

DICOM Conformance Statement

Application Annex:

SmartCT R1.1

On Interventional Workspot R1.6



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1. Data Specifications

1.1. Supported IOD's

This section specifies each IOD accepted and / or created by SmartCT Application.

ACCEPTED The applicable IOD is accepted for storage in the repository of the hosting platform and supported for import in SmartCT Application for viewing and analysis.

CREATED The SmartCT Application supports generation of derived data by using the applicable IOD and is able to store this data in the repository of the hosting platform.

Table 1: Supported IOD's

| IOD | | Support | |
|-----------------------------------------------------------------|--------------------------------|----------|---------|
| Name | UID | ACCEPTED | CREATED |
| X-Ray Angiographic Image Storage SOP Class* | 1.2.840.10008.5.1.4.1.1.12.1 | Yes | Yes |
| Secondary Capture Image Storage SOP Class ** | 1.2.840.10008.5.1.4.1.1.7 | Yes | Yes |
| Multiframe True Color Secondary Capture Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.7.4 | No | Yes |
| X-Ray 3D Angiographic Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.13.1.1 | Yes | Yes |

* **Note:** SmartCT XA supports the import of the following XA series from the Philips Azurion Modality:

- 3D acquisition series (imported in the hosting platform via the real time link interface or via DICOM import)
- 2D acquisition series (2D X-ray and fluoro) received during the Live tasks from the Philips Azurion modality..

Only these XA series can be recalled when the study is loaded again in SmartCT.

** **Note:** The following Secondary Capture Images are created by the SmartCT application:

- DICOM snapshots containing a screen capture created in the Series&Reconstruction, Segmentation, Projections or Live Tasks
- Data objects with results of:
 - o SmartCT session data (Tasks settings automatically created when the SmartCT application is closed).
 - o Contrast/Brightness settings (for 2D X-ray overlay series)
 - o Motion Compensation (for the 2D X-ray overlay series)
 - o Skull Segmentation data (only created for VasoCT volumes)

Only the Secondary Capture objects containing the SmartCT session information, Contrast/Brightness data, Motion Compensation data and Skull Segmentation data can be used as input in the SmartCT app.

DICOM Secondary Capture snapshots cannot be viewed in the SmartCT application, but they can be viewed in the image viewer of the Interventional Workspot and in other appropriate DICOM image viewers.

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3. Introduction

This DICOM Conformance Statement annex is applicable to the SmartCT on Interventional Workspot R1.6 hosting platform, later referred to as SmartCT Application.

SmartCT is a 3D image visualization and analysis software product (Interventional Tool) intended to provide fast and high-resolution 3D visualization of vasculature, hemorrhages, soft tissue and bone structures.

3.1. Revision History

The revision history provides dates and differences of the different releases.

Table 2: Revision History

| Document Version | Date of Issue | Description of change |
|------------------|---------------|----------------------------------------------------------------|
| 00 | 05-Aug-2022 | First Release for SmartCT R1.1 on Interventional Workspot R1.6 |

3.2. 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.

3.3. Remarks

The DICOM Conformance Statement is contained in chapter 4 through 8 and follows the contents and structuring requirements of DICOM PS 3.2.

This DICOM 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 an 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 ensure 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).

3.4. Definitions, Terms and Abbreviations

Table 3: Definitions, Terms and Abbreviations

| Abbreviation/Term | Explanation |
|-------------------|------------------------------------------------|
| AE | Application Entity |
| ANSI | American National Standard Institute |
| AP | Application Profile |
| BOT | Basic Offset Table |
| CD | Compact Disc |
| CD-R | CD-Recordable |
| CD-M | CD-Medical |
| CB | Contrast/Brightness |
| CR | Computed Radiography |
| CT | Computed Tomography |
| DCR | Dynamic Cardio Review |
| DICOM | Digital Imaging and Communications in Medicine |
| DIMSE | DICOM Message Service Element |
| DIMSE-C | DIMSE-Composite |
| DIMSE-N | DIMSE-Normalized |
| DX | Digital X-Ray |
| EBE | DICOM Explicit VR Big Endian |
| ELE | DICOM Explicit VR Little Endian |
| FSC | File-set Creator |
| FSR | File-set Reader |
| FSU | File-set Updater |
| GUI | Graphic User Interface |
| HIS | Hospital Information System |
| HL7 | Health Level Seven |
| ILE | DICOM Implicit VR Little Endian |
| IOD | Information Object Definition |
| IW | Interventional Workspot |
| MC | Motion Correction |
| MOD | Magneto-Optical Disk |
| MPPS | Modality Performed Procedure Step |
| MR | Magnetic Resonance |
| NEMA | National Electrical Manufacturers Association |
| NM | Nuclear Medicine |
| PDU | Protocol Data Unit |
| RF | X-Ray Radiofluoroscopic |
| RIS | Radiology Information System |
| RT | Radiotherapy |
| RWA | Real-World Activity |
| SC | Secondary Capture |
| SCM | Study Component Management |
| SCP | Service Class Provider |
| SCU | Service Class User |
| SES | Session |
| SKULL | Skull Segmentation |
| SNS | Snapshot |
| SOP | Service Object Pair |

| Abbreviation/Term | Explanation |
|-------------------|-------------------------------------------------|
| TCP/IP | Transmission Control Protocol/Internet Protocol |
| UID | Unique Identifier |
| US | Ultrasound |
| USMF | Ultrasound Multi-frame |
| WLM | Worklist Management |
| XA | X-Ray Angiographic |

3.5. References

[DICOM] Digital Imaging and Communications in Medicine, Parts 1 - 22 (NEMA PS 3.1- PS 3.22),

National Electrical Manufacturers Association

1300 North 17th Street

Suite 900

Arlington, Virginia 22209

Internet: <https://www.dicomstandard.org/current>

Note that at any point in time the official standard consists of the most recent yearly edition of the base standard (currently 2022) plus all the supplements and correction items that have been approved as Final Text.

4. Annexes of application " SmartCT R1.1 application"

4.1. IOD Contents

4.1.1. Created SOP Instance

This section specifies each IOD created by this application.

This section specifies each IOD created (including private IOD's). It should specify the attribute name, tag, VR, and value. The value should specify the range and source (e.g. user input, Modality Worklist, automatically generated, etc.). For content items in templates, the range and source of the concept name and concept values should be specified. Whether the value is always present or not shall be specified.

Abbreviations used in the IOD tables for the column "Presence of Module" are:

ALWAYS The module is always present
 CONDITIONAL The module is used under specified condition

Abbreviations used in the Module table for the column "Presence of Value" are:

ALWAYS The attribute is always present with a value
 EMPTY The attribute is always present without any value (attribute sent zero length)
 VNAP The attribute is always present and its Value is Not Always Present
 (attribute sent zero length if no value is present)
 ANAP The attribute is present under specified condition – if present then it will always have a value

The abbreviations used in the Module table for the column "Source" are:

AUTO The attribute value is generated automatically
 CONFIG The attribute value source is a configurable parameter
 COPY The attribute value source is another SOP instance
 FIXED The attribute value is hard-coded in the application
 IMPLICIT The attribute value source is a user-implicit setting
 MPPS The attribute value is the same as that use for Modality Performed Procedure Step
 MWL The attribute value source is a Modality Worklist
 USER The attribute value source is explicit user input

4.1.2. Acceptance Criteria

This section specifies the acceptance criteria applied by SmartCT R1.1 Application to which a dataset should adhere before it can be imported into the application. This can be criteria on the highest level (e.g. data from a certain manufacturer or system model) or certain DICOM attributes mandatory to be present into the dataset holding a specific value. In case one or more Philips private attributes are required, then a list of supported Philips system models will be mentioned.

