Philips Medical Systems
DICOM Conformance Statement

EasyWeb 3.0

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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-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) 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]. 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 3.2-1996.

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 and PS 3.4-1996.
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
National Electrical Manufacturers Association (NEMA) Publication Sales
1300 N. 17th Street, Suite 1847
Rosslyn, Va. 22209, United States of America

[INTURIS] Inturis for Cardiology
On-Line Image Access
Doc. nr. 4522 982 69681
Philips medical Systems Ned. BV

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 General 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
- MPPS Modality Performed Procedure Step
- NEMA National Electrical Manufacturers Association
- PACS Picture Archiving and Communication System
- 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

EasyWeb is a web server that allows web users access to medical images. *EasyWeb* is a single application entity that stores images sent to it by service class users, and simplifies the images into a format that can be viewed in a web browser. It also is able to query service class providers based on several standard query models, and retrieve requested images from a service class provider to the local database, either by an automated mechanism, or manually by user interaction.

2.1 Application Data Flow Diagram

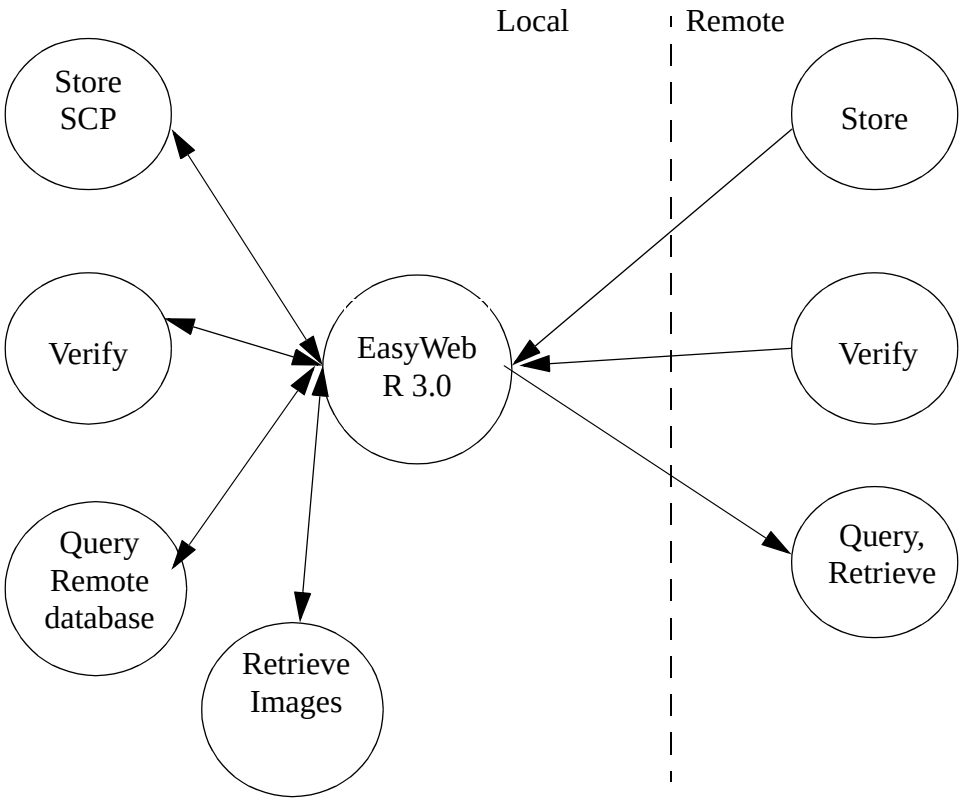

Figure 2-1: Application data Flow Diagram

2.2 Functional definition of Application Entities

2.2.1 Receive Images

EasyWeb stores a received image in its entirety, without change, in its internal data store. EasyWeb stores each image with the File Meta Information attached to it.

2.2.2 Query to Other Devices

EasyWeb acts as a Service Class User of C-Find to query for studies based on a number of cri-

teria. This type of query can be initiated by the user. See the *EasyWeb* User and System Administration manuals for more details.

