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# DICOM

## Conformance Statement

BV Family R2.3 with integrated  
VF Surgical Workstation R6.3 or  
3D-RX Surgical Workstation



***Issued by:***

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## 1. DICOM CONFORMANCE STATEMENT OVERVIEW

The BV Family R2.3 with integrated VF Surgical Workstation R6.3 or 3D-RX Surgical Workstation, later referred to as BV Family, is a mobile surgical X-ray image generating system.

Members of the BV Family product line are: BV Endura and BV Pulsera.

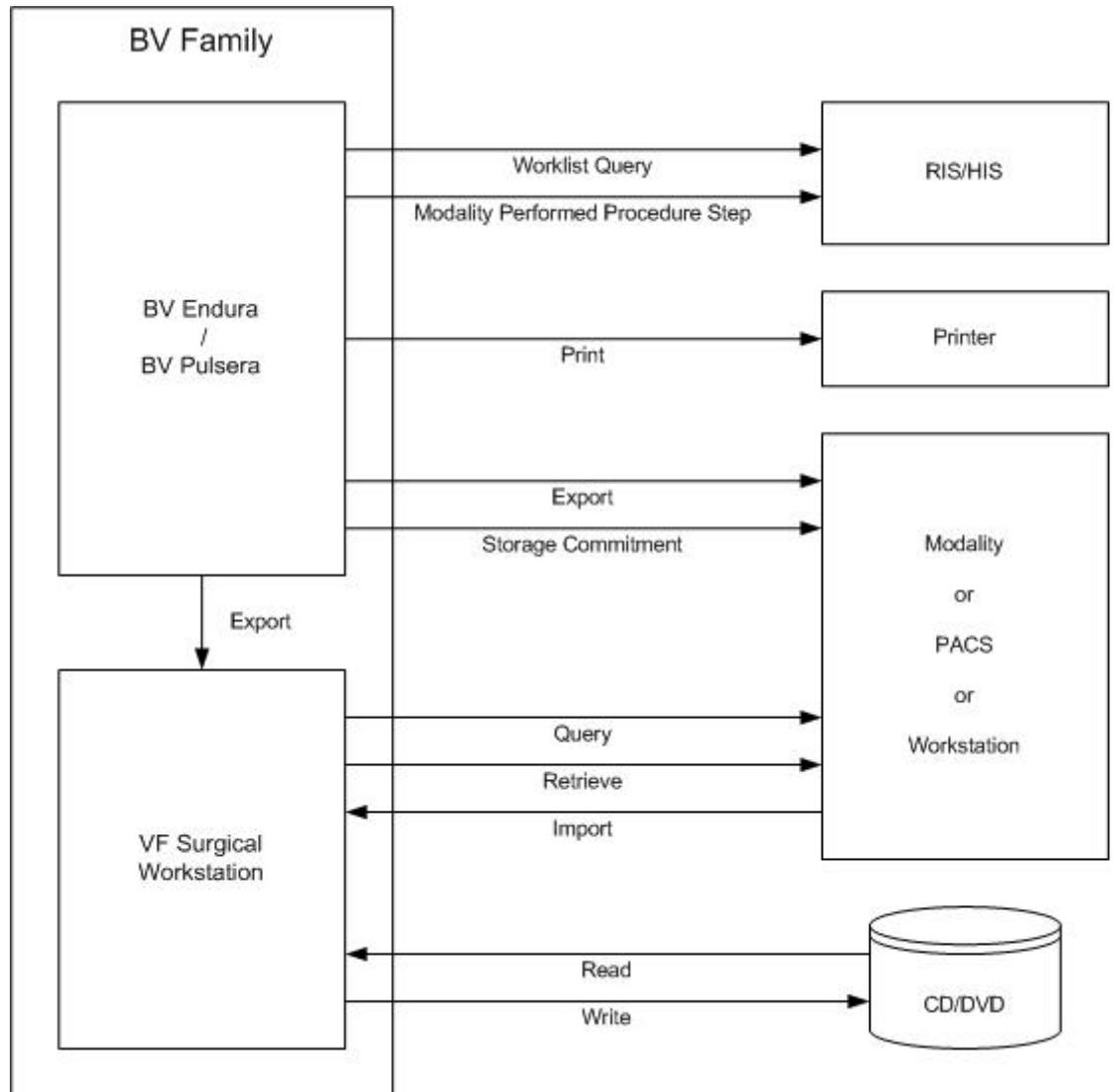
The BV Family implements a worklist management function to communicate with a RIS/HIS, an export function to transfer image data from the local system to a remote system, and an allocated function to print image data from the local system.

The BV Family can be configured with one of the following workstation options.

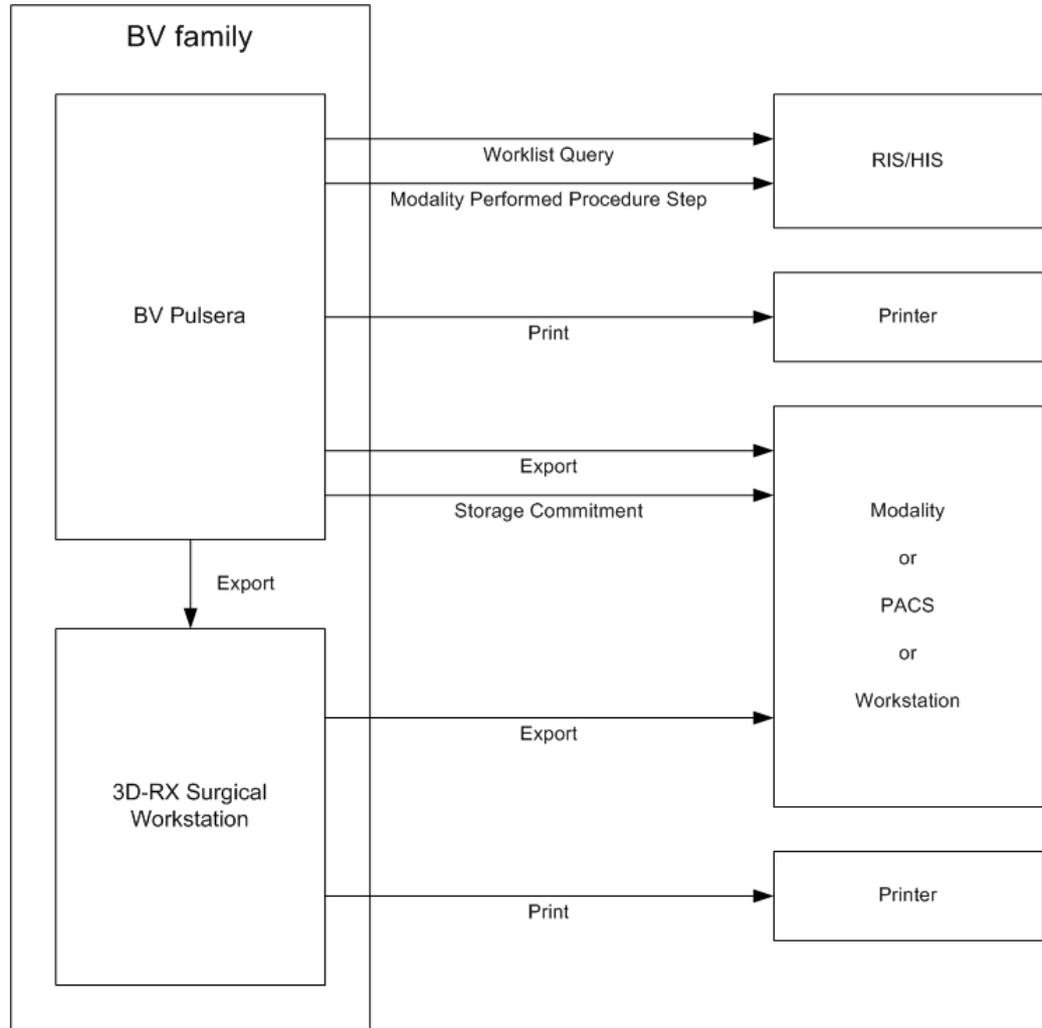
- The integrated VF surgical workstation offers an additional viewing function for images from the local system, images retrieved from remote systems, and images read from DVD or CD. Viewed images can be written to DVD or CD.
- The integrated 3D-RX surgical workstation offers an additional viewing function for images from the local system. Viewed images can be exported. Note that this workstation is only applicable for the BV Pulsera.

Thus the BV Family provides the following DICOM data exchange features:

- Print images from the local database on a DICOM printer (Standard DICOM package).
- Export images from the local database to a remote database (Standard DICOM package).
- Automatically send a storage commitment request (Advanced DICOM package).
- Query an information system for a modality worklist (Advanced DICOM package).
- Send Modality Performed Procedure Step details to an information system (Advanced DICOM package).
- Query and retrieve images from a remote database (VF Surgical Workstation).
- Read and Write DICOM media (VF Surgical Workstation).
- Export CT Images and Secondary Captures (3D-RX Surgical Workstation).



**Figure 1: System Overview of the BV Family with integrated VF Surgical Workstation**



**Figure 2: System Overview of the BV Pulsera with integrated 3D-RX Surgical Workstation**

Table 1 provides an overview of all network services as provided by the BV Family.

**Table 1: Network Services**

| SOP Class  |                               | User of Service (SCU) | Provider of Service (SCP) |
|--|-------------------------------|-----------------------|---------------------------|
| Name   | UID                           |                       |                           |
| <b>Transfer</b>  |                               |                       |                           |
| Computed Radiography Image Storage                         | 1.2.840.10008.5.1.4.1.1.1     | No                    | Option                    |
| Digital Mammography X-Ray Image Storage - Presentation SOP | 1.2.840.10008.5.1.4.1.1.1.2   | No                    | Option                    |
| Digital Mammography X-Ray Image Storage - Processing SOP   | 1.2.840.10008.5.1.4.1.1.1.2.1 | No                    | Option                    |
| Digital X-Ray Image Storage – for Presentation             | 1.2.840.10008.5.1.4.1.1.1.1   | No                    | Option                    |
| CT Image Storage   | 1.2.840.10008.5.1.4.1.1.2     | No                    | Option                    |
| Ultrasound Multi-frame Image Storage                       | 1.2.840.10008.5.1.4.1.1.3.1   | No                    | Option                    |

| SOP Class  |                              | User of Service (SCU) | Provider of Service (SCP) |
|--|------------------------------|-----------------------|---------------------------|
| Name   | UID                          |                       |                           |
| MR Image Storage   | 1.2.840.10008.5.1.4.1.1.4    | No                    | Option                    |
| Ultrasound Image Storage                                   | 1.2.840.10008.5.1.4.1.1.6.1  | No                    | Option                    |
| Secondary Capture Image Storage                            | 1.2.840.10008.5.1.4.1.1.7    | Yes                   | Option                    |
| Grayscale Softcopy Presentation State Storage              | 1.2.840.10008.5.1.4.1.1.11.1 | No                    | Option                    |
| X-Ray Angiographic Image Storage                           | 1.2.840.10008.5.1.4.1.1.12.1 | Yes                   | Option                    |
| X-Ray Radiofluoroscopic Image Storage                      | 1.2.840.10008.5.1.4.1.1.12.2 | No                    | Option                    |
| X-Ray Specialization                                       | 1.3.46.670589.2.3.1.1        | No                    | Option                    |
| Stack of X-Ray   | 1.3.46.670589.2.4.1.1        | Option                | Option                    |
| Volume   | 1.3.46.670589.5.0.1.1        | No                    | Option                    |
| 3D Volume Object   | 1.3.46.670589.5.0.2.1        | No                    | Option                    |
| Surface  | 1.3.46.670589.5.0.3.1        | No                    | Option                    |
| Cardio   | 1.3.46.670589.5.0.8.1        | No                    | Option                    |
| CT Synthetic Image   | 1.3.46.670589.5.0.9          | No                    | Option                    |
| MR Synthetic Image   | 1.3.46.670589.5.0.10         | No                    | Option                    |
| MR Cardio Analysis   | 1.3.46.670589.5.0.11.1       | No                    | Option                    |
| CX Synthetic Image   | 1.3.46.670589.5.0.12         | No                    | Option                    |
| Perfusion  | 1.3.46.670589.5.0.13         | No                    | Option                    |
| Perfusion Analysis   | 1.3.46.670589.5.0.14         | No                    | Option                    |
| <b>Query/Retrieve</b>                                      |                              |                       |                           |
| Patient Root Query/Retrieve Information Model – FIND       | 1.2.840.10008.5.1.4.1.2.1.1  | Option                | No                        |
| Patient Root Query/Retrieve Information Model – MOVE       | 1.2.840.10008.5.1.4.1.2.1.2  | Option                | No                        |
| Study Root Query/Retrieve Information Model – FIND         | 1.2.840.10008.5.1.4.1.2.2.1  | Option                | No                        |
| Study Root Query/Retrieve Information Model – MOVE         | 1.2.840.10008.5.1.4.1.2.2.2  | Option                | No                        |
| Patient/Study Only Query/Retrieve Information Model – FIND | 1.2.840.10008.5.1.4.1.2.3.1  | Option                | No                        |
| Patient/Study Only Query/Retrieve Information Model – MOVE | 1.2.840.10008.5.1.4.1.2.3.2  | Option                | No                        |
| <b>Workflow Management</b>                                 |                              |                       |                           |
| Storage Commitment Push Model                              | 1.2.840.10008.1.20.1         | Option                | No                        |
| Modality Performed Procedure Step                          | 1.2.840.10008.3.1.2.3.3      | Option                | No                        |
| Modality Worklist Information Model – FIND                 | 1.2.840.10008.5.1.4.31       | Option                | No                        |
| <b>Print Management</b>                                    |                              |                       |                           |
| Basic Grayscale Print Management (Meta)                    | 1.2.840.10008.5.1.1.9        | Yes                   | No                        |
| > Basic Film Session                                       | 1.2.840.10008.5.1.1.1        | Yes                   | No                        |
| > Basic Film Box   | 1.2.840.10008.5.1.1.2        | Yes                   | No                        |
| > Basic Grayscale Image Box                                | 1.2.840.10008.5.1.1.4        | Yes                   | No                        |
| > Printer  | 1.2.840.10008.5.1.1.16       | Yes                   | No                        |

The Transfer SCU (X-Ray Angiographic and Secondary Capture Image Storage) and Print Management SCU services are part of the Standard DICOM package. (Note that this package is optional though required for DICOM functionality.)

The optional Workflow Management SCU services are part of the Advanced DICOM package.

The optional integrated VF Surgical Workstation includes Transfer SCP and Query/Retrieve SCU services.

The optional integrated 3D-RX Surgical Workstation includes dedicated Transfer SCU (CT and Secondary Capture Image Storage) and Print Management SCU services.

Table 2 provides an overview of all media services as provided by the BV Family.

**Table 2: Media Services**

| Media Storage Application Profile               | Write Files |       | Read Files |
|---|-------------|-------|------------|
|   | (FSC)       | (FSU) | (FSR)      |
| <b>DVD Disk</b>                                 |             |       |            |
| General Purpose DVD Interchange with JPEG       | Yes         | No    | Yes        |
| <b>CD – R Disk</b>                              |             |       |            |
| General Purpose CD-R Interchange                | Yes         | Yes   | Yes        |
| <b>USB</b>                                      |             |       |            |
| General Purpose USB Media Interchange with JPEG | Yes         | Yes   | Yes        |

Note: After data is written to DVD, the DVD is finalized; the finalized DVD can now be read on mostly every DVD reader.

Currently the BV Family supports the FSC service for CD-R(W) and DVD + R(W) media; and the FSR service accepts for DVD both DVD + R(W) and DVD – R(W) media and CD-R(W). Not supported are the Media DVD –R / -RW.

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## 3. INTRODUCTION

### 3.1. Revision History

**Table 3: Revision History**

| Document Version | Date of Issue | Author        | Description  |
|------------------|---------------|---------------|--|
| 1.0              | 28 May 2008   | HI/PII<br>IC2 | Final DICOM Conformance Statement for the BV Family R2.3 with integrated VF Surgical Workstation R6.3 or 3D-RX Surgical Workstation. |

### 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 10 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 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).

### 3.4. Definitions, Terms and Abbreviations

DICOM definitions, terms and abbreviations are used throughout this Conformance Statement. For a description of these, see [DICOM] PS 3.3 and PS 3.4. The word Philips in this document refers to Philips Medical Systems.

The following acronyms and abbreviations are used in this document.

|           |   |
|-----------|---|
| 3D-RX     | 3 Dimensional Rotational X-ray  |
| ACC       | American College of Cardiology  |
| ACR       | American College of Radiology   |
| AE        | Application Entity  |
| AET       | Application Entity Title  |
| ANSI      | American National Standard Institute  |
| AP        | Application Profile   |
| BV Family | BV Family R2.3 with integrated VF Surgical Workstation R6.3 or 3D-RX Surgical Workstation |
| C&S       | Components & Services   |
| CR        | Computed Radiography  |
| CRL       | Certificate Revocation List   |
| CT        | Computed Tomography   |
| CTO       | Chief Technology Office   |
| CX        | Computed X-ray (reconstructed X-ray)  |
| DICOM     | Digital Imaging and Communications in Medicine  |
| DIMSE     | DICOM Message Service Element   |
| DIMSE-C   | DIMSE-Composite   |
| DIMSE-N   | DIMSE-Normalized  |
| DVD       | Digital Versatile Disc  |
| DX        | Digital X-Ray   |
| EBE       | DICOM Explicit VR Big Endian  |
| ELE       | DICOM Explicit VR Little Endian   |
| FIFO      | First In - First Out  |
| FSC       | File-set Creator  |
| FSR       | File-set Reader   |
| FSU       | File-set Updater  |
| GUI       | Graphic User Interface  |
| HIS       | Hospital Information System   |
| IC2       | Interoperability Competence Center  |
| IEEE      | Institute of Electrical and Electronic Engineers  |
| IHE       | Integrating the Healthcare Enterprise   |
| ILE       | DICOM Implicit VR Little Endian   |
| IOD       | Information Object Definition   |
| ISO       | International Organization for Standardization  |
| MG        | Digital Mammography X-Ray Image   |
| MPPS      | Modality Performed Procedure Step   |

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|        |   |
|--------|---|
| MR     | Magnetic Resonance                              |
| NEMA   | National Electrical Manufacturers Association   |
| PDU    | Protocol Data Unit                              |
| RF     | X-Ray Radiofluoroscopic                         |
| RIS    | Radiology Information System                    |
| RWA    | Real-World Activity                             |
| SC     | Secondary Capture                               |
| SCP    | Service Class Provider                          |
| SCU    | Service Class User                              |
| SOP    | Service Object Pair                             |
| SWS    | Surgery Workstation                             |
| TCP/IP | Transmission Control Protocol/Internet Protocol |
| TLS    | Transport Layer Security                        |
| UID    | Unique Identifier                               |
| US     | Ultrasound                                      |
| USB    | Universal Serial Bus                            |
| USMF   | Ultrasound Multi-frame                          |
| VF     | ViewForum                                       |
| VR     | Value Representation                            |
| WLM    | Worklist Management                             |
| XA     | X-Ray Angiographic                              |

### 3.5. References

- [DICOM] Digital Imaging and Communications in Medicine (DICOM), Part 1 – 18, National Electrical Manufacturers Association (NEMA) Publication Sales 1300 N. 17<sup>th</sup> Street, Suite 1847 Rosslyn, Virginia. 22209, United States of America
- [IHE] Integrating the Healthcare Enterprise Technical Framework Revision 5.4 Radiological Society of North America (RSNA), Inc. 820 Jorie Boulevard, Oak Brook, IL, United States of America
- [SYSLOG] Syslog Protocol RFC 3164: The BSD Syslog Protocol
- [TLS] Transport Layer Security protocol RFC 2246: Transport Layer Security protocol (TLS) v1.0
- [VFRB] Release Bulletin ViewForum R 6.3, 4522 170 10781, PMSN

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## 4. NETWORKING

### 4.1. Implementation model

#### 4.1.1. Application Data Flow

For the BV Family three application entities may be distinguished: the BV Family AE, the VF Surgical Workstation AE, and the 3D-RX Surgical Workstation AE.

- The BV Family AE is responsible for all networking functionality concerning acquisitions by the BV Family. It consists of two packages (ref. Section 1): the (optional) Standard DICOM package, and the Advanced DICOM package as an optional extension to the Standard DICOM package. Using both packages the BV Family AE offers the following functionality.

The operator can send a worklist query. (Get Worklist)

The operator can select and perform an examination (may be scheduled per worklist), resulting in an MPPS record. Then the operator can export the acquisition images; the images in the examination may be exported as separate Secondary Capture images, as XA images, or as print job. If applicable, the BV Family AE automatically sends a Storage Commitment request for those images. (Export)

In service mode the service operator can verify application level communication. (Check)

- The VF Surgical Workstation AE is intended to view images. Those images may be imported from the BV Family AE, or from a foreign storage SCU. (Query/Retrieve Image)

The VF Surgical Workstation AE can also be used to store images on DICOM media. (Media Interchange)

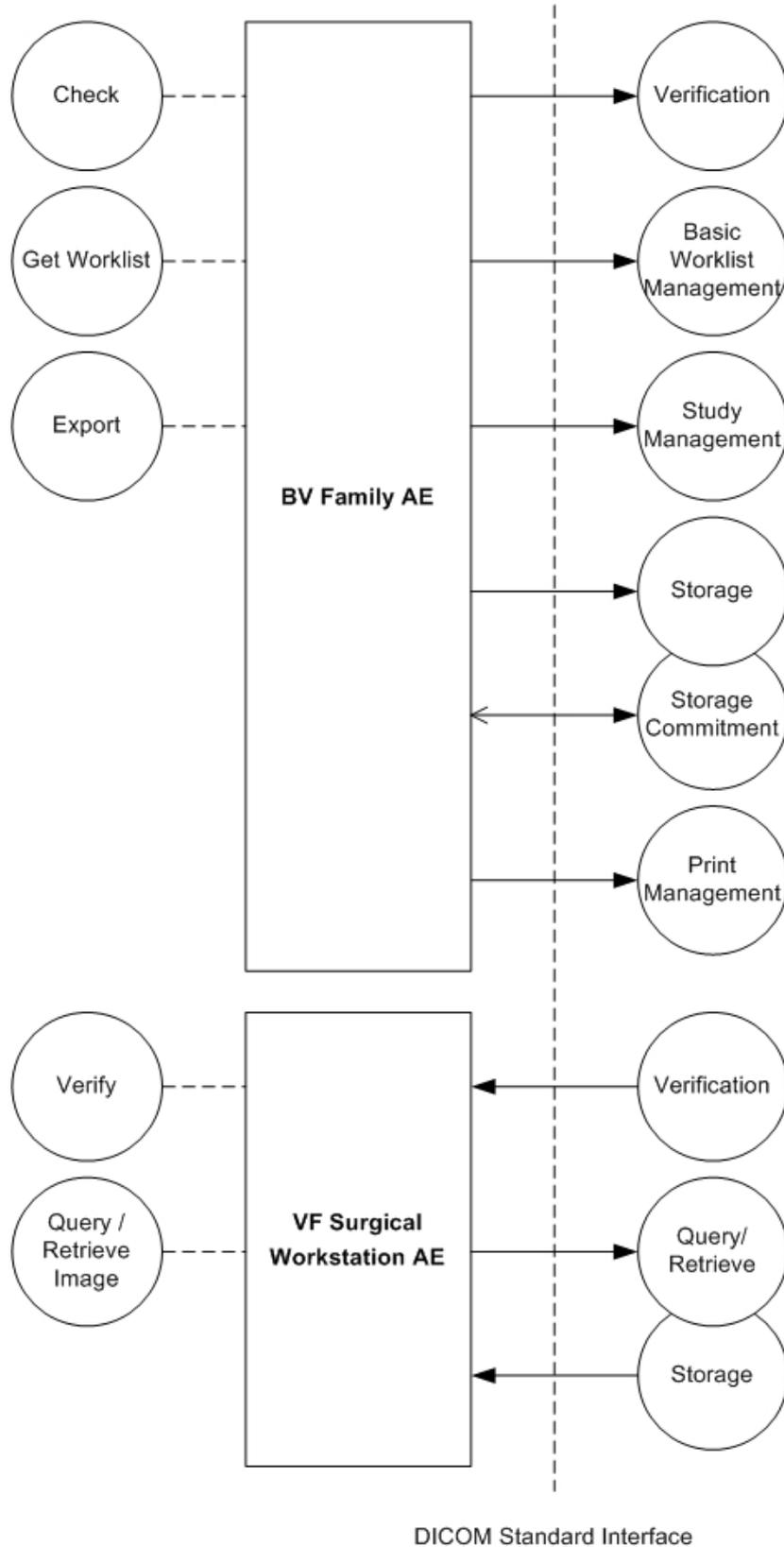
- The 3D-RX Surgical Workstation AE is intended to perform 3D reconstructions on the XA images received from the BV Family AE. The resulting images may be exported as Secondary Capture images or private X-ray images.

The BV Family can work both on-line and off-line. Therefore MPPS data and acquired images that have to be transferred by the BV Family AE are put in a queue (so only for RWA (Export)

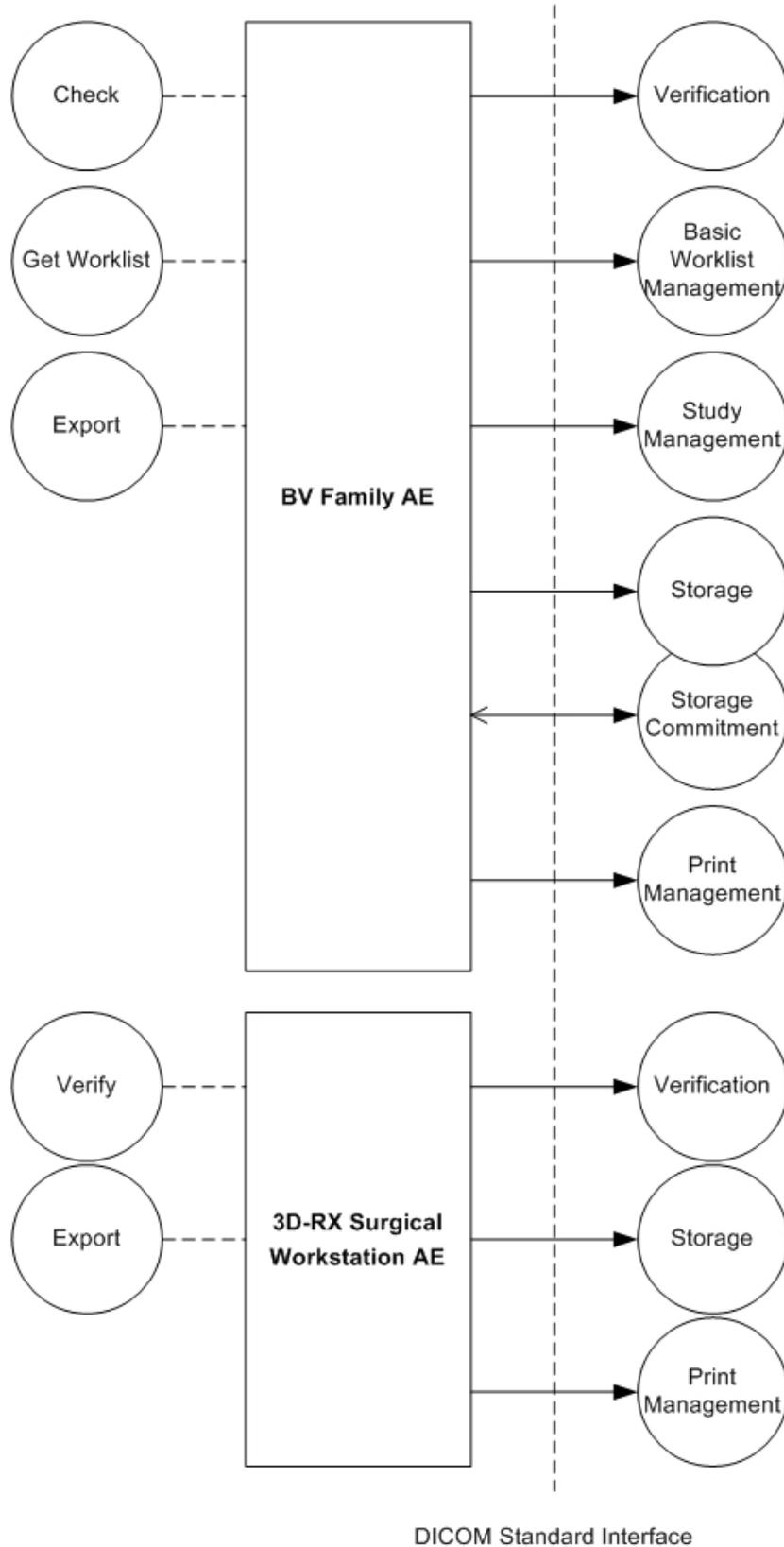
If the BV Family is connected to the network, then all queued jobs will be executed immediately.

If the BV Family is disconnected from the network, then Query/Retrieve and Worklist Queries are disabled. MPPS, storage, and print jobs will stay in the queue. When the system is connected to the network again, the user can resume the queued jobs. Then the jobs in the queue will be executed (FIFO).

The networking application data flow is shown in Figure 3 and Figure 4.



