Philips Medical Systems
DICOM Conformance Statement

Integris V with High-Speed
DICOM Image Interface R 1
(MCV 2971)

Document Number 4522 982 71031
1 September 1998

Philips
Medical
Systems

PHILIPS

PHILIPS

Issued by:

Philips Medical Systems Nederland B.V.
Integrated Clinical Solutions, Marketing & Communications
Building QP-2129
P.O. Box 10.000
5680 DA Best
The Netherlands
Tel.: +31 40 2762818
Fax.: +31 40 2762673
email: dicom@best.ms.philips.com
Internet (with the latest versions of Conformance Statements and other DICOM information):
      http://www.philips.com/ms/solution/connect
      ftp://ftp.philips.com/pub/ms/dicom/Conformance_Stmnts

1 Introduction

This section provides general information about the scope, intended audience and contents of this Conformance Statement and how to use it.

1.1 Scope and field of application

The scope of this DICOM Conformance Statement is to facilitate data exchange between equipment of Philips Medical Systems and with equipment of other vendors. This document specifies the compliance to the DICOM standard, formally called the NEMA PS 3.X-1996 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), Service Elements 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. The conformance to the DICOM standard is a key element of the Inturis Program (see [INTURIS]).

1.2 Intended audience

This Conformance Statement is intended for:
• (potential) clients,
• marketing staff interested in data exchange functionality,
• system integrators and Customer Support Engineers of medical equipment,
• software engineers 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 section 2 through 7 and follows the contents and structuring requirements of DICOM PS 3.2-1996.
Additionally, the sections following 7 (if present) specify the details of the applied IODs and Service Elements.

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 3.3-1996.
The word Philips in this document refers to Philips Medical Systems.

1.5 References

[DICOM]   The Digital Imaging and Communications in Medicine (DICOM) standard:
             NEMA PS 3.X 1996 (X refers to the part 1 - 13)
             National Electrical Manufacturers Association (NEMA) Publication Sales
             1300 N. 17th Street, Suite 1847

Rosslyn, Va. 22209, United States of America

[INTURIS]   Philips Inturis Program
             Integrated Clinical Solutions
             Philips Medical Systems Nederland B.V. (see address at page ii)
EASYVISION R4.2
             Conformance Statement Document Number 4522 220 84552

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 networked environment may require application functions that are not specified within the scope of DICOM. Consequently, using only the information provided by this Conformance Statement does not guarantee interoperability of Philips equipment with non-Philips equipment. It is the user's responsibility to analyse thoroughly the application requirements and to specify a solution that integrates Philips equipment with non-Philips equipment.

- **Validation**
  Philips equipment has been carefully tested to assure that the actual implementation of the DICOM interface corresponds with this Conformance Statement.
  Where Philips equipment is linked to non-Philips equipment, the first step is to compare the relevant Conformance Statements. If the Conformance Statements indicate that successful information exchange should be possible, additional validation tests will be necessary to ensure the functionality, performance, accuracy and stability of image and image related data. It is the responsibility of the user (or user's agent) to specify the appropriate test suite and to carry out the additional validation tests.

- **New versions of the DICOM Standard**
  The DICOM Standard will evolve in future to meet the user's growing requirements and to incorporate new features and technologies. Philips is actively involved in this evolution and plans to adapt its equipment to future versions of the DICOM Standard. In order to do so, Philips reserves the right to make changes to its products or to discontinue its delivery.
  The user should ensure that any non-Philips provider linking to Philips equipment, also adapts to future versions of the DICOM Standard. If not, the incorporation of DICOM enhancements into Philips equipment may lead to loss of connectivity (in case of networking) and incompatibility (in case of media).

1.7 Acronyms and Abbreviations.

The following acronyms and abbreviations are used in the document.

- ACC   American College of Cardiology
- AE   Application Entity
- ACR   American College of Radiology
- ANSI   American National Standard Institute
- BOT   Basic Offset Table
- CD-R   CD Recordable
- CD-M   CD Medical
- DCI   Digital Cardio Imaging
- DCR   Dynamic Cardio Review
- 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
- FSC   File Set Creator
- 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
- SCM   Study Component Management
- 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

2 Implementation model

The Integris V in combination with the EasyVision R 4.2 will be referred to as Integris.

