Philips Medical Systems
DICOM Conformance Statement

SiteView R2.3

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Philips
Medical
Systems

PHILIPS

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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-1993 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. 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) 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 3.2-1993 and Supplement 2 (in case of Media specifications).
Additionally, the chapters following 7 specify the details of the applied IODs.

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 3.3-1993 and PS 3.4-1994.
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 (X refers to the part 1 - 13) and Supplements
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)

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).

2 Implementation model

The Philips Medical Systems SiteView R2.3 system is a medical imaging viewing station. It provides the following features:

- The system is able to receive DICOM images sent to it by remote systems (e.g. workstations or imaging modalities) and stores them in its local database: the DICOM import function
- The application allows the operator to view and process the images stored in the local database.
- The system allows the operator to send stored images from the local database to a remote system: the DICOM export function. These images can be obtained from different sources. When not in DICOM format, they are converted to DICOM Secondary Capture images.

The SiteView Release R2.3 will replace the previous SiteView Release R2.2.

2.1 Application Data Flow Diagram

The SiteView system behaves as a single Application Entity. The related Implementation Model is shown in Figure 1 on page 3.

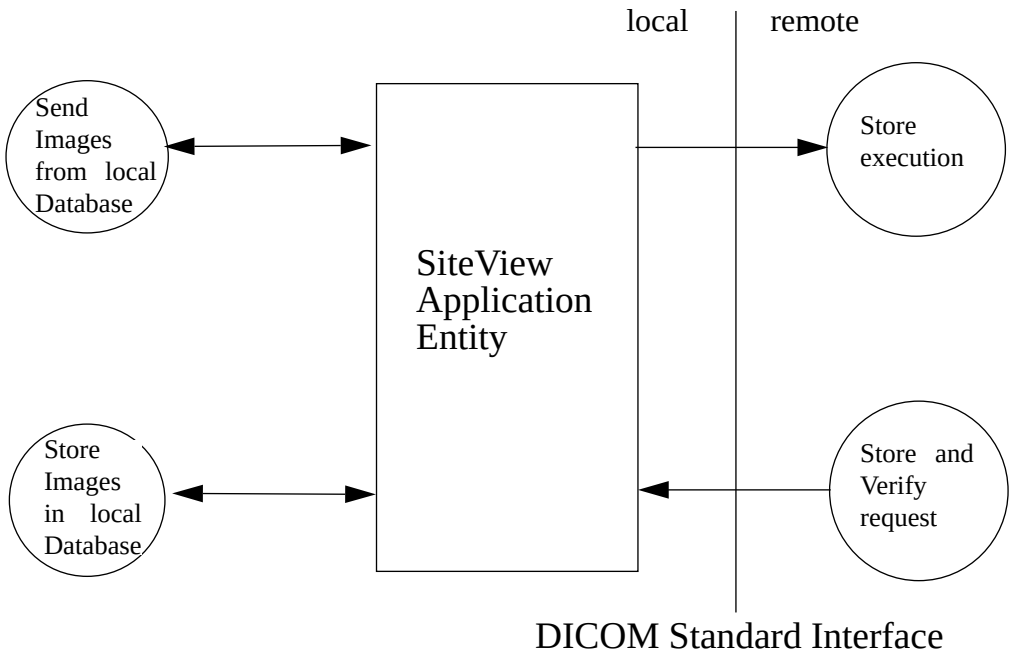
2.2 Functional definition of Application Entities

The SiteView Application Entity acts as a Service Class User of Store Service Classes. The application acts as a Service Class Provider of Store Service Classes.

2.3 Sequencing of Real World Activities

Not applicable.

Figure 1: SiteView Implementation Model



3 AE Specifications

3.1 AE SiteView Specification

The SiteView Application Entity provides Standard Conformance to the following DICOM V3.0 SOP classes as an SCU:

Table 1: Supported SOP classes by the SiteView AE as SCU [a]

SOP class Name	UID
Computed Radiography Image Storage - STORE	1.2.840.10008.5.1.4.1.1.1
Nuclear Medicine Image Storage - STORE (**new class**)	1.2.840.10008.5.1.4.1.1.20
Ultrasound Image Storage - STORE (**new class**)	1.2.840.10008.5.1.4.1.1.6.1
Secondary Capture Image Storage - STORE	1.2.840.10008.5.1.4.1.1.7
XA Single-Plane Image Storage - STORE	1.2.840.10008.5.1.4.1.1.12.1
RF Image Storage - STORE	1.2.840.10008.5.1.4.1.1.12.2

a. The SOP Classes listed here are the default Classes supported as SCU. Via configuration it is possible to support additional STORE SOP Classes; this should be applied in specific situations only (not described here).