**Figure 3: Application Data Flow Diagram  
BV Family AE with integrated VF Surgical Workstation**



**Figure 4: Application Data Flow Diagram  
BV Family AE with integrated 3D-RX Surgical Workstation**

## 4.1.2. Functional Definition of AE's

### 4.1.2.1. Functional Definition of the BV Family AE

The BV Family AE has no SCP implementation, and will act as SCU for Verification (Check), for Basic Worklist Management (Get Worklist), and for Study Management, Storage and Storage Commitment, and Print Management (Export). Initiated by the operator the BV Family AE will propose the required presentation contexts for an association with the peer SCP. For Storage Commitment the BV Family AE may accept associations for asynchronous event reports (Export).

### 4.1.2.2. Functional Definition of the VF Surgical Workstation AE

The VF Surgical Workstation AE can retrieve and view images from a foreign storage SCU (Query/Retrieve Image). The operator initiates a query request and selects examinations from the query response. The operator initiates a retrieve request for the selected images. The VF Surgical Workstation AE as storage SCP waits for an association to import the requested images (Query/Retrieve Image).

### 4.1.2.3. Functional Definition of the 3D-RX Surgical Workstation AE

The 3D-RX Surgical Workstation AE will act as SCU for Verification () and Storage () to export images after 3D reconstruction, either as Secondary Capture or CT image.

## 4.1.3. Sequencing of Real World Activities

The following figures describe the sequencing constraints of some typical acquisitions per scheduled procedure step.

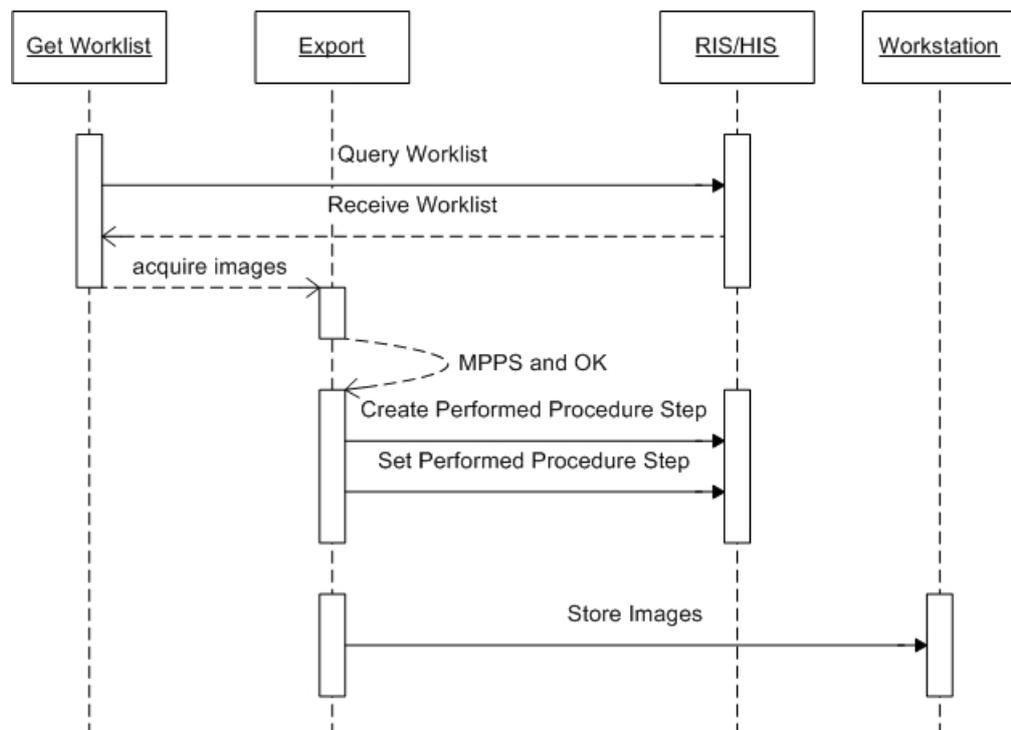


Figure 5: Typical Acquisition Workstation Storage Sequencing Constraint

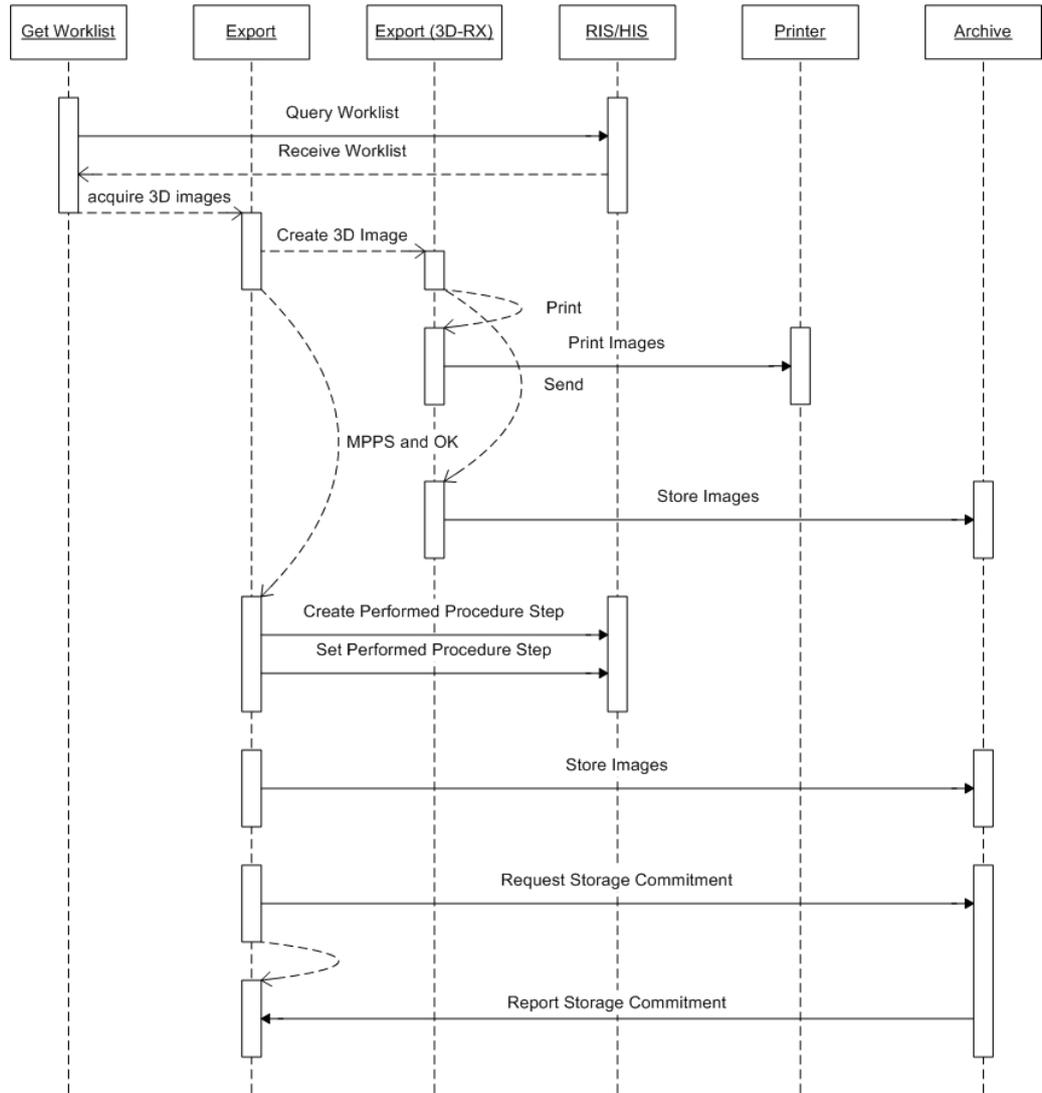
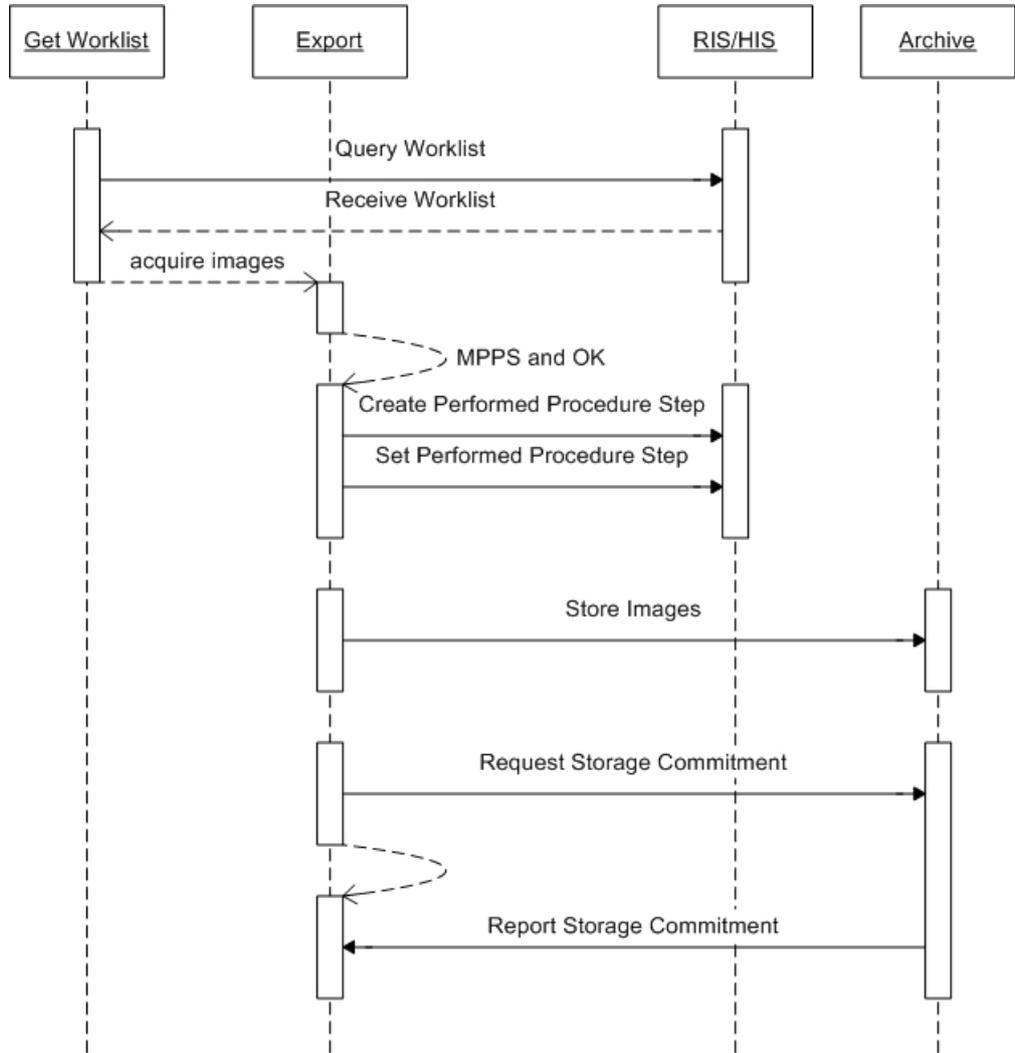
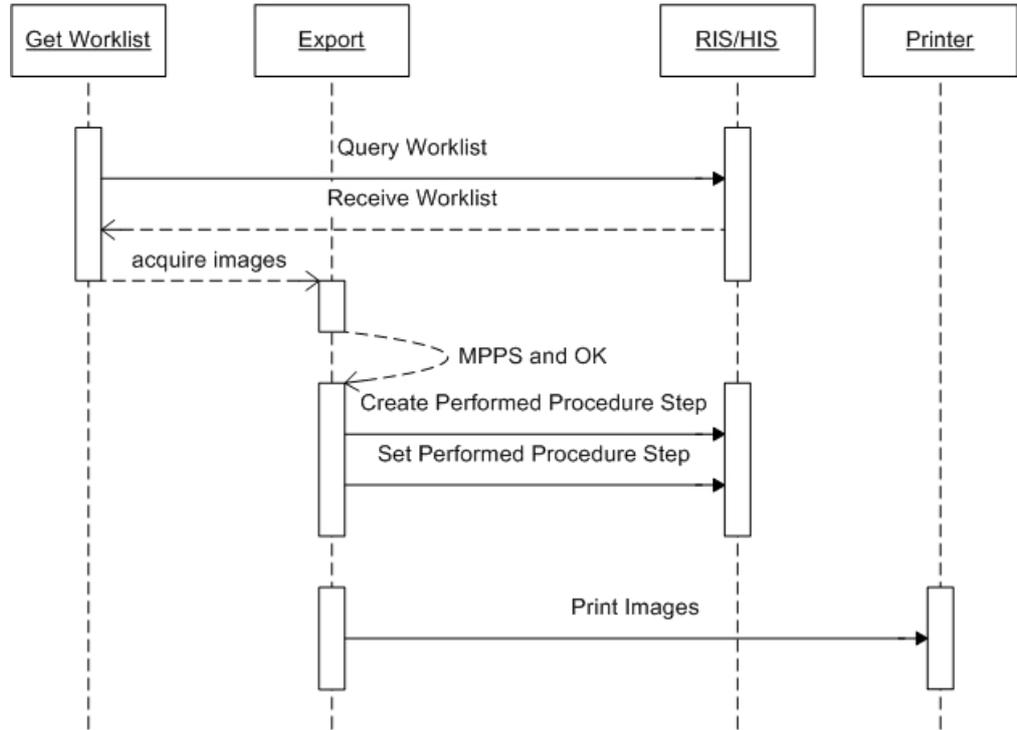


Figure 6: Typical 3D Acquisition Sequencing Constraint



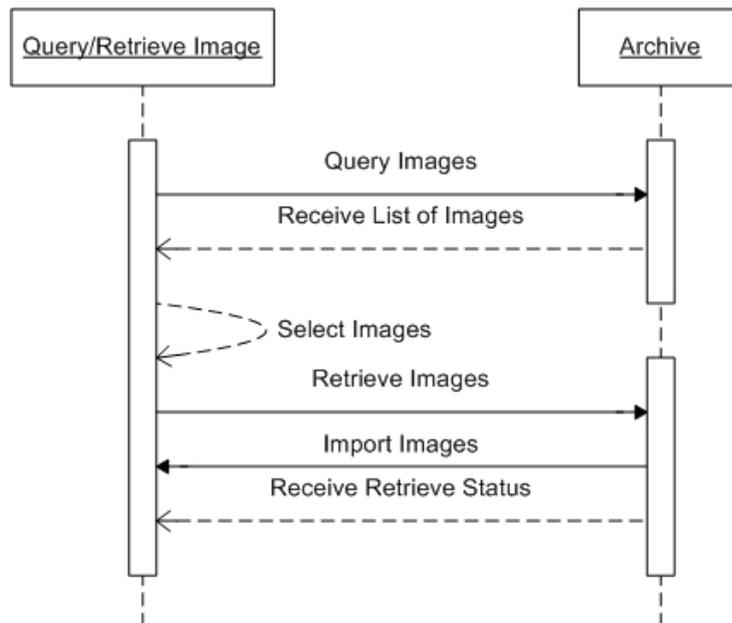
**Figure 7: Typical Acquisition Archive Storage Sequencing Constraint**



**Figure 8: Typical Acquisition Print Sequencing Constraint**

Note that an acquisition may also be started manually, i.e. without using a worklist.

The following figure describes the sequencing constraints of a typical Query/Retrieve action.



**Figure 9: Typical Query/Retrieve Sequencing Constraint**

Note that Import Images will be using a separate association.

## 4.2. AE Specifications

### 4.2.1. BV Family AE

#### 4.2.1.1. SOP Classes

This Application Entity provides Standard Conformance to the following SOP Classes.

**Table 4: SOP Classes for BV Family AE**

| SOP Class Name                             | SOP Class UID                | SCU | SCP |
|--|------------------------------|-----|-----|
| Verification                               | 1.2.840.10008.1.1            | Yes | No  |
| Storage Commitment Push Model              | 1.2.840.10008.1.20.1         | Yes | No  |
| Modality Performed Procedure Step          | 1.2.840.10008.3.1.2.3.3      | Yes | No  |
| Modality Worklist Information Model – FIND | 1.2.840.10008.5.1.4.31       | Yes | No  |
| Basic Grayscale Print Management (Meta)    | 1.2.840.10008.5.1.1.9        | Yes | No  |
| > Basic Film Session                       | 1.2.840.10008.5.1.1.1        | Yes | No  |
| > Basic Film Box                           | 1.2.840.10008.5.1.1.2        | Yes | No  |
| > Basic Grayscale Image Box                | 1.2.840.10008.5.1.1.4        | Yes | No  |
| > Printer                                  | 1.2.840.10008.5.1.1.16       | Yes | No  |
| Secondary Capture Image Storage            | 1.2.840.10008.5.1.4.1.1.7    | Yes | No  |
| CT Image Storage                           | 1.2.840.10008.5.1.4.1.1.2    | Yes | No  |
| X-Ray Angiographic Image Storage           | 1.2.840.10008.5.1.4.1.1.12.1 | Yes | No  |

#### 4.2.1.2. Association Policies

##### 4.2.1.2.1. General

The DICOM standard application context name for DICOM 3.0 is always proposed.

**Table 5: DICOM Application Context**

|                          |                       |
|--------------------------|-----------------------|
| Application Context Name | 1.2.840.10008.3.1.1.1 |
|--------------------------|-----------------------|

##### 4.2.1.2.2. Number of Associations

The BV Family AE may initiate and accept one association simultaneously.

**Table 6: Number of Associations as an Association Initiator for BV Family AE**

|   |   |
|---|---|
| Maximum number of simultaneous associations | 1 |
|---|---|

**Table 7: Number of Associations as an Association Acceptor for BV Family AE**

|   |   |
|---|---|
| Maximum number of simultaneous associations | 1 |
|---|---|

##### 4.2.1.2.3. Asynchronous Nature

The BV Family AE only supports asynchronous operations for Storage Commitment report. It will not perform asynchronous window negotiation.

#### 4.2.1.2.4. Implementation Identifying Information

For identification of the BV Family AE the following Implementation Class UID and Implementation Version Name are supplied.

**Table 8: DICOM Implementation Class and Version for BV Family AE**

|                             |                        |
|-----------------------------|------------------------|
| Implementation Class UID    | 1.3.46.670589.8.15.2.3 |
| Implementation Version Name | BV Family R2.3         |

#### 4.2.1.2.5. Communication Failure Handling

The behavior of the AE during communication failure is summarized in Table 9.

**Table 9: Communication Failure Behavior**

| Exception     | Behavior   |
|---------------|--|
| General       | In the DFI the error is logged including a description of the problem. Those are the standard notifications when an association cannot be established. |
| Not connected | MC_NETWORK_SHUTDOWN is logged e.g. ARTIM Timeout   |

#### 4.2.1.3. Association Initiation Policy

This describes the conditions under which the AE will initiate an association.

The behavior of the AE during DICOM communication failure is summarized in Table 10.

**Table 10: DICOM Command Communication Failure Behavior**

| Exception                 | Behavior  |
|---------------------------|---|
| Association setup failure | The association is aborted and the command marked as failed. The reason is logged and reported in the log file. |
| Network timeout behavior  | See section 4.4.2 for corresponding configurable time to wait parameters.                                       |

#### 4.2.1.3.1. Check

##### 4.2.1.3.1.1. Description and Sequencing of Activities

In service mode the BV Family AE can send a verification request (C-ECHO) to verify application level communication. This verification is initiated on a separate service system by using the "Check" function of the BV Scope program.

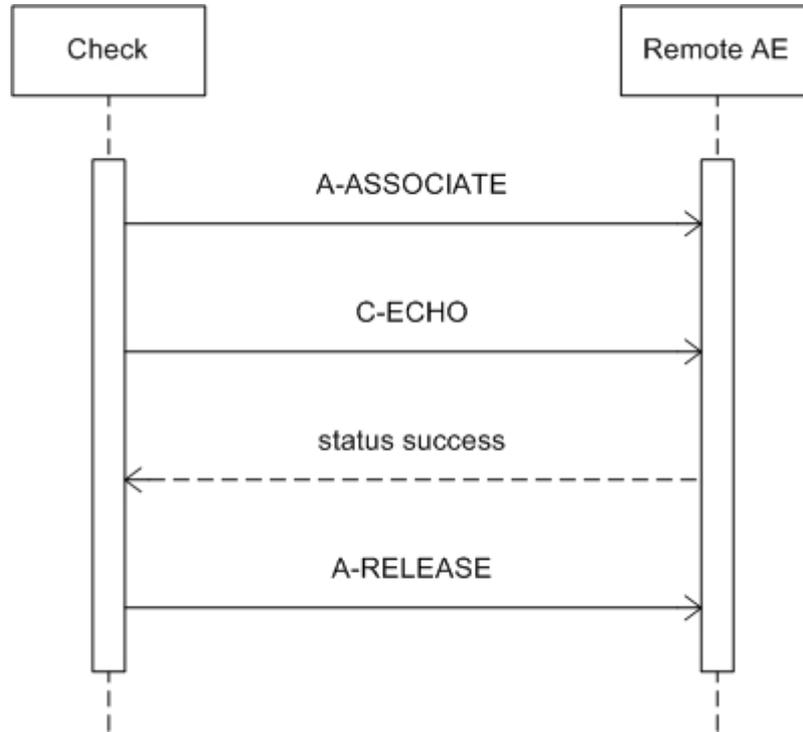


Figure 10: Sequencing of RWA Check

**4.2.1.3.1.2. Proposed Presentation Contexts**

For Check the BV Family AE will propose the following presentation contexts.

**Table 11: Proposed Presentation Contexts for Check**

| Presentation Context Table |                   |                   |   |      |                      |
|----------------------------|-------------------|-------------------|---|------|----------------------|
| Abstract Syntax            |                   | Transfer Syntax   |   | Role | Extended Negotiation |
| Name                       | UID               | Name List         | UID List  |      |                      |
| Verification               | 1.2.840.10008.1.1 | EBE<br>ELE<br>ILE | 1.2.840.10008.1.2.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2 | SCU  | None                 |

**4.2.1.3.1.3. SOP Specific Conformance for SOP Classes**

4.2.1.3.1.3.1. Verification

The BV Family AE provides standard conformance to the Verification service class.

All details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors are provided in Table 12.

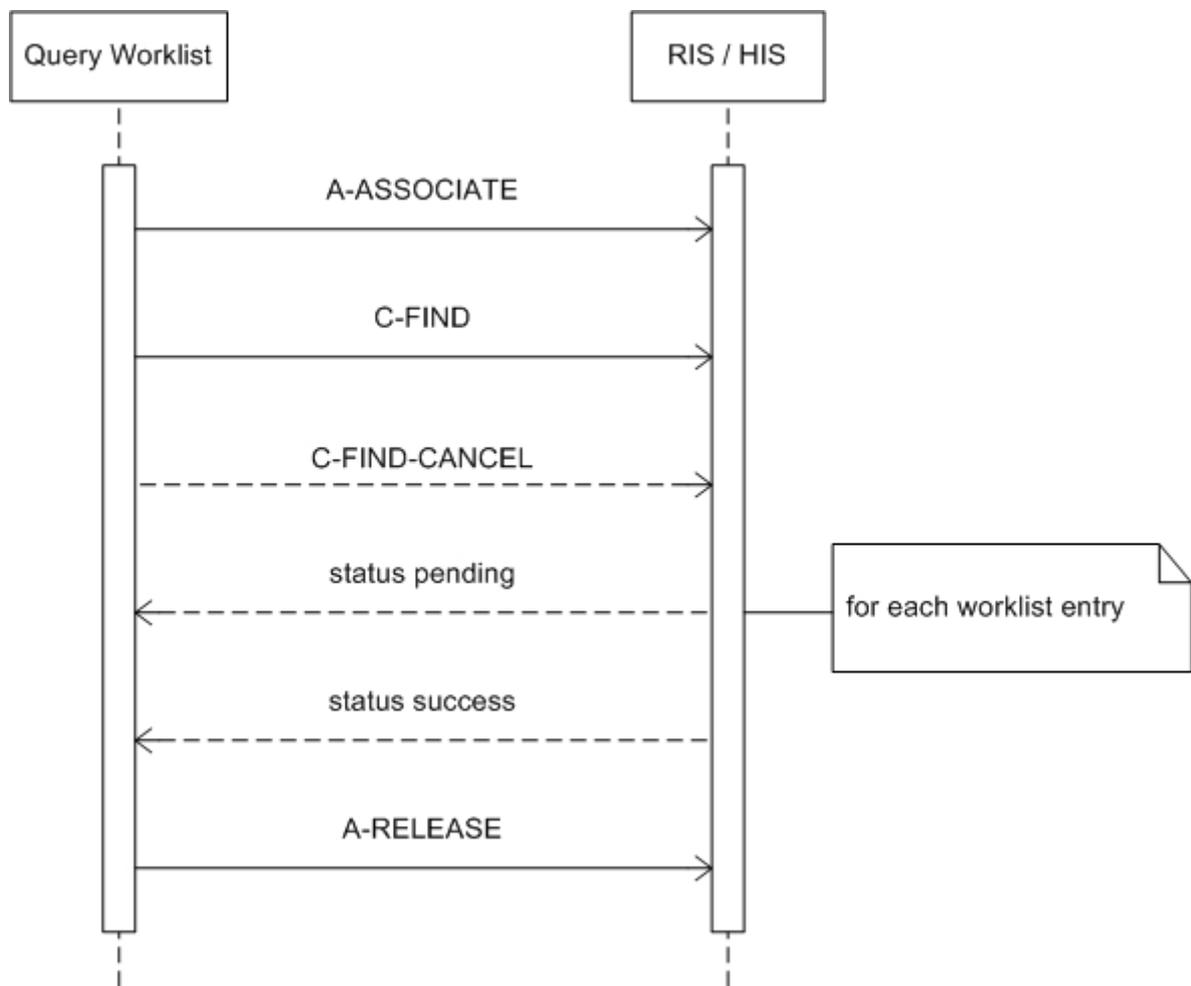
**Table 12: C-ECHO Response Status Handling Behavior**

| Service Status | Code | Further Meaning | Behavior   |
|----------------|------|-----------------|--|
| Success        | 0000 | Confirmation    | The SCP has successfully returned a verification response. |

**4.2.1.3.2. Get Worklist**

**4.2.1.3.2.1. Description and Sequencing of Activities**

The BV Family AE can send a modality worklist query (C-FIND) to update the BV Family worklist.



**Figure 11: Sequencing of RWA Get Worklist**

The worklist query is initiated by selecting "Get Worklist". Then the BV Family AE opens an association and sends a modality worklist query. The BWLM SCP (RIS/HIS) returns the applicable worklist; a response with status Pending is received for each new entry, the final response has status Success. After the final response the BV Family AE releases the association.

The contents of the received worklist are compared with the contents of the previous worklist. In case there are any changes, the BV Family patient file is updated. A unique match of the following attributes identifies a worklist entry.

**Table 13: Matching Criteria for Identifying Worklist Entries**

| Attribute                   |             |         |
|-----------------------------|-------------|---------|
| Name                        | Tag         | Comment |
| Scheduled Procedure Step ID | (0040,0009) |         |
| Accession Number            | (0008,0050) |         |
| Requested Procedure ID      | (0040,1001) |         |

If none of these identification attributes is present then the received worklist entry is ignored.

#### 4.2.1.3.2.2. Proposed Presentation Contexts

For Get Worklist the BV Family AE will propose the following presentation contexts.

**Table 14: Proposed Presentation Contexts for Get Worklist**

| Presentation Context Table                 |                         |                   |   |      |                      |
|--|-------------------------|-------------------|---|------|----------------------|
| Abstract Syntax                            |                         | Transfer Syntax   |   | Role | Extended Negotiation |
| Name                                       | UID                     | Name List         | UID List  |      |                      |
| Modality Worklist Information Model – FIND | 1.2.840.10008.5.1.4.31  | EBE<br>ELE<br>ILE | 1.2.840.10008.1.2.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2 | SCU  | None                 |
| Modality Performed Procedure Step          | 1.2.840.10008.3.1.2.3.3 | EBE<br>ELE<br>ILE | 1.2.840.10008.1.2.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2 | SCU  | None                 |

#### 4.2.1.3.2.3. SOP Specific Conformance for SOP Classes

##### 4.2.1.3.2.3.1. Modality Worklist Information Model – FIND

The BV Family AE provides standard conformance to the Modality Worklist SOP class.

The BV Family AE can contain a number of 100 worklist entries. If the sum of current and new worklist entries exceeds 100 then the BV Family AE will release the association immediately. The BV Family AE will show a message stating that the maximum number of examinations was reached.

All details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors are provided in Table 15.

**Table 15: C-FIND Response Status Handling Behavior**

| Service Status | Code | Further Meaning  | Behavior  |
|----------------|------|--|---|
| Success        | 0000 | Matching is complete<br>– No final identifier is supplied  | The association is released and the matches are stored.   |
| Failure        | A700 | Refused<br>– Out of resources  | Processing of the matches and the association is terminated. A message appears in the GUI.                      |
|                | A900 | Failed<br>– Identifier does not match SOP class  | The association is terminated and the status is logged into the system error log. A message appears in the GUI. |
|                | Cxxx | Failed<br>– Unable to process  | Processing of the matches and the association is terminated. A message appears in the GUI.                      |
| Pending        | FF00 | Matches are continuing<br>– Current match is supplied and any optional keys were supported in the same manner as required keys | Processing of the matches continues.  |
|                | FF01 | Matches are continuing<br>– Warning that one or more optional keys were not supported for existence for this identifier        | Processing of the matches continues without any warnings or errors.   |

Table 16 provides a description of the BV Family AE worklist request identifier.

