Philips Medical Systems
DICOM Conformance Statement

CD-Medical View Station
CDM 3500 - Release 1.2

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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-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)

[DCR] Dynamic Cardio Review
Extension to the X-Ray Angiographic Image Object and Media Storage
Version 1.1, July 7 1995
Siemens Medical Systems Inc. and Philips Medical Systems Nederland B.V.

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 Implementation Model identifies all of the DICOM *Application Entities (AEs)* and relates these Application Entities to the *Real World Activities (RWAs)*.

The DICOM interface for the CD-Medical product range of Philips Medical Systems is a Media Storage implementation of the 120mm *Compact Disc Recordable (CD-R)* medium, as described in the NEMA standard PS3.12-Annex F.
The CD-Medical product family consists of a CD-Medical Recorder (type CDM 3300) and a CD-Medical View Station (type CDM 3500). The latter is subject of this document.

2.1 Application Data Flow Diagram

The CD-Medical View Station application domain can be represented by a single Application Entity, describing the reading process (see Figure 2-1).
The “DICOM Reader” AE provides Standard Conformance to the DICOM Media Storage Service and File Format Class (PS 3.10) and the Media Storage Application Profile (PS 3.11). Moreover it also provides Augmented Conformance to the same DICOM standards in order to support the *Dynamic Cardio Review* (DCR) capabilities of the CD-Medical View Station.

The CD-Medical “DICOM Reader” AE is able to read the multi-frame images stored in two types of data-streams on the CD-R media. The first stream type is according to the DICOM format of the ACC-ACR-NEMA; i.e. each (cardiac) frame is stored as a 512 x 512, 8 bit wide, pixel matrix using a **lossless** JPEG compression algorithm; i.e. with a compression factor of about 2.
The second stream type consists of images in a **lossy** compressed format using a JPEG compression factor between 7 and 14. This allows images to be retrieved directly from the CD-R drive for instantaneous dynamic review on the CD-Medical View Station. This is the Dynamic Cardio Review and is an extension to the DICOM Media standard and is currently under consideration by the ACC-ACR-NEMA committee for incorporation in the standard, see [DCR].
.

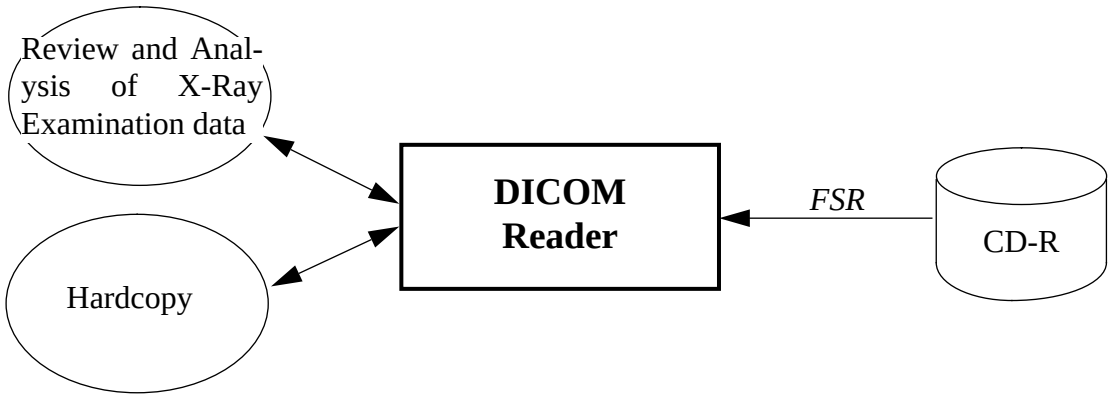

Figure 2-1: Application Data Flow diagram of the CD-Medical View Station

2.2 Functional definition of Application Entities

Referring to Figure 2-1, the local RWA “Review of X-Ray Examination” (i.e. putting a CD-R disc into the View Station) will cause the AE “DICOM Reader” to read the File-set on the CD-R medium. The term *File-set Reader (FSR)* means that the View Station device will read the DICOMDIR file and one or more DICOM files, covering all X-ray images, patient data, study parameters, etc.