EasyWeb supports the following matching key types:

Table 2-1: Matching key Types

Matching key Types	
SV	single valued match
WC	wild card match
Dr	data range match
Un	Universal match

Table 2-2: Allowable Query Attributes for C-FIND Study level

Level	*Attribute Name*	*Match*
Study	Study Date	Un,Dr
	Study Time	Un,Dr
	Accession Number	Un,SV
	Query/Retrieve level	
	Referring Physician's Name	Un,Sv
	Station name	Un
	Study Description	Un
	Name of Phys. Reading Study	Un
	Admitting Diagnoses Description	Un
	Patient's name	Wc,Sv,Un
	Patient ID	Wc,Sv,Un
	Patient's Birth Date	Un
	Patient's Sex	Un,Sv
	Patient's Age	Un
	Study Instance UID	Un
	Study ID	Un
	Number of Study Related Images	Un
	Study Status ID	Un

Table 2-2: Allowable Query Attributes for C-FIND Study level

Level	*Attribute Name*	*Match*
	Requesting Physician	Un
	Current Patient Location	Un,Sv

2.2.3 Retrieve from other Devices

Table 2-3: Allowable Query Attributes for C-FIND Series level

Level	*Attribute Name*	*Match*
Series	Query/Retrieve Level	
	Modality	Un,Sv
	Series Description	Un
	Operator's Name	Un
	Study Instance UID	Sv
	Series Instance UID	Un
	Series Number	Un

EasyWeb acts as a Service Class User of C-Move to retrieve images from a remote device. Retrieves are always performed at the Study level, regardless of the model used for querying.

3 AE Specifications

3.1 EasyWeb Specification.

3.1.1 Verification as a SCP.

The EasyWeb provides Standard Conformance to the following DICOM 3.0 SOP class as a SCP:

Table 3-1: Supported SOP class by the Modality AE as SCP

SOP class Name	*UID*
Verification	1.2.840.10008.1.1

3.1.2 Default Transfer Syntaxes

EasyWeb supports the default transfer syntaxes displayed in Table 3-2.

Table 3-2: Default Transfer Syntaxes

SOP class Name	*UID*
DICOM Implicit VR Little Endian	1.2.840.10008.1.2

3.1.3 Extended Transfer Syntaxes

EasyWeb supports the extended transfer syntaxes displayed in Table 4 for the purpose of storage.

Table 3-3: Extended Transfer Syntaxes

SOP class Name	*UID*
DICOM Implicit VR Little Endian	1.2.840.10008.1.2
DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1
DICOM Lossy JPEG 8 bit JPEG 1	1.2.840.10008.1.2.4.50
DICOM Lossy JPEG 12 bit JPEG 4	1.2.840.10008.1.2.4.51
DICOM Lossless Non-Hierachical JPEG 14	1.2.840.10008.1.2.4.57
DICOM Lossless Non-Hierachical, first order prediction JPEG 14-1	1.2.840.10008.1.2.4.70
DICOM RLE Lossless	1.2.840.10008.1.2.5

3.1.4 Storage as an SCP

Table 4 lists the SOP Classes that are supported by *EasyWeb* for storage services. In general, EasyWeb supports all image SOP classes recognized by DICOM, with the following exceptions:

- Standalone LUTs.

Table 3-4: Storage SOP Classes

SOP class Name	*UID*
CR Image Storage	1.2.840.10008.5.1.4.1.1.1
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
Nuclear Medicine Image Storage (retired)	1.2.840.10008.5.1.4.1.1.5
Ultrasound Image Storage (retired)	1.2.840.10008.5.1.4.1.1.6
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
US Multi-frame Image Storage (retired)	1.2.840.10008.5.1.4.1.1.3
US Multi-frame Image Storage	1.2.840.10008.5.4.1.1.1.3.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
X-ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
X-ray Radio Fluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2
Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20

3.1.5 Query/Retrieve as an SCU

EasyWeb provides Standard Conformance to the following DICOM V3.0 **Query/Retrieve** SOP Class as an SCU and SCP.

Table 3-5: Query/Retrieve SOP Classes

SOP class Name	*SOP Class UID*
Study Root Query/Retrieve IM FIND	1.2.840.10008.5.1.4.1.2.2.1
Study Root Query/retrieve IM MOVE	1.2.840.10008.5.1.4.1.2.2.2

While performing a Study Root Find, *EasyWeb* shall query at both the Study and Series level in the same association to obtain modality information, which is a series-level attribute. When performing a Study Root Move, however, *EasyWeb* will retrieve only at the Study level.