**Table 16: Worklist Request Identifier**

| Attribute Name                         | Tag       | VR | M | R | Q | DP | DW | IOD |
|--|-----------|----|---|---|---|----|----|-----|
| <b>Patient Identification Module</b>   |           |    |   |   |   |    |    |     |
| Patient's Name                         | 0010,0010 | PN |   | X |   | X  | X  | X   |
| Patient ID                             | 0010,0020 | LO |   | X |   | X  | X  | X   |
| Other Patient IDs                      | 0010,1000 | LO |   | X |   |    |    | X   |
| Other Patient Names                    | 0010,1001 | PN |   | X |   |    | X  | X   |
| <b>Patient Demographic Module</b>      |           |    |   |   |   |    |    |     |
| Patient's Birth Date                   | 0010,0030 | DA |   | X |   | X  | X  | X   |
| Patient's Birth Time                   | 0010,0032 | TM |   | X |   |    |    | X   |
| Patient's Sex                          | 0010,0040 | CS |   | X |   | X  | X  | X   |
| Patient's Weight                       | 0010,1030 | DS |   | X |   |    | X  | X   |
| <b>Patient Medical Module</b>          |           |    |   |   |   |    |    |     |
| Medical Alerts                         | 0010,2000 | LO |   | X |   |    | X  |     |
| Contrast Allergies                     | 0010,2110 | LO |   | X |   |    | X  |     |
| Special Needs                          | 0038,0050 | LO |   | X |   |    | x  |     |
| <b>Visit Relationship Module</b>       |           |    |   |   |   |    |    |     |
| Referenced Patient Sequence            | 0008,1120 | SQ |   | X |   |    |    | X   |
| >Referenced SOP Class UID              | 0008,1150 | UI |   | X |   |    |    | X   |
| >Referenced SOP Instance UID           | 0008,1155 | UI |   | X |   |    |    | X   |
| <b>Scheduled Procedure Step Module</b> |           |    |   |   |   |    |    |     |
| Scheduled Procedure Step Sequence      | 0040,0100 | SQ |   | X |   |    |    |     |
| >Modality                              | 0008,0060 | CS | S |   |   |    |    | X   |
| >Scheduled Station AE Title            | 0040,0001 | AE | S |   |   |    |    |     |
| >Scheduled Procedure Step Start Date   | 0040,0002 | DA | R |   |   |    | X  |     |

| Attribute Name                         | Tag       | VR | M | R | Q | DP | DW | IOD            |
|--|-----------|----|---|---|---|----|----|----------------|
| >Scheduled Procedure Step Start Time   | 0040,0003 | TM |   | X |   |    | X  |                |
| >Scheduled Performing Physician's Name | 0040,0006 | PN |   | X |   | X  |    |                |
| >Scheduled Procedure Step Description  | 0040,0007 | LO |   | X |   |    | X  | X<br>Note<br>1 |
| >Scheduled Action Item Code Sequence   | 0040,0008 | SQ |   | X |   |    |    |                |
| >>Code Value                           | 0008,0100 | SH |   | X |   |    |    |                |
| >>Coding Scheme Designator             | 0008,0102 | SH |   | X |   |    |    |                |
| >>Coding Scheme Version                | 0008,0103 | LO |   | X |   |    |    |                |
| >>Code Meaning                         | 0008,0104 | LO |   | X |   |    |    |                |
| >Scheduled Procedure Step ID           | 0040,0009 | SH |   | X |   |    |    | X              |
| >Scheduled Station Name                | 0040,0010 | SH | S |   |   |    | X  |                |
| >Scheduled Procedure Step Location     | 0040,0011 | SH |   | X |   |    | X  |                |
| >Requested Contrast Agent              | 0032,1070 | LO |   | X |   |    | X  |                |
| >Pre-Medication                        | 0040,0012 | LO |   | X |   |    | X  |                |
| <b>Requested Procedure Module</b>      |           |    |   |   |   |    |    |                |
| Study Instance UID                     | 0020,000D | UI |   | X |   |    |    | X              |
| Referenced Study Sequence              | 0008,1110 | SQ |   | X |   |    |    | X              |
| >Referenced SOP Class UID              | 0008,1150 | UI |   | X |   |    |    | X              |
| >Referenced SOP Instance UID           | 0008,1155 | UI |   | X |   |    |    | X              |
| Requested Procedure Description        | 0032,1060 | LO |   | X |   |    | X  | Note<br>2      |
| Requested Procedure Code Sequence      | 0032,1064 | SQ |   | X |   |    |    |                |
| >Code Value                            | 0008,0100 | SH |   | X |   |    |    |                |
| >Coding Scheme Designator              | 0008,0102 | SH |   | X |   |    |    |                |
| >Coding Scheme Version                 | 0008,0103 | LO |   | X |   |    |    |                |
| >Code Meaning                          | 0008,0104 | LO |   | X |   |    |    |                |
| Requested Procedure ID                 | 0040,1001 | SH |   | X |   |    | X  | X              |
| <b>Imaging Service Request Module</b>  |           |    |   |   |   |    |    |                |
| Accession Number                       | 0008,0050 | SH |   | X |   |    | X  | X              |
| Referring Physician's Name             | 0008,0090 | PN |   | X |   |    | X  | X              |

The above table should be read as follows:

- Attribute Name: Attributes supported to build a Modality Worklist Request Identifier.
- Tag: DICOM tag for this attribute.
- VR: DICOM VR for this attribute.
- M: Matching Keys for (configurable, automatic) Worklist Update.
  - R: Range Matching,
  - S: Single Value Matching,
  - U: Universal Matching
  - W: Wildcard Matching (\* and ?)
- R: Return Keys. An "X" will indicate that this attribute as Return Key with zero length for Universal Matching.
- Q: Interactive Query Key. An "X" will indicate that this attribute as matching key can be used.
- DP: Displayed keys on the Patient Administration screen. An "x" indicates that this worklist attribute is displayed to the user in the main patient administration panel. For example, Patient's Name will be displayed when registering the patient prior to an examination.
- DW: Displayed keys on the worklist information panel. An "x" indicates that this worklist attribute is displayed to the user in the Information from Worklist panel.
- IOD: An "X" indicates that this Worklist attribute is included into all object Instances created during performance of the related Procedure Step.

Note 1: Attribute (0040,0007) is not copied to image object.

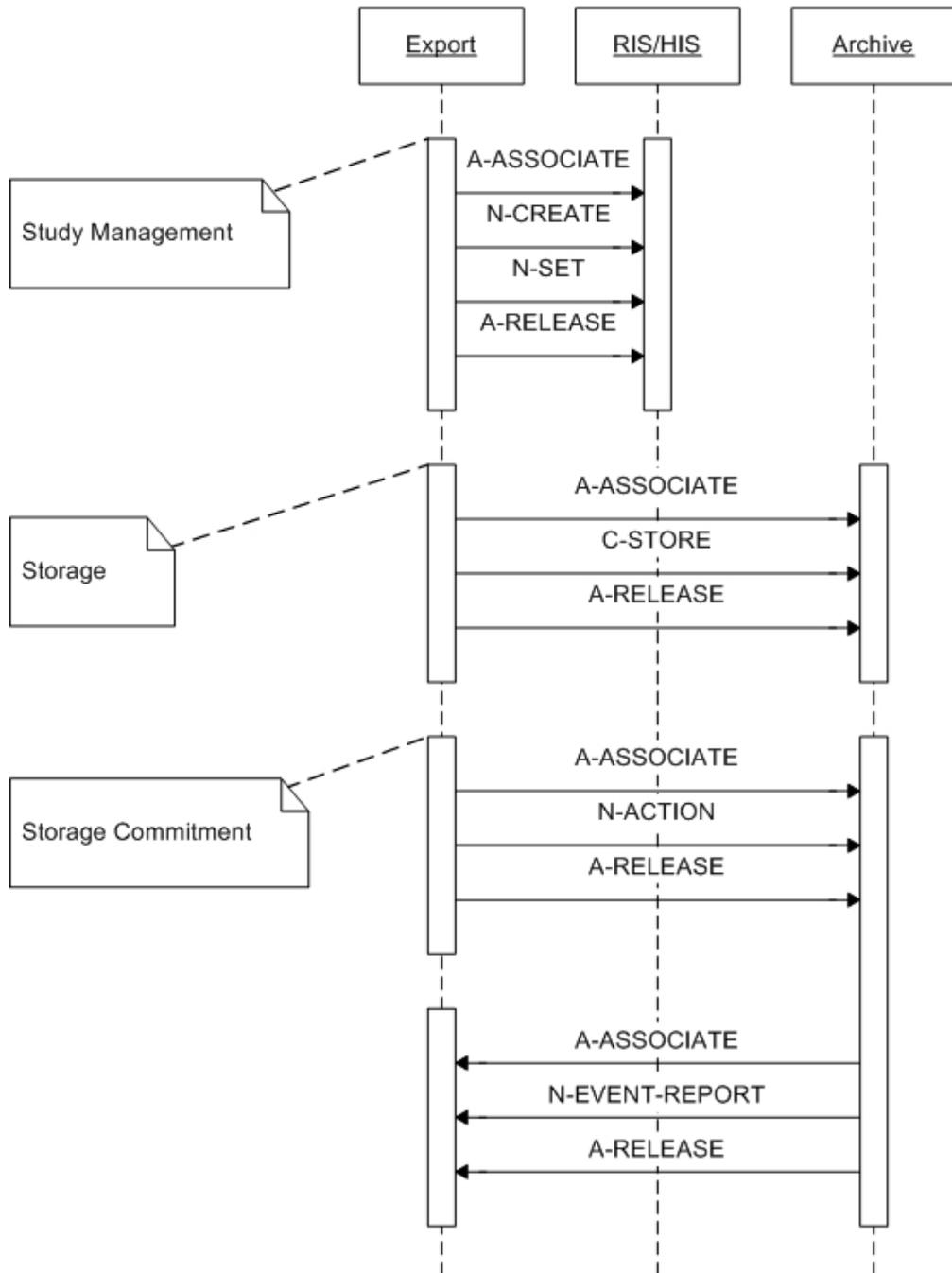
Note 2: If present then its value is copied in attribute Study Description (0008,1030) of IOD (XA, SC image)

The default Query Configuration is set to Modality (OT) and Date (today +/- 1 day). Optionally, additional matching for the own AET and/or own Station Name is configurable.

**4.2.1.3.3. Export**

**4.2.1.3.3.1. Description and Sequencing of Activities**

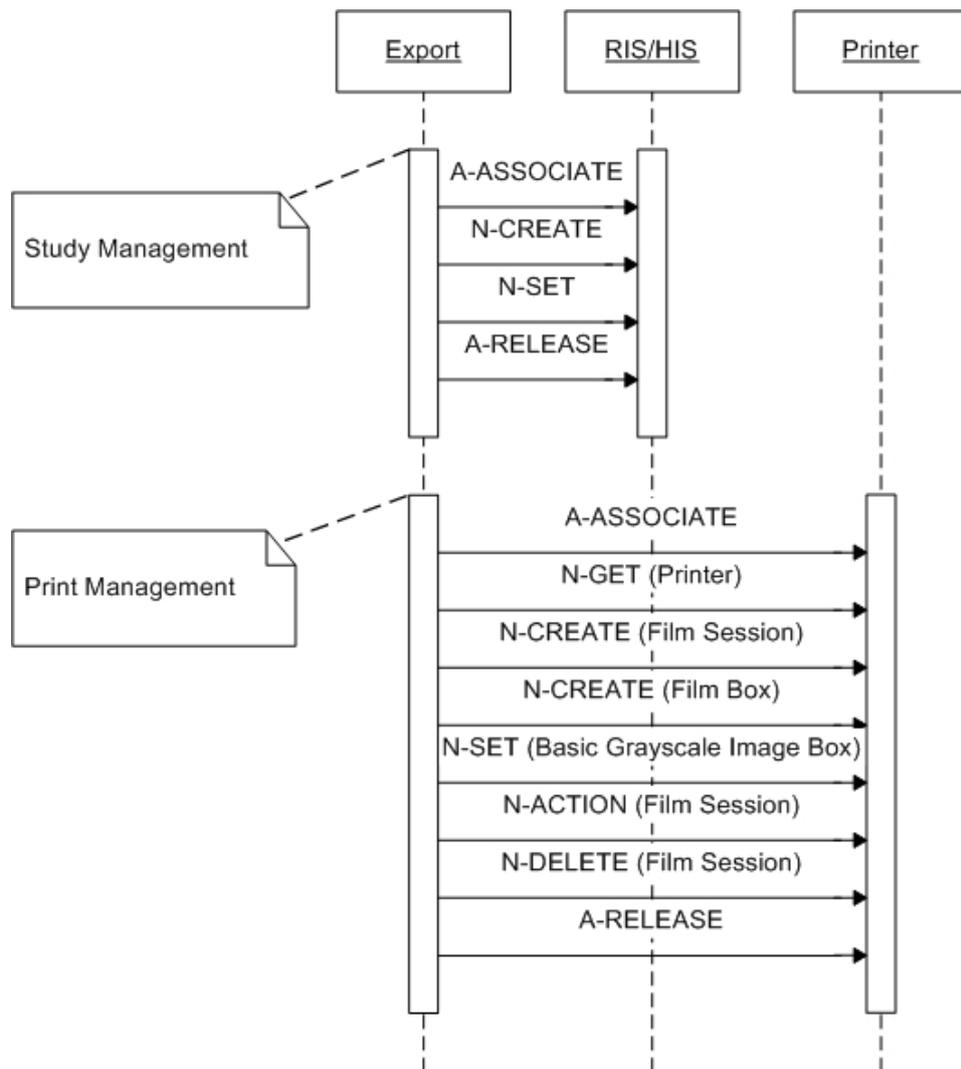
After an acquisition the BV Family AE sends related MPPS data to a Study Management SCP (RIS/HIS). Then the acquired image is stored or printed according the settings as specified by the operator.



**Figure 12: Sequencing of RWA Export (store)**

The acquisition is initiated by selecting an examination for Export. After selecting “MPPS & OK” the protocol name and study status have to be selected. Then the BV

Family AE opens an association and sends an N-CREATE service request, followed by an N-SET service request, and on final response releases the association. If the operator specified export to a storage SCP then the BV Family AE opens a new association and sends a C-STORE service request, and on final response releases the association. If Storage Commitment is enabled then the BV Family AE opens another association to send an N-ACTION service request, and on response releases the association. When the Storage Commitment SCP requests an association, the BV Family AE will accept an association for the N-EVENT-REPORT service request (ref. section 4.2.1.4.1).



**Figure 13: Sequencing of RWA Export (print)**

The acquisition is initiated by selecting an examination for export. After selecting "MPPS & OK" the protocol name and study status have to be selected. Then the BV Family AE opens an association and sends an N-CREATE service request, followed by an N-SET service request, and on final response releases the association.

If the operator specified export to a print SCP then the BV Family AE opens a new association to send the printer service requests, and on final response releases the association.

The BV Family AE may handle asynchronous status updates (N-EVENT-REPORT) from the printer.

**4.2.1.3.3.2. Proposed Presentation Contexts**

For Export the BV Family AE will propose the following presentation contexts.

**Table 17: Proposed Presentation Contexts for Study Management**

| Presentation Context Table                 |                         |                   |   |      |                      |
|--|-------------------------|-------------------|---|------|----------------------|
| Abstract Syntax                            |                         | Transfer Syntax   |   | Role | Extended Negotiation |
| Name                                       | UID                     | Name List         | UID List  |      |                      |
| Modality Worklist Information Model – FIND | 1.2.840.10008.5.1.4.31  | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| Modality Performed Procedure Step          | 1.2.840.10008.3.1.2.3.3 | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |

**Table 18: Proposed Presentation Contexts for Storage**

| Presentation Context Table      |                           |                   |   |      |                      |
|---------------------------------|---------------------------|-------------------|---|------|----------------------|
| Abstract Syntax                 |                           | Transfer Syntax   |   | Role | Extended Negotiation |
| Name                            | UID                       | Name List         | UID List  |      |                      |
| Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7 | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| CT Image Storage                | 1.2.840.10008.5.1.4.1.1.2 | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |

**Table 19: Proposed Presentation Contexts for Storage Commitment**

| Presentation Context Table    |                      |                   |   |      |                      |
|-------------------------------|----------------------|-------------------|---|------|----------------------|
| Abstract Syntax               |                      | Transfer Syntax   |   | Role | Extended Negotiation |
| Name                          | UID                  | Name List         | UID List  |      |                      |
| Storage Commitment Push Model | 1.2.840.10008.1.20.1 | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |

**Table 20: Proposed Presentation Contexts for Print Management**

| Presentation Context Table              |                       |                   |   |      |                      |
|---|-----------------------|-------------------|---|------|----------------------|
| Abstract Syntax                         |                       | Transfer Syntax   |   | Role | Extended Negotiation |
| Name                                    | UID                   | Name List         | UID List  |      |                      |
| Basic Grayscale Print Management (Meta) | 1.2.840.10008.5.1.1.9 | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| Basic Film Session                      | 1.2.840.10008.5.1.1.1 | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |

| Presentation Context Table |                        |                   |   |      |                      |
|----------------------------|------------------------|-------------------|---|------|----------------------|
| Abstract Syntax            |                        | Transfer Syntax   |   | Role | Extended Negotiation |
| Name                       | UID                    | Name List         | UID List  |      |                      |
| Basic Film Box             | 1.2.840.10008.5.1.1.2  | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| Basic Grayscale Image Box  | 1.2.840.10008.5.1.1.4  | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| Printer                    | 1.2.840.10008.5.1.1.16 | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |

**4.2.1.3.3.3. SOP Specific Conformance for SOP Classes**

4.2.1.3.3.3.1. Study Management

The BV Family AE provides standard conformance to the Modality Performed Procedure Step SOP class.

All details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors are provided in Table 21 and Table 22.

**Table 21: N-CREATE Response Status Handling Behavior**

| Service Status | Code | Further Meaning   | Behavior   |
|----------------|------|---|--|
| Success        | 0000 | Success   | The SCP has completed the MPPS service request successfully.                                     |
| Failure        | 0105 | No such attribute   | The association is aborted and the MPPS service request is marked as failed in the export queue. |
|                | 0110 | Processing failure – Performed procedure step object may no longer be updated | The association is aborted and the MPPS service request is marked as failed in the export queue. |
| Warning        | 0107 | Attribute list error  | The MPPS service request is considered successful.   |
|                | 0116 | Attribute value out of range  | The MPPS service request is considered successful.   |

**Table 22: N-SET Response Status Handling Behavior**

| Service Status | Code | Further Meaning   | Behavior   |
|----------------|------|---|--|
| Success        | 0000 | Success   | The SCP has completed the MPPS service request successfully.                                     |
| Failure        | 0105 | No such attribute   | The association is aborted and the MPPS service request is marked as failed in the export queue. |
|                | 0110 | Processing failure – Performed procedure step object may no longer be updated | The association is aborted and the MPPS service request is marked as failed in the export queue. |

| Service Status | Code | Further Meaning              | Behavior   |
|----------------|------|------------------------------|--|
| Warning        | 0107 | Attribute list error         | The MPPS service request is considered successful. |
|                | 0116 | Attribute value out of range | The MPPS service request is considered successful. |

Table 23 provides a description of the BV Family AE MPPS request identifier for N-CREATE and N-SET services.

**Table 23: MPPS Request Identifiers**

| Attribute Name                                      | Tag       | VR | N-CREATE                 | N-SET  |
|---|-----------|----|--------------------------|--|
| <b>SOP Common Module</b>                            |           |    |                          |  |
| Specific Character Set                              | 0008,0005 | CS | ISO_IR 100               | -  |
| <b>Image Acquisition Results Module</b>             |           |    |                          |  |
| Modality  | 0008,0060 | CS | From WLM                 | -  |
| Study ID  | 0020,0010 | SH | EMPTY                    | -  |
| Performed Protocol Code Sequence                    | 0040,0260 | SQ | EMPTY                    | -  |
| Performed Series Sequence                           | 0040,0340 | SQ | EMPTY                    | X  |
| >Retrieve AE Title                                  | 0008,0054 | AE | -                        | EMPTY  |
| >Series Description                                 | 0008,103E | LO | -                        | EMPTY  |
| >Performing Physician's Name                        | 0008,1050 | PN | -                        | Copied from scheduled performing physician's name if this provided by MWL or can be entered by Operator. |
| >Operator's Name                                    | 0008,1070 | PN | -                        | Performing Technologist; User selectable in MPPS panel   |
| >Referenced Image Sequence                          | 0008,1140 | SQ | -                        | Reference to all sent images   |
| >>Referenced SOP Class UID                          | 0008,1150 | UI | -                        | Reference to all sent images   |
| >>Referenced SOP Instance UID                       | 0008,1155 | UI | -                        | Reference to all sent images   |
| >Protocol Name                                      | 0018,1030 | LO | -                        | User selectable in MPPS panel  |
| >Series Instance UID                                | 0020,000E | UI | -                        | Reference to series  |
| >Referenced Standalone SOP Instance Sequence        | 0040,0220 | SQ | -                        | EMPTY  |
| <b>Performed Procedure Step Information Module</b>  |           |    |                          |  |
| Procedure Code Sequence                             | 0008,1032 | SQ | EMPTY                    | -  |
| Performed Station AE Title                          | 0040,0241 | AE | System AE Title          | -  |
| Performed Station Name                              | 0040,0242 | SH | Station Name             | -  |
| Performed Location                                  | 0040,0243 | SH | EMPTY                    | -  |
| Performed Procedure Step Start Date                 | 0040,0244 | DA | Exam date                | -  |
| Performed Procedure Step Start Time                 | 0040,0245 | TM | Exam time (format: hhmm) | -  |
| Performed Procedure Step End Date                   | 0040,0250 | DA | EMPTY                    | X  |
| Performed Procedure Step End Time                   | 0040,0251 | TM | EMPTY                    | X (format: hhmm)   |
| Performed Procedure Step Status                     | 0040,0252 | CS | Value: IN PROGRESS       | Value: COMPLETED or DISCONTINUED   |
| Performed Procedure Step ID                         | 0040,0253 | SH | Running Counter          | -  |
| Performed Procedure Step Description                | 0040,0254 | LO | EMPTY                    | EMPTY  |
| Performed Procedure Type Description                | 0040,0255 | LO | EMPTY                    | EMPTY  |
| <b>Performed Procedure Step Relationship Module</b> |           |    |                          |  |
| Referenced Patient Sequence                         | 0008,1120 | SQ | EMPTY or from WLM        | -  |

| Attribute Name                          | Tag       | VR | N-CREATE                         | N-SET |
|---|-----------|----|----------------------------------|-------|
| >Referenced SOP Class UID               | 0008,1150 | UI | From WLM                         | -     |
| >Referenced SOP Instance UID            | 0008,1155 | UI | From WLM                         | -     |
| Patient's Name                          | 0010,0010 | PN | Patient Name                     | -     |
| Patient ID                              | 0010,0020 | LO | Registration number              | -     |
| Patient's Birth Date                    | 0010,0030 | DA | Date of Birth                    | -     |
| Patient's Sex                           | 0010,0040 | CS | Value: F, M, or O                | -     |
| Scheduled Step Attribute Sequence       | 0040,0270 | SQ | X                                | -     |
| >Accession Number                       | 0008,0050 | SH | From WLM or entered by the user. | -     |
| >Referenced Study Sequence              | 0008,1110 | SQ | EMPTY or from WLM                | -     |
| >>Referenced SOP Class UID              | 0008,1150 | UI | From WLM                         | -     |
| >>Referenced SOP Instance UID           | 0008,1155 | UI | From WLM                         | -     |
| >Study Instance UID                     | 0020,000D | UI | Newly generated or from WLM      | -     |
| >Requested Procedure Description        | 0032,1060 | LO | EMPTY or from WLM                | -     |
| >Scheduled Procedure Step Description   | 0040,0007 | LO | EMPTY or from WLM                | -     |
| >Scheduled Protocol Code Sequence       | 0040,0008 | SQ | EMPTY or from WLM                | -     |
| >>Code Value                            | 0008,0100 | SH | From WLM                         | -     |
| >>Coding Scheme Designator              | 0008,0102 | SH | From WLM                         | -     |
| >>Coding Scheme Version                 | 0008,0103 | SH | From WLM                         | -     |
| >>Code Meaning                          | 0008,0104 | LO | From WLM                         | -     |
| >Scheduled Procedure Step ID            | 0040,0009 | SH | EMPTY or from WLM                | -     |
| >Requested Procedure ID                 | 0040,1001 | SH | EMPTY or from WLM                | -     |
| <b>Radiation Dose Module</b>            |           |    |                                  |       |
| Image and Fluoroscopy Area Dose Product | 0018,115E | DS | Value: 0                         | X     |
| Total Time of Fluoroscopy               | 0040,0300 | US | Value: 0                         | X     |
| Total Number of Exposures               | 0040,0301 | US | Value: 0                         | X     |
| Entrance Dose                           | 0040,0302 | US | Value: 0                         | X     |
| Entrance Dose in mGy                    | 0040,8302 | DS | Value: 0                         | X     |

Note: "-" indicates that the attribute is not sent; "EMPTY" indicates that the attribute is sent with zero length; "X" or an explicit value indicate that the attribute is sent with an appropriate value.

#### 4.2.1.3.3.3.2. Storage

The BV Family AE provides standard conformance to the Storage SOP classes.

The BV Family administration is based on Examinations, where each Examination is mapped to one Study (for one Patient). An Examination consists of one or more Runs, where each Run is mapped to one Series.

Note that a Secondary Capture Series can contain one or more Secondary Capture Images, though an XA Series can contain only one multi-frame XA Image of one or more Frames.

Upon receiving a C-STORE response with status Error or Refused, the BV Family AE will release the association. The transfer of all of the selected images of the examination will be considered failed. The operator may retry export jobs manually.

All details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors are provided in Table 24.

**Table 24: C-STORE Response Status Handling Behavior**

| Service Status | Code | Further Meaning                              | Behavior   |
|----------------|------|--|--|
| Success        | 0000 | Success                                      | The SCP has completed the Storage service request successfully.  |
| Failure        | A7xx | Refused<br>– Out of resources                | Image transfer is considered failed. Images remain in queue. User can initiate retry. Status is logged in system file. |
|                | A9xx | Error<br>– Data set does not match SOP class | Image transfer is considered failed. Images remain in queue. User can initiate retry. Status is logged in system file. |
|                | C000 | Error<br>– Cannot understand                 | Image transfer is considered failed. Images remain in queue. User can initiate retry. Status is logged in system file. |
| Warning        | B000 | Coercion of data elements                    | Image transfer is considered successful. Status is logged in system file.  |
|                | B006 | Elements discarded                           | Image transfer is considered successful. Status is logged in system file.  |
|                | B007 | Data set does not match SOP class            | Image transfer is considered successful. Status is logged in system file.  |

#### 4.2.1.3.3.3.3. Storage Commitment

The BV Family AE provides standard conformance to the Storage Commitment Push Model SOP class for Asynchronous storage commitment.

All details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors are provided in Table 25.

**Table 25: N-ACTION Response Status Handling Behavior**

| Service Status | Code | Further Meaning       | Behavior   |
|----------------|------|-----------------------|--|
| Success        | 0000 | Success               | The SCP has completed the Storage Commitment service request successfully. |
| Abort          | xxxx | Any other status code | The association is aborted and the storage commitment is marked as failed. |

The following table lists the contents of the N-ACTION request.

**Table 26: Storage Commitment N-ACTION Request Identifiers**

| Attribute Name               | Tag       | Note                          |
|------------------------------|-----------|-------------------------------|
| Transaction UID              | 0008,1195 | Generated Unique UID          |
| Referenced SOP Sequence      | 0008,1199 | References to all images sent |
| >Referenced SOP Class UID    | 0008,1150 | References to all images sent |
| >Referenced SOP Instance UID | 0008,1155 | References to all images sent |

#### 4.2.1.3.3.3.4. Print Management

Based on the selected layout, the BV Family AE will create a Film Session containing a single Film Box. The content of the Image Box will be filled for the print request (Film Box level). Once the print session has completed the Film Session will be deleted. A new Film Box is created for each successive film within the Film Session.

The BV Family AE is implemented to acquire grayscale images and thus to negotiate for Basic Grayscale Print Management. The processing of a print job can be cancelled at any time; then the BV Family AE will abort the processing immediately.

Before a queued print job is actually started, the system will retrieve the printer status. Upon receiving a normalized service response (N-GET) containing a Failure or Warning status, the BV Family AE does not start the export job.

Upon receiving a print command response with failure status, the BV Family AE will release the association. The transfer of all of the selected images of the examination will be considered failed. The operator may retry export jobs manually.

The following DIMSE services have been implemented.

**Table 27: Basic Grayscale Print Management DIMSE Services**

| SOP Class                           | Supported DIMSE Service Element |
|-------------------------------------|---------------------------------|
| Basic Film Session SOP Class        | N-CREATE, N-ACTION, N-DELETE    |
| Basic Film Box SOP Class            | N-CREATE                        |
| Basic Greyscale Image Box SOP Class | N-SET                           |
| Printer SOP Class                   | N-GET, N-EVENT-REPORT           |

The implemented attributes can be found sorted per IOD module in next the tables.