2.2.1 Application Entity: DICOM Reader

The AE “DICOM Reader” supports the following functions;

- Read the DICOMDIR file that represents the contents of the (image) data as recorded. This information is displayed as an ordered list of icon images together with pertinent identifying information (patient name, etc.).
- Read the selected image *SOP (Service Object Pair)* instance from CD-R device and display it on the monitor of the View Station.
  This information is displayed as an ordered list of frames of the selected image or as a dynamic review of the selected image.

2.3 Sequencing of Real World Activities

The Reader process is activated by request from the user.
In case of multiple discs for a single examination, these discs are considered as self-contained.

2.4 Implementation Identifying Information

The Implementation Class UID is:

Implementation Class UID = “1.3.46.670589.7.1.1.4”

The Implementation Version Name is not relevant because this release of the View Station only reads CD-R Media and has no network capabilities.

This version of the CD-Medical View Station Conformance Statement overrules the previously published Conformance Statement (for CD-Medical View Station Release 1.1.1) with number 4522 982 61581 (date 15 February 1996).

3 AE Specifications

This chapter describes in more detail the DICOM context of each individual Application Entity.
Since the CD-Medical View Station encompasses a single Application Entity, only one section is necessary to describe the AE specification.

3.1 AE Specification: DICOM Reader

The “DICOM Reader” AE provides Standard Conformance to the DICOM Media Storage Service and File Format Class (PS 3.10) and the Media Storage Application Profile (PS 3.11) as far as the reading of lossless compressed images is concerned.
Moreover it also provides Augmented Conformance to the same DICOM standard in order to support the Dynamic Cardio Review (DCR) capabilities of the CD-Medical View Station.
The relevant Application Profiles, their Roles and the *Service Class (SC)* options, all defined in DICOM terminology, are listed in Table 3-1.

Table 3-1: Application Profile, Activities and Roles of the CD-Medical DICOM Reader

Application Profile	*Identifier*	*Real World Activity*	*Role*	*SC Option*
Basic Cardiac X-ray Angiographic Studies on CD-R media	STD-XABC-CD	Review of X-ray Examination	FSR	Interchange
Basic Cardiac Dynamic Review of X-ray Angiographic Studies on CD-R media	AUG-XABC-DYNAMIC-CD	Review of X-ray Examination	FSR	Interchange

3.1.1 Application Entity Title

The Application Entity Title is not relevant because this release of the View Station only reads CD-R Media and has no network capabilities.

3.1.2 RWA Review and Analysis of X-ray Examination

The “DICOM Reader” AE will act as a FSR using the Interchange option when reading the directory of the medium and when reading the requested images.

3.1.2.1 Application Profile(s) for this RWA

Refer to Table 3-1 for the list of Application Profiles that invoke this AE.

3.1.2.2 Required and optionally applied Attributes and DICOMDIR Keys

The Modules and Attributes needed for the correct review of lossless compressed images (Basic Cardiac X-ray Angiographic Application Profile) are specified in detail in section 8.1 on

page 12. These Modules and Attributes are Mandatory (type 1 or 2) in the DICOM 3.0 standard.
The optionally applied Modules and Attributes (if present on the disc) are also specified in that section.

The Keys needed for the correct review of the contents of a CD-R disc are specified in detail in section 8.1 on page 12. These Keys are Mandatory (type 1 or 2) in the DICOM 3.0 standard.
The optionally applied Keys (if present on the disc) are also specified in that section.

3.1.3 RWA hardcopy

The “DICOM Reader” AE will act as a FSR using the Interchange option when the operator requests for a hardcopy of (a selected part of) the information on CD-R.

3.1.3.1 Application Profile(s) for this RWA

Refer to Table 3-1 for the list of Application Profiles that invoke this AE.

3.1.3.2 Required and optionally applied Attributes and DICOMDIR Keys

See section 3.1.2.2 on page 5.
Attribute Institution Name on the CD-R disk (if present) and the locally configured Hospital Name are printed on the Hardcopy.

4 Augmented Application Profile

The CD-Medical View Station has Augmented Conformance to the Basic Cardiac Application Profile (STD-XABC-CD) as mentioned in the previous chapter. This Augmented Application Profile is identified through **AUG-XABC-DYNAMIC-CD** and adds components which facilitate dynamic review of the basic cardiac images stored on the interchange media. The clinical context is further described in Reference [DCR].
Due to this augmentation, the View Station will recognise private attributes identified with Private Creator string "**CARDIO-D.R. 1.0**".