Table 4: Accepted system models

| Manufacturer | Modality | System Model Name(s) |
|----------------|----------------|----------------------|
| Not applicable | Not applicable | Not applicable |

Table 5: Accepted transfer syntaxes per IOD

| IOD | | Transfer Syntax | |
|--------------------------------------------|------------------------------|---------------------------------------------|------------------------|
| Name | UID | Name | UID |
| X-Ray Angiographic Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.12.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 |
| | | JPEG 2000 Image Compression | 1.2.840.10008.1.2.4.91 |
| | | JPEG 2000 Image Compression (Lossless Only) | 1.2.840.10008.1.2.4.90 |
| | | JPEG Baseline (Process 1) | 1.2.840.10008.1.2.4.50 |
| | | JPEG Extended (Process 2 & 4) | 1.2.840.10008.1.2.4.51 |

| | | |
|--|---------------------------------------------------|------------------------|
| | JPEG Lossless, Non-Hierarchical, FOP (Process 14) | 1.2.840.10008.1.2.4.70 |
| | RLE Lossless | 1.2.840.10008.1.2.5 |

Table 6: Accepted attribute values

| Attribute Name | Attribute Number | Values / Comments |
|----------------|------------------|-------------------|
| Not applicable | Not applicable | Not applicable |

4.1.3. List of created SOP Classes

Table 7: List of created SOP Classes

| SOP Class Name | SOP Class UID |
|------------------------------------------------------------------|--------------------------------|
| X-Ray Angiographic Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.12.1 |
| Secondary Capture Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.7 |
| Multi-frame True Color Secondary Capture Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.7.4 |
| X-Ray 3D Angiographic Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.13.1.1 |

4.1.3.1. X-Ray Angiographic Image Storage SOP Class

The 2D overlay series received by SmartCT R1.1 from the X-ray modality in the live Task are stored as an X-ray Angiographic Image. There are 2 types of overlay series:

- 2D exposure series.
- Fluoroscopy series.

Attribute values in the created X-ray Angiographic IOD can be different for 2D exposure series and Fluoroscopy series.

Differences in attribute values are indicated in the table below with:

- 2DXA
- FLUO

Table 5: IOD of Created X-Ray Angiographic Image Storage Instances

| Information Entity | Module | Presence | Conditions |
|--------------------|--------------------------|-------------|--------------------------------------------------------------------------------------------------|
| Patient | Patient Module | ALWAYS | Not Applicable |
| Study | General Study Module | ALWAYS | Not Applicable |
| | Patient Study Module | CONDITIONAL | Only present when primary 3D acquisition series was imported from X-Ray Modality via DICOM in IW |
| Series | General Series Module | ALWAYS | Not Applicable |
| Equipment | General Equipment Module | ALWAYS | Not Applicable |
| Image | General Image Module | ALWAYS | Not Applicable |
| | Image Pixel Module | ALWAYS | Not Applicable |
| | Cine Module | ALWAYS | Not Applicable |
| | Multi-Frame Module | ALWAYS | Not Applicable |
| | Display Shutter Module | ALWAYS | Not Applicable |
| | X-Ray Image Module | ALWAYS | Not Applicable |
| | X-Ray Acquisition Module | ALWAYS | Not Applicable |
| | X-Ray Table Module | ALWAYS | Not Applicable |
| | XA Positioner Module | ALWAYS | Not Applicable |
| | DX Detector Module | ALWAYS | Not Applicable |
| | VOI LUT Module | ALWAYS | Not Applicable |
| | SOP Common Module | ALWAYS | Not Applicable |

Remark: in tables below, source value = COPY means that the attribute value is copied from the imported X-Ray Angiographic run from the modality.

Table 6: Patient Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|----------------------|-----------|----|-------|-------------------|--------|-------------------------|
| Patient's Name | 0010,0010 | PN | - | VNAP | COPY | copied from source data |
| Patient ID | 0010,0020 | LO | - | VNAP | COPY | copied from source data |
| Patient's Birth Date | 0010,0030 | DA | - | VNAP | COPY | copied from source data |
| Patient's Sex | 0010,0040 | CS | - | VNAP | COPY | copied from source data |

Table 7: General Study Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|----------------------------|-----------|----|-------|-------------------|--------|-------------------------|
| Study Date | 0008,0020 | DA | - | ALWAYS | COPY | copied from source data |
| Study Time | 0008,0030 | TM | - | ALWAYS | COPY | copied from source data |
| Accession Number | 0008,0050 | SH | - | VNAP | COPY | copied from source data |
| Referring Physician's Name | 0008,0090 | PN | - | VNAP | COPY | copied from source data |
| Study Instance UID | 0020,000D | UI | - | ALWAYS | COPY | copied from source data |
| Study ID | 0020,0010 | SH | - | VNAP | COPY | copied from source data |

Table 8: Patient Study Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|----------------|-----------|----|-------|-------------------|--------|--------------------|
| Medical Alerts | 0010,2000 | LO | - | ANAP | COPY | Copied from source |
| Allergies | 0010,2110 | LO | - | ANAP | COPY | Copied from source |

Table 9: General Series Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|-------------------------------------|-----------|----|---------------------------------------------------------------------------------------|-------------------|--------|-------------------------|
| Series Date | 0008,0021 | DA | - | ALWAYS | AUTO | - |
| Series Time | 0008,0031 | TM | - | ALWAYS | AUTO | - |
| Modality | 0008,0060 | CS | XA | ALWAYS | FIXED | - |
| Series Description | 0008,103E | LO | 2DXA: Copied from received 2D exposure series) FLUO: " SmartCT 2D overlay series " | ALWAYS | AUTO | - |
| Performing Physician's Name | 0008,1050 | PN | - | VNAP | COPY | copied from source data |
| Related Series Sequence | 0008,1250 | SQ | - | ALWAYS | AUTO | Added by SmartCT |
| >Study Instance UID | 0020,000D | UI | - | ALWAYS | AUTO | - |
| >Series Instance UID | 0020,000E | UI | - | ALWAYS | AUTO | - |
| >Purpose of Reference Code Sequence | 0040,A170 | SQ | - | VNAP | AUTO | - |
| Series Instance UID | 0020,000E | UI | - | ALWAYS | AUTO | - |

| | | | | | | |
|-------------------------------------|-----------|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|------|-------------------------|
| Series Number | 0020,0011 | IS | 2DXA: 5000 + y (y = series number of 2D exposure series received from the X-ray system) FLUO: <xxxxx> (xxxxx is received from the X-ray modality via proprietary CWIS interface and is added by the SmartCT app to the series) | ALWAYS | AUTO | - |
| Performed Procedure Step Start Date | 0040,0244 | DA | - | ALWAYS | COPY | copied from source data |
| Performed Procedure Step Start Time | 0040,0245 | TM | - | ALWAYS | COPY | copied from source data |
| Performed Procedure Step ID | 0040,0253 | SH | - | ALWAYS | COPY | copied from source data |

Table 10: General Equipment Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---------------------------|-----------|----|---------|-------------------|--------|---------------------------------------------------|
| Manufacturer | 0008,0070 | LO | Philips | ALWAYS | FIXED | - |
| Institution Name | 0008,0080 | LO | - | VNAP | CONFIG | Hospital name configured in IW |
| Manufacturer's Model Name | 0008,1090 | LO | SmartCT | ALWAYS | FIXED | |
| Device Serial Number | 0018,1000 | LO | - | ALWAYS | AUTO | 12 digit MAC address of network card in IW system |
| Software Versions | 0018,1020 | LO | 1.1.x | ALWAYS | AUTO | where "x" application SW version |