3.2 Association Establishment Policies

3.2.1 General

The following Application Context Name will be proposed and recognized by *EasyWeb*:
- DICOM 3.0 Application Context **1.2.840.10008.3.1.1.1**

EasyWeb contains no limitations for maximum PDU size. The default size is 100 000 bytes.

3.2.1.1 Number of Associations

The maximum number of simultaneous associations accepted by *EasyWeb* is configurable at run time, based on the system resources available. By default, the maximum number of associations is set at 32. There is no inherent limit to the number of associations other than limits imposed by the computer operating system.

3.2.1.2 Asynchronous Nature

EasyWeb allows a single outstanding operation on any association. Therefore, *EasyWeb* does not support asynchronous operations window negotiation, other than the default as specified by the DICOM specification.

3.2.1.3 Implementation Identifying Information

3.2.1.3.1 For Store

EasyWeb will respond with the following implementation identifying parameters:
- Implementation Class UID: **1.3.46.670589.16.3.30**
- Implementation Version Name: **EASYWEB3.0**

The implementation version name policies are the following: product name "**EASYWEB**" followed by the version of the product, "**3.0**".

3.2.1.3.2 For Query/Retrieve

EasyWeb will respond with the following implementation identifying parameters:
- Implementation Class UID: **1.2.124.113532.1.1**
- Implementation Version Name: **MITRA22JAN97**

3.2.1.4 Called Titles

The default calling title that *EasyWeb* will use is the host name of the computer. This parameter can be configured via the GUI. *EasyWeb* can be configured to validate the Called Title of the requesting SCU during association negotiation.

3.2.2 Association Initiation Policy

3.2.2.1 Real World Activity - Verification

3.2.2.1.1 Associated Real World Activity - Verification

EasyWeb will respond to **Verification** requests to provide an SCU with the ability to determine if *EasyWeb* is receiving DICOM requests.

3.2.2.1.2 Presenting Context Table - Verification

EasyWeb will accept any of the Presentation Contexts listed in Table 3-1 for Verification.

3.2.2.1.3 SOP Specific Conformance - Verification

EasyWeb provides standard conformance to the DICOM **Verification** *Service Class. EasyWeb* returns one of the following status codes.

Table 3-6: Verification status codes

Service Status	*Further Meaning*	*Protocol Codes*	*Related Fields*	*Description*
Success	Success	0000		Operation performed properly.

3.2.2.1.4 Presentation Context Acceptance Criterion - Verification

EasyWeb will always accept a Presentation Context for the Verification SOP Class with the default DICOM transfer syntax listed in Table 3-2.

3.2.2.1.5 Transfer Syntax Selection Policies - Verification

Since no DICOM data object is associated with a **Verification** command, only the default DICOM transfer syntax is required/supported.

3.2.2.2 Real World Activity - Storage

3.2.2.2.1 Associated Real World Activity - Storage

EasyWeb will store images that are sent to it from an *SCU*. Images are stored temporarily in the local cache. Image data in EasyWeb is considered inherently transient.

3.2.2.2.2 Presentation Context Table - Storage

EasyWeb will accept any of the Presentation Contexts listed in Table 3-3 for Storage.

Note1: Storage Extended negotiation will is not be supported.

Table 3-7: Storage Extended Negotiation

Field Name	*Value*	*Description of Field*
Level of Support	2	level 2 (FULL) SCP
Element Coercion	0	does not coerce any element

3.2.2.2.3 SOP Specific Conformance - Storage

EasyWeb conforms to the DICOM **Storage** Service Class at Level 2 (Full). No elements are discarded or coerced by *EasyWeb*. In the event of a successful **C-STORE** operation, the image has been written to internal storage.

Updating images on the EasyWeb is not possible.

EasyWeb returns one of the following status codes upon configuration.