4.1 SOP Class Augmentations

The AUG-XABC-DYNAMIC-CD Augmented Application Profile utilizes all of the SOP classes and transfer syntaxes as applicable for the STD-XABC-CD Application profile plus additional SOP Classes and the lossy image compression transfer syntax for XA images, see Table 4-1. These SOP instances (referred to as lossy compressed images) are derived from the lossless compressed images and are encoded with the JPEG lossy compressed transfer syntax as specified in PS-3.5.

Table 4-1: AUG-XABC-DYNAMIC-CD SOP Classes and Transfer Syntaxes

SOP Class Name	*SOP Class UID*	*Transfer Syntax Definition*	*Transfer Syntax UID*
Media Storage Directory Storage	1.2.840.10008.1.3.10	Explicit VR Little Endian	1.2.840.10008.1.2.1
X-ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	**JPEG Baseline (Process 1); Lossy JPEG 8 bit image compression** Explicit VR Little Endian	1.2.840.10008.1.2.4.50
Detached Patient Mgt. Storage	1.2.840.10008.3.1.2.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
Detached Visit Mgt. Storage	1.2.840.10008.3.1.2.2.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
Detached Study Mgt. Storage	1.2.840.10008.3.1.2.3.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
Detached Study Component Mgt. Storage	1.2.840.10008.3.1.2.3.2	Explicit VR Little Endian	1.2.840.10008.1.2.1

4.2 Directory Augmentations

The AUG-XABC-DYNAMIC-CD Augmented Application Profile utilizes the same requirements for the Directory Information in the DICOMDIR as the STD-XABC-CD Application Profile with the addition that lossy compressed images shall be referenced by Private Directory

Records.
All Private and Image Directory Records contain, in addition to the keys required by the STD-XABC-CD Application Profile, the keys specified in Table 4-2.

Table 4-2: Additional DICOMDIR keys for AUG-XABC-DYNAMIC-CD

Key Attribute	*Tag*	*Directory Record Type*	*Type*	*Notes*
File Location	(0009,xx00)	IMAGE + PRIVATE	3	Start location of file specified by Ref. File ID. (0004,1500). Specified as a number of bytes from the beginning of the medium.
File Size	(0009,xx01)	IMAGE + PRIVATE	1C	Size of file specified by Ref. File ID. (0004,1500). Specified as a number of bytes. Required if File Location is present.
Source Image Sequence	(0008,2112)	PRIVATE	1C	Identifies the original lossless compressed image.
Image Sequence Number	(0021,xx13)	IMAGE + PRIVATE	2	The sequence number of this image in the Study, as stored on the medium.

4.3 Other Augmentations

None

4.4 Required and optionally applied Attributes and DICOMDIR Keys

The Modules and Attributes needed for the correct review of lossy compressed images (Augmented Basic Cardiac X-ray Angiographic Application Profile) are specified in detail in section 8.2 on page 15, see also [DCR].

The Keys needed for the correct review of the contents of a CD-R disc are specified in detail in section 8.2 on page 15, see also [DCR].

5 Extensions/Specializations/Privatizations

The Standard Extended Attributes (if present on the CD-R disc) applied by the View Station for the review applications are specified in the sections below.
Due to these extensions, the View Station will recognise private attributes identified with Private Creator string "**CARDIO-D.R. 1.0**".

5.1 Edge Enhancement Sequence

Each frame within a lossless and lossy compressed image may be Edge Enhanced by applying the formula and the values specified in the Edge Enhancement Sequence (see Table 5-1). Whether the Edge Enhancement is performed or not, depends on the values of the Edge Enhancement Attributes.

Table 5-1 : Edge Enhancement Sequence

Attribute Name	*Tag*	*Type*	*Attribute Description*
Edge Enhancement Sequence	(0029,xx00)	3	Edge Enhancement Sequence describing the Edge Enhancement Filter to be applied to the image. *Formula: E=F+((F-C)*G)* *E: Pixel value of enhanced frame* *F: pixel value of source frame* *C: pixel value of convoluted region* *G: edge enhancement gain*
> Convolution Kernel Size	(0029,xx01)	1C	Number of rows and columns in the convolution kernel. The first value specifies the number of rows; the second value specifies the number of columns. Values shall be equal or greater than 3. Required if Edge Enhancement Sequence (0029,xx00) is present. A fixed kernel size of 5 x 5 is applied; kernel sizes other than 5 x 5 are ignored.
> Convolution Kernel Coefficients	(0029,xx02)	1C	The coefficients of the convolution kernel organized by row from left to right starting with the top row. The number of values shall be equal to the number of rows times the number of columns specified in the Convolution Kernel Size. Required if Edge Enhancement Sequence (0029,xx00) is present. The View Station supports only coefficients of 1; other coefficients are ignored.
> Edge Enhancement Gain	(0029,xx03)	1C	Edge Enhancement Gain to be used. Required if Edge Enhancement Sequence (0029,xx00) is present. The View Station supports a gain between 0 and 12.4. If another gain is specified, the Edge Enhancement Gain 0 is taken.

