are received (via C-FIND Responses) as result of a worklist request, DSI will cancel the request by sending a C-CANCEL-FIND Request.

The status of the C-FIND Responses (Success, Refused, Error, Warning) is logged. Only general status messages are displayed on the user interface, like "RIS not responding" and "No patient available from RIS".

The following non-printable characters (hexa-decimal coded) are not supported in the received Worklist data:
- 00H through 1FH,
- 7FH
- 80H through 9FH,
- A0H, A6H, A8H, A9H, AAH, AEH
- B1H, B4H, B8H, B9H, BEH
- C0H, C1H, C2H, C3H, C8H, CAH, CBH, CCH, CDH, CEH, CFH
- D0H. D2H, D3H, D4H, D5H, D9H, DAH, DBH, DDH, DEH
- E3H
- F0H, F5H, FDH, FEH

If one or more of these non-printable characters are present in the strings of received Worklist data, the string is not accepted. If non-printable characters are present in the Patient Name or if this attribute is empty, the worklist entry is not accepted. In case the Patient Name only contains spaces, this Worklist entry and all succeeding Worklist entries will be skipped.

DSI is able to retrieve the modality Worklist from a RIS. This is done at request of the operator. From the received list a selection of one Worklist item is made; the examination to be performed.
After selecting a Worklist item, the RIS is informed about this creation of the study component.
The DSI can only display a maximum of 42 patients in the worklist. When the system receive more then 42 patients in the worklist the system acts as a FIFO system (First In First Out), so information about the first patient in the worklist is lost.

This chapter specifies in detail the applied attributes in the C-FIND Service Element of this supported SOP Class.

Table 8.   Modality Worklist Information Model - Patient Identification Module

Attribute Name	Tag	Note
Patient's Name	0010,0010	
Patient ID	0010,0020	

Table 9.   Modality Worklist Information Model - Patient Demographic Module

Attribute Name	Tag	Note
Patient's Birth Date	0010,0030	
Patient's Sex	0010,0040	

Table 10.   Modality Worklist Information Model - Scheduled Procedure Step Module

Attribute Name	Tag	Note
Scheduled Procedure Step Sequence	0040,0100	
>Modality	0008,0060	Can be used as matching key.
>Scheduled Station AE Title	0040,0001	Can be used as matching key.
>Scheduled Procedure Step Start Time	0040,0003	
>Scheduled Performing Physician's Name	0040,0006	
>Scheduled Procedure Step Description	0040,0007	

Table 11.   Modality Worklist Information Model - Requested Procedure Module

Attribute Name	Tag	Note
Study Instance UID	0020,000D	
Requested Procedure Code Sequence	0032,1064	

Table 12.   Modality Worklist Information Model - Imaging Service Request Module

Attribute Name	Tag	Note
Accession Number	0008,0050	
Referring Physician's Name	0008,0090	

3.1.2.3. Create a Study Component

3.1.2.3.1. Associated Real-World Activity

This DSI function will be triggered when a Worklist item is selected, i.e. a Study Component will be created. An Association will be set-up to the pre-configured remote system (usually a RIS). After informing the remote system about the created Study Component, the Association is released.

3.1.2.3.2. Proposed Presentation Contexts

DSI will propose the following presentation contexts:

Table 13. Proposed Presentation Contexts for Create a Study Component

Abstract Syntax Name	UID	Transfer Syntax	UID List	Role	Ext. Neg.
Study Component Management SOP Class	1.2.840.10008.3.1.2.3.2	ILE ELE	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU SCU SCU	None None None

3.1.2.3.3. SOP Specific Conformance to Study Component Management

DSI provides standard conformance.

Only the N-CREATE Service Element is used (as SCU), so no use of the N-GET and N-SET Service Elements.

No optional attributes are applied in the N-CREATE Service Element. The Specific Character Set (conditional in DICOM) will always be present.

The status of the DIMSE Responses (Success, Refused, Error, Warning) is logged. No status messages are displayed on the user interface.

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

Table 14. Study Component Management SOP Class - Study Component Module

Attribute Name	Tag	Note
Referenced Series Sequence	0008,1115	Is always empty
Study ID	0020,0010	Is always empty

Table 15. Study Component Management SOP Class - Study Component Relationship Module

Attribute Name	Tag	Note
Referenced Study Sequence	0008,1110	
>Referenced SOP Class UID	0008,1150	Applied Value(s): 1.2.840.10008.3.1.2.3.1
>Referenced SOP Instance UID	0008,1155	Value from Study Instance UID in C-FIND Response of Modality Worklist.