Table 11: General Image Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|-----------------------------|-----------|----|-----------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------|-------------------------|
| Image Type | 0008,0008 | CS | ORIGINAL\ PRIMARY\ SINGLE PLANE | ALWAYS | COPY | copied from source data |
| Acquisition Date | 0008,0022 | DA | - | ANAP | COPY | copied from source data |
| Content Date | 0008,0023 | DA | - | ANAP | COPY | copied from source data |
| Acquisition Time | 0008,0032 | TM | - | ANAP | COPY | copied from source data |
| Content Time | 0008,0033 | TM | - | ANAP | COPY | copied from source data |
| Instance Number | 0020,0013 | IS | 2DXA: 12000 + y (y = run number of 2D exposure series received from the X-ray system) FLUO: <xxxxx> (xxxx is generated by the SmartCT app) | ALWAYS | AUTO | |
| Patient Orientation | 0020,0020 | CS | - | VNAP | COPY | copied from source data |
| Lossy Image Compression | 0028,2110 | CS | 00 | ALWAYS | COPY | copied from source data |
| Icon Image Sequence | 0088,0200 | SQ | - | ALWAYS | COPY | copied from source data |
| >Samples per Pixel | 0028,0002 | US | 1 | ALWAYS | COPY | copied from source data |
| >Photometric Interpretation | 0028,0004 | CS | MONOCHROME2 | ALWAYS | COPY | copied from source data |

| | | | | | | |
|-----------------------|-----------|----|-----|--------|------|-------------------------|
| >Rows | 0028,0010 | US | 128 | ALWAYS | COPY | copied from source data |
| >Columns | 0028,0011 | US | 128 | ALWAYS | COPY | copied from source data |
| >Bits Allocated | 0028,0100 | US | 8 | ALWAYS | COPY | copied from source data |
| >Bits Stored | 0028,0101 | US | 8 | ALWAYS | COPY | copied from source data |
| >High Bit | 0028,0102 | US | 7 | ALWAYS | COPY | copied from source data |
| >Pixel Representation | 0028,0103 | US | 0 | ALWAYS | COPY | copied from source data |
| >Pixel Data | 7FE0,0010 | OB | - | ALWAYS | COPY | copied from source data |

Table 12: Image Pixel Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|----------------------------|-----------|-------|-------------|-------------------|--------|---------|
| Samples per Pixel | 0028,0002 | US | 1 | ALWAYS | AUTO | - |
| Photometric Interpretation | 0028,0004 | CS | MONOCHROME2 | ALWAYS | AUTO | - |
| Rows | 0028,0010 | US | - | ALWAYS | AUTO | - |
| Columns | 0028,0011 | US | - | ALWAYS | AUTO | - |
| Bits Allocated | 0028,0100 | US | 16 | ALWAYS | AUTO | - |
| Bits Stored | 0028,0101 | US | 16 | ALWAYS | AUTO | - |
| High Bit | 0028,0102 | US | 15 | ALWAYS | AUTO | - |
| Pixel Representation | 0028,0103 | US | 0 | ALWAYS | AUTO | - |
| Pixel Data | 7FE0,0010 | OB/OW | - | ALWAYS | AUTO | - |

Table 13: Cine Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|----------------|-----------|----|-------|-------------------|--------|-------------------------|
| Cine Rate | 0018,0040 | IS | - | ANAP | COPY | copied from source data |
| Frame Time | 0018,1063 | DS | - | ALWAYS | COPY | copied from source data |

Table 14: Multi-Frame Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|-------------------------|-----------|----|----------|-------------------|--------|-------------------------|
| Number of Frames | 0028,0008 | IS | - | ALWAYS | COPY | copied from source data |
| Frame Increment Pointer | 0028,0009 | AT | 00181063 | ALWAYS | COPY | copied from source data |

Table 15: Display Shutter Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|-------------------------------|-----------|----|-------------|-------------------|--------|-------------------------|
| Shutter Shape | 0018,1600 | CS | RECTANGULAR | ALWAYS | COPY | copied from source data |
| Shutter Left Vertical Edge | 0018,1602 | IS | - | ALWAYS | COPY | copied from source data |
| Shutter Right Vertical Edge | 0018,1604 | IS | - | ALWAYS | COPY | copied from source data |
| Shutter Upper Horizontal Edge | 0018,1606 | IS | - | ALWAYS | COPY | copied from source data |
| Shutter Lower Horizontal Edge | 0018,1608 | IS | - | ALWAYS | COPY | copied from source data |

Table 16: X-Ray Image Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|----------------|-----------|----|-----------|-------------------|--------|---------|
| Image Type | 0008,0008 | CS | ORIGINAL\ | ALWAYS | FIXED | - |

| | | | PRIMARY SINGLE PLANE | | | |
|------------------------------|-----------|----|-------------------------|--------|-------|-------------------------|
| Samples per Pixel | 0028,0002 | US | 1 | ALWAYS | FIXED | - |
| Photometric Interpretation | 0028,0004 | CS | MONOCHROME2 | ALWAYS | FIXED | - |
| Frame Increment Pointer | 0028,0009 | AT | 00181063 | ALWAYS | COPY | copied from source data |
| Bits Allocated | 0028,0100 | US | 16 | ALWAYS | FIXED | - |
| Bits Stored | 0028,0101 | US | 16 | ALWAYS | FIXED | - |
| High Bit | 0028,0102 | US | 15 | ALWAYS | FIXED | - |
| Pixel Representation | 0028,0103 | US | 0 | ALWAYS | FIXED | - |
| Pixel Intensity Relationship | 0028,1040 | CS | LIN | ALWAYS | FIXED | - |
| Lossy Image Compression | 0028,2110 | CS | 00 | ALWAYS | COPY | - |

Table 87: X-Ray Acquisition Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|----------------------|-----------|----|-------|-------------------|--------|-------------------------|
| KVP | 0018,0060 | DS | - | VNAP | COPY | copied from source data |
| Exposure | 0018,1152 | IS | - | ALWAYS | COPY | copied from source data |
| Radiation Setting | 0018,1155 | CS | SC | ALWAYS | COPY | copied from source data |
| Imager Pixel Spacing | 0018,1164 | DS | - | ANAP | COPY | copied from source data |
| Pixel Spacing | 0028,0030 | DS | - | ALWAYS | COPY | copied from source data |

Table 98: X-Ray Table Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|----------------|-----------|----|--------|-------------------|--------|-------------------------|
| Table Motion | 0018,1134 | CS | STATIC | VNAP | COPY | copied from source data |
| Table Angle | 0018,1138 | DS | - | ANAP | COPY | copied from source data |

Table 19: XA Positioner Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|--------------------------------------|-----------|----|---------|-------------------|--------|-------------------------|
| Distance Source to Detector | 0018,1110 | DS | - | ALWAYS | COPY | copied from source data |
| Distance Source to Patient | 0018,1111 | DS | - | ALWAYS | COPY | copied from source data |
| Positioner Motion | 0018,1500 | CS | DYNAMIC | ALWAYS | COPY | copied from source data |
| Positioner Primary Angle | 0018,1510 | DS | - | VNAP | COPY | copied from source data |
| Positioner Secondary Angle | 0018,1511 | DS | - | VNAP | COPY | copied from source data |
| Positioner Primary Angle Increment | 0018,1520 | DS | - | ANAP | COPY | copied from source data |
| Positioner Secondary Angle Increment | 0018,1521 | DS | - | ANAP | COPY | copied from source data |

Table 20: DX Detector Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|----------------------|-----------|----|-------|-------------------|--------|-------------------------|
| Imager Pixel Spacing | 0018,1164 | DS | - | ALWAYS | COPY | copied from source data |
| Pixel Spacing | 0028,0030 | DS | - | ALWAYS | AUTO | |