Defined abbreviations for the presence of module attributes in the tables 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   |
| ANAPCV | the attribute is present under specified condition – if present then its Value is Not Always Present (attribute sent zero length if condition applies and no value is present) |
| ANAPEV | the attribute is present under specified condition – if present then it will not have any value  |

Defined abbreviations for the source of the attribute data values in the tables 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 source is a Modality Performed Procedure Step |
| MWL      | the attribute value source is a Modality Worklist                 |
| PRINTER  | the attribute value source is a printer                           |
| USER     | the attribute value source is explicit user input                 |

**Table 28: Printer SOP Class - N-GET-RQ**

| Attribute Name  | Tag       | VR | Note                                    | Presence | Source  |
|---|-----------|----|---|----------|---------|
| <b>Printer Module</b>   |           |    |   |          |         |
| Printer Status  | 2110,0010 | CS | Printer Status provided by printer      | ALWAYS   | PRINTER |
| Printer Status Info   | 2110,0020 | CS | Printer Status Info provided by printer | ALWAYS   | PRINTER |
| <i>Note: Only in case that the printer responds with a Printer status of "NORMAL" or "WARNING" the BV Family AE continues printing of the images.</i> |           |    |   |          |         |

**Table 29: Basic Film Session SOP Class - N-CREATE-RQ**

| Attribute Name  | Tag       | VR | Note  | Presence | Source |
|---|-----------|----|---|----------|--------|
| <b>Basic Film Session Presentation Module</b>           |           |    |   |          |        |
| Number of Copies*                                       | 2000,0010 | IS | Integer (1-99)                                      | ALWAYS   | CONFIG |
| Print Priority*   | 2000,0020 | CS | LOW, MED, HIGH                                      | ALWAYS   | CONFIG |
| Medium Type*  | 2000,0030 | CS | CURRENT, BLUE FILM, CLEAR FILM, PAPER, TRANSPARENCY | ALWAYS   | CONFIG |
| Film Destination*                                       | 2000,0040 | CS | CURRENT, PROCESSOR, MAGAZINE, BIN (integer)         | ALWAYS   | CONFIG |
| Film Session Label                                      | 2000,0050 | LO | Equal to Exam Type                                  | ALWAYS   | AUTO   |
| <i>* The default values are printer type dependent.</i> |           |    |   |          |        |

**Table 30: Basic Film Box SOP Class - N-CREATE-RQ**

| Attribute Name   | Tag       | VR | Note   | Presence | Source  |
|--|-----------|----|--|----------|---------|
| <b>Basic Film Box Presentation Module</b>                          |           |    |  |          |         |
| Image Display Format   | 2010,0010 | ST | STANDARD\1,1, STANDARD\1,2, STANDARD\2,2, STANDARD\2,3   | ALWAYS   | USER    |
| Film Orientation   | 2010,0040 | CS | LANDSCAPE, PORTRAIT  | ALWAYS   | CONFIG  |
| Film Size ID*  | 2010,0050 | CS | 8INX10IN, 8_5INX11IN, 10INX12IN, 10INX14IN, 11INX11IN, 11INX14IN, 11INX17IN, 14INX14IN, 14INX17IN, 24CMX24CM, 24CMX30CM, A3, A4, CURRENT | ALWAYS   | CONFIG  |
| Magnification Type*  | 2010,0060 | CS | BILINEAR, CUBIC, NONE, REPLICATE   | ALWAYS   | CONFIG  |
| Smoothing Type   | 2010,0080 | CS | 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 140, ENHANCED, ENHANCED1, MEDIUM, NORMAL, SHARP, SMOOTH                            | ALWAYS   | CONFIG  |
| Border Density*  | 2010,0100 | CS | BLACK, OD (Integer), WHITE   | ALWAYS   | CONFIG  |
| Empty Image Density*   | 2010,0110 | CS | BLACK, WHITE   | ALWAYS   | CONFIG  |
| Min Density*   | 2010,0120 | US | 0..1000  | ALWAYS   | CONFIG  |
| Max Density*   | 2010,0130 | US | 0..1000  | ALWAYS   | CONFIG  |
| Trim*  | 2010,0140 | CS | NO, YES  | ALWAYS   | CONFIG  |
| Configuration Information*   | 2010,0150 | ST | Printer configurable character string (max. 1024 char.)  | ALWAYS   | CONFIG  |
| <b>Basic Film Box Relationship Module</b>                          |           |    |  |          |         |
| Referenced Film Session Sequence                                   | 2010,0500 | SQ | -  | ALWAYS   | AUTO    |
| >Referenced SOP Class UID  | 0008,1150 | UI | Applied value: 1.2.840.10008.5.1.1.1   | ALWAYS   | FIXED   |
| >Referenced SOP Instance UID                                       | 0008,1155 | UI | -  | ALWAYS   | PRINTER |
| <i>* The default values and ranges are printer type dependent.</i> |           |    |  |          |         |

**Table 31: Basic Grayscale Image Box SOP Class - N-SET-RQ**

| Attribute Name | Tag | VR | Note | Presence | Source |
|----------------|-----|----|------|----------|--------|
|----------------|-----|----|------|----------|--------|

| Image Box Pixel Presentation Module   |           |    |                            |        |        |
|---------------------------------------|-----------|----|----------------------------|--------|--------|
| Image Position                        | 2020,0010 | US | Generated                  | ALWAYS | AUTO   |
| Polarity*                             | 2020,0020 | CS | NORMAL, REVERSE            | ALWAYS | CONFIG |
| Preformatted Grayscale Image Sequence | 2020,0110 | SQ | -                          | ALWAYS | AUTO   |
| >Samples per Pixel                    | 0028,0002 | US | Applied value: 1           | ALWAYS | FIXED  |
| >Photometric Interpretation           | 0028,0004 | CS | Applied value: MONOCHROME2 | ALWAYS | FIXED  |
| >Rows                                 | 0028,0010 | US | Applied value: 1024        | ALWAYS | FIXED  |
| >Columns                              | 0028,0011 | US | Applied value: 1280        | ALWAYS | FIXED  |
| >Bits Allocated                       | 0028,0100 | US | Applied value: 16          | ALWAYS | FIXED  |
| >Bits Stored                          | 0028,0101 | US | Applied value: 12          | ALWAYS | FIXED  |
| >High Bit                             | 0028,0102 | US | Applied value: 11          | ALWAYS | FIXED  |
| >Pixel Representation                 | 0028,0103 | US | Applied value: 0x0000      | ALWAYS | FIXED  |
| >Pixel Data                           | 7FE0,0010 | OW | -                          | ALWAYS | AUTO   |

\* The default values are printer type dependent.

All details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors are provided in Table 32 to Table 35.

**Table 32: Basic Film Session N-CREATE Response Status Handling Behavior**

| Service Status | Further Meaning                   | Error Code | Behavior  |
|----------------|-----------------------------------|------------|---|
| Success        | Film Session successfully created | 0000       | Normal Completion.  |
| Warning        |                                   | B6XX       | Print Film Session considered successful. Status logged in system file. |
| Failure        |                                   |            | Print Film Session considered failed. Status logged in system file.     |

**Table 33: Basic Film Box N-CREATE Response Status Handling Behavior**

| Service Status | Further Meaning               | Error Code | Behavior  |
|----------------|-------------------------------|------------|---|
| Success        | Film Box successfully created | 0000       | Normal Completion.  |
| Warning        |                               | B6XX       | Print Film Session considered successful. Status logged in system file. |
| Failure        |                               | C6XX       | Print Film Session considered failed. Status logged in system file.     |

**Table 34: Basic Grayscale Image Box N-SET Response Status Handling Behavior**

| Service Status | Further Meaning                        | Error Code | Behavior  |
|----------------|--|------------|---|
| Success        | Image successfully stored in Image Box | 0000       | Normal Completion.  |
| Warning        |  | B6XX       | Print Film Session considered successful. Status logged in system file. |
| Failure        |  | C6XX       | Print Film Session considered failed. Status logged in system file.     |

**Table 35: Basic Film Session N-ACTION Response Status Handling Behavior**

| Service Status | Further Meaning            | Error Code | Behavior  |
|----------------|----------------------------|------------|---|
| Success        | Film accepted for printing | 0000       | Normal Completion.  |
| Warning        |                            | B6XX       | Print Film Session considered successful. Status logged in system file. |
| Failure        |                            | C6XX       | Print Film Session considered failed. Status logged in system file.     |

**Table 36: Printer - N-EVENT-REPORT Behavior**

| Event Type Name | Event Type ID | Behavior  |
|-----------------|---------------|---|
| NORMAL          | 1             | When evaluated, the BV Family AE sends response. The event is logged. The print job continues.                            |
| WARNING         | 2             | When evaluated, the BV Family AE sends response. The event is logged. The print job continues.                            |
| FAILURE         | 3             | When evaluated, the BV Family AE sends response. The event is logged. The print job gets aborted and is marked as failed. |

**4.2.1.4. Association Acceptance Policy**

**4.2.1.4.1. Export**

**4.2.1.4.1.1. Description and Sequencing of Activities**

After requesting storage commitment the BV Family AE will accept an association for the storage commitment report.

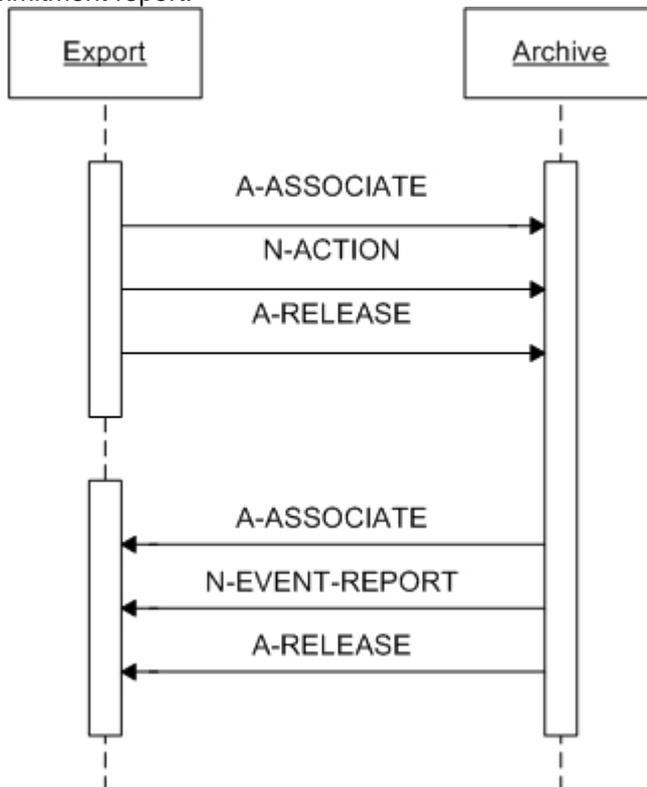


Figure 14: Sequencing of RWA Export

**4.2.1.4.1.2. Accepted Presentation Contexts**

The BV Family AE will accept presentation contexts as shown in Table 37.

**Table 37: Acceptable Presentation Contexts for Export**

| Presentation Context Table    |                      |                 |                     |      |                      |
|-------------------------------|----------------------|-----------------|---------------------|------|----------------------|
| Abstract Syntax               |                      | Transfer Syntax |                     | Role | Extended Negotiation |
| Name                          | UID                  | Name List       | UID List            |      |                      |
| Storage Commitment Push Model | 1.2.840.10008.1.20.1 | ILE             | 1.2.840.10008.1.2   | SCU  | None                 |
|                               |                      | ELE             | 1.2.840.10008.1.2.1 |      |                      |
|                               |                      | EBE             | 1.2.840.10008.1.2.2 |      |                      |

The BV Family AE will only accept the SCU role (which must be proposed via SCP/SCU Role Selection Negotiation) within a Presentation Context for the Storage Commitment Push Model SOP Class.

**4.2.1.4.1.3. SOP Specific Conformance for SOP Classes**

The behavior of the BV Family AE when receiving Event Types within the N-EVENT-REPORT is summarized in Table 38.

**Table 38: Storage Commitment - N-EVENT-REPORT Behavior**

| Event Type Name                                      | Event Type ID | Behavior   |
|--|---------------|--|
| Storage Commitment Request Successful                | 1             | The Referenced SOP Instances under Referenced SOP Sequence (0008,1199) are marked within the database as "Stored & Committed (SC)" to the value of Retrieve AE Title (0008,0054).  |
| Storage Commitment Request Complete – Failures Exist | 2             | In case of a "Failure Exist" situation (Referenced SOP Instances under Failed SOP Sequence (0008,1198)), all of the stored SOP Instances for that examination are considered as failed for storage commitment. A send job that failed storage commitment will not be automatically restarted but can be resumed by the user. |

The status response behavior of the BV Family AE is as summarized in Table 39.

**Table 39: Storage Commitment - N-EVENT-REPORT Status Response**

| Service Status | Code | Further Meaning               | Description   |
|----------------|------|-------------------------------|---|
| Success        | 0000 | Success                       | The BV Family AE has completed the operation successfully.                            |
| Failure        | *    | Any other Failure status code | The association is aborted and the storage commit N-EVENT-REPORT is marked as failed. |

## 4.2.2. VF Surgical Workstation AE

### 4.2.2.1. SOP Classes

This Application Entity provides Standard Conformance to the following SOP Classes.

**Table 40: SOP Classes for VF Surgical Workstation AE**

| SOP Class Name   | SOP Class UID                 | SCU | SCP |
|--|-------------------------------|-----|-----|
| Verification   | 1.2.840.10008.1.1             | No  | Yes |
| Computed Radiography Image Storage                         | 1.2.840.10008.5.1.4.1.1.1     | No  | Yes |
| Digital X-Ray Image Storage – for Presentation             | 1.2.840.10008.5.1.4.1.1.1.1   | No  | Yes |
| CT Image Storage   | 1.2.840.10008.5.1.4.1.1.2     | No  | Yes |
| Digital Mammography X-Ray Image Storage - Pres. SOP        | 1.2.840.10008.5.1.4.1.1.1.2   | No  | Yes |
| Digital Mammography X-Ray Image Storage - Proc. SOP        | 1.2.840.10008.5.1.4.1.1.1.2.1 | No  | Yes |
| Ultrasound Multi-frame Image Storage                       | 1.2.840.10008.5.1.4.1.1.3.1   | No  | Yes |
| MR Image Storage   | 1.2.840.10008.5.1.4.1.1.4     | No  | Yes |
| Ultrasound Image Storage                                   | 1.2.840.10008.5.1.4.1.1.6.1   | No  | Yes |
| Secondary Capture Image Storage                            | 1.2.840.10008.5.1.4.1.1.7     | No  | Yes |
| Grayscale Softcopy Presentation State Storage              | 1.2.840.10008.5.1.4.1.1.11.1  | No  | Yes |
| X-Ray Angiographic Image Storage                           | 1.2.840.10008.5.1.4.1.1.12.1  | No  | Yes |
| X-Ray Radiofluoroscopic Image Storage                      | 1.2.840.10008.5.1.4.1.1.12.2  | No  | Yes |
| X-Ray Specialization                                       | 1.3.46.670589.2.3.1.1         | No  | Yes |
| Stack of X-Ray   | 1.3.46.670589.2.4.1.1         | No  | Yes |
| Volume   | 1.3.46.670589.5.0.1.1         | No  | Yes |
| 3D Volume Object   | 1.3.46.670589.5.0.2.1         | No  | Yes |
| Surface  | 1.3.46.670589.5.0.3.1         | No  | Yes |
| Cardio   | 1.3.46.670589.5.0.8.1         | No  | Yes |
| CT Synthetic Image   | 1.3.46.670589.5.0.9           | No  | Yes |
| MR Synthetic Image   | 1.3.46.670589.5.0.10          | No  | Yes |
| MR Cardio Analysis   | 1.3.46.670589.5.0.11.1        | No  | Yes |
| CX Synthetic Image   | 1.3.46.670589.5.0.12          | No  | Yes |
| Perfusion  | 1.3.46.670589.5.0.13          | No  | Yes |
| Perfusion Analysis   | 1.3.46.670589.5.0.14          | No  | Yes |
| Patient Root Query/Retrieve Information Model – FIND       | 1.2.840.10008.5.1.4.1.2.1.1   | Yes | No  |
| Patient Root Query/Retrieve Information Model – MOVE       | 1.2.840.10008.5.1.4.1.2.1.2   | Yes | No  |
| Study Root Query/Retrieve Information Model – FIND         | 1.2.840.10008.5.1.4.1.2.2.1   | Yes | No  |
| Study Root Query/Retrieve Information Model – MOVE         | 1.2.840.10008.5.1.4.1.2.2.2   | Yes | No  |
| Patient/Study Only Query/Retrieve Information Model – FIND | 1.2.840.10008.5.1.4.1.2.3.1   | Yes | No  |
| Patient/Study Only Query/Retrieve Information Model – MOVE | 1.2.840.10008.5.1.4.1.2.3.2   | Yes | No  |

### 4.2.2.2. Association Policies

#### 4.2.2.2.1. General

The DICOM standard application context name for DICOM 3.0 is always proposed.

**Table 41: DICOM Application Context**

|                          |                       |
|--------------------------|-----------------------|
| Application Context Name | 1.2.840.10008.3.1.1.1 |
|--------------------------|-----------------------|

**4.2.2.2.2. Number of Associations**

The VF Surgical Workstation AE may initiate and accept one association simultaneously.

**Table 42: Number of Associations as an Association Initiator for VF Surgical Workstation AE**

|   |   |
|---|---|
| Maximum number of simultaneous associations | 1 |
|---|---|

**Table 43: Number of Associations as an Association Acceptor for VF Surgical Workstation AE**

|   |              |
|---|--------------|
| Maximum number of simultaneous associations | configurable |
|---|--------------|

**4.2.2.2.3. Asynchronous Nature**

The VF Surgical Workstation AE does not support asynchronous operations and will not perform asynchronous window negotiation.

**4.2.2.2.4. Implementation Identifying Information**

For identification of the VF Surgical Workstation AE the following Implementation Class UID and Implementation Version Name are supplied.

**Table 44: DICOM Implementation Class and Version for VF Surgical Workstation AE**

|                             |                      |
|-----------------------------|----------------------|
| Implementation Class UID    | 1.3.46.670589.5.2.23 |
| Implementation Version Name | ViewForum R6.3       |

**4.2.2.2.5. Communication Failure Handling**

The behavior of the AE during communication failure is summarized in Table 45.

**Table 45: Communication Failure Behavior**

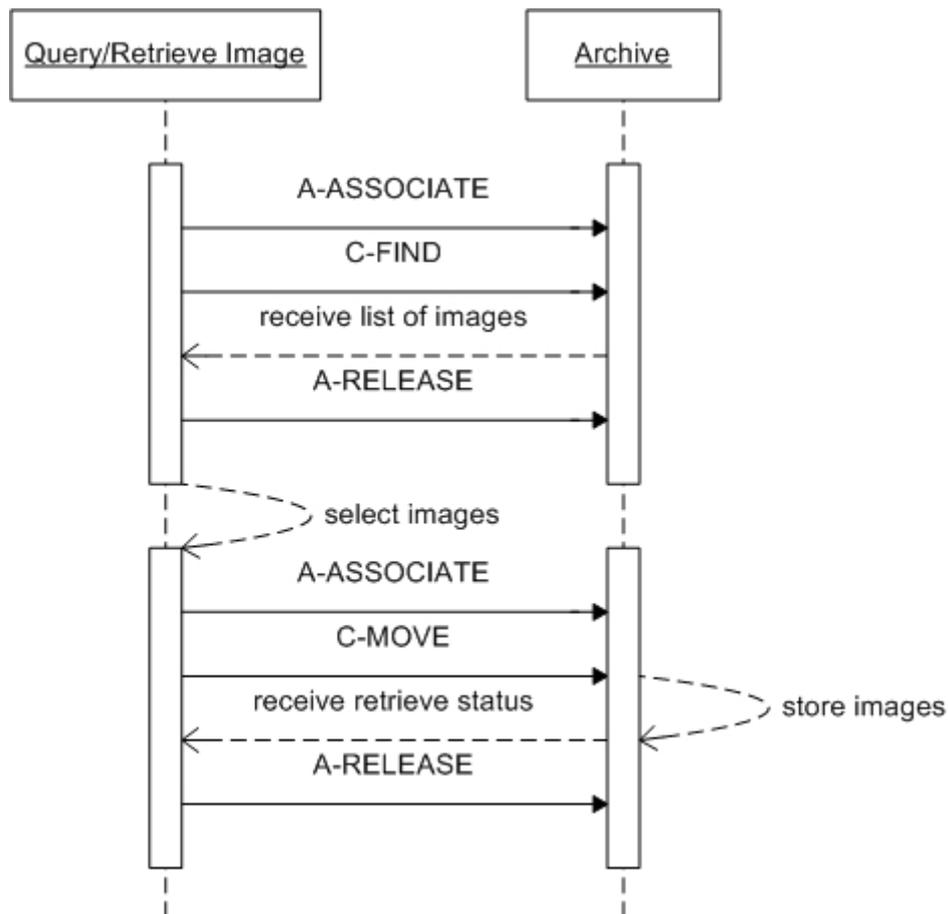
| Exception           | Behavior   |
|---------------------|--|
| ARTIM Timeout       | The job fails in case of association setup. The reason is logged and reported to the operator.   |
| Reply Timeout       | The job fails and the association is aborted. The reason is logged and reported to the operator. |
| Association Timeout | The association is released.   |
| Association Aborted | The job fails. The reason is logged and reported to the operator.                                |

### 4.2.2.3. Association Initiation Policy

#### 4.2.2.3.1. Query/Retrieve Image

##### 4.2.2.3.1.1. Description and Sequencing of Activities

For viewing images, the operator can use the VF Surgical Workstation AE to query a remote archive and select the images to retrieve. The VF Surgical Workstation AE then sends a retrieve request and accepts the related images.



**Figure 15: Sequencing of RWA Query/Retrieve Image**

The operator queries a remote archive, using the query tool in the data handling facility. The VF Surgical Workstation AE initiates an association to the selected peer entity (Archive) and uses it to send Query (C-FIND) requests and receive subsequent responses. The association is released when the execution of the query completes and the Query/Retrieve dialog on the GUI is closed. The matching images are then displayed in a patient folder for the remote archive.

The required images can now be selected for copying to the BV Family, using the copy tool in the data handling facility. For each copy request the VF Surgical Workstation AE initiates an association to the selected peer entity (Archive) and uses it to send Retrieve (C-MOVE) requests and receive subsequent responses; an examination may contain both images and presentation states. The association is released after the final Retrieve (C-MOVE) response for the related request has been received (no more pending).

**4.2.2.3.1.2. Proposed Presentation Contexts**

For Query/Retrieve Image the VF Surgical Workstation AE will propose the following presentation contexts.

**Table 46: Proposed Presentation Contexts for Query/Retrieve Image**

| Presentation Context Table                                 |                             |                    |   |      |                      |
|--|-----------------------------|--------------------|---|------|----------------------|
| Abstract Syntax  |                             | Transfer Syntax    |   | Role | Extended Negotiation |
| Name   | UID                         | Name List          | UID List  |      |                      |
| Patient Root Query/Retrieve Information Model – FIND       | 1.2.840.10008.5.1.4.1.2.1.1 | IELE<br>ILE<br>EBE | 1.2.840.10008.1.2.1<br>1.2.840.10008.1.2<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| Study Root Query/Retrieve Information Model – FIND         | 1.2.840.10008.5.1.4.1.2.2.1 | ELE<br>ILE<br>EBE  | 1.2.840.10008.1.2.1<br>1.2.840.10008.1.2<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| Patient/Study Only Query/Retrieve Information Model – FIND | 1.2.840.10008.5.1.4.1.2.3.1 | ELE<br>ILE<br>EBE  | 1.2.840.10008.1.2.1<br>1.2.840.10008.1.2<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| Patient Root Query/Retrieve Information Model – MOVE       | 1.2.840.10008.5.1.4.1.2.1.2 | ELE<br>ILE<br>EBE  | 1.2.840.10008.1.2.1<br>1.2.840.10008.1.2<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| Study Root Query/Retrieve Information Model – MOVE         | 1.2.840.10008.5.1.4.1.2.2.2 | ELE<br>ILE<br>EBE  | 1.2.840.10008.1.2.1<br>1.2.840.10008.1.2<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| Patient/Study Only Query/Retrieve Information Model – MOVE | 1.2.840.10008.5.1.4.1.2.3.2 | ELE<br>ILE<br>EBE  | 1.2.840.10008.1.2.1<br>1.2.840.10008.1.2<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| Any other defined SOP class                                |                             | ELE<br>ILE<br>EBE  | 1.2.840.10008.1.2.1<br>1.2.840.10008.1.2<br>1.2.840.10008.1.2.2 | SCU  | None                 |

Note: For performance reasons the ELE transfer syntax is preferred.

**4.2.2.3.1.3. SOP Specific Conformance for SOP Classes**

**4.2.2.3.1.3.1. Query/Retrieve Information Model – FIND**

The VF Surgical Workstation AE will not generate queries containing optional keys. The VF Surgical Workstation AE will not generate relational queries.

In the following table the supported query keys for each query level are described. Universal matching shall be supported as default.

**Table 47: Supported Query Keys**

| Query Level | Query Key      |           | Type of Matching     |
|-------------|----------------|-----------|----------------------|
|             | Name           | Tag       |                      |
| Patient     | Patient's Name | 0010,0010 | Wild Card/ Universal |
|             | Patient ID     | 0010,0020 | Wild Card/ Universal |

| Query Level | Query Key                           |           | Type of Matching |
|-------------|-------------------------------------|-----------|------------------|
|             | Name                                | Tag       |                  |
| Study       | Patient's Birth Date                | 0010,0030 | -                |
|             | Patient's Sex                       | 0010,0040 | -                |
|             | Study Date                          | 0008,0020 | -                |
|             | Study Time                          | 0008,0030 | -                |
|             | Accession Number                    | 0008,0050 | -                |
|             | Modalities in Study                 | 0008,0061 | -                |
|             | Referring Physician's Name          | 0008,0090 | -                |
|             | Study Description                   | 0008,1030 | -                |
|             | Study Instance UID                  | 0020,000D | -                |
|             | Study ID                            | 0020,0010 | -                |
| Series      | Modality                            | 0008,0060 | -                |
|             | Station Name                        | 0008,1010 | -                |
|             | Performing Physician's Name         | 0008,1050 | -                |
|             | Body Part Examined                  | 0018,0015 | -                |
|             | Protocol Name                       | 0018,1030 | -                |
|             | Series Instance UID                 | 0020,000E | -                |
|             | Series Number                       | 0020,0011 | -                |
|             | Performed Procedure Step Start Date | 0040,0244 | -                |
| Image       | Performed Procedure Step ID         | 0040,0253 | -                |
|             | SOP Class UID                       | 0008,0016 | -                |
|             | SOP Instance UID                    | 0008,0018 | -                |
|             | Content Date                        | 0008,0023 | -                |
|             | Content Time                        | 0008,0033 | -                |
|             | Instance Number                     | 0020,0013 | -                |

Do note that the query results screen will display all patients that have an empty Patient ID as one patient entry.

All details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors are provided in Table 48.

**Table 48: C-FIND Command Response Status Handling Behavior**

| Service Status | Code | Further Meaning                                    | Behavior  |
|----------------|------|--|---|
| Success        | 0000 | Matching is complete                               | The find results are displayed.                         |
| Failure        | A700 | Refused<br>– Out of resources                      | No find results are displayed.<br>The reason is logged. |
|                | A900 | Failed<br>– Identifier does not<br>match SOP class | No find results are displayed.<br>The reason is logged. |
|                | Cxxx | Failed<br>– Unable to process                      | No find results are displayed.<br>The reason is logged. |
| Cancel         | FE00 | Matching terminated<br>due to Cancel Request       | No find results are displayed.<br>The reason is logged. |

| Service Status | Code | Further Meaning   | Behavior                    |
|----------------|------|---|-----------------------------|
| Pending        | FF00 | Matches are continuing<br>– Current match is supplied and any optional keys were supported in the same manner as required keys          | The find command continues. |
|                | FF01 | Matches are continuing<br>– Warning that one or more optional keys were not supported for existence and/or matching for this identifier | The find command continues. |

#### 4.2.2.3.1.3.2. Query/Retrieve Information Model – MOVE

The VF Surgical Workstation AE provides standard conformance.

All details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors are provided in Table 49.