Table 16.   Study Component Management SOP Class -Study Component Acquisition Module

Attribute Name	Tag	Note
Modality	0008,0060	Applied Value(s): RF, RG
Study Description	0008,1030	Description of the classification of the Study (Component) performed, entered by institution.
Study Component Status ID	0032,1055	Applied Value(s): COMPLETED

Table 17.   Study Component Management SOP Class - Sop Common Module

Attribute Name	Tag	Note
Specific Character Set	0008,0005	Applied Value(s): ISO_IR 100

3.1.3.   Association Acceptance Policy

DSI does not accept Association.

4. COMMUNICATION PROFILES

4.1.   TCP/IP Stack

DSI provides DICOM 3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM 3.0 Standard.

4.2.   Physical Media Support

➢   The DSI system supports ISO 8802-3 10 MB Ethernet.

5. EXTENSIONS/SPECIALIZATIONS/PRIVATIZATIONS

Table 18.   Mapping between UI elements and DICOM attributes

UI Element	DICOM NAME	Service
Name	Patient's Name	RIS and Export
Birthdate	Patient's Birth Date	RIS and Export
S	Patient's Sex	RIS and Export
Patient ID	Patient ID	RIS and Export
Exam	Sched. Proc. Step. Desc Study Description Protocol Name	RIS Export Export
Physician Name	Referring Physician's Name Referring Physician's name Performing Physician's Name	RIS Export Export

6. CONFIGURATION

The configuration of a DSI system is done by means of a configuration program. It is intended to be used by Philips service engineers only.

6.1. AE Title/Presentation Address mapping

6.1.1. Local AE Titles and Presentation Addresses

The local (so of DSI itself) Application Entity Title, local System Name and local (System) IP Address are selected by the service configuration program.

6.1.2. Remote AE Titles and Presentation Addresses

All remote applications to be selected as image export destination or as Worklist supplier are configurable for the following items:

- The Application Entity Title of the remote application.
- The IP Address and Port Number at which the remote application should accept Association requests.
- The Remote Host Name (i.e. System name) of the system on which the remote application resides.
- The Remote Host Name is used in the remote DICOM system list with the F4 Config page.

6.2. Configurable parameters

Configurable parameters are:

- The PDU size of DSI (i.e. the maximum allowed size of PDU messages received by DSI) is fixed on 16K.

  For optimal performance of the communication DSI - remote system, it is advised to configure the PDU size on the remote system as large as possible: unlimited and 64K are preferred (in that order). PDU size of 32K on the remote system should not be taken due to an implementation restriction of DSI, PDU size of 32 is allowed for DSIs with MEN board.
- "Hospital Name" (configurable) is mapped on "Institution Name" see Table 3-8 on page 11.
- "System Name" (configurable) is mapped on ""Station Name" see Table 3-8 on page 11..

7. SUPPORT OF EXTENDED CHARACTER SETS

DSI supports the Extended Character Set "ISO_IR 100" (Latin alphabet No 1, supplementary set) for the Image Export function.

The following non-printable characters (hexa-decimal coded) are not supported in the received Worklist data:

- 00H through 1FH,
- 7FH
- 80H through 9FH,
- A0H, A6H, A8H, A9H, AAH, AEH
- B1H, B4H, B8H, B9H, BEH
- C0H, C1H, C2H, C3H, C8H, CAH, CBH, CCH, CDH, CEH, CFH
- D0H. D2H, D3H, D4H, D5H, D9H, DAH, DBH, DDH, DEH
- E3H
- F0H, F5H, FDH, FEH

ANNEX 1.   Created SC Objects by the DSI DICOM AE

The following tables give a detailed overview of all supported attributes of the SC Storage SOP Class. The list of possible values are given (if applicable). The situation that an attribute is present conditionally/optionally or that an attribute may contain a zero length value, is indicated too. Conditions and Defined/Enumerated Values of DICOM 3.0 are applicable but are not shown in the tables.

Note: The shaded attributes are received from the RIS with the Worklist Management Query.

Table 19.   Secondary Capture Image Storage SOP Class-Patient Module

Attribute Name	Tag	Note
Patient's Name	0010,0010	Received From RIS or Entered by Operator.
Patient ID	0010,0020	Received From RIS or Entered by Operator.
Patient's Birth Date	0010,0030	Received From RIS or Entered by Operator.
Patient's Sex	0010,0040	Received From RIS or Entered by Operator.

Table 20.   Secondary Capture Image Storage SOP Class-General Study Module

Attribute Name	Tag	Note
Study Date	0008,0020	
Study Time	0008,0030	
Accession Number	0008,0050	Zero length if not received from RIS.
Referring Physician's Name	0008,0090	Zero length if not received from RIS.
Study Description	0008,1030	Received from RIS as "Scheduled Proc. Step Desc." or entered by user.
Study Instance UID	0020,000D	Generated at the creation of the study or received from RIS.
Study ID	0020,0010	Always zero.