5.2 Image Blanking

The player will interpret the data in the optional Image Blanking Module as follows:

Table 5-2 : Image Blanking Module

Attribute Name	*Tag*	*Type*	*Attribute Description*
Image Blanking Shape	(0019,xx00)	1	Shape(s) of the image blanking defined for display. The following shapes are supported: RECTANGULAR CIRCULAR POLYGONAL data will be ignored. This multi-valued Attribute shall contain at most one of each Enumerated value (so combinations are supported).
Image Blanking Left Vertical Edge	(0019,xx02)	1C	Location of the left edge of the rectangular image blanking with respect to pixels in the image given as column. Required if Image Blanking Shape (0019,xx00) contains RECTANGULAR.
Image Blanking Right Vertical Edge	(0019,xx04)	1C	Location of the right edge of the rectangular image blanking with respect to pixels in the image given as column. Required if Image Blanking Shape (0019,xx00) contains RECTANGULAR.
Image Blanking Upper Horizontal Edge	(0019,xx06)	1C	Location of the upper edge of the rectangular image blanking with respect to pixels in the image given as row. Required if Image Blanking Shape (0019,xx00) contains RECTANGULAR.
Image Blanking Lower Horizontal Edge	(0019,xx08)	1C	Location of the lower edge of the rectangular image blanking with respect to pixels in the image given as row. Required if Image Blanking Shape (0019,xx00) contains CIRCULAR.
Center of Circular Image Blanking	(0019,xx10)	1C	Location of the center of the circular image blanking with respect to pixels in the image given as number of pixels. Required if Image Blanking Shape (0019,xx00) contains CIRCULAR.
Radius of Circular Image Blanking	(0019,xx12)	1C	Radius of the circular image blanking with respect to pixels in the image given as row and column. Required if Image Blanking Shape (0019,xx00) contains CIRCULAR.

6 Configuration

The Hospital Name can be configured locally and will be used for Hardcopies.

7 Support of Extended Character Sets

The CD-Medical View Station supports the following Extended Character Set(s) on the medium:

ISO_IR 100: Latin Alphabet No. 1

8 Specification of the applied IODs

The Modules and Attributes required or applied (if present on the disc) by the review functions of the CD-Medical View Station are specified in detail for the two Application Profiles supported: Basic Cardiac and Augmented Basic Cardiac.

8.1 Basic Cardiac Application Profile

8.1.1 Applied XA Image IOD

The Modules and Attributes required by the review functions of the CD-Medical View Station are specified for the SOP Classes in this Application Profile in Table 8-1. These are the mandatory (type 1 and 2) Attributes in the Mandatory Modules.
The references are made to sections of DICOM Part PS 3.3 and its Supplements and (in case of the Media Storage Directory information) to DICOM Supplement 11 (Media Storage Application Profiles).

Table 8-1: Required Modules and required Attributes in the standard XA Image IOD

Information Entity	*Required Module*	*Reference*	*Required Attributes*[a]
Patient	Patient	C.7.1.1	-
Study	General Study	C.7.2.1	Study Date, Study Time, Referring Physician's Name
Series	General Series	C.7.3.1	Modality, Performing Physician's Name
Equipment	General Equipment	C.7.5.1	Manufacturer, Institution Name
Image	General Image	C.7.6.1	-
	Image Pixel	C.7.6.3	Rows, Columns, Pixel Data
	Cine	C.7.6.5	Frame Time (required if Frame Increment Pointer points to it), Frame Time Vector (required if Frame Increment Pointer points to it)
	Multi-Frame	C.7.6.6	Number of Frames
	Frame Pointers	C.7.6.9	-
	Display Shutters	C.7.6.11	-
	X-Ray Image	C.8.7.1	Image Type, Samples per Pixel, Photometric Interpretation, Bits Allocated, Bits Stored, High Bit, Pixel Representation, Pixel Intensity Relationship, Frame Increment Pointer
	X-Ray Acquisition	C.8.7.2	KVP, Exposure (required if either Exposure Time or X-Ray Tube Current is not present), Exposure Time and X-Ray Tube Current (both are required if Exposure not present)
	XA Positioner	C.8.7.5	Positioner Primary Angle, Positioner Secondary Angle