**Table 49: C-MOVE Command Response Status Handling Behavior**

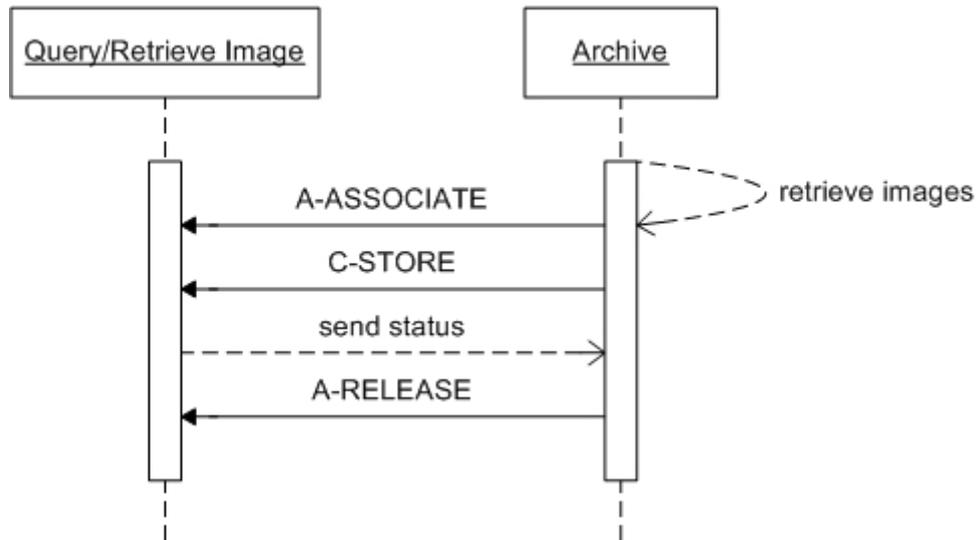
| Service Status | Code | Further Meaning  | Behavior  |
|----------------|------|--|---|
| Success        | 0000 | Sub-operations complete – No Failures                                    | The move job is marked as completed.<br>The association is released.  |
| Failure        | A701 | Refused<br>– Out of Resources<br>– Unable to calculate number of matches | The move job is marked as failed.<br>The association is released.<br>The reason is logged and reported to the user. |
|                | A702 | Refused<br>– Out of Resources<br>– Unable to perform Sub-operations      | The move job is marked as failed.<br>The association is released.<br>The reason is logged and reported to the user. |
|                | A801 | Refused<br>– Move Destination unknown                                    | The move job is marked as failed.<br>The association is released.<br>The reason is logged and reported to the user. |
|                | A900 | Failed<br>– Identifier does not match SOP class                          | The move job is marked as failed.<br>The association is released.<br>The reason is logged and reported to the user. |
|                | Cxxx | Failed<br>– Unable to process  | The move job is marked as failed.<br>The association is released.<br>The reason is logged and reported to the user. |
| Cancel         | FE00 | Sub-operations terminated due to Cancel Indication                       | The move job is marked as failed.<br>The association is released.<br>The reason is logged and reported to the user. |
| Warning        | B000 | Sub-operations complete – One or more Failures                           | The move job is marked as completed.<br>The association is released.  |
| Pending        | FF00 | Sub-operations are continuing  | The move job continues.   |

**4.2.2.4. Association Acceptance Policy**

**4.2.2.4.1. Query/Retrieve Image**

**4.2.2.4.1.1. Description and Sequencing of Activities**

For viewing images, the VF Surgical Workstation AE accepts the retrieved images.



**Figure 16: Sequencing of RWA Query/Retrieve Image**

For each retrieve request (selected from query results) the VF Surgical Workstation AE accepts an association from the selected peer entity (Archive) and uses it to receive image Storage (C-STORE) requests and send subsequent responses. On request of the Storage SCU (Archive) the association is released.

**4.2.2.4.1.2. Accepted Presentation Contexts**

The VF Surgical Workstation AE will accept Presentation Contexts as shown in Table 50.

**Table 50: Acceptable Presentation Contexts for Query/Retrieve Image**

| Presentation Context Table |     |                 |                     |      |                      |
|----------------------------|-----|-----------------|---------------------|------|----------------------|
| Abstract Syntax            |     | Transfer Syntax |                     | Role | Extended Negotiation |
| Name                       | UID | Name List       | UID List            |      |                      |
| Any defined SOP class      |     | ELE             | 1.2.840.10008.1.2.1 | SCP  | None                 |
|                            |     | EBE             | 1.2.840.10008.1.2.2 |      |                      |
|                            |     | ILE             | 1.2.840.10008.1.2   |      |                      |

*Note:* For performance reasons the ELE transfer syntax is preferred and shall be chosen in case multiple transfer syntaxes are proposed in the association negotiation.

The VF Surgical Workstation AE shall accept all contexts in the intersection of the proposed and acceptable presentation contexts. This means that the VF Surgical Workstation AE accepts multiple proposed presentation contexts with the same SOP class but different transfer syntaxes.

There is no check for duplicate contexts, and these will therefore be accepted.

#### 4.2.2.4.1.3. SOP Specific Conformance for SOP Classes

##### 4.2.2.4.1.3.1. Verification

The VF Surgical Workstation AE provides standard conformance to the Verification service class.

The status code behavior is as summarized in Table 51.

**Table 51: C-ECHO Status Response**

| Service Status | Code | Further Meaning | Description                     |
|----------------|------|-----------------|---------------------------------|
| Success        | 0000 | Confirmation    | Standard verification response. |

##### 4.2.2.4.1.3.2. Image Storage

The VF Surgical Workstation AE provides standard level 1 (Base) conformance to the Storage service class.

If the VF Surgical Workstation AE imports an image and during the association negotiation the presentation state SOP class was not negotiated, then the VF Surgical Workstation AE creates a presentation state instance for the imported image.

The VF Surgical Workstation AE standard supports the photometric interpretations MONOCHROME1, MONOCHROME2, and RGB.

The status code behavior is as summarized in Table 52.

**Table 52: C-STORE Status Response**

| Service Status | Code | Further Meaning                              | Description   |
|----------------|------|--|---|
| Success        | 0000 | Storage is complete                          | The images are stored in the VF Surgical Workstation AE database.   |
| Failure        | A700 | Refused<br>– Out of resources                | The VF Surgical Workstation AE database is full – recovery from this condition is left to the SCU. The VF Surgical Workstation AE sends a notification, log the condition, and abort the association. |
|                | A900 | Error<br>– Data set does not match SOP class | The SOP class of the image(s) does not match the negotiated abstract syntax. The VF Surgical Workstation AE sends a notification, log the condition, and abort the association.                       |
|                | C000 | Error<br>– Cannot understand                 | The image(s) cannot be parsed. The VF Surgical Workstation AE sends a notification, log the condition, and abort the association.   |
| Warning        | B000 | Coercion of data elements                    | N/A   |
|                | B006 | Elements discarded                           | N/A   |
|                | B007 | Data set does not match SOP class            | N/A   |

### 4.2.3. 3D-RX Surgical Workstation AE

#### 4.2.3.1. SOP Classes

This Application Entity provides Standard Conformance to the following SOP Classes.

**Table 53: SOP Classes for 3D-RX Surgical Workstation AE**

| SOP Class Name                          | SOP Class UID             | SCU | SCP |
|---|---------------------------|-----|-----|
| Verification                            | 1.2.840.10008.1.1         | Yes | No  |
| Basic Grayscale Print Management (Meta) | 1.2.840.10008.5.1.1.9     | Yes | No  |
| > Basic Film Session                    | 1.2.840.10008.5.1.1.1     | Yes | No  |
| > Basic Film Box                        | 1.2.840.10008.5.1.1.2     | Yes | No  |
| > Basic Grayscale Image Box             | 1.2.840.10008.5.1.1.4     | Yes | No  |
| > Printer                               | 1.2.840.10008.5.1.1.16    | Yes | No  |
| Secondary Capture Image Storage         | 1.2.840.10008.5.1.4.1.1.7 | Yes | No  |
| CT Image Storage                        | 1.2.840.10008.5.1.4.1.1.2 | Yes | No  |

#### 4.2.3.2. Association Policies

##### 4.2.3.2.1. General

The DICOM standard application context name for DICOM 3.0 is always proposed.

**Table 54: DICOM Application Context**

|                          |                       |
|--------------------------|-----------------------|
| Application Context Name | 1.2.840.10008.3.1.1.1 |
|--------------------------|-----------------------|

##### 4.2.3.2.2. Number of Associations

The 3D-RX Surgical Workstation AE may initiate and accept one association simultaneously.

**Table 55: Number of Associations as an Association Initiator for 3D-RX Surgical Workstation AE**

|   |   |
|---|---|
| Maximum number of simultaneous associations | 1 |
|---|---|

**Table 56: Number of Associations as an Association Acceptor for 3D-RX Surgical Workstation AE**

|   |   |
|---|---|
| Maximum number of simultaneous associations | 0 |
|---|---|

##### 4.2.3.2.3. Asynchronous Nature

The 3D-RX Surgical Workstation AE does not support asynchronous operations and will not perform asynchronous window negotiation.

##### 4.2.3.2.4. Implementation Identifying Information

For identification of the 3D-RX Surgical Workstation AE the following Implementation Class UID and Implementation Version Name are supplied.

**Table 57: DICOM Implementation Class and Version for 3D-RX Surgical Workstation AE**

|                             |                       |
|-----------------------------|-----------------------|
| Implementation Class UID    | 1.3.46.670589.7.8.7.2 |
| Implementation Version Name | XV_rel_7.2            |

**4.2.3.2.5. Communication Failure Handling**

The behavior of the AE during communication failure is summarized in next table.

**Table 58: Communication Failure Behavior**

| Exception                             | Behavior  |
|---------------------------------------|---|
| Unreachable Host                      | Message "Storage error: Check storage device"               |
| Connection lost in middle of transfer | Message "Storage error: Check storage device"               |
| Network Timeouts                      | Message "Communication cannot be established. Call service" |

**4.2.3.3. Association Initiation Policy**

This describes the conditions under which the AE will initiate an association.

The behavior of the AE during association rejection is summarized in next table

**Table 59: DICOM Association Rejection Handling**

| Result  | Source  | Reason/Diagnosis                           | Behavior |
|---|---|--|----------|
| 1 – rejected-permanent  | 1 – DICOM UL service-user                                     | 1 – no-reason-given                        | Message  |
|   |   | 2 – application-context-name-not-supported | Message  |
|   |   | 3 – calling-AE-title-not-recognized        | Message  |
|   |   | 7 – called-AE-title-not-recognized         | Message  |
|   | 2 – DICOM UL service-provider (ACSE related function)         | 1 – no-reason-given                        | Message  |
|   |   | 2 – protocol-version-not-supported         | Message  |
| 3 – DICOM UL service-provider (presentation related function) | 1 – temporary-congestion                                      | Message                                    |          |
|   | 2 – local-limit-exceeded                                      | Message                                    |          |
| 2 – rejected-transient  | 1 – DICOM UL service-user                                     | 1 – no-reason-given                        | Message  |
|   |   | 2 – application-context-name-not-supported | Message  |
|   |   | 3 – calling-AE-title-not-recognized        | Message  |
|   |   | 7 – called-AE-title-not-recognized         | Message  |
|   | 2 – DICOM UL service-provider (ACSE related function)         | 1 – no-reason-given                        | Message  |
|   |   | 2 – protocol-version-not-supported         | Message  |
|   | 3 – DICOM UL service-provider (presentation related function) | 1 – temporary-congestion                   | Message  |

| Result | Source | Reason/Diagnosis         | Behavior |
|--------|--------|--------------------------|----------|
|        |        | 2 – local-limit-exceeded | Message  |

The message is in all cases: “Communication cannot be established. Call service”. The behavior of the AE on receiving an association abort is summarized in next table

**Table 60: DICOM Association Abort Handling**

| Source                        | Reason/Diagnosis                | Behavior |
|-------------------------------|---------------------------------|----------|
| 0 – DICOM UL service-user     | 0 – reason-not-specified        | Message  |
| 2 – DICOM UL service-provider | 0 – reason-not-specified        | Message  |
|                               | 1 – unrecognized-PDU            | Message  |
|                               | 2 – unexpected-PDU              | Message  |
|                               | 4 – unrecognized-PDU parameter  | Message  |
|                               | 5 – unexpected-PDU parameter    | Message  |
|                               | 6 – invalid-PDU-parameter value | Message  |

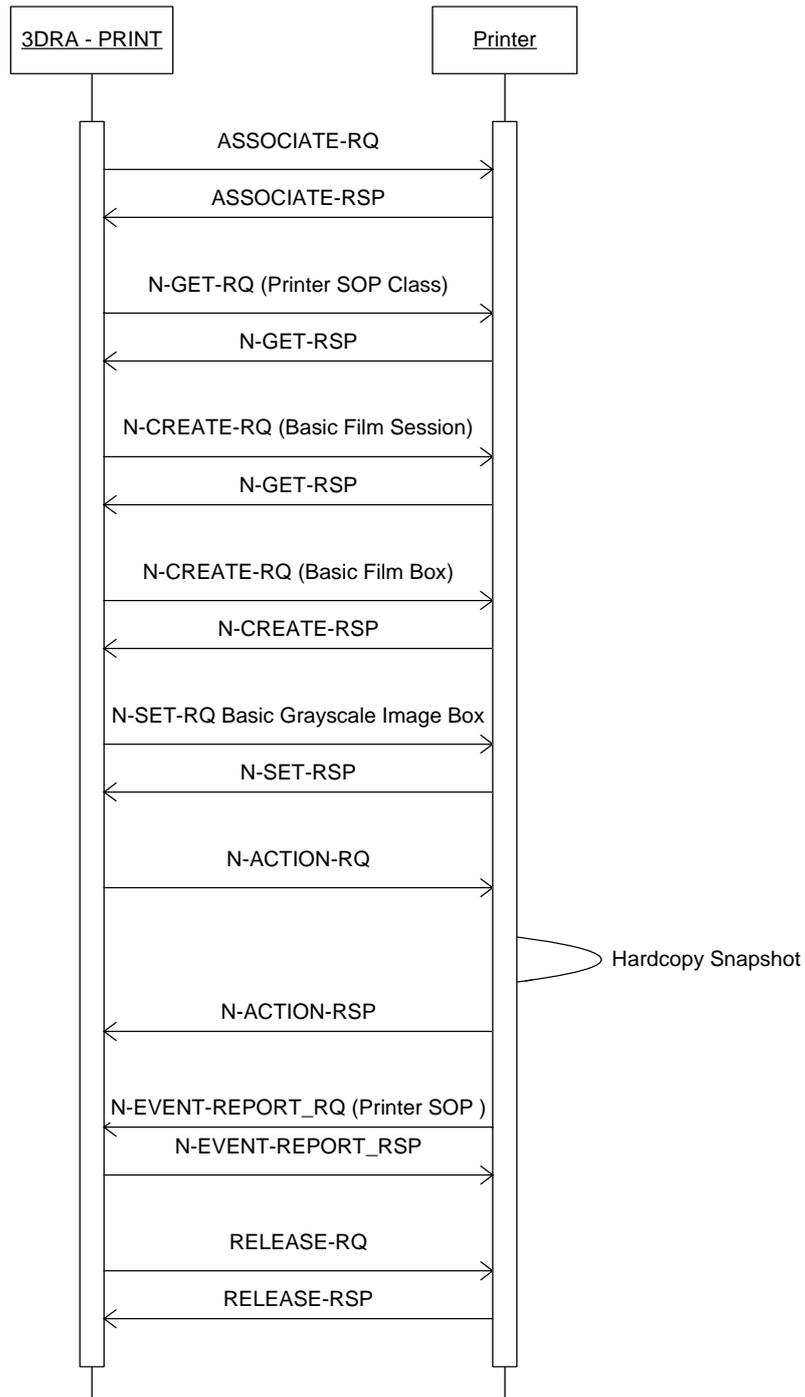
The behavior of the AE for sending an association abort is summarized in next table.

**Table 61: DICOM Association Abort Policies**

| Source                        | Reason/Diagnosis                | Behavior |
|-------------------------------|---------------------------------|----------|
| 0 – DICOM UL service-user     | 0 – reason-not-specified        | Message  |
| 2 – DICOM UL service-provider | 0 – reason-not-specified        | Message  |
|                               | 1 – unrecognized-PDU            | Message  |
|                               | 2 – unexpected-PDU              | Message  |
|                               | 4 – unrecognized-PDU parameter  | Message  |
|                               | 5 – unexpected-PDU parameter    | Message  |
|                               | 6 – invalid-PDU-parameter value | Message  |

**4.2.3.3.1. (Real-World) Activity – Print Management As SCU**

**4.2.3.3.1.1. Description and Sequencing of Activities**



**Figure 17: (Real World) Activity - Print Management As SCU**

#### 4.2.3.3.1.2. Proposed Presentation Contexts

**Table 62: Proposed Presentation Contexts for (Real-World) Activity – Print Management As SCU**

| Presentation Context Table                      |                       |                   |   |      |                      |
|---|-----------------------|-------------------|---|------|----------------------|
| Abstract Syntax                                 |                       | Transfer Syntax   |   | Role | Extended Negotiation |
| Name  | UID                   | Name List         | UID List  |      |                      |
| Basic Grayscale Print Management Meta SOP Class | 1.2.840.10008.5.1.1.9 | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |

This section specifies each IOD created (including private IOD's).

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   |
| VNAPCV | The attribute is present under specified condition – if present then its Value is Not Always Present (attribute sent zero length if condition applies and no value is present) |
| ANAPEV | The attribute is present under specified condition – if present then it will not have any 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                                 |

**4.2.3.3.1.3. SOP Specific Conformance for Basic Film Box SOP Class**

**4.2.3.3.1.3.1. Dataset Specific Conformance for Basic Film Box N-CREATE SCU**

**Table 63: Basic Film Box Presentation Module**

| Attribute Name            | Tag       | VR | Value   | Presence of Value | Source | Comment                   |
|---------------------------|-----------|----|---|-------------------|--------|---------------------------|
| Image Display Format      | 2010,0010 | ST | "STANDARD\1,1",<br>"STANDARD\1,2",<br>"STANDARD\2,2",<br>"STANDARD\2,3"   | ALWAYS            | USER   |                           |
| Film Orientation          | 2010,0040 | CS |   | ALWAYS            | AUTO   |                           |
| Film Size ID              | 2010,0050 | CS | 8IN * 10 IN,<br>10IN * 12 IN,<br>10 IN * 14IN,<br>11IN * 14IN,<br>14IN * 14IN,<br>14IN * 17IN,<br>24CM * 24CM,<br>24CM *30CM. | ALWAYS            | CONFIG |                           |
| Magnification Type        | 2010,0060 | CS | BILINEAR, CUBIC,<br>NONE, REPLICATE   | ALWAYS            | CONFIG |                           |
| Smoothing Type            | 2010,0080 | CS |   | ALWAYS            | CONFIG |                           |
| Border Density            | 2010,0100 | CS | BLACK   | ALWAYS            | FIXED  |                           |
| Empty Image Density       | 2010,0110 | CS | BLACK   | ALWAYS            | FIXED  |                           |
| Min Density               | 2010,0120 | US |   | ALWAYS            | AUTO   | 0-349 (printer dependent) |
| Max Density               | 2010,0130 | US |   | ALWAYS            | CONFIG | 1-350                     |
| Trim                      | 2010,0140 | CS | NO  | ALWAYS            | FIXED  |                           |
| Configuration Information | 2010,0150 | ST |   | ALWAYS            | CONFIG | printer dependent         |

**Table 64: Basic Film Box Relationship Module**

| Attribute Name                   | Tag       | VR | Value                 | Presence of Value | Source | Comment             |
|----------------------------------|-----------|----|-----------------------|-------------------|--------|---------------------|
| Referenced Film Session Sequence | 2010,0500 | SQ |                       | ALWAYS            | AUTO   | Parent Film Session |
| >Referenced SOP Class UID        | 0008,1150 | UI | 1.2.840.10008.5.1.1.1 | ALWAYS            | FIXED  |                     |
| >Referenced SOP Instance UID     | 0008,1155 | UI |                       | ALWAYS            | AUTO   |                     |

**Table 65: DICOM Command Communication Failure Behavior**

| Exception           | Behavior   |
|---------------------|--|
| Timeout             | The Association is aborted using AP-ABORT and command marked as failed. The standard error message is displayed.   |
| Association aborted | The command is marked as failed. The standard error message is displayed.  |
| Aborting print job  | When the print workflow is aborted by the printer, the standard error message is displayed. There can be considerable delay before the message is shown to the user. |

#### 4.2.3.3.1.4. Dataset Specific Conformance for Basic Film Box N-ACTION SCU

**Table 66: N-ACTION-RQ Status Response**

| Service Status | Code   | Further Meaning  | Description  |
|----------------|--------|--|--|
| Success        | 0000   | Film Box successfully created  | e.g. The SCP has successfully returned all matching information. |
| Error          | <>0000 | There is an existing Film Box that has not been printed and N-ACTION at the Film Session level is not supported. A new Film Box will not be created when a previous Film Box has not been printed. | Stop Job + UI Message  |
| Warning        | <>0000 | Requested Min Density or Max Density outside of printer's operating range. The printer will use its respective minimum or maximum density value instead.   | Continue Job + UI Message  |

**Table 67: DICOM Command Communication Failure Behavior**

| Exception           | Behavior   |
|---------------------|--|
| Timeout             | The Association is aborted using AP-ABORT and command marked as failed. The standard error message is displayed.   |
| Association aborted | The command is marked as failed. The standard error message is displayed.  |
| Aborting print job  | When the print workflow is aborted by the printer, the standard error message is displayed. There can be considerable delay before the message is shown to the user. |

#### 4.2.3.3.1.5. SOP Specific Conformance for Basic Film Session SOP Class

This section includes the SOP specific behavior, i.e. error codes, error and exception handling, time-outs, etc.

The behavior of an Application Entity SOP class is summarized as shown in next Table . The standard as well as the manufacturer specific status codes and their corresponding behavior is specified.

##### 4.2.3.3.1.5.1. Dataset Specific Conformance for Basic Film Session N-CREATE SCU

**Table 68: Basic Film Session Presentation Module**

| Attribute Name   | Tag       | VR | Value          | Presence of Value | Source | Comment |
|------------------|-----------|----|----------------|-------------------|--------|---------|
| Number of Copies | 2000,0010 | IS |                | ALWAYS            | USER   | 1-9     |
| Print Priority   | 2000,0020 | CS | HIGH, LOW, MED | ALWAYS            | CONFIG |         |

|                  |           |    |                                       |        |        |  |
|------------------|-----------|----|---------------------------------------|--------|--------|--|
| Medium Type      | 2000,0030 | CS | BLUE FILM, CLEAR FILM, CURRENT, PAPER | ALWAYS | CONFIG |  |
| Film Destination | 2000,0040 | CS | BIN_1, MAGAZINE, PROCESSOR            | ALWAYS | CONFIG |  |

**Table 69: N-CREATE-RQ Status Response**

| Service Status | Code   | Further Meaning   | Description               |
|----------------|--------|---|---------------------------|
| Success        | 0000   | Film belonging to the film session are accepted for printing; if supported, the Print Job SOP Instance is created.  | Continue Job              |
| Error          | <>0000 | Film Session SOP Instance hierarchy does not contain Film Box SOP Instances.<br>OR<br>Unable to create Print Job SOP Instance; print queue is full.<br>OR<br>Image size is larger than image box size.<br>OR<br>Combined Print Image size is larger than the Image Box size.  | Stop Job + UI Message     |
| Warning        | <>0000 | Film session printing (collation) is not supported.<br>OR<br>Film Session SOP Instance hierarchy does not contain Image Box SOP Instances (empty page).<br>OR<br>Image size is larger than image box size, the image has been Demagnified.<br>OR<br>Image size is larger than the Image Box size. The Image has been cropped to fit.<br>OR<br>Image size or Combined Print Image size is larger than the Image Box size. Image or Combined Print Image has been decimated to fit. | Continue Job + UI Message |

**Table 70: DICOM Command Communication Failure Behavior**

| Exception           | Behavior   |
|---------------------|--|
| Timeout             | The Association is aborted using AP-ABORT and command marked as failed. The standard error message is displayed.   |
| Association aborted | The command is marked as failed. The standard error message is displayed.  |
| Aborting print job  | When the print workflow is aborted by the printer, the standard error message is displayed. There can be considerable delay before the message is shown to the user. |

#### 4.2.3.3.1.6. SOP Specific Conformance for Basic Grayscale Image Box SOP Class

This section includes the SOP specific behavior, i.e. error codes, error and exception handling, time-outs, etc.

The behavior of an Application Entity SOP class is summarized as shown in next Table. The standard as well as the manufacturer specific status codes and their corresponding behavior are specified.

##### 4.2.3.3.1.6.1. Dataset Specific Conformance for Basic Grayscale Image Box N-SET SCU

**Table 71: Image Box Pixel Presentation Module**

| Attribute Name                 | Tag       | VR        | Value  | Presence of Value | Source | Comment |
|--------------------------------|-----------|-----------|--------|-------------------|--------|---------|
| Image Position                 | 2020,0010 | US        |        | ALWAYS            | AUTO   |         |
| Polarity                       | 2020,0020 | CS        | NORMAL | ALWAYS            | FIXED  |         |
| Basic Grayscale Image Sequence | 2020,0110 | SQ        |        | ALWAYS            | AUTO   |         |
| >Samples per Pixel             | 0028,0002 | US        |        | ALWAYS            | AUTO   |         |
| >Photometric Interpretation    | 0028,0004 | CS        |        | ALWAYS            | AUTO   |         |
| >Rows                          | 0028,0010 | US        |        | ALWAYS            | AUTO   |         |
| >Columns                       | 0028,0011 | US        |        | ALWAYS            | AUTO   |         |
| >Bits Allocated                | 0028,0100 | US        |        | ALWAYS            | AUTO   |         |
| >Bits Stored                   | 0028,0101 | US        |        | ALWAYS            | AUTO   |         |
| >High Bit                      | 0028,0102 | US        |        | ALWAYS            | AUTO   |         |
| >Pixel Representation          | 0028,0103 | US        |        | ALWAYS            | AUTO   |         |
| >Pixel Data                    | 7FE0,0010 | OW/<br>OB |        | ALWAYS            | AUTO   |         |

**Table 72: N-CREATE-RQ Status Response**

| Service Status | Code   | Further Meaning   | Description           |
|----------------|--------|---|-----------------------|
| Success        | 0000   | Image successfully stored in Image Box.   | Continue Job          |
| Error          | <>0000 | Image size is larger than image box size.<br>OR<br>Insufficient memory in printer to store the image.<br>OR<br>Combined Print Image size is larger than the Image Box size. | Stop Job + UI Message |

| Service Status | Code   | Further Meaning   | Description               |
|----------------|--------|---|---------------------------|
| Warning        | <>0000 | Image size larger than image box size, the image has been demagnified.<br>OR<br>Requested Min Density or Max Density outside of printer's operating range. The printer will use its respective minimum or maximum density value instead.<br>OR<br>Image size is larger than the Image Box size. The Image has been cropped to fit.<br>OR<br>Image size or Combined Print Image size is larger than the Image Box size. The Image or Combined Print Image has been decimated to fit. | Continue Job + UI Message |

**Table 73: DICOM Command Communication Failure Behavior**

| Exception           | Behavior   |
|---------------------|--|
| Timeout             | The Association is aborted using AP-ABORT and command marked as failed. The standard error message is displayed.   |
| Association aborted | The command is marked as failed. The standard error message is displayed.  |
| Aborting print job  | When the print workflow is aborted by the printer, the standard error message is displayed. There can be considerable delay before the message is shown to the user. |

#### 4.2.3.3.1.7. SOP Specific Conformance for Printer SOP Class

This section includes the SOP specific behavior, i.e. error codes, error and exception handling, time-outs, etc.

The behavior of an Application Entity SOP class is summarized as shown in next Table . The standard as well as the manufacturer specific status codes and their corresponding behavior are specified.

## 4.2.3.3.1.7.1. Dataset Specific Conformance for Printer N-GET SCU

**Table 74: N-GET-RQ Response Contents**

| Attribute Name | Tag       | VR | Comment   |
|----------------|-----------|----|---|
| Printer Status | 2110,0010 | CS | Retrieves the printer statuses OK or WARNING or ERROR. Xtravision takes the following actions for these responses.                                |
|                |           |    | OK – Xtravision starts the print session  |
|                |           |    | WARNING – Shows warning message in UI and starts print session  |
|                |           |    | ERROR- Gets the printer status info (2110,0020), logs the information for service engineer , Closes the communication with the printer and exits. |

**Table 75: DICOM Command Communication Failure Behavior**

| Exception           | Behavior   |
|---------------------|--|
| Timeout             | The Association is aborted using AP-ABORT and command marked as failed. The standard error message is displayed.   |
| Association aborted | The command is marked as failed. The standard error message is displayed.  |
| Aborting print job  | When the print workflow is aborted by the printer, the standard error message is displayed. There can be considerable delay before the message is shown to the user. |

**4.2.3.3.2. (Real-World) Activity – Image Export****4.2.3.3.2.1. Description and Sequencing of Activities**

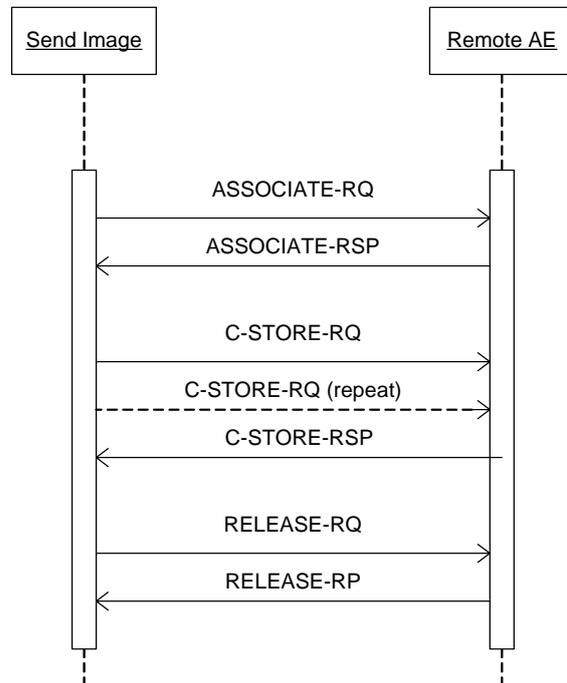


Figure 18: Real world activity Send Image

After selection of an image file, the file will be sent when initiating the Send command. The 3D-RX Surgical Workstation AE initiates one association to the pre-configured peer system and uses it to send the selected images and runs via C-STORE requests (and receives the associated C-STORE responses). The association is released after successful transfer of the images or when an error occurs. The 3D-RX Surgical Workstation AE handles each send request one after another.