Table 21.   Secondary Capture Image Storage SOP Class-General Series Module

Attribute Name	Tag	Note
Series Date	0008,0021	
Series Time	0008,0031	
Modality	0008,0060	Applied Value(s): OT
Performing Physician's Name	0008,1050	Received from RIS, entered by user or is empty is not known.
Protocol Name	0018,1030	Filled with the Exam type, limited to a maximum of 6 characters. This Exam type is received from RIS as "Scheduled Proc. Step Desc.", or entered by the user.
Series Instance UID	0020,000E	Generated at creation of the series.
Series Number	0020,0011	
Laterality	0020,0060	Always zero length value

Table 22.   Secondary Capture Image Storage SOP Class-Sc Image Equipment Module

Attribute Name	Tag	Note
Conversion Type	0008,0064	Applied Value(s): DV
Secondary Ca pture Device Manufacturer	0018,1016	Applied Value(s): Philips Medical Systems
Secondary Capture Device Manufacturer's Model Name	0018,1018	Applied Value(s): DSI R5.2.3
Secondary Capture Device Software Version(s)	0018,1019	

Table 23.   Secondary Capture Image Stor age SOP Class-General Image Module

Attribute Name	Tag	Note
Acquisition Date	0008,0022	
Content Date	0008,0023	
Acquisition Time	0008,0032	
Content Time	0008,0033	
Acquisition Number	0020,0012	
Instance Number	0020,0013	Applied Value(s): 1
Patient Orientation	0020,0020	Always zero length value
Image Comments	0020,4000	Contains also the DSI image annotations on normal (i.e. non zoomed) images in the format --(x,y) text --. This attribute is not present if not entered by user and if no annotations are present.

Table 24.   Secondary Capture Image Storage SOP Class-Image Pixel Module

Attribute Name	Tag	Note
Samples per Pixel	0028,0002	Applied Value(s): 1
Photometric Interpretation	0028,0004	Applied Value(s): MONOCHROME2
Rows	0028,0010	Equal to the value of Rows (512 or 1024). The actual image size in 60 Hz DSI system is smaller: 470 or 960. Applied Value(s): 1024, 512
Columns	0028,0011	Equal to the value of Rows (512 or 1024). The actual image size in 60 Hz DSI system is smaller: 470 or 960. Applied Valu e(s): 1024, 512
Bits Allocated	0028,0100	Applied Value(s): 8
Bits Stored	0028,0101	Applied Value(s): 8
High Bit	0028,0102	Applied Value(s): 7
Pixel Representation	0028,0103	Applied Value(s): 0000
Pixel Data	7FE0,0010	

Table 25.   Secondary Capture Image Storage SOP Class-Sc Image Module

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

Table 26.   Secondary Capture Image Storage SOP Class-Voi Lut Module

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

Table 27.   Secondary Capture Image Storage SOP Class-Sop Common Module

Attribute Name	Tag	Note
Specific Character Set	0008,0005	Applied Value(s): ISO_IR 100
SOP Class UID	0008,0016	Applied Value(s): 1.2.840.10008.5.1.4.1.1.7
SOP Instance UID	0008,0018	Generated at creation of the image.

ANNEX 2.   Created XA Objects by the DSI DICOM AE

The following tables give a detailed overview of all supported attributes of the XA Storage SOP Class. The list of possible values are given. The situation that an attribute is present conditionally/optionally or that an attribute may contain a zero length value, is indicated too. Conditions and Defined/Enumerated Values of DICOM 3.0 are applicable but are not shown in the tables.

Note: The shaded attributes are received from the RIS with the Worklist Management Query.

Table 28.   X-Ray Radiofluoroscopic Image Storage SOP Class -Patiënt Module

Attribute Name	Tag	Note
Patient's Name	0010,0010	Received From RIS or Entered by Operator.
Patient ID	0010,0020	Received From RIS or Entered by Operator.
Patient's Birth Date	0010,0030	Received From RIS or Entered by Operator.
Patient's Sex	0010,0040	Received From RIS or Entered by Operator.

Table 29.   X-Ray Radiofluoroscopic Image Storage SOP Class -General Study Module

Attribute Name	Tag	Note
Study Date	0008,0020	
Study Time	0008,0030	
Accession Number	0008,0050	Zero length if not received from RIS.
Referring Physician's Name	0008,0090	Zero length if not received from RIS.
Study Description	0008,1030	Received from RIS as "Scheduled Proc. Step Desc." or entered by user.
Study Instance UID	0020,000D	Generated at the creation of the study or received from RIS.
Study ID	0020,0010	Always zero.