The SiteView Application Entity provides Standard Conformance to the following DICOM V3.0 SOP classes as an SCP:

Table 2: Supported SOP classes by the SiteView AE as SCP

SOP class Name	UID
Verification	1.2.840.10008.1.1
Computed Radiography Image Storage - STORE	1.2.840.10008.5.1.4.1.1.1
CT Image Storage - STORE	1.2.840.10008.5.1.4.1.1.2
MR Image Storage - STORE	1.2.840.10008.5.1.4.1.1.4
Nuclear Medicine Image Storage - STORE (**new class**)	1.2.840.10008.5.1.4.1.1.20
Ultrasound Image Storage - STORE (**new class**)	1.2.840.10008.5.1.4.1.1.6.1
Secondary Capture Image Storage - STORE	1.2.840.10008.5.1.4.1.1.7
XA Single-Plane Image Storage - STORE	1.2.840.10008.5.1.4.1.1.12.1
RF Image Storage - STORE	1.2.840.10008.5.1.4.1.1.12.2

3.1.1 Association Establishment Policies

3.1.1.1 General

SiteView will offer a configurable maximum PDU size in steps (default is 16K = 16384 bytes) on associations initiated by the application itself.

3.1.1.2 Number of Associations

SiteView will attempt to establish 1 association at a time as Service Class User.
The number of simultaneous associations supported by SiteView as a Service Class Provider is limited to 2.

3.1.1.3 Asynchronous Nature

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

3.1.1.4 Implementation Identifying Information

The Implementation Class UID is “1.3.46.670589.5.2.3”.
The implementation version name is “SITEVIEW23”.

3.1.2 Association Initiation Policy

SiteView initiates associations as a result of the following local Real-World activities:

- The SiteView operator sends images from the SiteView database to a remote system.

3.1.2.1 Request to send images from the SiteView Database to a system

3.1.2.1.1 Associated Real-World Activity

The operator selects one or more exams (i.e. series) from the local database, selects a peer station and initiates a send operation. SiteView initiates one association to the selected peer entity and uses it to send all images in the selected exams via C-STORE requests (and receives the associated C-STORE Responses). The association is released by SiteView when all selected images have been transmitted or an error occurred.
SiteView handles the send requests one after another.

3.1.2.1.2 Proposed Presentation Contexts

SiteView will propose the following presentation contexts:

Table 3: Proposed Presentation Contexts for Send Request

Presentation Context table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
See Note	See Note	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
See Note	See Note	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
See Note	See Note	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None

Note: Any of the STORE SOP classes listed in Table 1, “Supported SOP classes by the SiteView AE as SCU,” on page 4.

3.1.2.1.3 C-STORE SCU Conformance

SiteView will stop the transfer of the images and releases the association as soon as it receives an unsuccessful or warning store response status. The store response status is displayed via the user interface of SiteView.
Extended negotiation is not supported.

The transmitted Storage SOP instances may include all optional elements specified in the DICOM standard (including its supplements).
The transmitted Storage SOP instances may contain extra standard DICOM, retired and private data elements, dependent of the source of the images. See also chapter 3.1.3.2.3 on page 8. These data elements can only be sent out when the presentation context at import and export

time has no conflicting settings (implicit VR little endian to explicit VR big endian can not be supported when VR is unknown and byte swapping is required).

3.1.3 Association Acceptance Policy

The SiteView Application Entity will accept association requests from applications that do or do not address the SiteView AE, so any “Called AE Title” satisfies. The SiteView AE Title is defined during configuration of the SiteView system.
SiteView accepts associations as result of the following remote Real-World activities:

- Request to verify at application level (see chapter 3.1.3.1 on page 7),
- Request to store images in the SiteView database (see chapter 3.1.3.2 on page 8).

3.1.3.1 Verify Application Level Communication

3.1.3.1.1 Associated Real-World Activity

SiteView accepts associations from nodes that wish to verify application level communication using the C-ECHO command.