4.2.3.3.2.2. Proposed Presentation Contexts

Table 76: Proposed Presentation Contexts for (Real-World) Activity – Image Export

| Presentation Context Table                |                           |                           |                     |      |                      |
|---|---------------------------|---------------------------|---------------------|------|----------------------|
| Abstract Syntax                           |                           | Transfer Syntax           |                     | Role | Extended Negotiation |
| Name                                      | UID                       | Name List                 | UID List            |      |                      |
| Secondary Capture Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.7 | Implicit VR Little Endian | 1.2.840.10008.1.2   | SCU  | None                 |
|   |                           | Explicit VR Little Endian | 1.2.840.10008.1.2.1 |      |                      |
|   |                           | Explicit VR Big Endian    | 1.2.840.10008.1.2.2 |      |                      |
| CT Image Storage SOP Class                | 1.2.840.10008.5.1.4.1.1.2 | Implicit VR Little Endian | 1.2.840.10008.1.2   | SCU  | None                 |
|   |                           | Explicit VR Little Endian | 1.2.840.10008.1.2.1 |      |                      |
|   |                           | Explicit VR Big Endian    | 1.2.840.10008.1.2.2 |      |                      |

**4.2.3.3.2.3. SOP Specific Conformance for Storage SOP Classes**

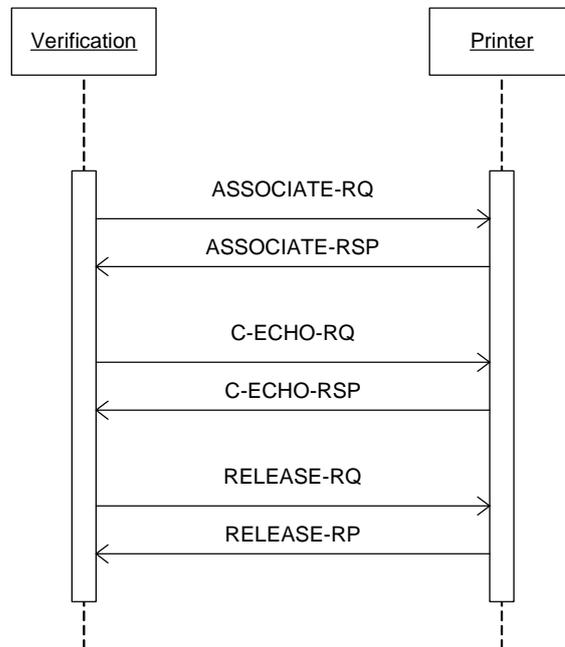
A not succeeded transfer is indicated on the console with an error messages:

**Table 77: C-STORE-RQ Status Response**

| Service Status | Code         | Further Meaning                   | Description        |
|----------------|--------------|-----------------------------------|--------------------|
| Success        | 0000         | Complete successful               | Message in console |
| Refused        | A7xx         | Out of Resources                  | Message in console |
| Error          | A9xx<br>Cxxx | Data Set does not match SOP Class | Message in console |
| Error          | 0122         | SOP class not supported           | Message in console |
| Warning        | B00x         |                                   | Message in console |

**4.2.3.3.3. (Real-World) Activity – 3D-RX Surgical Workstation AE as SCU**

**4.2.3.3.3.1. Description and Sequencing of Activities**



**Figure 19: (Real World) Activity - 3D-RX Surgical Workstation AE as SCU**

The operator is able to select one or more images from the internal database (via the Data Handling facility) and perform the Print operation on them.

The operator will select the print destination (out of choice list of configured printers) and some print parameters.  
 As a result, the 3D-RX Surgical Workstation AE will initiate an association to the selected printer and uses it to send the Print Service Elements of the Print SOP Classes.

**4.2.3.3.3.2. Proposed Presentation Contexts**

**Table 78: Proposed Presentation Contexts for (Real-World) Activity – 3D-RX Surgical Workstation AE as SCU**

| Presentation Context Table |                   |                           |                     |      |                      |
|----------------------------|-------------------|---------------------------|---------------------|------|----------------------|
| Abstract Syntax            |                   | Transfer Syntax           |                     | Role | Extended Negotiation |
| Name                       | UID               | Name List                 | UID List            |      |                      |
| Verification SOP Class     | 1.2.840.10008.1.1 | Implicit VR Little Endian | 1.2.840.10008.1.2   | SCU  | None                 |
|                            |                   | Explicit VR Little Endian | 1.2.840.10008.1.2.1 |      |                      |
|                            |                   | Explicit VR Big Endian    | 1.2.840.10008.1.2.2 |      |                      |

**4.2.3.3.3.3. SOP Specific Conformance for Verification SOP Class**

This section includes the SOP specific behavior, i.e. error codes, error and exception handling, time-outs, etc.  
 The behavior of an Application Entity SOP class is summarized as shown in next Table . The standard as well as the manufacturer specific status codes and their corresponding behavior is specified.

**4.2.3.3.3.3.1. Dataset Specific Conformance for Verification C-ECHO SCU**

This section includes the dataset specific behavior, i.e. error codes, error and exception handling, time-outs, etc.

**Table 79: DICOM Command Communication Failure Behavior**

| Exception           | Behavior   |
|---------------------|--|
| Timeout             | The Association is aborted using AP-ABORT and command marked as failed. The standard error message is displayed. |
| Association aborted | The command is marked as failed. The standard error message is displayed.  |

**4.2.3.4. Association Acceptance Policy**

Link between 3D-RX Surgical Workstation AE and modality is private. So, this section is **Not Applicable**.

## **4.3. Network Interfaces**

### **4.3.1. Physical Network Interface**

The BV Family provides DICOM 3.0 TCP/IP Network Communication Support as defined in [DICOM] PS 3.8.

For the BV Family AE the TCP/IP stack is inherited from the VxWorks operating system.

For the VF Surgical Workstation AE and the 3D-RX Surgical Workstation AE the TCP/IP stack is inherited from the Windows XP operating system.

The BV Family supports Ethernet (ISO 8802-3) and IEEE 802.3 (10 / 100 BASE-T) for the printer and image interfaces.

### **4.3.2. Additional Protocols**

No additional protocols are used.

## 4.4. Configuration

The configuration of a BV Family AE is done by means of a web-based service program called BV-Scope.

The configuration of a VF Surgical Workstation AE is done by means of a configuration program, which is accessible at start-up (password protected, intended to be used by Philips Customer Support Engineers only).

The configuration of a 3D-RX Surgical Workstation AE is done by means of service user tool.

### 4.4.1. AE Title/Presentation Address Mapping

An important installation issue is the translation from AE title to presentation address. How this is to be performed shall be described in this section.

#### 4.4.1.1. Local AE Titles

Per default the BV Family AE Application Entity Title is "No Name". At installation the Customer Support Engineer can change the host name. The BV Family AE can be changed independently.

**Table 80: AE Title Configuration Table**

| Application Entity            | Default AE Title | Default TCP/IP Port              |
|-------------------------------|------------------|----------------------------------|
| BV Family AE                  | "No Name"        | 104                              |
|                               |                  | 8104 (Storage Commitment, fixed) |
| VF Surgical Workstation AE    | "VF1"            | 3010                             |
| 3D-RX Surgical Workstation AE | "XVexport"       | 3110                             |
|                               | "XVexportvol"    | 3110                             |
|                               | "XVprint"        | 3110                             |

#### 4.4.1.2. Remote AE Title/Presentation Address Mapping

##### 4.4.1.2.1. Remote Association Initiators

The following information must be provided for all relevant remote applications that are able to initiate DICOM associations to the BV Family.

- The Application Entity Title.
- The host name/IP address on which the remote application resides
- The port number at which the remote application has to send association requests
- The SOP classes and transfer syntaxes for which the VF Surgical Workstation AE accepts associations.

##### 4.4.1.2.2. Remote Association Acceptors

The following information must be provided for all relevant remote applications that are able to accept DICOM associations from BV Family AE:

- The Application Entity Title.
- The host name/IP address on which the remote application resides.
- The port number at which the remote application accepts association requests.

#### 4.4.2. Parameters

The specification of important operational parameters, and if configurable, their default value and range, are specified here.

The configuration parameters of the BV Family AE are given in Table 81, categorized in the following sections:

- Local System Parameters
- Export Target(s) (Store) Parameters
- Export Target(s) (Print) Parameters
- Worklist Management Target Parameters
- MPPS Target Parameters
- Storage commit (N-EVENT-REPORT) Parameters

**Table 81: Configuration Parameters table for BV Family AE**

| Parameter                                  | Configurable   | Default Value                         |
|--|----------------|---------------------------------------|
| <b>AE Specific Parameters</b>              |                |                                       |
| SOP Class support                          | Yes            | MPPS<br>Storage Commitment<br>Printer |
| <b>Local System Parameters</b>             |                |                                       |
| AE Title                                   | Yes            | "No Name"                             |
| Host Name                                  | Yes            | "No Name"                             |
| IP Address                                 | Yes            | 0.0.0.0                               |
| Subnet Mask                                | Yes            | 0.0.0.0                               |
| Default Gateway                            | Yes            | 0.0.0.0                               |
| Max. PDU size                              | Yes            | 28672 Bytes<br>(4..256 kb)            |
| Receive Message Timeout                    | Yes            | 60 [s] (0..3600 s)                    |
| Association Close Timeout                  | Yes            | 1 [s] (0..3600 s)                     |
| Association Reply Timeout                  | Yes            | 60 [s] (0..3600 s)                    |
| Association Release Timeout                | Yes            | 60 [s] (0..3600 s)                    |
| Network Write Timeout                      | Yes            | 60 [s] (0..3600 s)                    |
| Network Connect Timeout                    | Yes            | 60 [s] (0..3600 s)                    |
| Network Inactivity Timeout                 | Yes            | 60 [s] (0..3600 s)                    |
| <b>Export Target(s) (Store) Parameters</b> |                |                                       |
| AE Title                                   | Yes            | "No Name"                             |
| Name                                       | Yes            | Max. 25 char. Unique                  |
| IP Address                                 | Yes            | 0.0.0.0                               |
| Port number                                | Yes            | 104                                   |
| Type                                       | Yes            | STORE                                 |
| Storage Commit                             | AE Title       | "No Name"                             |
|  | IP Address     | 0.0.0.0                               |
|  | Port number    | 104                                   |
|  | Enable/Disable | Disable                               |
| <b>Export Target(s) (Print) Parameters</b> |                |                                       |
| AE Title                                   | Yes            | "No Name"                             |
| Name                                       | Yes            | Max. 25 char. Unique                  |
| IP Address                                 | Yes            | 0.0.0.0                               |
| Port number                                | Yes            | 104                                   |
| Type                                       | Yes            | PRINT                                 |
| Printer type                               | Yes            | Predefined List                       |
| Printer Priority                           | Yes            | LOW                                   |

| Parameter   | Configurable | Default Value   |
|---|--------------|---|
| Film Destination                                  | Yes          | CURRENT   |
| Film Orientation                                  | Yes          | PORTRAIT  |
| Film Size   | Yes          | CURRENT,<br>depending on Printer<br>Type  |
| Border Density                                    | Yes          | BLACK   |
| Border Density Value                              | Yes          | 1   |
| Number of Copies                                  | Yes          | 1   |
| Magnification Type                                | No           | Depending on Printer<br>Type  |
| Smoothing Type                                    | No           | Depending on Printer<br>Type  |
| Minimum Density                                   | No           | Depending on Printer<br>Type  |
| Maximum Density                                   | No           | Depending on Printer<br>Type  |
| Empty Image Density                               | No           | Depending on Printer<br>Type  |
| Polarity  | No           | Depending on Printer<br>Type  |
| Trim  | No           | Depending on Printer<br>Type  |
| Configuration Information                         | No           | Depending on Printer<br>Type  |
| <b>Worklist Management Target Parameters</b>      |              |   |
| AE Title  | Yes          | "No Name"   |
| Name  | Yes          | Max. 25 char. Unique  |
| IP Address  | Yes          | 0.0.0.0   |
| Port number                                       | Yes          | 104   |
| Type  | Yes          | MWL   |
| Select Query                                      | Yes          | Predefined Query<br>List, maximum 4<br>items in the list                                    |
| Define Query                                      | Yes          | Defines the queries<br>that can be selected   |
| <b>MPPS Target Parameters</b>                     |              |   |
| AE Title  | Yes          | "No Name"   |
| Name  | Yes          | Max. 25 char. Unique  |
| IP Address  | Yes          | 0.0.0.0   |
| Port number                                       | Yes          | 104   |
| Type  | Yes          | MPPS  |
| Automatic MPPS                                    | Yes          | If configured, always<br>start MPPS panel<br>directly after selection<br>of Export function |
| Protocol Names                                    | Yes          | List of Protocol<br>Names that can be<br>selected in the MPPS<br>panel                      |
| <b>Storage commit (N-EVENT-REPORT) Parameters</b> |              |   |
| AE Title  | Yes          | Local System AE-<br>Title   |
| IP Address  | Yes          | Local System IP<br>address  |
| Port number                                       | No           | Fixed: 8104   |

Note: Parameters that are part of a specific DICOM IOD are specified in section 4 and 8

**Table 82: Configuration Parameters table for VF Surgical Workstation AE**

| Parameter   | Configurable | Default Value |
|---|--------------|---------------|
| <b>General Parameters</b>   |              |               |
| Time-out waiting for acceptance or rejection Response to an Association Open Request. (Application Level timeout) | No           | -             |
| General DIMSE level time-out values   | No           | -             |
| Time-out waiting for response to TCP/IP connect request. (Low-level timeout)                                      | No           | -             |
| Time-out waiting for acceptance of a TCP/IP message over the network. (Low-level timeout)                         | No           | -             |
| Time-out for waiting for data between TCP/IP packets. (Low-level timeout)   | No           | -             |
| Any changes to default TCP/IP settings, such as configurable stack parameters.                                    | No           | -             |
| <b>Local Configurable AE Specific Parameters</b>  |              |               |
| Size constraint in maximum object size  | No           | -             |
| Maximum PDU size the AE can receive   | Yes          | 0 (unlimited) |
| Maximum PDU size the AE can send  | No           | -             |
| AE specific DIMSE level time-out values   | No           | -             |
| Number of simultaneous Associations by Service and/or SOP Class   | No           | -             |
| SOP Class support   | Yes          | -             |
| Transfer Syntax support   | Yes          | -             |
| <b>Remote Configurable AE Specific Parameters</b>   |              |               |
| Size constraint in maximum object size  | No           | -             |
| Maximum PDU size the AE can receive   | Yes          | 0 (unlimited) |
| Maximum PDU size the AE can send  | No           | -             |
| AE specific DIMSE level time-out values   | No           | -             |
| Number of simultaneous Associations by Service and/or SOP Class   | No           | -             |
| SOP Class support   | Yes          | -             |
| Transfer Syntax support   | Yes          | -             |

Note: *The JPEG Baseline transfer syntax is only supported for RGB and YBR\_FULL\_422 images; therefore JPEG Baseline may NOT be configured for systems that are capable of handling storage of monochrome images too.*

**Table 83: Configuration Parameters table for 3D-RX Surgical Workstation AE**

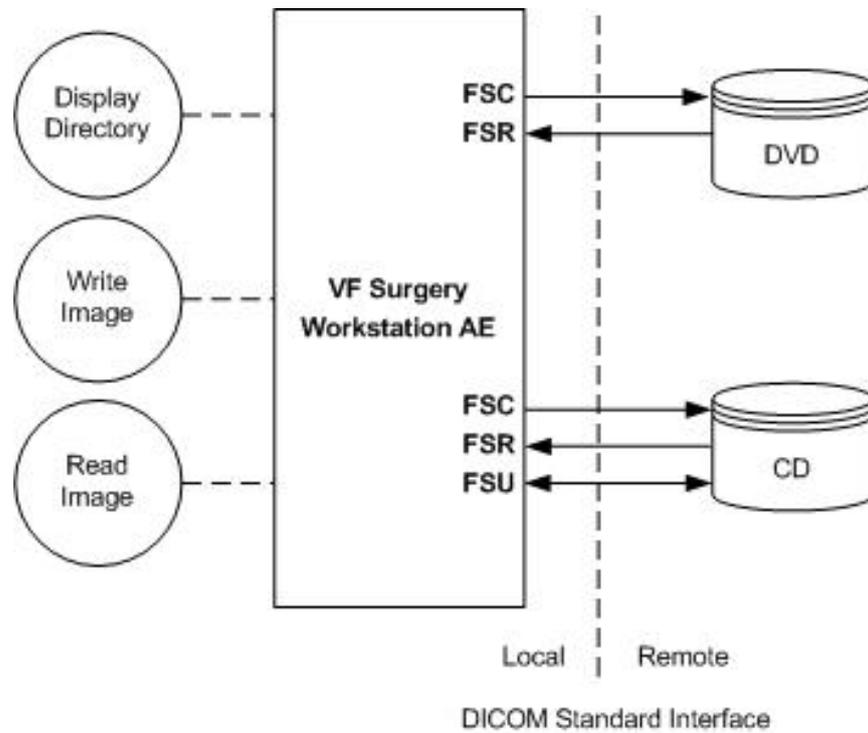
| Parameter  | Configurable | Default Value   |
|--|--------------|---|
| <b>Local Configurable AE Specific Parameters</b> |              |   |
| Exam ID  | Yes          | The Exam ID can be set to either Accession Number, Requested Procedure ID, Study ID, or Study Instance UID. |

## 5. MEDIA INTERCHANGE

### 5.1. Implementation Model

#### 5.1.1. Application Data Flow Diagram

The only DICOM media interchange implementation of the BV Family is implemented in the VF Surgical Workstation AE. Figure 20 shows the Media Interchange Application Data Flow as a functional overview of the VF Surgical Workstation AE for CD and DVD.



**Figure 20: Application Data Flow Diagram**

Table 90 shows the Media Interchange overview of the VF Surgical Workstation AE and the supporting roles for CD-R and DVD.

**Table 84: Media Services**

| Media Storage Application Profile               | Write Files |       | Read Files |
|---|-------------|-------|------------|
|   | (FSC)       | (FSU) | (FSR)      |
| <b>DVD Disk</b>                                 |             |       |            |
| General Purpose DVD Interchange with JPEG       | Yes         | No    | Yes        |
| <b>CD – R Disk</b>                              |             |       |            |
| General Purpose CD-R                            | Yes         | Yes   | Yes        |
| General Purpose USB Media Interchange with JPEG | Yes         | Yes   | Yes        |

*Note: After data is written to DVD, the DVD is finalized; the finalized DVD can now be read on mostly every DVD reader. Currently the BV Family supports the next services: FSC service for CD-R(W) and DVD + R(W) and USB media; and the*

FSR service accepts for DVD both DVD + R(W) and DVD - R(W) media, CD-R(W) and USB.  
Not supported are the Media DVD -R / -RW.

The VF Surgical Workstation AE will act as a FSR, for CD-R, DVD and USB, when reading the directory of the medium. The VF Surgical Workstation AE will act as a FSC / FSU for a CD-R and as FSC for DVD, when writing the selected images in a patient folder onto the medium.

The VF Surgical Workstation AE supports the media profiles as shows in the Table below:

**Table 85: Media Profiles supported by VF Surgical Workstation AE**

| Application Profile | CD         | DVD+RW / DVD+R | USB         |
|---------------------|------------|----------------|-------------|
| General Purpose     | STD-GEN-CD | STD-GEN-DVD    | STD-GEN-USB |

Note; DVD-R and DVD-RW can be read but are not supported for writing.

### Supported Photometric Interpretations

The VF Surgical Workstation AE supports images with the following DICOM Photometric Interpretations as shows in the Table below:

**Table 86: Photometric interpretations supported by VF Surgical Workstation AE**

| Photometric Interpretation | Import | Export | Viewing |
|----------------------------|--------|--------|---------|
| MONOCHROME1                | YES    | YES    | YES     |
| MONOCHROME2                | YES    | YES    | YES     |
| PALETTE COLOR              | YES    | YES    | NO      |
| RGB                        | YES    | YES    | YES     |
| YBR_FULL                   | YES    | YES    | NO      |
| YBR_FULL_422 (see note)    | YES    | YES    | NO      |
| YBR_PARTIAL_422            | YES    | YES    | NO      |
| YBR_RCT                    | YES    | YES    | NO      |
| YBR_ICT                    | YES    | YES    | NO      |

Note: if the photometric interpretation YBR\_FULL\_422 is used in combination with transfer syntax JPEG-lossy then the pixel data is converted to RGB on import.

The system proposes the transfer syntaxes mentioned in Table below.

**Table 87: Transfer Syntaxes of DVD/CD supported by VF Surgical Workstation AE**

| Abstract Syntax |          | Transfer Syntax   |   | Role | Extended Negotiation |
|-----------------|----------|-------------------|---|------|----------------------|
| Name            | UID      | Name List (note)  | UID List  |      |                      |
| See Note        | See Note | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |

Note: any of the standard image storage and private SOP classes mentioned before. The preferred transfer syntax is ELE.

The VF Surgical Workstation AE supports images with Lossy image compression via JPEG as described as shows in the Table below.

**Table 88: JPEG coding supported by VF Surgical Workstation AE**

| DICOM Transfer Syntax UID | JPEG coding process | JPEG description                                  |
|---------------------------|---------------------|---|
| 1.2.840.10008.1.2.4.50    | 1                   | Lossy, Baseline<br>(JPEG 8 Bit Image Compression) |

*Note: Lossy Compression is only supported for images with photometric interpretation RGB and YBR\_FULL\_422 and therefore VF Surgical Workstation AE supports this only for Ultrasound Images.*

### 5.1.2. Functional Definitions of AE's

The VF Surgical Workstation AE implements the following functions for DICOM media.

#### DICOM Media Storage Service Class for CD and DVD

The VF Surgical Workstation AE can perform the CD-R DICOM Media Storage service as SCU, with capabilities for:

RWA Display Directory (as FSR),  
RWA Write Images (as FSC / FSU), and  
RWA Read Images (as FSR).

The VF Surgical Workstation AE can perform the USB DICOM Media Storage service as SCU, with capabilities for:

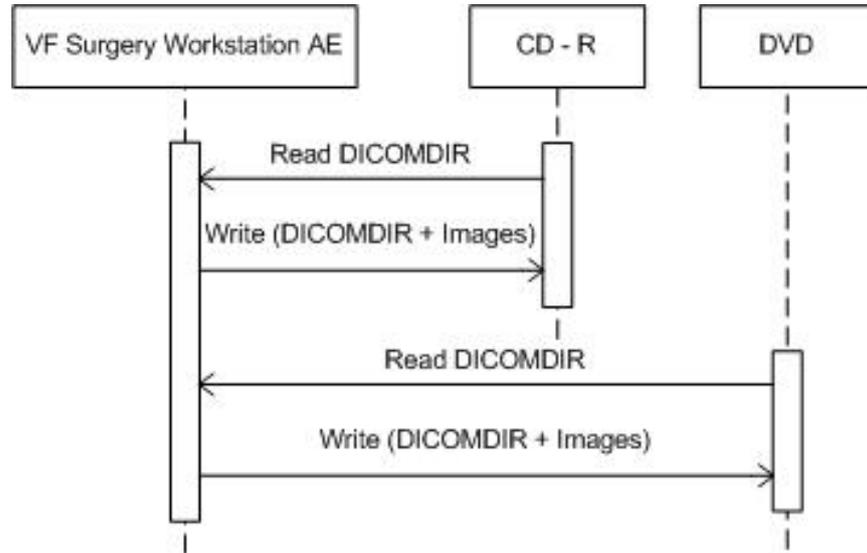
RWA Display Directory (as FSR),  
RWA Write Images (as FSC / FSU), and  
RWA Read Images (as FSR).

For DVD the VF Surgical Workstation AE can perform the DICOM Media Storage service as SCU, with capabilities for:

RWA Display Directory (as FSR),  
RWA Write Images (as FSC), and  
RWA Read Images (as FSR).

### 5.1.3. Sequencing of Real World Activities

Whenever DICOM Media (CD or DVD) has to be written, the VF Surgical Workstation AE first tries to read the DICOMDIR. The VF Surgical Workstation AE will compile the updated DICOMDIR and any required DICOM images into a CD or DVD session image; this session image will be written to the DICOM Media.



**Figure 21: Sequencing of RWA Write Image**

Note that after the DVD Media is written the DVD will be finalized by VF Surgical Workstation AE to guarantee the readability on the most DVD reader.

**5.1.4. File Meta Information for Implementation Class and Version**

The Implementation Class UID and Implementation Version Name are supplied as specified for the VF Surgical Workstation AE for networking. Conform [DICOM], using File Meta Information Header version 1 requires the File Meta Information Version to be set as specified below.

**Table 89: File Meta Information for VF Surgical Workstation AE**

|                               |                      |
|-------------------------------|----------------------|
| File Meta Information Version | 00, 01               |
| Implementation Class UID      | 1.3.46.670589.5.2.23 |
| Implementation Version Name   | ViewForum R6.3       |

## 5.2. AE Specifications

### 5.2.1. VF Surgical Workstation AE

The VF Surgical Workstation AE provides standard conformance to the DICOM interchange option of the Media Storage service class, and follows the specifications as defined in [DICOM] Media Storage and File Format for Data Interchange (PS 3.10) the Media Storage Application Profiles STD-GEN-CD, STD-GEN-USB-JPEG ([DICOM] PS 3.11) and the Media Storage Application Profiles STD-GEN-DVD-JPEG ([DICOM] PS 3.12) for Reading and Writing.

The VF Surgical Workstation AE supports multi-patient and multi-session for CD/DVD, both for reading and writing. Table 90 shows for each Application Profile in the first column the Real-World Activities in the second column, the roles required for each of these Real-World Activities in the third column, and the related Service Class Option in the fourth column.

**Table 90: AE Related Application Profiles, Real-World Activities, and Roles for CD-R, USB and DVD**

| Supported Application Profile | Real-World Activity | Roles | SC Option   |
|-------------------------------|---------------------|-------|-------------|
| STD-GEN-CD                    | Display Directory   | FSR   | Interchange |
|                               | Read Image          | FSR   | Interchange |
|                               | Write Image         | FSC   | Interchange |
| STD-GEN-USB-JPEG              | Display Directory   | FSR   | Interchange |
|                               | Read Image          | FSR   | Interchange |
|                               | Write Image         | FSC   | Interchange |
| STD-GEN-DVD-JPEG              | Display Directory   | FSR   | Interchange |
|                               | Read Image          | FSR   | Interchange |
|                               | Write Image         | FSC   | Interchange |

The next table gives an overview of the supported SOP classes that can be read and written according the supported application profile in Table 90.

**Table 91: Supported SOP Classes by the Media AE**

| Abstract Syntax                                     |                               | Transfer Syntax |                     |
|---|-------------------------------|-----------------|---------------------|
| Name  | UID                           | Name List       | UID List            |
| Media Storage Directory Storage                     | 1.2.840.10008.1.3.10          | ELE             | 1.2.840.10008.1.2.1 |
| Computed Radiography Image Storage                  | 1.2.840.10008.5.1.4.1.1.1     |                 |                     |
| Digital X-Ray Image Storage – for Presentation      | 1.2.840.10008.5.1.4.1.1.1.1   |                 |                     |
| Digital Mammography X-Ray Image Storage - Pres. SOP | 1.2.840.10008.5.1.4.1.1.1.2   |                 |                     |
| Digital Mammography X-Ray Image Storage - Proc. SOP | 1.2.840.10008.5.1.4.1.1.1.2.1 |                 |                     |
| CT Image Storage                                    | 1.2.840.10008.5.1.4.1.1.2     |                 |                     |
| Ultrasound Multi-frame Image Storage                | 1.2.840.10008.5.1.4.1.1.3.1   |                 |                     |
| MR Image Storage                                    | 1.2.840.10008.5.1.4.1.1.4     |                 |                     |
| Ultrasound Image Storage                            | 1.2.840.10008.5.1.4.1.1.6.1   |                 |                     |

| Abstract Syntax                               |                              | Transfer Syntax |          |
|---|------------------------------|-----------------|----------|
| Name  | UID                          | Name List       | UID List |
| Secondary Capture Image Storage               | 1.2.840.10008.5.1.4.1.1.7    |                 |          |
| Grayscale Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.1 |                 |          |
| X-Ray Angiographic Image Storage              | 1.2.840.10008.5.1.4.1.1.12.1 |                 |          |
| X-Ray Radiofluoroscopic Image Storage         | 1.2.840.10008.5.1.4.1.1.12.2 |                 |          |
| X-Ray Specialization                          | 1.3.46.670589.2.3.1.1        |                 |          |
| Stack of X-Ray                                | 1.3.46.670589.2.4.1.1        |                 |          |
| Volume  | 1.3.46.670589.5.0.1.1        |                 |          |
| 3D Volume Object                              | 1.3.46.670589.5.0.2.1        |                 |          |
| Surface                                       | 1.3.46.670589.5.0.3.1        |                 |          |
| Cardio  | 1.3.46.670589.5.0.8.1        |                 |          |
| CT Synthetic Image                            | 1.3.46.670589.5.0.9          |                 |          |
| MR Synthetic Image                            | 1.3.46.670589.5.0.10         |                 |          |
| MR Cardio Analysis                            | 1.3.46.670589.5.0.11.1       |                 |          |
| CX Synthetic Image                            | 1.3.46.670589.5.0.12         |                 |          |
| Perfusion                                     | 1.3.46.670589.5.0.13         |                 |          |
| Perfusion Analysis                            | 1.3.46.670589.5.0.14         |                 |          |

#### 5.2.1.1. File Meta Information for the VF Surgical Workstation AE

The Source Application Entity Title is configurable (ref. section 5.4).

#### 5.2.1.2. Real-World Activities

##### 5.2.1.2.1. Display Directory

When a Database Open action is initiated on DICOM media then the VF Surgical Workstation AE acts as an FSR using the interchange option to read the DICOMDIR of the DICOM media.