Table 30.   X-Ray Radiofluoroscopic Image Storage SOP Class -General Series Module

Attribute Name	Tag	Note
Series Date	0008,0021	
Series Time	0008,0031	
Modality	0008,0060	Applied Value(s): RF
Performing Physician's Name	0008,1050	Received from RIS, entered by user or is empty if not known.
Protocol Name	0018,1030	Filled with the Exam type, limited to a maximum of 6 characters. This Exam type is received from RIS as "Scheduled Proc. Step Desc.", or entered by the user.
Series Instance UID	0020,000E	
Series Number	0020,0011	
Laterality	0020,0060	Always zero length value.

Table 31. **X-Ray Radiofluoroscopic Image Storage SOP Class -General Equipment Module**

Attribute Name	Tag	Note
Manufacturer	0008,0070	Applied Value(s): Philips Medical Systems
Institution Name	0008,0080	
Station Name	0008,1010	
Manufacturer's Model Name	0008,1090	Applied Value(s): DSI R5.2.3
Device Serial Number	0018,1000	
Software Version(s)	0018,1020	Applied Value(s): R5.2.3 LUTPROM 97-10-20 R2.1.1

Table 32. **X-Ray Radiofluoroscopic Image Storage SOP Class -General Image Module**

Attribute Name	Tag	Note
Acquisition Date	0008,0022	
Content Date	0008,0023	
Acquisition Time	0008,0032	
Content Time	0008,0033	
Acquisition Number	0020,0012	
Instance Number	0020,0013	
Patient Orientation	0020,0020	Always zero length value.
Image Comments	0020,4000	Contains also the DSI image annotations on normal (i.e. non zoomed) images in the format --(x,y) text --. This attribute is not present if not entered by user and if no annotations are present.

Table 33. **X-Ray Radiofluoroscopic Image Storage SOP Class -Image Pixel Module**

Attribute Name	Tag	Note
Samples per Pixel	0028,0002	Applied Value(s): 1
Photometric Interpretation	0028,0004	Applied Value(s): MONOCHROME2
Rows	0028,0010	Equal to the value of Rows (512 or 1024). The actual image size in 60 Hz DSI system is smaller: 470 or 960. Applied Value(s): 1024, 512
Columns	0028,0011	Equal to the value of Rows (512 or 1024). The actual image size in 60 Hz DSI system is smaller: 470 or 960. Applied Value(s): 1024, 512
Bits Allocated	0028,0100	Applied Value(s): 8
Bits Stored	0028,0101	Applied Value(s): 8
High Bit	0028,0102	Applied Value(s): 7
Pixel Representation	0028,0103	Applied Value(s): 0000
Pixel Data	7FE0,0010	

Table 34. X-Ray Radiofluoroscopic Image Storage SOP Class -Display Shutter Module

Attribute Name	Tag	Note
Shutter Shape	0018,1600	Applied Value(s): CIRCULAR, RECTA NGULAR
Shutter Left Vertical Edge	0018,1602	
Shutter Right Vertical Edge	0018,1604	
Shutter Upper Horizontal Edge	0018,1606	
Shutter Lower Horizontal Edge	0018,1608	
Center of Circular Shutter	0018,1610	
Radius of Circular Shutter	0018,1612	

Table 35. X-Ray Radiofluoroscopic Image Storage SOP Class -X-ray Image Module

Attribute Name	Tag	Note
Image Type	0008,0008	Applied Value(s): ORIGINAL, PRIMARY, SINGLE PLANE
Samples per Pixel	0028,0002	
Photometric Interpretation	0028,0004	
Bits Allocated	0028,0100	
Bits Stored	0028,0101	
High Bit	0028,0102	
Pixel Representation	0028,0103	
Pixel Intensity Relationship	0028,1040	Applied Value(s): DISP

Table 36. X-Ray Radiofluoroscopic Image Storage SOP Class -X-ray Acquisition Module

Attribute Name	Tag	Note
KVP	0018,0060	Always zero length value.
Exposure	0018,1152	Always zero length value.
Radiation Setting	0018,1155	Applied Value(s): GR, SC

Table 37. X-Ray Radiofluoroscopic Image Storage SOP Class -Voi Lut Module

Attribute Name	Tag	Note
Window Center	0028,1050	This attribute is related to the DSI Contrast / Brightness.
Window Width	0028,1051	This Attribute is related to the DSI Contrast / Brightness.

Table 38. X-Ray Radiofluoroscopic Image Storage SOP Class -Sop Common Module

Attribute Name	Tag	Note
Specific Character Set	0008,0005	Applied Value(s): ISO_IR 100
SOP Class UID	0008,0016	Applied Value(s): 1.2.840.10008.5.1.4.1.1.12.2
SOP Instance UID	0008,0018	