3.1.3.1.2 Presentation Context Table

Any of the presentation contexts shown in the table below are acceptable:

Table 4: Acceptable Presentation Contexts

Presentation Context table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Verification	1.2.840.10008.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Verification	1.2.840.10008.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None

3.1.3.1.3 C-ECHO SCP Conformance

SiteView provides standard conformance.

3.1.3.1.4 Presentation Context Acceptance Criterion

SiteView accepts all contexts in the intersection of the proposed and acceptable presentation contexts.

3.1.3.1.5 Transfer Syntax Selection Policies

SiteView prefers Explicit VR Big Endian above Explicit VR Little Endian above Implicit VR transfer syntax.

3.1.3.2 Store Images in the SiteView Database

3.1.3.2.1 Associated Real-World Activity

SiteView accepts associations from nodes that wish to store images in the SiteView database using the C-STORE command.

3.1.3.2.2 Presentation Context Table

Any of the presentation contexts shown in the table below are acceptable:

Table 5: Acceptable Presentation Contexts

Presentation Context table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
See Note	See Note	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
See Note	See Note	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
See Note	See Note	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None

Note: Any of the SOP classes listed in Table 2, “Supported SOP classes by the SiteView AE as SCP,” on page 4

3.1.3.2.3 C-STORE SCP Conformance

SiteView provides level 2 (Full) conformance for the Storage Service Class. In the event of a successful C-STORE operation, the image has been stored in the SiteView database. The duration of the storage of the image is determined by the operator of the SiteView system.

The Siteview Storage implementation has the following restrictions:
- The maximum number of images in a series is limited to 256.
- Overlays and curves will not be stored,
- Colours in images are not stored,

The received DICOM images are not changed by SiteView except:
- A unique Patient ID will be assigned by SiteView (and SiteView uses it as an internal Database key), if it is not filled in. Such images are accepted. However, this added attribute value will not be exported.

- SiteView will modify Pixel Data, Rows and Columns if the rows and/or columns in the received DICOM images exceeds 1024 pixels.
- SiteView will modify Pixel Data, Bits Allocated, Bits Stored and High Bit if the DICOM image pixel depth is larger than 8 bits. As a consequence, SiteView always sends out 8 bits allocated, 8 bits stored, high bit 7.

In case of an unsuccessful C-STORE, SiteView returns one of the following status codes:
- A700 - Indicates the database is full or the maximum number of images in a series is reached. Recovery from this condition is left to the Service Class User.
- A900 - Indicates that the SOP class of the image does not match the abstract syntax negotiated for the presentation context.
- C000 - Indicates that the image cannot be parsed.

3.1.3.2.4 Presentation Context Acceptance Criterion

SiteView accepts all contexts in the intersection of the proposed and acceptable presentation contexts.

3.1.3.2.5 Transfer Syntax Selection Policies

SiteView prefers Explicit VR Big Endian above Explicit VR Little Endian above Implicit VR transfer syntax.

4 Communication Profiles

4.1 Supported Communication Stacks

The SiteView application provides DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard.

4.2 TCP/IP Stack

SiteView inherits its TCP/IP stack from the PC system with OS/2 upon which it executes.

4.2.1 Physical Media Support

Ethernet ISO 8802-3. Standard AUI, optional twisted pair 10-BaseT.

5 Extensions/Specializations/Privatizations

Not applicable.

6 Configuration

The SiteView system is configured by means of the DICOM configuration option. This configuration 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 SiteView AE Title is configurable. By default this AE Title is the Host name.
By default SiteView listens on port 3010. This port number is configurable.

6.1.2 Remote AE Titles and Presentation Addresses

For remote applications that act as Service Class User no information is needed.
For remote applications that act as Service Class Provider the following information must be provided:

- The host name on which the application resides.
- The port number at which the application accepts association requests.

6.2 Configurable parameters

The following parameters are configurable:

- Maximum PDU size (to be configured in steps of 1K, 2K, 4K, 8K and 16K). Default is 16K.
- Additional STORE SOP Classes, see the note of Table 1 on page 4.

7 Support of Extended Character Sets

SiteView supports Extended Character Set “ISO_IR 100” which is the Latin alphabet No 1, supplementary set.