Table 21: VOI LUT Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|----------------|-----------|----|-------|-------------------|--------|-------------------------|
| Window Center | 0028,1050 | DS | - | ALWAYS | COPY | copied from source data |
| Window Width | 0028,1051 | DS | - | ALWAYS | COPY | copied from source data |

Table 22: SOP Common Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|------------------------|-----------|----|------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------|-------------------------|
| Specific Character Set | 0008,0005 | CS | - | ANAP | COPY | Copied from source data |
| Instance Creation Date | 0008,0012 | DA | - | ALWAYS | AUTO | - |
| Instance Creation Time | 0008,0013 | TM | - | ALWAYS | AUTO | - |
| SOP Class UID | 0008,0016 | UI | 1.2.840.10008.5.1.4.1.1.12.1 | ALWAYS | FIXED | - |
| SOP Instance UID | 0008,0018 | UI | - | ALWAYS | AUTO | - |
| Instance Number | 0020,0013 | IS | 2DXA: 12000 + y (y = run number of 2D exposure series received from the X-ray system) FLUO: <xxxx> (value generated by SmartCT) | ALWAYS | AUTO | - |

4.1.3.2. Secondary Capture Image Storage SOP class

The Secondary Capture Image Storage SOP class is used for the storage of the following SmartCT objects:

- Session
- Contrast/Brightness
- Motion Compensation
- Skull Segmentation
- Snapshot

In the tables below the attributes and attribute values are specified for above objects.

Table 10: IOD of Created Secondary Capture Image Storage SOP Class Instances

| Information Entity | Module | Presence Of Module | Condition |
|--------------------|--------------------------|--------------------|--------------------------------------------------------------------------------------------------|
| Patient | Patient Module | ALWAYS | - |
| Study | General Study Module | ALWAYS | - |
| | Patient Study Module | CONDITIONAL | Only present when primary 3D acquisition series was imported from X-Ray Modality via DICOM in IW |
| Series | General Series Module | ALWAYS | - |
| Equipment | General Equipment Module | ALWAYS | - |
| | SC Equipment Module | ALWAYS | - |
| Image | General Image Module | ALWAYS | - |
| | Image Pixel Module | ALWAYS | - |
| | SC Image Module | CONDITIONAL | Only present in SNS object |
| | VOI LUT Module | CONDITIONAL | Not present in the SES, SNS and SKULL objects |
| | SOP Common Module | ALWAYS | - |

Table 24: Patient Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|----------------------|-----------|----|-------|-------------------|--------|-------------------------|
| Patient's Name | 0010,0010 | PN | - | VNAP | COPY | copied from source data |
| Patient ID | 0010,0020 | LO | - | VNAP | COPY | copied from source data |
| Patient's Birth Date | 0010,0030 | DA | - | VNAP | COPY | copied from source data |
| Patient's Sex | 0010,0040 | CS | - | VNAP | COPY | copied from source data |

Table 25: General Study Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|----------------------------|-----------|----|-------|-------------------|--------|-------------------------|
| Study Date | 0008,0020 | DA | - | ALWAYS | COPY | copied from source data |
| Study Time | 0008,0030 | TM | - | ALWAYS | COPY | copied from source data |
| Accession Number | 0008,0050 | SH | - | VNAP | COPY | copied from source data |
| Referring Physician's Name | 0008,0090 | PN | - | VNAP | COPY | copied from source data |
| Study Instance UID | 0020,000D | UI | - | ALWAYS | COPY | copied from source data |
| Study ID | 0020,0010 | SH | - | VNAP | COPY | copied from source data |

Table 26: Patient Study Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|----------------|-----------|----|-------|-------------------|--------|-------------------------|
| Medical Alerts | 0010,2000 | LO | - | ANAP | COPY | Copied from source data |
| Allergies | 0010,2110 | LO | - | ANAP | COPY | Copied from source data |

Table 27: General Series Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|-------------------------------------|-----------|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------|---------|
| Series Date | 0008,0021 | DA | - | ALWAYS | AUTO | - |
| Series Time | 0008,0031 | TM | - | ALWAYS | AUTO | - |
| Modality | 0008,0060 | CS | XA | ALWAYS | AUTO | - |
| Series Description | 0008,103E | LO | SNS: Snapshot SES: SmartCT CB: X-ray run contrast brightness data MC: Motion Compensation Data SKULL: SmartCT | ALWAYS | AUTO | - |
| Related Series Sequence | 0008,1250 | SQ | - | ALWAYS | AUTO | - |
| >Study Instance UID | 0020,000D | UI | - | ALWAYS | AUTO | - |
| >Series Instance UID | 0020,000E | UI | - | ALWAYS | AUTO | - |
| >Purpose of Reference Code Sequence | 0040,A170 | SQ | - | ANAP | AUTO | - |
| Series Instance UID | 0020,000E | UI | - | ALWAYS | AUTO | - |

| | | | | | | |
|-------------------------------------|-----------|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|------|-----------------------------------------------------------------------|
| Series Number | 0020,0011 | IS | SNS: 8001 (incremented by 1 for each additional snapshot) SES: 5000 +y CB: 5000 +y MC: 5000 +y SKULL: 5000 +y | ALWAYS | AUTO | y = number of primary exposure series received from the X-ray system. |
| Performed Procedure Step Start Date | 0040,0244 | DA | - | ALWAYS | COPY | Copied from source data |
| Performed Procedure Step Start Time | 0040,0245 | TM | - | ALWAYS | COPY | Copied from source data |
| Performed Procedure Step ID | 0040,0253 | SH | - | ALWAYS | COPY | Copied from source data |

Table 118: General Equipment Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---------------------------|-----------|----|---------|-------------------|--------|---------------------------------------------------|
| Manufacturer | 0008,0070 | LO | Philips | ALWAYS | FIXED | - |
| Institution Name | 0008,0080 | | - | VNAP | CONFIG | Hospital name configured in IW |
| Manufacturer's Model Name | 0008,1090 | LO | SmartCT | ALWAYS | FIXED | - |
| Device Serial Number | 0018,1000 | LO | - | ALWAYS | AUTO | 12 digit MAC address of network card in IW system |
| Software versions | 0018,1020 | LO | 1.1.x | ALWAYS | AUTO | where "x" application SW version |

Table 29 : SC Equipment Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|-----------------|-----------|----|-------|-------------------|--------|---------|
| Modality | 0008,0060 | CS | XA | ALWAYS | FIXED | - |
| Conversion Type | 0008,0064 | CS | WSD | ANAP | FIXED | - |

Table 120: General Image Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---------------------|-----------|----|-------------------------------------------------------------------------------------------------|-------------------|--------|---------|
| Image Type | 0008,0008 | CS | SNS: DERIVED\SECONDARY | ALWAYS | AUTO | - |
| | | | SES: DERIVED\SECONDARY\SMART3D | | | - |
| | | | CB: | | | - |
| | | | DERIVED\SECONDARY\CONBRIGHTRUN | | | - |
| | | | MC: DERIVED\SECONDARY\MOTIONCOMP | | | - |
| | | | SKULL: DERIVED\SECONDARY\SKULLSEGMENT | | | - |
| Instance Number | 0020,0013 | IS | SNS: 7001 – 7nnn SES: 1 → n CB: 1 MC: 1 SKULL: 2 | ALWAYS | AUTO | - |
| Patient Orientation | 0020,0020 | CS | | VNAP | AUTO | - |