This will result in an overview of the patients, studies, series, and images on the GUI.

##### 5.2.1.2.1.1. Media Storage Application Profile

As depicted in Table 90, the VF Surgical Workstation AE supports the RWA Display Directory for STD-GEN-CD, STD-GEN-USB-JPEG and STD-GEN-DVD-JPEG application profiles.

##### 5.2.1.2.1.1.1. Options

The mandatory DICOMDIR keys are required for the correct display of directory information. The display is structured according the DICOM Composite Information Model: Patient, Study, Series, and Image.

##### 5.2.1.2.2. Read Image

When an image transfer from DICOM media is initiated then the VF Surgical Workstation AE acts as an FSR using the interchange option to import SOP instances from the DICOM media.

#### 5.2.1.2.2.1. Media Storage Application Profile

As depicted in Table 90, the VF Surgical Workstation AE supports the RWA Read Image for STD-GEN-CD, STD-GEN-USB-JPEG and STD-GEN-DVD-JPEG application profiles.

##### 5.2.1.2.2.1.1. Options

The mandatory attributes of the DICOM images are required for the correct storage of the images in the local database. Optional attributes and retired/private attributes are stored too – if present; this is equivalent with the level 2 (Full) conformance for the Storage service class in the Network support.

#### 5.2.1.2.3. Write Image

When an image transfer to DICOM media is initiated then the VF Surgical Workstation AE acts as an FSC using the interchange option to write SOP instances on the DICOM media.

#### 5.2.1.2.3.1. Media Storage Application Profile

As depicted in Table 90, the VF Surgical Workstation AE supports the RWA Write Image for STD-GEN-CD, STD-GEN-USB-JPEG and STD-GEN-DVD-JPEG application profiles. However, the VF Surgical Workstation AE only supports writing on DVD+R(W) media, not DVD-R(W) media.

##### 5.2.1.2.3.1.1. Options

The DICOMDIR file will be extended when new images are written. In case some attributes are not present in an image but are specified as mandatory in the DICOMDIR definition of DICOM media, a generated value will be filled in.

#### Implementation remarks and restrictions

When writing the DICOMDIR records, key values are generated when no value of the corresponding attribute is supplied, according to the following table.

**Table 92: Generated Keys**

| Key                 | Tag       | Generated Value  |
|---------------------|-----------|--|
| <b>Patient Keys</b> |           |  |
| Patient ID          | 0010,0020 | At import the VF Surgical Workstation AE each time creates a new value based on the Study Instance UID for each new study written to DICOM media (even if this study belongs to a patient recorded earlier). Otherwise the default generated value shall be a succession of "UNKNOWN", the Patient's Name, the Patient's Birth Date, and the Patient's Sex, concatenated by using underscore characters. |
| <b>Study Keys</b>   |           |  |
| Study Date          | 0008,0020 | Current date.  |
| Study Time          | 0008,0030 | Current time.  |
| Study ID            | 0020,0010 | "UNKNOWN"  |
| <b>Series Keys</b>  |           |  |
| Series Number       | 0020,0011 | 1  |
| <b>Image Keys</b>   |           |  |
| Instance Number     | 0020,0013 | 1  |

The default value for (0028,1040) Pixel Intensity Relationship is set to DISP.

The VF Surgical Workstation AE can write volumes of the media to that media. If spanning is required then the VF Surgical Workstation AE asks for a new media.

## 5.3. Augmented and Private Application Profiles

### 5.3.1. Augmented Application Profiles

#### 5.3.1.1. Augmented Application Profile AUG-GEN-DVD-JPEG

##### 5.3.1.1.1. SOP Class Augmentations

As augmentation to the STD-GEN-DVD-JPEG application profile, also the SOP classes as per following table are supported.

**Table 93: Additional SOP Classes supported by AUG-GEN-DVD-JPEG**

| SOP Class Name       | SOP Class UID          |
|----------------------|------------------------|
| X-Ray Specialization | 1.3.46.670589.2.3.1.1  |
| Stack of X-Ray       | 1.3.46.670589.2.4.1.1  |
| Volume               | 1.3.46.670589.5.0.1.1  |
| 3D Volume Object     | 1.3.46.670589.5.0.2.1  |
| Surface              | 1.3.46.670589.5.0.3.1  |
| Cardio               | 1.3.46.670589.5.0.8.1  |
| CT Synthetic Image   | 1.3.46.670589.5.0.9    |
| MR Synthetic Image   | 1.3.46.670589.5.0.10   |
| MR Cardio Analysis   | 1.3.46.670589.5.0.11.1 |
| CX Synthetic Image   | 1.3.46.670589.5.0.12   |
| Perfusion            | 1.3.46.670589.5.0.13   |
| Perfusion Analysis   | 1.3.46.670589.5.0.14   |

##### 5.3.1.1.2. Directory Augmentations

Not applicable.

##### 5.3.1.1.3. Other Augmentations

Not applicable.

### 5.3.2. Private Application Profiles

Not applicable.

## **5.4. Media Configuration**

Any configuration issues may be found in the Networking section 4.4.

## 6. SUPPORT OF CHARACTER SETS

Any support for character sets beyond the default character repertoire in Network and Media services shall be described here.

**Table 94: Supported DICOM Character Sets of BV Family**

| Character Set Description | Defined Term    | ESC Sequence    | ISO Registration Number | Code Element | Character Set                 |
|---------------------------|-----------------|-----------------|-------------------------|--------------|-------------------------------|
| Latin alphabet No. 1      | ISO 2022 IR 100 | ESC 02/08 04/02 | ISO-IR 6                | G0           | ISO 646                       |
|                           |                 | ESC 02/13 04/01 | ISO-IR 100              | G1           | Supplementary set of ISO 8859 |
| Japanese                  | ISO 2022 IR 87  | -               | ISO-IR 87               | G0           | JIS X 0208: Kanji             |
|                           |                 | -               | -                       | -            | -                             |
| Latin alphabet No. 1      | ISO_IR 100      | -               | ISO-IR 6                | G0           | ISO 646                       |
|                           |                 | -               | ISO-IR 100              | G1           | Supplementary set of ISO 8859 |

If a WLM query response includes a Person Name attribute containing character code 5C (i.e. BACKSLASH “\” in ISO-IR 6) then all characters behind the character code 5C will be omitted (at GUI and export, i.e. will still be present in MPPS).

Unsupported character sets will be accepted, though all characters will be displayed as per ISO\_IR 100, not conform with the actual character set specification.

- The behavior when an unsupported character set is received shall be documented.
- Character set configuration capabilities, if any, shall be specified.
- Mapping and/or conversion of character sets across services and instances shall be specified.
- Query capabilities for attributes that include non-default character sets, both for the Worklist service class and the Query service class, shall be specified. Behavior of attributes using extended character sets by a C-FIND, both as SCU and SCP request and response, shall be specified. In particular the handling of Person Names (VR of PN) shall be specified.
- The presentation of the characters to a user, i.e. capabilities, font limitations and/or substitutions shall be specified.

## 7. SECURITY

### 7.1. Security Profiles

#### 7.1.1. Basic Application Level Confidentiality Profile

The BV Family AE conforms to the Basic Application Level Confidentiality Profile as de-identifier.

De-identified SOP Instances will be created on DICOM Media if specified by the user.

No instances of the Encrypted Attributes Data Set are created. No transfer syntaxes are supported for encoding/decoding of Encrypted Attributes Data Sets.

The terms used to describe the replacement value in the anonymized patient data can be read as follows:

|       |  |
|-------|--|
| COPY  | Same value as in source data   |
| EMPTY | The attribute will have a value of zero length.  |
| ANP   | Attribute Not Present  |
| n.a.  | Not applicable, the attribute is not contained in the standard IOD of the BV Family AE |

The next table lists the protected data attributes.

**Table 95: Basic Application Level Confidentiality Profile Attributes**

| Name                                    | Tag       | VR | Replacement Value |
|---|-----------|----|-------------------|
| Instance Creator UID                    | 0008,0014 | UI | n.a.              |
| SOP Instance UID                        | 0008,0018 | UI | COPY              |
| Accession Number                        | 0008,0050 | SH | EMPTY             |
| Institution Name                        | 0008,0080 | LO | ANP               |
| Institution Address                     | 0008,0081 | ST | n.a.              |
| Referring Physician's Name              | 0008,0090 | PN | EMPTY             |
| Referring Physician's Address           | 0008,0092 | ST | n.a.              |
| Referring Physician's Telephone Numbers | 0008,0094 | SH | n.a.              |
| Station Name                            | 0008,1010 | SH | COPY              |
| Study Description                       | 0008,1030 | LO | COPY              |
| Series Description                      | 0008,103E | LO | COPY              |
| Institutional Department Name           | 0008,1040 | LO | n.a.              |
| Physician(s) of Record                  | 0008,1048 | PN | n.a.              |
| Performing Physicians' Name             | 0008,1050 | PN | ANP               |
| Name of Physician(s) Reading Study      | 0008,1060 | PN | n.a.              |
| Operators' Name (Technologist)          | 0008,1070 | PN | COPY              |
| Admitting Diagnoses Description         | 0008,1080 | LO | n.a.              |
| Referenced SOP Instance UID             | 0008,1155 | UI | COPY              |
| Derivation Description                  | 0008,2111 | ST | COPY              |
| Patient's Name                          | 0010,0010 | PN | EMPTY             |

| Name                                   | Tag       | VR | Replacement Value  |
|--|-----------|----|--|
| Patient ID                             | 0010,0020 | LO | In Patient Module the Patient ID value is "EMPTY". In the DIRECTORY RECORD: 0 (PATIENT) the Patient ID value has a new generated value |
| Patient's Birth Date                   | 0010,0030 | DA | EMPTY  |
| Patient's Birth Time                   | 0010,0032 | TM | COPY   |
| Patient's Sex                          | 0010,0040 | CS | EMPTY  |
| Other Patient Ids                      | 0010,1000 | LO | COPY   |
| Other Patient Names                    | 0010,1001 | PN | COPY   |
| Patient's Age                          | 0010,1010 | AS | EMPTY  |
| Patient's Size                         | 0010,1020 | DS | COPY   |
| Patient's Weight                       | 0010,1030 | DS | COPY   |
| Medical Record Locator                 | 0010,1090 | LO | n.a.   |
| Ethnic Group                           | 0010,2160 | SH | n.a.   |
| Occupation                             | 0010,2180 | SH | n.a.   |
| Additional Patient's History           | 0010,21B0 | LT | n.a.   |
| Patient Comments                       | 0010,4000 | LT | n.a.   |
| Device Serial Number                   | 0018,1000 | LO | COPY   |
| Protocol Name                          | 0018,1030 | LO | COPY   |
| Study Instance UID                     | 0020,000D | UI | COPY   |
| Series Instance UID                    | 0020,000E | UI | COPY   |
| Study ID                               | 0020,0010 | SH | EMPTY  |
| Frame of Reference UID                 | 0020,0052 | UI | n.a.   |
| Synchronization Frame of Reference UID | 0020,0200 | UI | n.a.   |
| Image Comments                         | 0020,4000 | LT | COPY   |
| Requested Attributes Sequence          | 0040,0275 | SQ | n.a.   |
| UID                                    | 0040,A124 | UI | n.a.   |
| Content Sequence                       | 0040,A730 | SQ | n.a.   |
| Storage Media File-set UID             | 0088,0140 | UI | n.a.   |
| Referenced Frame of Reference UID      | 3006,0024 | UI | n.a.   |
| Related Frame of Reference UID         | 3006,00C2 | UI | n.a.   |

#### 7.1.1.1. SOP Class Augmentations

DICOM media that have been written with the de-identification feature switched on (anonymized data) will have DICOM-format data.

In case of writing to CD or DVD, de-identification is supported. However, when the de-identification feature is active, also Secondary Capture images are written to the DICOM media; it is possible that they contain burned-in patient information.

## 7.2. Association Level Security

Not supported.

Any calling AE title and/or IP address may open an association.

## 7.3. Application Level Security

Not applicable.

## 8. ANNEXES BV FAMILY AE

### 8.1. IOD Contents

#### 8.1.1. Created SOP Instances

This section specifies each IOD created by the BV Family AE.

Defined abbreviations for the presence of IOD modules are:

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

Defined abbreviations for the presence of module attributes in the tables 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  
 ANAPCV          the attribute is present under specified condition – if present then its Value is Not Always Present (attribute sent zero length if condition applies and no value is present)  
 ANAPEV          the attribute is present under specified condition – if present then it will not have any value

Defined abbreviations for the source of the attribute data values in the tables 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 source is a Modality Performed Procedure Step  
 MWL             the attribute value source is a Modality Worklist  
 USER            the attribute value source is explicit user input

#### 8.1.1.1. Secondary Capture Image Storage SOP Class

**Table 96: Modules of the Secondary Capture Image Storage SOP Class**

| Information Entity | Module Name              | Usage       |
|--------------------|--------------------------|-------------|
| Patient            | Patient module           | ALWAYS      |
| Study              | General Study module     | ALWAYS      |
|                    | Patient Study module     | CONDITIONAL |
| Series             | General Series module    | ALWAYS      |
| Equipment          | General Equipment module | CONDITIONAL |
|                    | SC Equipment module      | ALWAYS      |
| Image              | General Image module     | ALWAYS      |
|                    | Image Pixel module       | ALWAYS      |
|                    | SC Image module          | ALWAYS      |

| Information Entity | Module Name       | Usage  |
|--------------------|-------------------|--------|
|                    | SOP Common module | ALWAYS |

**Table 97: Created Secondary Capture Image Storage SOP Class Attributes**

| Name                          | Tag       | VR | Present of Value | Source         | Comment   |
|-------------------------------|-----------|----|------------------|----------------|---|
| <b>Patient Module</b>         |           |    |                  |                |   |
| Patient's Name                | 0010,0010 | PN | ALWAYS           | MWL / USER     | -   |
| Patient ID                    | 0010,0020 | LO | ALWAYS           | MWL / USER     | -   |
| Patient's Birth Date          | 0010,0030 | DA | ALWAYS           | MWL / USER     | -   |
| Patient's Birth Time          | 0010,0032 | TM | VNAP             | MWL            | -   |
| Patient's Sex                 | 0010,0040 | CS | ALWAYS           | MWL / USER     | -   |
| Other Patient IDs             | 0010,1000 | LO | VNAP             | MWL            | -   |
| Other Patient Names           | 0010,1001 | PN | VNAP             | MWL            | -   |
| <b>General Study Module</b>   |           |    |                  |                |   |
| Study Date                    | 0008,0020 | DA | ALWAYS           | AUTO           | Examination date.   |
| Study Time                    | 0008,0030 | TM | ALWAYS           | AUTO           | Examination time.   |
| Accession Number              | 0008,0050 | SH | ALWAYS           | MWL / USER     | -   |
| Referring Physician's Name    | 0008,0090 | PN | VNAP             | MWL            | -   |
| Study Description             | 0008,1030 | LO | ALWAYS           | IMPLICIT / MWL | User selected examination type or copied from requested procedure description (0032,1060) received via WLM. |
| Procedure Code Sequence       | 0008,1032 | SQ | ANAP             | MWL            | -   |
| Referenced Study Sequence     | 0008,1110 | SQ | VNAP             | MWL            | -   |
| > Referenced SOP Class UID    | 0008,1150 | UI | ALWAYS           | MWL            | -   |
| > Referenced SOP Instance UID | 0008,1155 | UI | ALWAYS           | MWL            | -   |
| Study Instance UID            | 0020,000D | UI | ALWAYS           | AUTO / MWL     | -   |
| Study ID                      | 0020,0010 | SH | EMPTY            | FIXED          | -   |
| <b>Patient Study Module</b>   |           |    |                  |                |   |
| Patient's Weight              | 0010,1030 | DS | VNAP             | MWL            | -   |
| <b>General Series Module</b>  |           |    |                  |                |   |
| Performing Physician's Name   | 0008,1050 | PN | VNAP, USER       |                | Can be entered by Physician who makes the Examination   |
| Series Instance UID           | 0020,000E | UI | ALWAYS           | AUTO           | -   |
| Series Number                 | 0020,0011 | IS | ALWAYS           | AUTO           | Increasing number that identifies series (run).   |
| Laterality                    | 0020,0060 | CS | EMPTY            | FIXED          | -   |

| Name   | Tag       | VR | Present of Value | Source | Comment   |
|--|-----------|----|------------------|--------|---|
| Performed Procedure Step Start Date                | 0040,0244 | DA | ALWAYS           | AUTO   | Examination date.   |
| Performed Procedure Step Start Time                | 0040,0245 | TM | ALWAYS           | AUTO   | Examination time.   |
| <b>General Equipment Module</b>                    |           |    |                  |        |   |
| Manufacturer                                       | 0008,0070 | LO | ALWAYS, AUTO     |        | Applied value: Philips Medical Systems                                    |
| Institution Name                                   | 0008,0080 | LO | ALWAYS           | CONFIG | Hospital Name.  |
| Station Name                                       | 0008,1010 | SH | ALWAYS           | CONFIG | -   |
| Manufacturer's Model Name                          | 0008,1090 | LO | ALWAYS           | AUTO   | Applied value: BV Family  |
| <b>SC Equipment Module</b>                         |           |    |                  |        |   |
| Modality   | 0008,0060 | CS | ALWAYS           | AUTO   | Applied values: OT (Dose report only); XA                                 |
| Conversion Type                                    | 0008,0064 | CS | ALWAYS           | AUTO   | Applied value: DI   |
| Secondary Capture Device ID                        | 0018,1010 | LO | ALWAYS           | CONFIG | BV System ID.   |
| Secondary Capture Device Manufacturer              | 0018,1016 | LO | ALWAYS           | AUTO   | Applied value: Philips Medical Systems                                    |
| Secondary Capture Device Manufacturer's Model Name | 0018,1018 | LO | ALWAYS           | AUTO   | Applied value: BV Family  |
| Secondary Capture Device Software Version          | 0018,1019 | LO | ALWAYS           | AUTO   | Applied value: BV Family R2.3   |
| <b>General Image Module</b>                        |           |    |                  |        |   |
| Image Type   | 0008,0008 | CS | ALWAYS           | AUTO   | Applied value: DERIVED\SECONDARY  |
| Instance Number                                    | 0020,0013 | IS | ALWAYS           | AUTO   | Generated running number.   |
| Patient Orientation                                | 0020,0020 | CS | EMPTY            | FIXED  | -   |
| <b>Image Pixel Module</b>                          |           |    |                  |        |   |
| Samples per Pixel                                  | 0028,0002 | US | ALWAYS           | AUTO   | Applied value: 1  |
| Photometric Interpretation                         | 0028,0004 | CS | ALWAYS           | AUTO   | Applied value: MONOCHROME2  |
| Rows   | 0028,0010 | US | ALWAYS           | AUTO   | Applied values: 1024  |
| Columns  | 0028,0011 | US | ALWAYS           | AUTO   | Applied values: For images with text: 1280; For images without text: 1024 |
| Bits Allocated                                     | 0028,0100 | US | ALWAYS           | AUTO   | Applied value: 16   |
| Bits Stored  | 0028,0101 | US | ALWAYS           | AUTO   | Applied value: 12   |
| High Bit   | 0028,0102 | US | ALWAYS           | AUTO   | Applied value: 11   |
| Pixel Representation                               | 0028,0103 | US | ALWAYS           | AUTO   | Applied value: 0  |
| Pixel Data   | 7FE0,0010 | OW | ALWAYS           | AUTO   | -   |

| Name                      | Tag       | VR | Present of Value | Source | Comment  |
|---------------------------|-----------|----|------------------|--------|--|
| <b>SC Image Module</b>    |           |    |                  |        |  |
| Date of Secondary Capture | 0018,1012 | DA | ALWAYS           | AUTO   | The date the Secondary Capture Image is captured.                          |
| Time of Secondary Capture | 0018,1014 | TM | ALWAYS           | AUTO   | The time the Secondary Capture Image is captured.                          |
| <b>SOP Common Module</b>  |           |    |                  |        |  |
| Specific Character Set    | 0008,0005 | CS | ALWAYS           | AUTO   | Applied value: ISO_IR 100  |
| SOP Class UID             | 0008,0016 | UI | ALWAYS           | AUTO   | Applied value: 1.2.840.10008.5.1.4.1.1.7 (Secondary Capture Image Storage) |
| SOP Instance UID          | 0008,0018 | UI | ALWAYS           | AUTO   | -  |

**8.1.1.2. X-Ray Angiographic Image Storage SOP Class**

**Table 98: Created X-Ray Angiographic Image Storage SOP Class Attributes**

| Information Entity | Module Name              | Usage       |
|--------------------|--------------------------|-------------|
| Patient            | Patient module           | ALWAYS      |
| Study              | General Study module     | ALWAYS      |
|                    | Patient Study module     | CONDITIONAL |
| Series             | General Series module    | ALWAYS      |
| Equipment          | General Equipment module | ALWAYS      |
| Image              | General Image module     | ALWAYS      |
|                    | Image Pixel module       | ALWAYS      |
|                    | Cine module              | ALWAYS      |
|                    | Multi-Frame module       | ALWAYS      |
|                    | X-Ray Image module       | ALWAYS      |
|                    | X-Ray Acquisition module | ALWAYS      |
|                    | XA Positioner module     | ALWAYS      |
|                    | SOP Common module        | ALWAYS      |

**Table 99: Created X-Ray Angiographic Image Storage SOP Class Attributes**

| Name                  | Tag       | VR | Present of Value | Source     | Comment |
|-----------------------|-----------|----|------------------|------------|---------|
| <b>Patient Module</b> |           |    |                  |            |         |
| Patient's Name        | 0010,0010 | PN | ALWAYS           | MWL / USER | -       |
| Patient ID            | 0010,0020 | LO | ALWAYS           | MWL / USER | -       |

| Name                         | Tag       | VR | Present of Value | Source         | Comment   |
|------------------------------|-----------|----|------------------|----------------|---|
| Patient's Birth Date         | 0010,0030 | DA | ALWAYS           | MWL / USER     | -   |
| Patient's Birth Time         | 0010,0032 | TM | VNAP             | MWL            | -   |
| Patient's Sex                | 0010,0040 | CS | ALWAYS           | MWL / USER     | -   |
| Other Patient IDs            | 0010,1000 | LO | VNAP             | MWL            | -   |
| Other Patient Names          | 0010,1001 | PN | VNAP             | MWL            | -   |
| <b>General Study Module</b>  |           |    |                  |                |   |
| Study Date                   | 0008,0020 | DA | ALWAYS           | AUTO           | Examination date.   |
| Study Time                   | 0008,0030 | TM | ALWAYS           | AUTO           | Examination time.   |
| Accession Number             | 0008,0050 | SH | ALWAYS           | MWL / USER     | -   |
| Referring Physician's Name   | 0008,0090 | PN | VNAP             | MWL            | -   |
| Study Description            | 0008,1030 | LO | ALWAYS           | IMPLICIT / MWL | User selected examination type or copied from requested procedure description (0032,1060) received via WLM. |
| Referenced Study Sequence    | 0008,1110 | SQ | VNAP             | MWL            | -   |
| >Referenced SOP Class UID    | 0008,1150 | UI | ALWAYS           | MWL            | Applied value: 1.2.840.1000 8.3.1.2.3.1   |
| >Referenced SOP Instance UID | 0008,1155 | UI | ALWAYS           | MWL            | -   |
| Study Instance UID           | 0020,000D | UI | ALWAYS,          | AUTO / MWL     | -   |
| Study ID                     | 0020,0010 | SH | VNAP             | FIXED          | Value only present for 3D acquisitions. Applied value: 3D-RX  |
| <b>Patient Study Module</b>  |           |    |                  |                |   |
| Patient's Weight             | 0010,1030 | DS | VNAP             | MWL            | -   |
| <b>General Series Module</b> |           |    |                  |                |   |
| Series Date                  | 0008,0021 | DA | ANAP             | AUTO           | Only present for 3D acquisitions  |
| Series Time                  | 0008,0031 | TM | ANAP             | AUTO           | Only present for 3D acquisitions.   |
| Modality                     | 0008,0060 | CS | ALWAYS           | AUTO           | Applied value: XA   |

| Name                                | Tag       | VR | Present of Value | Source     | Comment  |
|-------------------------------------|-----------|----|------------------|------------|--|
| Series Description                  | 0008,103E | LO | ANAP             | AUTO       | Depending on 3D run. Applied values: 3DRAanypos, 3DRApatient (normal 3D run), 3DRAanypos, 3DRAadodec (geometry calibration), 3DRAanypos, 3DRApincus (pincushion calibration) |
| Performing Physician's Name         | 0008,1050 | PN | VNAP             | MWL / USER | Can be entered by Physician who makes the Examination  |
| Series Instance UID                 | 0020,000E | UI | ALWAYS           | AUTO       | -  |
| Series Number                       | 0020,0011 | IS | ALWAYS           | AUTO       | Increasing number that identifies series (run).  |
| Laterality                          | 0020,0060 | CS | EMPTY            | FIXED      | -  |
| Performed Procedure Step Start Date | 0040,0244 | DA | ALWAYS           | AUTO       | Examination date.  |
| Performed Procedure Step Start Time | 0040,0245 | TM | ALWAYS           | AUTO       | Examination time.  |
| Request Attributes Sequence         | 0040,0275 | SQ | ANAP             | AUTO       | Only present for 3D acquisitions.  |
| > Request Procedure ID              | 0040,1001 | SH | ALWAYS           | AUTO       | Applied values:<br>For acquisition: 3DRAAcquisition<br>For calibration: GeometryCalibration, PincushionCalibration   |
| <b>General Equipment Module</b>     |           |    |                  |            |  |
| Manufacturer                        | 0008,0070 | LO | ALWAYS           | AUTO       | Applied value: Philips Medical Systems   |
| Institution Name                    | 0008,0080 | LO | ALWAYS           | CONFIG     | Hospital Name.   |
| Station Name                        | 0008,1010 | SH | ALWAYS           | CONFIG     | -  |
| Manufacturer's Model Name           | 0008,1090 | LO | ALWAYS           | AUTO       | Applied value: BV Family   |
| <b>General Image Module</b>         |           |    |                  |            |  |
| Content Date                        | 0008,0023 | DA | ALWAYS           | AUTO       | -  |

| Name                           | Tag       | VR | Present of Value | Source | Comment  |
|--------------------------------|-----------|----|------------------|--------|--|
| Content Time                   | 0008,0033 | TM | ALWAYS           | AUTO   | -  |
| Instance Number                | 0020,0013 | IS | ALWAYS           | AUTO   | -  |
| Patient Orientation            | 0020,0020 | CS | EMPTY            | FIXED  | -  |
| <b>Image Pixel Module</b>      |           |    |                  |        |  |
| Rows                           | 0028,0010 | US | ALWAYS           | AUTO   | Applied value: 1024  |
| Columns                        | 0028,0011 | US | ALWAYS           | AUTO   | Applied value: 1024  |
| Pixel Data                     | 7FE0,0010 | OW | ALWAYS           | AUTO   | -  |
| <b>Cine Module</b>             |           |    |                  |        |  |
| Start Trim                     | 0008,2142 | IS | ALWAYS           | AUTO   | Applied value: 1   |
| Stop Trim                      | 0008,2143 | IS | ALWAYS           | AUTO   | Number of images in the run.                                   |
| Recommended Display Frame Rate | 0008,2144 | IS | ALWAYS           | AUTO   | Acquisition speed.   |
| Cine Rate                      | 0018,0040 | IS | ALWAYS           | AUTO   | Calculated from acquisition speed.                             |
| Frame Time                     | 0018,1063 | DS | ALWAYS           | AUTO   | Calculated from acquisition speed [ms].                        |
| <b>Multi-Frame Module</b>      |           |    |                  |        |  |
| Number of Frames               | 0028,0008 | IS | ALWAYS           | AUTO   | Number of exported images in the run.                          |
| Frame Increment Pointer        | 0028,0009 | AT | ALWAYS           | AUTO   | Applied value: 0x00181063 (Frame Time)                         |
| <b>X-Ray Image Module</b>      |           |    |                  |        |  |
| Image Type                     | 0008,0008 | CS | ALWAYS           | AUTO   | Applied value: ORIGINAL\ PRIMARY                               |
| Samples per Pixel              | 0028,0002 | US | ALWAYS           | AUTO   | Applied value: 1   |
| Photometric Interpretation     | 0028,0004 | CS | ALWAYS           | AUTO   | Applied value: MONOCHR OME2                                    |
| Pixel Spacing                  | 0028,0030 | DS | ANAP             | FIXED  | Only present for 3D acquisitions<br>Applied value: 0.183/0.183 |
| Bits Allocated                 | 0028,0100 | US | ALWAYS           | AUTO   | Applied value: 16  |
| Bits Stored                    | 0028,0101 | US | ALWAYS           | AUTO   | Applied value: 12  |
| High Bit                       | 0028,0102 | US | ALWAYS           | AUTO   | Applied value: 11  |

| Name                            | Tag       | VR | Present of Value | Source | Comment  |
|---------------------------------|-----------|----|------------------|--------|--|
| Pixel Representation            | 0028,0103 | US | ALWAYS           | AUTO   | Applied value: 0   |
| Pixel Intensity Relationship    | 0028,1040 | CS | ALWAYS           | AUTO   | Applied value: LIN   |
| <b>X-Ray Acquisition Module</b> |           |    |                  |        |  |
| KVP                             | 0018,0060 | DS | EMPTY            | FIXED  | -  |
| Field of View Shape             | 0018,1147 | CS | ALWAYS           | AUTO   | Applied value: ROUND   |
| Exposure                        | 0018,1152 | IS | EMPTY            | FIXED  | -  |
| Radiation Setting               | 0018,1155 | CS | ALWAYS           | AUTO   | Applied values: GR, SC   |
| Type of Filters                 | 0018,1161 | LO | ALWAYS           | AUTO   | Applied value: NONE  |
| Intensifier Size                | 0018,1162 | DS | ALWAYS           | AUTO   | Applied values: 150, 230, 310  |
| Grid                            | 0018,1166 | CS | ALWAYS           | AUTO   | Applied value: IN  |
| <b>XA Positioner Module</b>     |           |    |                  |        |  |
| Distance Source to Detector     | 0018,1110 | DS | ALWAYS           | FIXED  | Applied value: 983   |
| Distance Source to Patient      | 0018,1111 | DS | ANAP             | FIXED  | Only present for 3D acquisitions<br>Applied value: 651                         |
| Positioner Motion               | 0018,1500 | CS | VNAP             | AUTO   | Value only present for 3D acquisitions<br>Applied value: DYNAMIC               |
| Positioner Primary Angle        | 0018,1510 | DS | ALWAYS           | AUTO   | Applied values:<br>For non-3D acquisitions : 0<br>For 3D acquisitions : -101.5 |
| Positioner Secondary Angle      | 0018,1511 | DS | ALWAYS           | FIXED  | Applied value: 0   |

| Name                                 | Tag       | VR | Present of Value | Source | Comment   |
|--------------------------------------|-----------|----|------------------|--------|---|
| Positioner Primary Angle Increment   | 0018,1520 | DS | ANAP             | AUTO   | Only present for 3D acquisitions . Applied value equals 203 divided by the number of images in the run. |
| Positioner Secondary Angle Increment | 0018,1521 | DS | ANAP             | FIXED  | Only present for 3D acquisitions . Applied value: 0   |
| <b>SOP Common Module</b>             |           |    |                  |        |   |
| Specific Character Set               | 0008,0005 | CS | ALWAYS           | AUTO   | Applied value: ISO_IR 100   |
| SOP Class UID                        | 0008,0016 | UI | ALWAYS           | AUTO   | Applied value: 1.2.840 .10008.5.1.4.1.1.12.1 (X-Ray Angiography Image Storage)                          |
| SOP Instance UID                     | 0008,0018 | UI | ALWAYS           | AUTO   | -   |

**8.1.2. Usage of Attributes from Received IOD's**

Not applicable.