2.1 Implementation model for the Integris.

The Integris of Philips Medical Systems is an X-Ray image generating system. The system contains:

• a DICOM Image Export function to transfer DICOM XA single frame and Secondary Capture.

The above DICOM functions are described in this document.

2.1.1 Application Data Flow Diagram for the Integris.

The Integris behaves as one Implementation model as shown in Figure 2-1 on page 8.

The images to be sent are selected from one or more examinations. At export request the images will be converted into DICOM format and sent out to a remote destination.
These images are intended for viewing purposes.

Figure 2-1: The Integris V/EasyVision DICOM Implementation Model (with references to the related sections)

2.1.2 Functional definition of Application Entities

The EasyVision DICOM Image Export AE acts as a Service Class User (SCU) of the Storage Service Class. When the export is initiated, the AE will open an association to the remote system. The selected images and related image data are converted into a DICOM message to be sent to the remote system.

3 AE Specifications

See also Chapter 3 "EasyVision 4.2 Conformance Statement, Section 1.5 on page 5".

3.1 EasyVision DICOM Image Storage AE Specification for the Integris.

The EasyVision DICOM Storage Application Entity provides Standard Conformance to the following DICOM V3.0 SOP Classes as an SCU:

Table 3-1: Supported SOP Classes by the EasyVision AE as SCU

SOP Class Name	UID
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7
X-Ray Angiographic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.1

3.1.1 Implementation Identifying Information

The Implementation Class UID is: 1.3.46.670589.5.2.11
The implementation version name is: EV42

3.1.2 Proposed Presentation Contexts

See Chapter 3.1.2.1.2 on page 12 of the EasyVision R 4.2 Conformance Statement.

3.2 SC Conformance.

Table 3-2 lists the applied Conditional (DICOM Type 1C and 2C) and Optional (DICOM Type 3) attributes of the SC Image IOD.

Table 3-2: Applied Conditional and Optional Attributes of the SC Image IOD

Information Entity	Module	Conditional Attributes	Optional Attributes
Patient	Patient	-	-
Study	General Study	-	-
Series	General Series	-	Series Date, Series Time, Performing Physician's Name
Equipment	General Equipment	-	Institution Name, Manufacturer's Model Name, Software Version(s)
	SC Equipment	-	-
Image	General Image	Patient Orientation	Image Type, Acquisition Date, Acquisition Time, Acquisition Number, Images in Acquisition, Derivation Description
	Image Pixel	-	-
	SOP Common	Specific Character Set	-

3.3 XA Conformance.

Table 3-3 lists the applied Conditional (DICOM Type 1C and 2C) and Optional (DICOM Type 3) attributes of the XA Image IOD.

Table 3-3: Applied optional Modules and Attributes of the XA Image IOD

IE	Module	Conditional Attributes	Optional Attributes
Patient	Patient	-	-
Study	General Study	-	-
Series	General Series	-	Series Date, Series Time, Performing Physician's Name
Equipment	General Equipment	-	Institution Name, Station Name, Manufacturer's Model Name, Software Version(s)
Image	General Image	Patient Orientation	-
	Image Pixel	Pixel Aspect Ratio	-
	Display Shutter (applied optional Module)	Shutter Left Vertical Edge, Shutter Right Vertical Edge, Shutter Upper Horizontal Edge, Shutter Lower Horizontal Edge	-
	X-Ray Image	High Bit	-
	X-Ray Acquisition	Exposure Time, X-Ray Tube Current, Exposure	Intensifier Size
	XA-Positioner		Distance Source to Detector
	VOI LUT (applied optional Module)	Window Width	Window Center
	SOP Common	Specific Character Set	-

4 Communication Profiles

See Chapter 4 of the EasyVision R4.2 Conformance Statement, see Section 1.5 on page 5.