Table 31: Image Pixel Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|----------------------------|-----------|-----------|--------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------|--------------------------------------------|
| Samples per Pixel | 0028,0002 | US | 1: for MONOCHROME1 | ALWAYS | FIXED | - |
| | | | 3: for RGB | | | - |
| Photometric Interpretation | 0028,0004 | CS | SNS: RGB SES: RGB CB: MONOCHROME1 MC: MONOCHROME1 SKULL: RGB | ALWAYS | FIXED | - |
| Planar Configuration | 0028,0006 | US | 0 | ANAP | FIXED | Only present in SNS ,SKULL and SES objects |
| Rows | 0028,0010 | US | SNS: <values depends on connected monitor resolution> SES: 128 CB: 1 MC: 1 SKULL: 128 | ALWAYS | AUTO | - |
| Columns | 0028,0011 | US | SNS: <values depends on connected monitor resolution> SES: 128 CB: 1 MC: 1 SKULL: 128 | ALWAYS | AUTO | - |
| Bits Allocated | 0028,0100 | US | 8 | ALWAYS | FIXED | - |
| Bits Stored | 0028,0101 | US | 8 | ALWAYS | FIXED | - |
| High Bit | 0028,0102 | US | 7 | ALWAYS | FIXED | - |
| Pixel Representation | 0028,0103 | US | 0 | ALWAYS | FIXED | - |
| Pixel Data | 7FE0,0010 | OW/ OB | - | ALWAYS | AUTO | - |

Table 32 : SC Image Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---------------------------|-----------|----|-------|-------------------|--------|---------------------|
| Date of Secondary Capture | 0018,1012 | DA | - | ANAP | AUTO | Only present in SNS |
| Time of Secondary Capture | 0018,1014 | TM | - | ANAP | AUTO | Only present in SNS |

Table 33: VOI LUT Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|----------------|-----------|----|---------------------------------------------------------------------------------------------------------------------|-------------------|--------|---------|
| Window Center | 0028,1050 | DS | SNS: not present SES: not present CB: 128 MC: 128 SKULL: not present | ANAP | AUTO | - |
| Window Width | 0028,1051 | DS | SNS: not present SES: not present CB: 256 MC: 256 SKULL: not present | ANAP | AUTO | - |

Table 34: SOP Common Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|------------------------|-----------|----|------------------------------------------------------------------------------------------------|-------------------|--------|-------------------------|
| Specific Character Set | 0008,0005 | CS | - | ANAP | COPY | Copied from source data |
| Instance Creation Date | 0008,0012 | DA | - | ANAP | AUTO | - |
| Instance Creation Time | 0008,0013 | TM | - | ANAP | AUTO | - |
| SOP Class UID | 0008,0016 | UI | 1.2.840.10008.5.1.4.1.1.7 | ALWAYS | FIXED | - |
| SOP Instance UID | 0008,0018 | UI | - | ALWAYS | AUTO | - |
| Instance Number | 0020,0013 | IS | SNS: 7001 – 7nn SES: 1 → n CB: 1 MC: 1 SKULL: 2 | ALWAYS | AUTO | - |

4.1.3.3. Multiframe True Color Secondary Capture Image Storage SOP class

Multiframe True Color Secondary capture storage objects are used for:

- saving of automatic movies
- saving of free interaction movies

In the tables below, for the attributes where source value = “COPY” it means that the value is copied from the imported XA run. The other attribute values are defined by the SmartCT application or by the IW platform.

Table 35: IOD of Created Multiframe True Color Secondary Capture Image Storage SOP Class Instances

| Information Entity | Module | Presence Of Module | Condition |
|--------------------|--------------------------------------|--------------------|--------------------------------------------------------------------------------------------------|
| Patient | Patient Module | ALWAYS | - |
| Study | General Study Module | ALWAYS | - |
| | Patient Study Module | CONDITIONAL | Only present when primary 3D acquisition series was imported from X-Ray Modality via DICOM in IW |
| Series | General Series Module | ALWAYS | - |
| Frame of Reference | Frame of Reference Module | ALWAYS | - |
| Equipment | General Equipment Module | ALWAYS | - |
| | SC Equipment Module | ALWAYS | - |
| Image | General Image Module | ALWAYS | - |
| | Image Pixel Module | ALWAYS | - |
| | Cine Module | ALWAYS | - |
| | Multi-Frame Module | ALWAYS | - |
| | Multi-Frame Functional Groups Module | ALWAYS | - |
| | SC Image Module | ALWAYS | - |
| | SC Multi-frame Image Module | ALWAYS | - |
| | SOP Common Module | ALWAYS | - |

Table 36: Patient Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|----------------|-----------|----|-------|-------------------|--------|-------------------------|
| Patient's Name | 0010,0010 | PN | - | VNAP | COPY | copied from source data |

| | | | | | | |
|----------------------|-----------|----|---|------|------|-------------------------|
| Patient ID | 0010,0020 | LO | - | VNAP | COPY | copied from source data |
| Patient's Birth Date | 0010,0030 | DA | - | VNAP | COPY | copied from source data |
| Patient's Sex | 0010,0040 | CS | - | VNAP | COPY | copied from source data |

Table 37: General Study Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|----------------------------|-----------|----|-------|-------------------|--------|-------------------------|
| Study Date | 0008,0020 | DA | - | ALWAYS | COPY | copied from source data |
| Study Time | 0008,0030 | TM | - | ALWAYS | COPY | copied from source data |
| Accession Number | 0008,0050 | SH | - | VNAP | COPY | copied from source data |
| Referring Physician's Name | 0008,0090 | PN | - | VNAP | COPY | copied from source data |
| Study Instance UID | 0020,000D | UI | - | ALWAYS | COPY | copied from source data |
| Study ID | 0020,0010 | SH | - | VNAP | COPY | copied from source data |

Table 138: Patient Study Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|----------------|-----------|----|-------|-------------------|--------|-------------------------|
| Medical Alerts | 0010,2000 | LO | - | ANAP | COPY | copied from source data |
| Allergies | 0010,2110 | LO | - | ANAP | COPY | copied from source data |

Table 39: General Series Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|-------------------------------------|-----------|----|-------------|-------------------|--------|----------------------------------------------------------------------------------------------|
| Series Date | 0008,0021 | DA | - | ALWAYS | AUTO | - |
| Series Time | 0008,0031 | TM | - | ALWAYS | AUTO | - |
| Modality | 0008,0060 | CS | XA | ALWAYS | FIXED | - |
| Series Description | 0008,103E | LO | Movie | ALWAYS | AUTO | - |
| Related Series Sequence | 0008,1250 | SQ | - | ALWAYS | AUTO | - |
| >Study Instance UID | 0020,000D | UI | - | ALWAYS | AUTO | - |
| >Series Instance UID | 0020,000E | UI | - | ALWAYS | AUTO | - |
| >Purpose of Reference Code Sequence | 0040,A170 | SQ | - | VNAP | AUTO | - |
| Series Instance UID | 0020,000E | UI | - | ALWAYS | AUTO | Each DICOM movie has a unique value. |
| Series Number | 0020,0011 | IS | 6001 → 6nnn | ALWAYS | AUTO | For each DICOM movie a new series number is created (where nnn is incremented in steps of 1) |
| Performed Procedure Step Start Date | 0040,0244 | DA | - | ALWAYS | COPY | copied from source data |
| Performed Procedure Step Start Time | 0040,0245 | TM | - | ALWAYS | COPY | copied from source data |
| Performed Procedure Step ID | 0040,0253 | SH | - | ALWAYS | COPY | copied from source data |

Table 40: Frame of Reference Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|------------------------------|-----------|----|-------|-------------------|--------|---------|
| Frame of Reference UID | 0020,0052 | UI | - | ALWAYS | AUTO | - |
| Position Reference Indicator | 0020,1040 | LO | - | VNAP | AUTO | - |