Table 8-1: Required Modules and required Attributes in the standard XA Image IOD (Continued)

Information Entity	*Required Module*	*Reference*	*Required Attributes*[a]
Image	Curve	C.10.2	-
	Modality LUT	C.11.1	-
	VOI LUT	C.11.2	-
	SOP Common	C.12.1	-

a. Some of the required Attributes may be empty.

Table 8-2 specifies applied optional Modules and Attributes if these Modules and Attributes are present on the CD-R medium.

Table 8-2: Applied optional Modules and Attributes in the standard XA Image IOD

Information Entity	*Applied optional Module*	*Reference*	*Applied optional Attributes*
Study	General Study	C.7.2.1	Study ID
Equipment	General Equipment	C.7.5.1	Manufacturer's Model Name, Software Version(s)
Image	General Image	C.7.6.1	Acquisition Date, Acquisition Time, Image Number
	Image Pixel	C.7.6.3	-
	Cine	C.7.6.5	Frame Delay, Cine Rate
	Display Shutters	C.7.6.11	Shutter Shape, Shutter Left Vertical Edge, Shutter Right Vertical Edge, Shutter Upper Horizontal Edge, Shutter Lower Horizontal Edge, Center of Circular Shutter, Radius of Circular Shutter, Vertices of Polygonal Shutter
	X-Ray Acquisition	C.8.7.2	Intensifier Size
	XA Positioner	C.8.7.5	Distance Source to Detector
	VOI LUT	C.11.2	Window Center, Window Width

8.1.2 Applied Basic Directory IOD

Table 8-3 specifies the Modules and Attributes/Keys in the Basic Directory IOD required by the review functions of the CD-Medical View Station. These are Mandatory (type 1 or 2) Attributes/Keys in the Mandatory Modules.

Table 8-3: Required Modules and required Attributes/Keys in the Basic Directory IOD

Information Entity	*Required Module*	*Reference*	*Required Attributes/Keys*[a]
DICOMDIR	File-set Identification	B.X.3.2.1	File-Set ID
	Directory Information	B.X.3.2.2	Offset of the First Directory Record of Root Directory Entity, Offset of the Last Directory Record of Root Directory Entity, File-set Consistency Flag, Directory Record Sequence, Offset of Next Directory Record, Record In-use Flag, Offset of Referenced Lower-Level Directory Entity, Directory Record Type, Referenced File ID, Referenced SOP Class UID in File, Referenced SOP Instance UID in File, Referenced Transfer Syntax UID in File
	PATIENT keys	B.X.5.1 A.3.3.1	Patient ID, Patient's Birth Date, Patient's Sex, Patient Name
	STUDY keys	B.X.5.1 A.3.3.1	-
	SERIES keys	B.X.5.1 A.3.3.1	Institution Name, Performing Physician’s Name
	IMAGE keys	B.X.5.4 A.3.3.1	Image Type (with at least 3 values), Icon Image Sequence (with its sequenced Attributes) Referenced Image Sequence (if Image Type is BIPLANE A or B)

a. Some of the required Keys may be empty.

Table 8-4 specifies applied optional Modules and Attributes/Keys in the Basic Directory IOD if these Modules and Attributes/Keys are present on the CD-R medium.

Table 8-4: Applied optional Modules and Attributes/Keys in the Basic Directory IOD

Information Entity	*Applied optional Module*	*Reference*	*Applied optional Attributes/Keys*
DICOMDIR	File-set Identification	B.X.3.2.1	-
	STUDY keys	B.X.5.1 A.3.3.1	Study Date, Study Time, Study Description, Study ID

8.1.3 Applied Patient Management IOD

None of the Modules (so none of the Attributes) in the Detached Patient Management IOD are required by the review functions of the CD-Medical View Station.