5 Extensions/Specialization/Privatization

See Chapter 5 of the EasyVision R4.2 Conformance Statement see Section 1.5 on page 5.

6 Configuration.

See Chapter 6 of the EasyVision R4.2 Conformance Statement, Section 1.5 on page 5.

The configuration of the EasyVision has to be set for "Processing XA & RF Images before export". Otherwise the image quality will degrade.

7 Support of Extended Character Sets

See Chapter 7of the EasyVision R4.2 Conformance Statement, see Section 1.5 on page 5

8 Overview applied IOD's for the Integris V/EasyVision

8.1 SC Image IOD for the EasyVision

Table 8-1: Applied Modules in the SC Image IOD

Information Entity	Module	Reference
Patient	Patient	Table 8-2
Study	General Study	Table 8-3
Series	General Series	Table 8-4
Equipment	General Equipment	Table 8-5
	SC Equipment	Table 8-6
Image	General Image	Table 8-7
	Image Pixel	Table 8-8
	SOP Common	Table 8-9

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

Table 8-2: SC Image Storage SOP Class - Patient Module

Attribute Name	Tag	Note
Patient's Name	0010,0010	
Patient ID	0010,0020	
Patient's Birth Date	0010,0030	
Patient's Sex	0010,0040	Applied value(s): F, M, O

Table 8-3: SC Image Storage SOP Class - General Study Module

Attribute Name	Tag	Note
Study Date	0008,0020	
Study Time	0008,0030	

Table 8-3: SC Image Storage SOP Class - General Study Module (Continued)

Attribute Name	Tag	Note
Accession Number	0008,0050	
Referring Physician's Name	0008,0090	
Study Instance UID	0020,000D	
Study ID	0020,0010	

Table 8-4: SC 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): XA
Performing Physician's Name	0008,1050	
Series Instance UID	0020,000E	
Series Number	0020,0011	

Table 8-5: SC Image Storage SOP Class - General Equipment Module

Attribute Name	Tag	Note
Manufacturer	0008,0070	Applied value(s): Philips Medical Systems
Institution Name	0008,0080	
Manufacturer's Model Name	0008,1090	Applied value(s): P H I L I P S INTEGRIS H, P H I L I P S INTEGRIS V
Software Version(s)	0018,1020	

Table 8-6: SC Image Storage SOP Class - SC Equipment Module

Attribute Name	Tag	Note
Conversion Type	0008,0064	Applied value(s): WSD

Table 8-7: SC Image Storage SOP Class - General Image Module

Attribute Name	Tag	Note
Image Type	0008,0008	Applied value(s): DERIVED \ SECONDARY
Acquisition Date	0008,0022	
Acquisition Time	0008,0032	
Acquisition Number	0020,0012	
Image Number	0020,0013	
Patient Orientation	0020,0020	Always empty
Images in Acquisition	0020,1002	
Derivation Description	0008,2111	

Table 8-8: SC Image Storage SOP Class - Image Pixel Module

Attribute Name	Tag	Note
Samples per Pixel	0028,0002	
Photometric Interpretation	0028,0004	Applied value(s): MONOCHROME2
Rows	0028,0010	Applied value(s): 1024, 960
Columns	0028,0011	Applied value(s): 1280
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 8-9: SC 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	

8.2 XA Image IOD for the EasyVision (single frame)

Table 8-10: XA Image IOD

Information Entity	Module	Reference
Patient	Patient	Table 8-11
Study	General Study	Table 8-12
Series	General Series	Table 8-13
Equipment	General Equipment	Table 8-14
Image	General Image	Table 8-15
	Image Pixel	Table 8-16
	Display Shutter	Table 8-17
	X-Ray Image	Table 8-18
	X-Ray Acquisition	Table 8-19
	XA Positioner	Table 8-20
	VOI LUT	Table 8-21
	SOP Common	Table 8-22

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

Table 8-11: XA Image Storage SOP Class - Patient Module

Attribute Name	Tag	Note
Patient's Name	0010,0010	
Patient ID	0010,0020	
Patient's Birth Date	0010,0030	
Patient's Sex	0010,0040	Applied value(s): F, M, O