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Table 3-8: C-Store status codes

Service Status	*Further Meaning*	*Protocol Codes*	*Related Fields*	*Description*
Refused	Out of resources	A700		Indicates that there was not enough storage space to store the image. Recovery from this condition is left to the administrative functions.
	SOP Class not supported	A800		Indicates that the SOP Class of the Image in the C-STORE operation did not match the Abstract Syntax negotiated for the Presentation Context.
Error	Data set does not match SOP Class	A900		Indicates that the Data Set does not encode an instance of the SOP Class specified.
	Failed	C000		The operation was not successful.
	Cannot understand	C005		Indicates that the Data Set cannot be parsed into elements.
Warning	Data set does not match SOP Class	B007		match SOP Class Indicates that the Data Set does not match the SOP Class, but that the image was stored anyway.
	Duplicate SOP Instance UID	D000		Instance UID Indicates that the SOP Instance UID of the specified image is already stored in the database.
Success	Success	0000		Operation performed properly.

3.2.2.2.4 Presentation Context Acceptance Criterion - Storage

EasyWeb will accept any number of **Storage** Presentation Contexts per association request. Any one Abstract Syntax may be specified more than once in an association request, if the Transfer Syntaxes differs between the Presentation Contexts.

3.2.2.2.5 Transfer Syntax Selection Policies - Storage

EasyWeb supports all transfer syntaxes listed in Table 3-3

3.2.2.3 Real World Activity - FIND

3.2.2.3.1 Associated Real World Activity - FIND

EasyWeb will negotiate requests to an *SCP. EasyWeb* negotiates for the Study Root Query/ Retrieve IM FIND listed in Table 3-5.

3.2.2.3.2 Presentation Context Table - FIND

EasyWeb will initiate the Study Root Query/Retrieve IM FIND Model listed in Table 3-4.

C-Find Extended Negotiation may be supported, depending on the configuration of the database. It is NOT enabled for EasyWeb installations. If Extended Negotiation is enabled, *EasyWeb* will respond with the following information:

Table 3-9: FIND Extended Negotiation

Field Name	*Value*	*Description of Field*
Relational-queries	1	relational queries supported.

3.2.2.3.3 SOP Specific Conformance - FIND

SOP classes of the **Query/Retrieve** Service Class are implemented via the DIMSE **C-FIND** and **C-MOVE** services as defined in Part 7 of the DICOM standard.

3.2.2.3.4 Presentation Context Acceptance Criterion - FIND

EasyWeb will initiate one **Find** Presentation Context per association request. Any one Abstract Syntax may be specified more than once in an association request, if the Transfer Syntaxes differ between the Presentation Contexts.

3.2.2.3.5 Transfer Syntax Selection Policies - FIND

EasyWeb currently only supports the default transfer syntax of Implicit Little Endian.

3.2.2.4 Real World Activity - MOVE

3.2.2.4.1 Associated Context Table - MOVE

EasyWeb will initiate retrieve requests to an *SCP. EasyWeb* negotiates for the Study Root Query/Retrieve IM MOVE Model listed in Table 3-4.

3.2.2.4.2 Presentation Context Table - MOVE

EasyWeb will initiate the Study Root Query/Retrieve IM MOVE Model listed in Table 3-4.

3.2.2.4.3 SOP Specific Conformance - MOVE

EasyWeb will try to establish an association with the move destination specified in the **Move** request. One or more of the Presentation Contexts listed in the **Store** section of this document, may be negotiated in this association.

3.2.2.4.4 Presentation Context Proposed - MOVE

EasyWeb will initiate one number of **Move** Presentation Contexts per association request. Any one Abstract Syntax may be specified more than once in an association request, if the Transfer Syntaxes differ between the Presentation Contexts.

3.2.2.4.5 Transfer Syntax Selection Policies - MOVE

EasyWeb currently supports the ILE transfer syntax.

4 Communication Profiles

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

4.1 TCP/IP Stack

EasyWeb inherits its TCP/IP stack from the computer system upon which it executes.

4.1.1 Physical Media Support

EasyWeb is indifferent to the physical medium over which TCP/IP executes; it inherits the medium from the computer system upon which it executes.

5 Extensions /Specialization/Privatization

none.

6 Configuration

EasyWeb obtains configuration information from the following sources:

- Mapping from Application Entity Title to Presentation Address is provided by the database. Along with this mapping, the database stores those AE titles that are allowed to communicate with *EasyWeb*.

7 Support of Extended Character Sets

EasyWeb is known to support the following extended character sets:

- ISO-IR 100 Latin Alphabet No. 1