Table 41: General Equipment Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---------------------------|-----------|----|---------|-------------------|--------|---------------------------------------------------|
| Manufacturer | 0008,0070 | LO | Philips | ALWAYS | FIXED | - |
| Institution Name | 0008,0080 | LO | - | VNAP | CONFIG | Hospital name configured in IW |
| Manufacturer's Model Name | 0008,1090 | LO | SmartCT | ALWAYS | FIXED | - |
| Device Serial Number | 0018,1000 | LO | - | ALWAYS | AUTO | 12 digit MAC address of network card in IW system |
| Software Versions | 0018,1020 | LO | 1.1.x | ANAP | AUTO | where "x" application SW version |

Table 42 : SC Equipment Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|-----------------|-----------|----|-------|-------------------|--------|---------|
| Modality | 0008,0060 | CS | XA | ALWAYS | FIXED | - |
| Conversion Type | 0008,0064 | CS | WSD | ALWAYS | FIXED | - |

Table 43: General Image Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|------------------------------|-----------|-------|-------------------|-------------------|--------|------------------------------------------------------------------------------------------------|
| Image Type | 0008,0008 | CS | DERIVED\SECONDARY | ALWAYS | FIXED | - |
| Content Date | 0008,0023 | DA | - | ALWAYS | AUTO | - |
| Content Time | 0008,0033 | TM | - | ALWAYS | AUTO | - |
| Instance Number | 0020,0013 | IS | 9001->9nnn | ALWAYS | AUTO | For each DICOM movie a new instance number is created (where nnn is incremented in steps of 1) |
| Patient Orientation | 0020,0020 | CS | - | ALWAYS | EMPTY | - |
| Burned in Annotation | 0028,0301 | CS | YES | ALWAYS | AUTO | - |
| Icon Image Sequence | 0088,0200 | SQ | - | ALWAYS | AUTO | - |
| > Samples per Pixel | 0028,0002 | US | 1 | ALWAYS | FIXED | - |
| > Photometric Interpretation | 0028,0004 | CS | MONOCHROME2 | ALWAYS | FIXED | - |
| > Rows | 0028,0010 | US | 128 | ALWAYS | FIXED | - |
| > Columns | 0028,0011 | US | 128 | ALWAYS | FIXED | - |
| > Bits Allocated | 0028,0100 | US | 8 | ALWAYS | FIXED | - |
| > Bits Stored | 0028,0101 | US | 8 | ALWAYS | FIXED | - |
| > High Bit | 0028,0102 | US | 7 | ALWAYS | FIXED | - |
| > Pixel Representation | 0028,0103 | US | 0 | ALWAYS | FIXED | - |
| > Pixel Data | 7FE0,0010 | OW/OB | - | ALWAYS | AUTO | - |

Table 44: Image Pixel Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|----------------------------|-----------|----|-------|-------------------|--------|---------|
| Samples per Pixel | 0028,0002 | US | 3 | ALWAYS | FIXED | |
| Photometric Interpretation | 0028,0004 | CS | RGB | ALWAYS | FIXED | |

| | | | | | | |
|----------------------|-----------|-------|---|--------|-------|--------------------------------------------------------------------------------------------------------------|
| Planar Configuration | 0028,0006 | US | 0 | ALWAYS | FIXED | |
| Rows | 0028,0010 | US | | ALWAYS | AUTO | Value depends on: - monitor resolution - navigation pane expanded (Y/N) - main view maximized (Y/N) |
| Columns | 0028,0011 | US | | ALWAYS | AUTO | Value depends on: - monitor resolution - navigation pane expanded (Y/N) - main view maximized (Y/N) |
| Bits Allocated | 0028,0100 | US | 8 | ALWAYS | FIXED | - |
| Bits Stored | 0028,0101 | US | 8 | ALWAYS | FIXED | - |
| High Bit | 0028,0102 | US | 7 | ALWAYS | FIXED | - |
| Pixel Representation | 0028,0103 | US | 0 | ALWAYS | FIXED | - |
| Pixel Data | 7FE0,0010 | OW/OB | - | ALWAYS | AUTO | - |

Table 45: Cine Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|----------------|-----------|----|-------|-------------------|--------|---------|
| Cine Rate | 0018,0040 | IS | 10 | ALWAYS | AUTO | - |
| Frame Time | 0018,1063 | DS | 100 | ALWAYS | AUTO | - |

Table 46: Multi-Frame Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|-------------------------|-----------|----|----------|-------------------|--------|---------------------------------------------------------------------------------------------------------|
| Number of Frames | 0028,0008 | IS | - | ALWAYS | AUTO | Value depends on: - movie type (auto or free) - 2D or 3D view recording - slice thickness (2D) |
| Frame Increment Pointer | 0028,0009 | AT | 00181063 | ALWAYS | FIXED | |

Table 47: Multi-Frame Functional Groups Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|-----------------|-----------|----|--------------|-------------------|--------|------------------------------------------------------------------------------------------------|
| Content Date | 0008,0023 | DA | - | ALWAYS | AUTO | - |
| Content Time | 0008,0033 | TM | - | ALWAYS | AUTO | - |
| Instance Number | 0020,0013 | IS | 9001 -> 9nnn | ALWAYS | AUTO | For each DICOM movie a new instance number is created (where nnn is incremented in steps of 1) |

| | | | | | | |
|------------------|-----------|----|---|--------|------|---------------------------------------------------------------------------------------------------------|
| Number of Frames | 0028,0008 | IS | - | ALWAYS | AUTO | Value depends on: - movie type (auto or free) - 2D or 3D view recording - slice thickness (2D) |
|------------------|-----------|----|---|--------|------|---------------------------------------------------------------------------------------------------------|

Table 48: SC Image Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---------------------------|-----------|----|-------|-------------------|--------|---------|
| Date of Secondary Capture | 0018,1012 | DA | - | ALWAYS | AUTO | - |
| Time of Secondary Capture | 0018,1014 | TM | - | ALWAYS | AUTO | - |

Table 49: SC Multi-Frame Image Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|-------------------------|-----------|----|----------|-------------------|--------|--------------------|
| Frame Increment Pointer | 0028,0009 | AT | 00181063 | ALWAYS | COPY | copied from source |
| Burned In Annotation | 0028,0301 | CS | YES | ALWAYS | AUTO | - |

Table 50: SOP Common Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|------------------------|-----------|----|-----------------------------|-------------------|--------|------------------------------------------------------------------------------------------------|
| Specific Character Set | 0008,0005 | CS | - | ANAP | COPY | Copied from source data |
| Instance Creation Date | 0008,0012 | DA | - | ANAP | AUTO | - |
| Instance Creation Time | 0008,0013 | TM | - | ANAP | AUTO | - |
| SOP Class UID | 0008,0016 | UI | 1.2.840.10008.5.1.4.1.1.7.4 | ALWAYS | FIXED | - |
| SOP Instance UID | 0008,0018 | UI | - | ALWAYS | AUTO | - |
| Instance Number | 0020,0013 | IS | 9001 -> 9nnn | ANAP | AUTO | For each DICOM movie a new instance number is created (where nnn is incremented in steps of 1) |

4.1.3.4. X-Ray 3D Angiographic Image Storage SOP class.

The X-Ray 3D angiographic Image is created from the 3D acquisition run that is received from the X-ray system. In the SmartCT application the X-ray 3D angiographic image is created as a result of:

- New reconstruction.
- Subtracted reconstruction.