Overview applied IOD's for the Integris V/EasyVision

Table 8-12: XA Image Storage SOP Class - General Study Module

Attribute Name	Tag	Note
Study Date	0008,0020	
Study Time	0008,0030	
Accession Number	0008,0050	
Referring Physician's Name	0008,0090	
Study Instance UID	0020,000D	
Study ID	0020,0010	

Table 8-13: XA 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): XA
Performing Physician's Name	0008,1050	
Series Instance UID	0020,000E	
Series Number	0020,0011	

Table 8-14: XA 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): P H I L I P S INTEGRIS H, P H I L I P S INTEGRIS V
Software Version(s)	0018,1020	

Table 8-15: XA Image Storage SOP Class - General Image Module

Attribute Name	Tag	Note
Image Number	0020,0013	
Patient Orientation	0020,0020	Always empty

Table 8-16: XA Image Storage SOP Class - Image Pixel Module

Attribute Name	Tag	Note
Rows	0028,0010	Applied value(s): 1024, 480, 512, 960
Columns	0028,0011	Applied value(s): 1024, 480, 512, 960
Pixel Aspect Ratio	0028,0034	Values used: 1.0, 0.5 and 2.0. Applied value(s): 1, 2 \ 1, 2
Pixel Data	7FE0,0010	Non-substratum original acquired pixel data.

Table 8-17: XA Image Storage SOP Class - Display Shutter Module

Attribute Name	Tag	Note
Shutter Shape	0018,1600	Applied value(s): RECTANGULAR
Shutter Left Vertical Edge	0018,1602	
Shutter Right Vertical Edge	0018,1604	
Shutter Upper Horizontal Edge	0018,1606	
Shutter Lower Horizontal Edge	0018,1608	

Table 8-18: XA Image Storage SOP Class - X-Ray Image Module

Attribute Name	Tag	Note
Image Type	0008,0008	Applied value(s): DERIVED, ORIGINAL \ PRIMARY \ BIPLANE A, BIPLANE B, SINGLE PLANE

Overview applied IOD's for the Integris V/EasyVision

Table 8-18: XA Image Storage SOP Class - X-Ray Image Module (Continued)

Attribute Name	Tag	Note
Referenced Image Sequence	0008,1140	A sequence which provides reference to a set of Image SOP Class/Instance pairs identifying other images significantly related to this image.
> Referenced SOP Class UID	0008,1150	
> Referenced SOP Instance UID	0008,1155	
Samples per Pixel	0028,0002	Applied value(s): 1
Photometric Interpretation	0028,0004	Applied value(s): MONOCHROME2
Bits Allocated	0028,0100	Applied value(s): 16, 8
Bits Stored	0028,0101	Applied value(s): 10, 8
High Bit	0028,0102	Applied value(s): 9, 7
Pixel Representation	0028,0103	Applied value(s): 0000
Pixel Intensity Relationship	0028,1040	Applied value(s): DISP

Table 8-19: XA Image Storage SOP Class - X-Ray Acquisition Module

Attribute Name	Tag	Note
KVP	0018,0060	
Exposure Time	0018,1150	
X-ray Tube Current	0018,1151	
Exposure	0018,1152	
Radiation Setting	0018,1155	Applied value(s): GR, SC
Intensifier Size	0018,1162	

Table 8-20: XA Image Storage SOP Class - XA Positioner Module

Attribute Name	Tag	Note
Distance Source to Detector	0018,1110	
Positioner Primary Angle	0018,1510	
Positioner Secondary Angle	0018,1511	

Table 8-21: XA Image Storage SOP Class - VOI LUT Module

Attribute Name	Tag	Note
Window Center	0028,1050	The configuration of the EasyVision has to be set for "Processing XA & RF Images before export". Otherwise the image quality will degrade.
Window Width	0028,1051	The configuration of the EasyVision has to be set for "Processing XA & RF Images before export". Otherwise the image quality will degrade.

Table 8-22: XA 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): 1.2.840.10008.5.1.4.1.1.12.1
SOP Instance UID	0008,0018	