8.2 Augmented Basic Cardiac Application Profile

8.2.1 Applied Augmented XA Image IOD

The Modules and Attributes of the Augmented XA Image IOD (both lossless and lossy compressed) required by the review functions of CD-Medical View Station are the same as those for the Basic Cardiac Application Profile, see section 8.1 on page 12) plus those specified in Table 8-5.
The references are made to sections of DICOM Part PS 3.3 and its Supplements and (in case of Media Storage Directory information) to DICOM Supplement 11 (Media Storage Application Profiles).

Table 8-5: Extra required Modules and Attributes in the Augmented XA Image IOD

Information Entity	*Required Module*	*Reference*	*Required Attributes*
Image	X-Ray Image	C.8.7.1	Lossy Image Compression (for lossy compressed XA images only), see [DCR]

Table 8-6 specifies applied optional Modules and Attributes (if present on the disc) of the Augmented XA Image IOD (both lossless and lossy compressed).

Table 8-6: Applied optional Modules and Attributes in the Augmented XA Image IOD

Information Entity	*Applied optional Module*	*Reference*	*Applied optional Attributes*
Image	General Image	C.7.6.1	Image Sequence Number
	Image Blanking	C.7.6.11	Image Blanking Shape, Image Blanking Left Vertical Edge, Image Blanking Right Vertical Edge, Image Blanking Upper Horizontal Edge, Image Blanking Lower Horizontal Edge, Center of Circular Image Blanking, Radius of Circular Image Blanking
	X-Ray Image	C.8.7.1	Edge Enhancement Sequence (containing Convolution Kernel Size, Convolution Kernel Coefficients, Edge Enhancement Gain), Alternate Image Sequence (for lossless compressed XA images only)

8.2.2 Applied Augmented Basic Directory IOD

The augmented Basic Directory Modules and Attributes/Keys required by the review functions of the CD-Medical View Station are the same as those for the Basic Cardiac Application Profile, see section 8.1 on page 12). The required Attributes/Keys for the PRIVATE Directory Record (referring to the lossy compressed XA images) are the same as those for the IMAGE Directory Records plus the Private Record UID.
Table 8-7 specifies the optionally applied Modules and Attributes in the Basic Directory IOD.

Table 8-7: Applied Modules and applied Attributes in the Basic Directory IOD

Information Entity	*Applied optional Module*	*Reference*	*Applied optional Attributes/Keys*
DICOMDIR	IMAGE keys	B.X.5.4 A.3.3.1	Alternate Image Sequence
	PRIVATE keys	B.X.5.4 A.3.3.1	Source Image Sequence

8.2.3 Applied Detached Patient Management IOD

None of the Attributes in the (possibly present) Detached Patient Management SOP instances are required or used (if present) by the dynamic review function of the CD-Medical View Station.

8.2.4 Applied Detached Visit, Study (Component) Management IODs

None of the Attributes in the (possibly present) Detached Visit Management SOP instances, Detached Study Management SOP instances and Detached Study Component Management SOP instances are required or used (if present) by the dynamic review function of the CD-Medical View Station.

9 Implementation restrictions and choices

A number of implementation restrictions/choices exist in this release of the View Station which may limit the use of the review functions:

- Only the first Study of the first Patient on a CD-R disc can be reviewed. However, all available Series can be read.
- Multi-session is not supported.
- The maximum number of images read per CD-R disk is 32 (the rest is ignored).
- The maximum number of frames per image read is 1000 (the rest is ignored).
- The Basic Offset Table (BOT) should be present in the XA Image IOD in order to perform the dynamic review.
- Presence of an image with 0 frames disables the “PLAY” function - the cyclic display of all frames of all images on the CD. Selecting an image and starting “RUN CYCLE” (the cyclic display of all the frames in that image) is still possible.
- Edge Enhancement reacts only on the gain factor, see also Table 5-1 on page 9.
- If attribute Lossy Image Compression has value 1, string “O.I.=L” is shown on screen.
- The ECG data is displayed (if present) as far as image frames are present.
- Attribute Record In-Use Flag (in the DICOMDIR file) is not handled.
- The ISO 9660 file naming is less strictly implemented; file names without ‘.’ and ‘;’ at the end of the name are read.
- Attribute Maximum Image Frame Size is not required while reading the dynamic stream.
- Files on CD-R other than (Basic Cardiac) XA images and (Augmented Basic Cardiac) Dynamic XA images are ignored.
- A negative Window Width is interpreted as video invert and the absolute value of Window Width.