Table 51: IOD of Created X-Ray 3D Angiographic Image Storage Instance.

| Information Entity | Module | Presence Of Module | Condition |
|--------------------|----------------------|--------------------|--------------------------------------------------------------------------------------------------|
| Patient | Patient Module | ALWAYS | - |
| Study | General Study Module | ALWAYS | - |
| | Patient Study Module | CONDITIONAL | Only present when primary 3D acquisition series was imported from X-Ray Modality via DICOM in IW |

| | | | |
|--------------------|--------------------------------------|--------|---|
| Series | General Series Module | ALWAYS | - |
| | Enhanced Series Module | ALWAYS | - |
| Frame of Reference | Frame Of Reference Module | ALWAYS | - |
| Equipment | General Equipment Module | ALWAYS | - |
| | Enhanced General Equipment Module | ALWAYS | - |
| Image | Image Pixel Module | ALWAYS | - |
| | Acquisition Context Module | ALWAYS | - |
| | Multi-frame Functional Groups Module | ALWAYS | - |
| | X-Ray 3D Image Module | ALWAYS | - |
| | X-Ray 3D Reconstruction Module | ALWAYS | - |
| | SOP Common Module | ALWAYS | - |

Table 52: Patient Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|----------------------|-----------|----|-------|-------------------|--------|-------------------------|
| Patient's Name | 0010,0010 | PN | - | VNAP | COPY | copied from source data |
| Patient ID | 0010,0020 | LO | - | VNAP | COPY | copied from source data |
| Patient's Birth Date | 0010,0030 | DA | - | VNAP | COPY | copied from source data |
| Patient's Sex | 0010,0040 | CS | - | VNAP | COPY | copied from source data |

Table 53: General Study Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|----------------------------|-----------|----|-------|-------------------|--------|-------------------------|
| Study Date | 0008,0020 | DA | - | ALWAYS | COPY | copied from source data |
| Study Time | 0008,0030 | TM | - | ALWAYS | COPY | copied from source data |
| Accession Number | 0008,0050 | SH | - | VNAP | COPY | copied from source data |
| Referring Physician's Name | 0008,0090 | PN | - | VNAP | COPY | copied from source data |
| Study Instance UID | 0020,000D | UI | - | ALWAYS | COPY | copied from source data |
| Study ID | 0020,0010 | SH | - | VNAP | COPY | copied from source data |

Table 54: Patient Study Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|----------------|-----------|----|-------|-------------------|--------|-------------------------|
| Medical Alerts | 0010,2000 | LO | - | ANAP | COPY | Copied from source data |
| Allergies | 0010,2110 | LO | - | ANAP | COPY | Copied from source data |

Table 55: General Series Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|----------------|-----------|----|-------|-------------------|--------|---------|
| Series Date | 0008,0021 | DA | - | ALWAYS | AUTO | - |
| Series Time | 0008,0031 | TM | - | ALWAYS | AUTO | - |
| Modality | 0008,0060 | CS | XA | ALWAYS | AUTO | - |

| | | | | | | |
|--------------------------------------|-----------|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|------|---------------------------------------------------|
| Series Description | 0008,103E | LO | CBCT /VasoCT volumes: <reconstruction size>%, <resolution size>, <smoothness/optimize for>, MAR, BMI 3DRA volumes Subtracted, <reconstruction size>%, <resolution size>, <smoothness/optimize for> | ALWAYS | AUTO | MAR, BMI and Subtracted are added when applicable |
| Performing Physician's Name | 0008,1050 | PN | - | VNAP | COPY | Copied from source |
| Related Series Sequence | 0008,1250 | SQ | - | ALWAYS | AUTO | - |
| > Study Instance UID | 0020,000D | UI | - | ALWAYS | AUTO | - |
| > Series Instance UID | 0020,000E | UI | - | ALWAYS | AUTO | - |
| > Purpose of Reference Code Sequence | 0040,A170 | SQ | - | ANAP | AUTO | - |
| Series Instance UID | 0020,000E | UI | - | ALWAYS | AUTO | - |
| Series Number | 0020,0011 | IS | 5000 + y (y = number of primary acquisition run received from the X-ray system) | ALWAYS | AUTO | - |
| Performed Procedure Step Start Date | 0040,0244 | DA | - | ALWAYS | COPY | Copied from source |
| Performed Procedure Step Start Time | 0040,0245 | TM | - | ALWAYS | COPY | Copied from source |
| Performed Procedure Step ID | 0040,0253 | SH | - | ALWAYS | COPY | Copied from source |

Table 56: Enhanced Series Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|----------------|-----------|----|-------|-------------------|--------|-------------------------------------------|
| Series Number | 0020,0011 | IS | 5nnn | ALWAYS | AUTO | nnn = number 3D acq run from X-ray system |

Table 57: Frame of Reference Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|------------------------------|-----------|----|-------|-------------------|--------|--------------------|
| Frame of Reference UID | 0020,0052 | UI | - | ALWAYS | AUTO | - |
| Position Reference Indicator | 0020,1040 | LO | - | VNAP | COPY | Copied from source |

Table 58: General Equipment Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---------------------------|-----------|----|---------|-------------------|--------|---------------------------------------------------|
| Manufacturer | 0008,0070 | LO | Philips | ALWAYS | FIXED | - |
| Institution Name | 0008,0080 | LO | - | VNAP | CONFIG | Hospital name configured in IW |
| Manufacturer's Model Name | 0008,1090 | LO | SmartCT | ALWAYS | FIXED | - |
| Device Serial Number | 0018,1000 | LO | - | ALWAYS | AUTO | 12 digit MAC address of network card in IW system |

| | | | | | | |
|-------------------|-----------|----|-------|------|------|----------------------------------|
| Software Versions | 0018,1020 | LO | 1.1.x | ANAP | AUTO | where "x" application SW version |
|-------------------|-----------|----|-------|------|------|----------------------------------|

Table 59: Enhanced General Equipment Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---------------------------|-----------|----|---------|-------------------|--------|---------------------------------------------------|
| Manufacturer | 0008,0070 | LO | Philips | ALWAYS | FIXED | - |
| Manufacturer's Model Name | 0008,1090 | LO | SmartCT | ALWAYS | FIXED | Hospital name configured in IW |
| Device Serial Number | 0018,1000 | LO | - | ALWAYS | AUTO | 12 digit MAC address of network card in IW system |
| Software Versions | 0018,1020 | LO | 1.1.x | ANAP | AUTO | where "x" is the SW application Version |

Table 60: Image Pixel Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|----------------------------|-----------|----|-------------|-------------------|--------|----------------------------------------------------------------------------------------------------------|
| Samples per Pixel | 0028,0002 | US | 1 | ALWAYS | AUTO | - |
| Photometric Interpretation | 0028,0004 | CS | MONOCHROME2 | ALWAYS | AUTO | - |
| Rows | 0028,0010 | US | - | ALWAYS | AUTO | Value depends on: - reconstruction type (subtracted/non-subtracted) - selected reconstruction size |
| Columns | 0028,0011 | US | - | ALWAYS | AUTO | Value depends on: - reconstruction type (subtracted/non-subtracted) - selected reconstruction size |
| Bits Allocated | 0028,0100 | US | 16 | ALWAYS | FIXED | - |
| Bits Stored | 0028,0101 | US | 16 | ALWAYS | FIXED | - |
| High Bit | 0028,0102 | US | 15 | ALWAYS | FIXED | - |
| Pixel Representation | 0028,0103 | US | 0 | ALWAYS | AUTO | - |
| Pixel Data | 7FE0,0010 | OW | - | ALWAYS | AUTO | - |

Table 61: Acquisition Context Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|------------------------------|-----------|----|-------|-------------------|--------|---------|
| Acquisition Context Sequence | 0040,0555 | SQ | - | VNAP | AUTO | - |

Table 62: Multi-frame Functional Groups Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|-----------------|-----------|----|-------|-------------------|--------|---------|
| Content Date | 0008,0023 | DA | - | ALWAYS | AUTO | - |
| Content Time | 0008,0033 | TM | - | ALWAYS | AUTO | - |
| Instance Number | 0020,0013 | IS | 1 | ALWAYS | AUTO | - |

| | | | | | | |
|--------------------------------------|-----------|----|-----------------------------|--------|------|----------------------------------------------------------------------------------------------------------|
| Number of Frames | 0028,0008 | IS | - | ALWAYS | USER | Value depends on: - reconstruction type (subtracted/non-subtracted) - selected reconstruction size |
| Shared Functional Groups Sequence | 5200,9229 | SQ | - | ALWAYS | AUTO | - |
| >Frame Anatomy Sequence | 0020,9071 | SQ | - | ALWAYS | AUTO | - |
| >>Anatomic Region Sequence | 0008,2218 | SQ | - | ALWAYS | AUTO | - |
| >>>Code Value | 0008,0100 | SH | - | ALWAYS | AUTO | - |
| >>>Coding Scheme Designator | 0008,0102 | SH | - | ALWAYS | AUTO | - |
| >>>Code Meaning | 0008,0104 | LO | - | ALWAYS | AUTO | - |
| >>Frame Laterality | 0020,9072 | CS | U | ALWAYS | AUTO | - |
| >Pixel Measures Sequence | 0028,9110 | SQ | - | ALWAYS | AUTO | - |
| >>Slice Thickness | 0018,0050 | DS | - | ALWAYS | AUTO | - |
| >>Pixel Spacing | 0028,0030 | DS | - | ALWAYS | AUTO | - |
| >Frame VOI LUT Sequence | 0028,9132 | SQ | - | ALWAYS | AUTO | - |
| >>Window Center | 0028,1050 | DS | - | ALWAYS | AUTO | - |
| >>Window Width | 0028,1051 | DS | - | ALWAYS | AUTO | - |
| Per-frame Functional Groups Sequence | 5200,9230 | SQ | - | ALWAYS | AUTO | - |
| >X-Ray 3D Frame Type Sequence | 0018,9504 | SQ | - | ALWAYS | AUTO | - |
| >>Frame Type | 0008,9007 | CS | DERIVED\PRIMARY\VOLUME\NONE | ALWAYS | AUTO | - |
| >>Pixel Presentation | 0008,9205 | CS | MONOCHROME | ALWAYS | AUTO | - |
| >>Volumetric Properties | 0008,9206 | CS | VOLUME | ALWAYS | AUTO | - |
| >>Volume Based Calculation Technique | 0008,9207 | CS | NONE | ALWAYS | AUTO | - |
| >>Reconstruction Index | 0020,9536 | US | 1 → n | ALWAYS | AUTO | Value incremented by 1 for each new reconstruction |
| >Frame Content Sequence | 0020,9111 | SQ | - | VNAP | AUTO | - |
| >Plane Position Sequence | 0020,9113 | SQ | - | ALWAYS | AUTO | - |
| >>Image Position (Patient) | 0020,0032 | DS | - | ALWAYS | AUTO | - |
| >Plane Orientation Sequence | 0020,9116 | SQ | - | ALWAYS | AUTO | - |
| >>Image Orientation (Patient) | 0020,0037 | DS | - | ALWAYS | AUTO | - |

Table 63: X-Ray 3D Image Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|------------------------------------|-----------|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------|-------------------------------------------------------------------------------------------------------------------|
| Image Type | 0008,0008 | CS | For 3DRA volume: DERIVED\SECONDARY\ AXIAL\3DRA_PROP or 3DRA_ROLL For CBCT/VasoCT volume: DERIVED\SECONDARY\ AXIAL\XPERCT_PROP or XPERCT_ROLL | ALWAYS | AUTO | 4 th value indicates if the scan was acquired with: - 3DRA or CBCT procedure - prop or roll scan |
| Pixel Presentation | 0008,9205 | CS | MONOCHROME | ALWAYS | FIXED | - |
| Volumetric Properties | 0008,9206 | CS | VOLUME | ALWAYS | FIXED | - |
| Volume Based Calculation Technique | 0008,9207 | CS | NONE | ALWAYS | FIXED | - |

| | | | | | | |
|-----------------------------|-----------|----|-------------|--------|-------|---|
| Content Qualification | 0018,9004 | CS | PRODUCT | ALWAYS | FIXED | - |
| Samples per Pixel | 0028,0002 | US | 1 | ALWAYS | AUTO | - |
| Photometric Interpretation | 0028,0004 | CS | MONOCHROME2 | ALWAYS | FIXED | - |
| Bits Allocated | 0028,0100 | US | 16 | ALWAYS | FIXED | - |
| Bits Stored | 0028,0101 | US | 16 | ALWAYS | FIXED | - |
| High Bit | 0028,0102 | US | 15 | ALWAYS | FIXED | - |
| Burned In Annotation | 0028,0301 | CS | NO | ALWAYS | FIXED | - |
| Lossy Image Compression | 0028,2110 | CS | 00 | ALWAYS | AUTO | - |
| Icon Image Sequence | 0088,0200 | SQ | | ALWAYS | AUTO | - |
| >Samples per Pixel | 0028,0002 | US | 1 | ALWAYS | FIXED | - |
| >Photometric Interpretation | 0028,0004 | CS | MONOCHROME2 | ALWAYS | FIXED | - |
| >Rows | 0028,0010 | US | 128 | ALWAYS | FIXED | - |
| >Columns | 0028,0011 | US | 128 | ALWAYS | FIXED | - |
| >Bits Allocated | 0028,0100 | US | 8 | ALWAYS | FIXED | - |
| >Bits Stored | 0028,0101 | US | 8 | ALWAYS | FIXED | - |
| >High Bit | 0028,0102 | US | 7 | ALWAYS | FIXED | - |
| >Pixel Representation | 0028,0103 | US | 0 | ALWAYS | FIXED | - |
| >Pixel Data | 7FE0,0010 | OW | | ALWAYS | AUTO | - |
| Presentation LUT Shape | 2050,0020 | CS | IDENTITY | ALWAYS | FIXED | - |

Table 64: X-Ray 3D Reconstruction Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|----------------------------------|-----------|----|-------------------------|-------------------|--------|------------------------------------------------------------------------------|
| X-Ray 3D Reconstruction Sequence | 0018,9530 | SQ | - | ALWAYS | AUTO | - |
| >Application Name | 0018,9524 | LO | Interventional Workspot | ALWAYS | FIXED | |
| >Application Version | 0018,9525 | LO | 1.6.x | ALWAYS | AUTO | where "x" is the detailed Interventional Workspot (hosting platform) version |
| >Application Manufacturer | 0018,9526 | LO | Philips | ALWAYS | FIXED | - |
| >Algorithm Type | 0018,9527 | CS | FILTER_BACK_PROJ | ALWAYS | FIXED | - |
| >Acquisition Index | 0020,9518 | US | 1 | ALWAYS | AUTO | - |

Table 65: SOP Common Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|------------------------------------|-----------|----|--------------------------------|-------------------|--------|-------------------------|
| Specific Character Set | 0008,0005 | CS | - | ANAP | COPY | copied from source data |
| Instance Creation Date | 0008,0012 | DA | - | ANAP | AUTO | - |
| Instance Creation Time | 0008,0013 | TM | - | ANAP | AUTO | - |
| SOP Class UID | 0008,0016 | UI | 1.2.840.10008.5.1.4.1.1.13.1.1 | ALWAYS | FIXED | - |
| SOP Instance UID | 0008,0018 | UI | - | ALWAYS | AUTO | - |
| Original Specialized SOP Class UID | 0008,001B | UI | - | ALWAYS | AUTO | - |
| Content Qualification | 0018,9004 | CS | PRODUCT | ALWAYS | FIXED | - |
| Instance Number | 0020,0013 | IS | 1 | ANAP | AUTO | - |

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Issued by:

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Internet: <https://www.philips.com/DICOM>

Doc Id: HSDP-953935

Date: 05-Aug-2022