**8.1.3. Attribute Mapping**

The following mapping applies for attributes of the BV Family AE.

**Table 100: Attribute Mapping of the BV Family AE**

| Attribute Name                      | MWL Tag   | MPPS       |         | SC Tag    | XA Tag    |
|-------------------------------------|-----------|------------|---------|-----------|-----------|
|                                     |           | Create Tag | Set Tag |           |           |
| Specific Character Set (if present) | 0008,0005 | 0008,0005  | -       | 0008,0005 | 0008,0005 |
| Accession Number                    | 0008,0050 | 0008,0050  | -       | 0008,0050 | 0008,0050 |
| Modality                            | 0008,0060 | 0008,0060  | -       | 0008,0060 | 0008,0060 |
| Referring Physician's Name          | 0008,0090 | -          | -       | 0008,0090 | 0008,0090 |
| Referenced Study Sequence           | 0008,1110 | 0008,1110  | -       | 0008,1110 | 0008,1110 |
| > Referenced SOP Class UID          | 0008,1150 | 0008,1150  | -       | -         | 0008,1150 |
| > Referenced SOP Instance UID       | 0008,1155 | 0008,1155  | -       | -         | 0008,1155 |
| Referenced Patient Sequence         | 0008,1120 | 0008,1120  | -       | -         | -         |
| > Referenced SOP Class UID          | 0008,1150 | 0008,1150  | -       | -         | -         |

| Attribute Name  | MWL Tag   | MPPS       |           | SC Tag    | XA Tag    |
|---|-----------|------------|-----------|-----------|-----------|
|   |           | Create Tag | Set Tag   |           |           |
| > Referenced SOP Instance UID   | 0008,1155 | 0008,1155  | -         | -         | -         |
| Patient's Name  | 0010,0010 | 0010,0010  | -         | 0010,0010 | 0010,0010 |
| Patient ID  | 0010,0020 | 0010,0020  | -         | 0010,0020 | 0010,0020 |
| Patient's Birth Date  | 0010,0030 | 0010,0030  | -         | 0010,0030 | 0010,0030 |
| Patient's Birth Time  | 0010,0032 | -          | -         | 0010,0032 | 0010,0032 |
| Patient's Sex   | 0010,0040 | 0010,0040  | -         | 0010,0040 | 0010,0040 |
| Other Patient IDs   | 0010,1000 | -          | -         | 0010,1000 | 0010,1000 |
| Other Patient Names   | 0010,1001 | -          | -         | 0010,1001 | 0010,1001 |
| Patient's Weight  | 0010,1030 | -          | -         | 0010,1030 | 0010,1030 |
| Study Instance UID  | 0020,000D | 0020,000D  | -         | 0020,000D | 0020,000D |
| Requested Procedure Description   | 0032,1060 | 0032,1060  | -         | -         | -         |
| Scheduled Performing Physician's Name (Physician who makes the Examination) | 0040,0006 | -          | 0008,1050 | 0008,1050 | 0008,1050 |
| Scheduled Procedure Step Description  | 0040,0007 | 0040,0007  | -         | -         | -         |
| Scheduled Procedure Step ID   | 0040,0009 | 0040,0009  | -         | -         | -         |
| > Scheduled Performing Physician's Name                                     | 0040,0006 | -          | 0008,1050 | 0008,1050 | 0008,1050 |
| > Scheduled Procedure Step Description                                      | 0040,0007 | 0040,0007  | -         | -         | -         |
| > Scheduled Protocol Code Sequence  | 0040,0008 | 0040,0008  | -         | -         | -         |
| >> Code Value   | 0008,0100 | 0008,0100  | -         | -         | -         |
| >> Coding Scheme Designator   | 0008,0102 | 0008,0102  | -         | -         | -         |
| >> Coding Scheme Version  | 0008,0103 | 0008,0103  | -         | -         | -         |
| >> Code Meaning   | 0008,0104 | 0008,0104  | -         | -         | -         |
| > Scheduled Procedure Step ID   | 0040,0009 | 0040,0009  | -         | -         | -         |
| Requested Procedure ID  | 0040,1001 | 0040,1001  | -         | -         | -         |

#### 8.1.4. Coerced/Modified fields

When exporting an image the following behavior applies.

A Secondary Capture image shall be exported as reflected in the GUI.

To enable reconstruction, an X-ray image shall be exported without annotations and using the original grayscale values as per acquisition, and a 3D image shall be exported without supplementary rotation.

## 8.2. Data Dictionary of Private Attributes

Not applicable.

## 8.3. Coded Terminology and Templates

Not applicable.

## 8.4. Grayscale Image consistency

Not applicable.

## **8.5. Standard Extended/Specialized/Private SOPs**

### **8.5.1. Standard Extended X-Ray Angiographic Image Storage SOP Class**

The X-Ray Angiographic Image Storage SOP Class is extended to create a standard extended SOP class by addition of standard and private attributes to the created SOP instances as documented in section 8.1.1.2

## **8.6. Private Transfer Syntaxes**

Not applicable.

## 9. ANNEXES VF SURGICAL WORKSTATION AE

### 9.1. IOD Contents

#### 9.1.1. Created SOP Instances

This section specifies each IOD created by the VF Surgical Workstation AE.

Defined abbreviations for the presence of IOD modules are:

|             |  |
|-------------|--|
| ALWAYS      | the module is always present                 |
| CONDITIONAL | the module is used under specified condition |

Defined abbreviations for the presence of module attributes in the tables 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   |
| ANAPCV | the attribute is present under specified condition – if present then its Value is Not Always Present (attribute sent zero length if condition applies and no value is present) |
| ANAPEV | the attribute is present under specified condition – if present then it will not have any value  |

Defined abbreviations for the source of the attribute data values in the tables 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 source is a Modality Performed Procedure Step |
| MWL      | the attribute value source is a Modality Worklist                 |
| USER     | the attribute value source is explicit user input                 |

### 9.1.1.1. Secondary Capture Image Storage SOP Class

**Table 101: Modules of the Secondary Capture Image Storage SOP Class**

| Information Entity | Module Name              | Usage       |
|--------------------|--------------------------|-------------|
| Patient            | Patient module           | ALWAYS      |
| Study              | General Study module     | ALWAYS      |
|                    | Patient Study module     | CONDITIONAL |
| Series             | General Series module    | ALWAYS      |
| Equipment          | General Equipment module | CONDITIONAL |
|                    | SC Equipment module      | ALWAYS      |
| Image              | General Image module     | ALWAYS      |
|                    | Image Pixel module       | ALWAYS      |
|                    | SC Image module          | ALWAYS      |
|                    | Overlay Plane module     | CONDITIONAL |
|                    | Modality LUT module      | CONDITIONAL |
|                    | VOI LUT module           | CONDITIONAL |
|                    | SOP Common               | ALWAYS      |

**Table 102: Created Secondary Capture Image Storage SOP Class Attributes**

| Name                                 | Tag       | VR | Presence of Value | Source     | Comment             |
|--------------------------------------|-----------|----|-------------------|------------|---------------------|
| <b>Patient Module (ALWAYS)</b>       |           |    |                   |            |                     |
| Referenced Patient Sequence          | 0008,1120 | SQ | ANAP              | AUTO       | -                   |
| > Referenced SOP Class UID           | 0008,1150 | UI | ALWAYS            | AUTO       | -                   |
| > Referenced SOP Instance UID        | 0008,1155 | UI | ALWAYS            | AUTO       | -                   |
| Patient's Name                       | 0010,0010 | PN | VNAP              | AUTO, USER | From GUI            |
| Patient ID                           | 0010,0020 | LO | VNAP              | AUTO, USER | From GUI            |
| Patient's Birth Date                 | 0010,0030 | DA | VNAP              | AUTO, USER | From GUI            |
| Patient's Birth Time                 | 0010,0032 | TM | ANAP              | AUTO       | Format <hhmm>       |
| Patient's Sex                        | 0010,0040 | CS | VNAP              | AUTO, USER | From GUI<br>M, F, O |
| Other Patient IDs                    | 0010,1000 | LO | ANAP              | AUTO       | -                   |
| Other Patient Names                  | 0010,1001 | PN | ANAP              | AUTO       | -                   |
| Ethnic Group                         | 0010,2160 | SH | ANAP              | AUTO       | -                   |
| Patient Comments                     | 0010,4000 | LT | ANAP              | AUTO, USER | From GUI            |
| <b>PATIENT MEDICAL MODULE</b>        |           |    |                   |            |                     |
| Medical Alerts                       | 0010,2000 | LO | ANAP              | AUTO, USER | From GUI            |
| Contrast Allergies                   | 0010,2110 | LO | ANAP              | AUTO, USER | From GUI            |
| <b>General Study Module (ALWAYS)</b> |           |    |                   |            |                     |
| Study Date                           | 0008,0020 | DA | VNAP              | AUTO       | -                   |
| Study Time                           | 0008,0030 | TM | VNAP              | AUTO       | -                   |
| Accession Number                     | 0008,0050 | SH | VNAP              | AUTO, USER | From GUI            |
| Referring Physician's Name           | 0008,0090 | PN | VNAP              | AUTO, USER | From GUI            |
| Study Description                    | 0008,1030 | LO | ANAP              | AUTO, USER | From GUI            |

| Name   | Tag       | VR | Presence of Value | Source     | Comment  |
|--|-----------|----|-------------------|------------|----------|
| Procedure Code Sequence                      | 0008,1032 | SQ | ANAP              | AUTO       | -        |
| > Code Value                                 | 0008,0100 | SH | ALWAYS            | AUTO       | -        |
| > Coding Scheme Designator                   | 0008,0102 | SH | ALWAYS            | AUTO       | -        |
| > Coding Scheme Version                      | 0008,0103 | SH | ALWAYS            | AUTO       | -        |
| > Code Meaning                               | 0008,0104 | LO | ALWAYS            | AUTO       | -        |
| > Mapping Resource                           | 0008,0105 | CS | ALWAYS            | AUTO       | -        |
| > Context Group Version                      | 0008,0106 | DT | ALWAYS            | AUTO       | -        |
| > Context Group Local Version                | 0008,0107 | DT | ALWAYS            | AUTO       | -        |
| > Context Group Extension Flag               | 0008,010B | CS | ANAP              | AUTO       | -        |
| > Context Group Extension Creator UID        | 0008,010D | UI | ALWAYS            | AUTO       | -        |
| > Context Identifier                         | 0008,010F | CS | ANAP              | AUTO       | -        |
| Physician(s) of Record                       | 0008,1048 | PN | ANAP              | AUTO, USER | From GUI |
| Name of Physician(s) Reading Study           | 0008,1060 | PN | ANAP              | AUTO, USER | From GUI |
| Referenced Study Sequence                    | 0008,1110 | SQ | ANAP              | AUTO       | -        |
| > Referenced SOP Class UID                   | 0008,1150 | UI | ALWAYS            | AUTO       | -        |
| > Referenced SOP Instance UID                | 0008,1155 | UI | ALWAYS            | AUTO       | -        |
| Study Instance UID                           | 0020,000D | UI | ALWAYS            | AUTO       | -        |
| Study ID                                     | 0020,0010 | SH | VNAP              | AUTO       | -        |
| <b>Patient Study Module (CONDITIONAL)</b>    |           |    |                   |            |          |
| Admitting Diagnoses Description              | 0008,1080 | UI | ANAP              | AUTO, USER | From GUI |
| Admitting Diagnoses Code Sequence            | 0008,1084 | SQ | ANAP              | AUTO       | -        |
| > Code Value                                 | 0008,0100 | SH | ALWAYS            | AUTO       | -        |
| > Coding Scheme Designator                   | 0008,0102 | SH | ALWAYS            | AUTO       | -        |
| > Coding Scheme Version                      | 0008,0103 | SH | ALWAYS            | AUTO       | -        |
| > Code Meaning                               | 0008,0104 | LO | ALWAYS            | AUTO       | -        |
| > Mapping Resource                           | 0008,0105 | CS | ALWAYS            | AUTO       | -        |
| > Context Group Version                      | 0008,0106 | DT | ALWAYS            | AUTO       | -        |
| > Context Group Local Version                | 0008,0107 | DT | ALWAYS            | AUTO       | -        |
| > Context Group Extension Flag               | 0008,010B | CS | ANAP              | AUTO       | -        |
| > Context Group Extension Creator UID        | 0008,010D | UI | ALWAYS            | AUTO       | -        |
| > Context Identifier                         | 0008,010F | CS | ANAP              | AUTO       | -        |
| Patient's Age                                | 0010,1010 | AS | ANAP              | AUTO, USER | From GUI |
| Patient's Size                               | 0010,1020 | DS | ANAP              | AUTO       | -        |
| Patient's Weight                             | 0010,1030 | DS | ANAP              | AUTO       | -        |
| Occupation                                   | 0010,2180 | SH | ANAP              | AUTO, USER | From GUI |
| Additional Patient's History                 | 0010,21B0 | LT | ANAP              | AUTO, USER | From GUI |
| <b>General Series Module (ALWAYS)</b>        |           |    |                   |            |          |
| Series Date                                  | 0008,0021 | DA | ANAP              | AUTO       | -        |
| Series Time                                  | 0008,0031 | TM | ANAP              | AUTO       | -        |
| Series Description                           | 0008,103E | LO | ANAP              | AUTO       | -        |
| Performing Physicians' Name                  | 0008,1050 | PN | ANAP              | AUTO, USER | -        |
| Operators' Name                              | 0008,1070 | PN | ANAP              | AUTO       | -        |
| Referenced Performed Procedure Step Sequence | 0008,1111 | SQ | ANAP              | AUTO       | -        |
| > Referenced SOP Class UID                   | 0008,1150 | UI | ALWAYS            | AUTO       | -        |
| > Referenced SOP Instance UID                | 0008,1155 | UI | ALWAYS            | AUTO       | -        |
| Body Part Examined                           | 0018,0015 | CS | ANAP              | AUTO       | -        |

| Name  | Tag       | VR      | Presence of Value | Source     | Comment  |
|---|-----------|---------|-------------------|------------|----------|
| Protocol Name                                 | 0018,1030 | LO      | ANAP              | AUTO, USER | -        |
| Patient Position                              | 0018,5100 | CS      | ANAPCV            | AUTO       | -        |
| Series Instance UID                           | 0020,000E | UI      | ALWAYS            | CONF       | -        |
| Series Number                                 | 0020,0011 | IS      | VNAP              | AUTO       | -        |
| Laterality                                    | 0020,0060 | CS      | ANAPCV            | AUTO       | -        |
| Smallest Pixel Value in Series                | 0028,0108 | SS / US | ANAP              | AUTO       | -        |
| Largest Pixel Value in Series                 | 0028,0109 | SS / US | ANAP              | AUTO       | -        |
| Request Attributes Sequence                   | 0040,0275 | SQ      | ANAP              | AUTO       | -        |
| > Scheduled Procedure Step Description        | 0040,0007 | LO      | ANAP              | AUTO       | -        |
| > Scheduled Protocol Code Sequence            | 0040,0008 | SQ      | ANAP              | AUTO       | -        |
| >> Code Value                                 | 0008,0100 | SH      | ALWAYS            | AUTO       | -        |
| >> Coding Scheme Designator                   | 0008,0102 | SH      | ALWAYS            | AUTO       | -        |
| >> Coding Scheme Version                      | 0008,0103 | SH      | ALWAYS            | AUTO       | -        |
| >> Code Meaning                               | 0008,0104 | LO      | ALWAYS            | AUTO       | -        |
| >> Mapping Resource                           | 0008,0105 | CS      | ALWAYS            | AUTO       | -        |
| >> Context Group Version                      | 0008,0106 | DT      | ALWAYS            | AUTO       | -        |
| >> Context Group Local Version                | 0008,0107 | DT      | ALWAYS            | AUTO       | -        |
| >> Context Group Extension Flag               | 0008,010B | CS      | ANAP              | AUTO       | -        |
| >> Context Group Extension Creator UID        | 0008,010D | UI      | ALWAYS            | AUTO       | -        |
| >> Context Identifier                         | 0008,010F | CS      | ANAP              | AUTO       | -        |
| > Scheduled Procedure Step ID                 | 0040,0009 | SH      | ALWAYS            | AUTO       | -        |
| > Requested Procedure ID                      | 0040,1001 | SH      | ALWAYS            | AUTO       | -        |
| Performed Procedure Step Start Date           | 0040,0244 | DA      | ANAP              | AUTO       | -        |
| Performed Procedure Step Start Time           | 0040,0245 | TM      | ANAP              | AUTO       | -        |
| Performed Procedure Step ID                   | 0040,0253 | SH      | ANAP              | AUTO       | -        |
| Performed Procedure Step Description          | 0040,0254 | LO      | ANAP              | AUTO, USER | From GUI |
| Performed Protocol Code Sequence              | 0040,0260 | SQ      | ANAP              | AUTO       | -        |
| > Code Value                                  | 0008,0100 | SH      | ALWAYS            | AUTO       | -        |
| > Coding Scheme Designator                    | 0008,0102 | SH      | ALWAYS            | AUTO       | -        |
| > Coding Scheme Version                       | 0008,0103 | SH      | ALWAYS            | AUTO       | -        |
| > Code Meaning                                | 0008,0104 | LO      | ALWAYS            | AUTO       | -        |
| > Mapping Resource                            | 0008,0105 | CS      | ALWAYS            | AUTO       | -        |
| > Context Group Version                       | 0008,0106 | DT      | ALWAYS            | AUTO       | -        |
| > Context Group Local Version                 | 0008,0107 | DT      | ALWAYS            | AUTO       | -        |
| > Context Group Extension Flag                | 0008,010B | CS      | ANAP              | AUTO       | -        |
| > Context Group Extension Creator UID         | 0008,010D | UI      | ALWAYS            | AUTO       | -        |
| > Context Identifier                          | 0008,010F | CS      | ANAP              | AUTO       | -        |
| Comments on the Performed Procedure Step      | 0040,0280 | ST      | ANAP              | AUTO, USER | From GUI |
| <b>General Equipment Module (CONDITIONAL)</b> |           |         |                   |            |          |
| Manufacturer                                  | 0008,0070 | LO      | VNAP              | AUTO       | -        |
| Institution Name                              | 0008,0080 | LO      | ANAP              | AUTO       | -        |
| Institution Address                           | 0008,0081 | ST      | ANAP              | AUTO       | -        |
| Station Name                                  | 0008,1010 | SH      | ANAP              | AUTO, USER | -        |
| Institutional Department Name                 | 0008,1040 | LO      | ANAP              | AUTO       | -        |
| Manufacturer's Module Name                    | 0008,1090 | LO      | ANAP              | AUTO       | -        |
| Device Serial Number                          | 0018,1000 | LO      | ANAP              | AUTO       | -        |
| Software Versions                             | 0018,1020 | LO      | ANAP              | AUTO       | -        |

| Name                                   | Tag       | VR      | Presence of Value | Source     | Comment   |
|--|-----------|---------|-------------------|------------|---|
| Spatial Resolution                     | 0018,1050 | DS      | ANAP              | AUTO       | -   |
| Date of Last Calibration               | 0018,1200 | DA      | ANAP              | AUTO       | -   |
| Time of Last Calibration               | 0018,1201 | TM      | ANAP              | AUTO       | -   |
| Pixel Padding Value                    | 0028,0120 | SS / US | ANAP              | AUTO       | -   |
| <b>SC Equipment Module (ALWAYS)</b>    |           |         |                   |            |   |
| Modality                               | 0008,0060 | CS      | ALWAYS            | AUTO, USER | -   |
| Conversion Type                        | 0008,0064 | CS      | ALWAYS            | AUTO       | Applied value: WSD                              |
| <b>General Image Module (ALWAYS)</b>   |           |         |                   |            |   |
| Image Type                             | 0008,0008 | CS      | ANAP              | AUTO       | -   |
| Acquisition Date                       | 0008,0022 | DA      | ANAP              | AUTO       | -   |
| Content Date                           | 0008,0023 | DA      | ANAPCV            | AUTO       | The date the image pixel data creation started. |
| Acquisition Datetime                   | 0008,002A | DT      | ANAP              | AUTO       | -   |
| Acquisition Time                       | 0008,0032 | TM      | ANAP              | AUTO       | -   |
| Content Time                           | 0008,0033 | TM      | ANAPCV            | AUTO       | The time the image pixel data creation started. |
| Referenced Image Sequence              | 0008,1140 | SQ      | ANAP              | AUTO       | -   |
| > Referenced SOP Class UID             | 0008,1150 | UI      | ALWAYS            | AUTO       | -   |
| > Referenced SOP Instance UID          | 0008,1155 | UI      | ALWAYS            | AUTO       | -   |
| > Referenced Frame Number              | 0008,1160 | IS      | ANAP              | AUTO       | -   |
| > Purposed of Reference Code Sequence  | 0040,A170 | SQ      | ANAP              | AUTO       | -   |
| >> Code Value                          | 0008,0100 | SH      | ALWAYS            | AUTO       | -   |
| >> Coding Scheme Designator            | 0008,0102 | SH      | ALWAYS            | AUTO       | -   |
| >> Coding Scheme Version               | 0008,0103 | SH      | ALWAYS            | AUTO       | -   |
| >> Code Meaning                        | 0008,0104 | LO      | ALWAYS            | AUTO       | -   |
| >> Mapping Resource                    | 0008,0105 | CS      | ALWAYS            | AUTO       | -   |
| >> Context Group Version               | 0008,0106 | DT      | ALWAYS            | AUTO       | -   |
| >> Context Group Local Version         | 0008,0107 | DT      | ALWAYS            | AUTO       | -   |
| >> Context Group Extension Flag        | 0008,010B | CS      | ANAP              | AUTO       | -   |
| >> Context Group Extension Creator UID | 0008,010D | UI      | ALWAYS            | AUTO       | -   |
| >> Context Identifier                  | 0008,010F | CS      | ANAP              | AUTO       | -   |
| Derivation Description                 | 0008,2111 | ST      | ANAP              | AUTO       | -   |
| Source Image Sequence                  | 0008,2112 | SQ      | ANAP              | AUTO       | -   |
| > Referenced SOP Class UID             | 0008,1150 | UI      | ALWAYS            | AUTO       | -   |
| > Referenced SOP Instance UID          | 0008,1155 | UI      | ALWAYS            | AUTO       | -   |
| > Referenced Frame Number              | 0008,1160 | IS      | ANAP              | AUTO       | -   |
| > Purpose of Reference Code Sequence   | 0040,A170 | SQ      | ANAP              | AUTO       | -   |
| >> Code Value                          | 0008,0100 | SH      | ALWAYS            | AUTO       | -   |
| >> Coding Scheme Designator            | 0008,0102 | SH      | ALWAYS            | AUTO       | -   |
| >> Coding Scheme Version               | 0008,0103 | SH      | ALWAYS            | AUTO       | -   |
| >> Code Meaning                        | 0008,0104 | LO      | ALWAYS            | AUTO       | -   |
| >> Mapping Resource                    | 0008,0105 | CS      | ALWAYS            | AUTO       | -   |
| >> Context Group Version               | 0008,0106 | DT      | ALWAYS            | AUTO       | -   |
| >> Context Group Local Version         | 0008,0107 | DT      | ALWAYS            | AUTO       | -   |
| >> Context Group Extension Flag        | 0008,010B | CS      | ANAP              | AUTO       | -   |

| Name  | Tag       | VR         | Presence of Value | Source | Comment |
|---|-----------|------------|-------------------|--------|---------|
| >> Context Group Extension Creator UID      | 0008,010D | UI         | ALWAYS            | AUTO   | -       |
| >> Context Identifier                       | 0008,010F | CS         | ANAP              | AUTO   | -       |
| Derivation Code Sequence                    | 0008,9215 | SQ         | ANAP              | AUTO   | -       |
| > Code Value                                | 0008,0100 | SH         | ALWAYS            | AUTO   | -       |
| > Coding Scheme Designator                  | 0008,0102 | SH         | ALWAYS            | AUTO   | -       |
| > Coding Scheme Version                     | 0008,0103 | SH         | ALWAYS            | AUTO   | -       |
| > Code Meaning                              | 0008,0104 | LO         | ALWAYS            | AUTO   | -       |
| > Mapping Resource                          | 0008,0105 | CS         | ALWAYS            | AUTO   | -       |
| > Context Group Version                     | 0008,0106 | DT         | ALWAYS            | AUTO   | -       |
| > Context Group Local Version               | 0008,0107 | DT         | ALWAYS            | AUTO   | -       |
| > Context Group Extension Flag              | 0008,010B | CS         | ANAP              | AUTO   | -       |
| > Context Group Extension Creator UID       | 0008,010D | UI         | ALWAYS            | AUTO   | -       |
| > Context Identifier                        | 0008,010F | CS         | ANAP              | AUTO   | -       |
| Acquisition Number                          | 0020,0012 | IS         | ANAP              | AUTO   | -       |
| Instance Number                             | 0020,0013 | IS         | VNAP              | AUTO   | -       |
| Patient Orientation                         | 0020,0020 | CS         | ALWAYS            | AUTO   | -       |
| Images in Acquisition                       | 0020,1002 | IS         | ANAP              | AUTO   | -       |
| Image Comments                              | 0020,4000 | LT         | ANAP              | AUTO   | -       |
| Quality Control Image                       | 0028,0300 | CS         | ANAP              | AUTO   | -       |
| Burned in Annotation                        | 0028,0301 | CS         | ANAP              | AUTO   | -       |
| Lossy Image Compression                     | 0028,2110 | CS         | ANAP              | AUTO   | -       |
| Lossy Image Compression Ratio               | 0028,2112 | DS         | ANAP              | AUTO   | -       |
| Icon Image Sequence                         | 0088,0200 | SQ         | ANAP              | AUTO   | -       |
| > Slice Thickness                           | 0018,0050 | DS         | ALWAYS            | AUTO   | -       |
| > Slice Location                            | 0020,1041 | DS         | ALWAYS<br>AUTO    | AUTO   | -       |
| > Pixel Spacing                             | 0028,0030 | DS         | ALWAYS            | AUTO   | -       |
| Presentation LUT Shape                      | 2050,0020 | CS         | ANAP              | AUTO   | -       |
| <b>Image Pixel Module (ALWAYS)</b>          |           |            |                   |        |         |
| Samples per Pixel                           | 0028,0002 | US         | ALWAYS            | AUTO   | -       |
| Photometric Interpretation                  | 0028,0004 | CS         | ALWAYS            | AUTO   | -       |
| Planar Configuration                        | 0028,0006 | US         | ANAP              | AUTO   | -       |
| Row   | 0028,0010 | US         | ALWAYS            | AUTO   | -       |
| Columns                                     | 0028,0011 | US         | ALWAYS            | AUTO   | -       |
| Pixel Aspect Ratio                          | 0028,0034 | IS         | ANAP              | AUTO   | -       |
| Bits Allocated                              | 0028,0100 | US         | ALWAYS            | AUTO   | -       |
| Bits Stored                                 | 0028,0101 | US         | ALWAYS            | AUTO   | -       |
| High Bit                                    | 0028,0102 | US         | ALWAYS            | AUTO   | -       |
| Pixel Representation                        | 0028,0103 | US         | ALWAYS            | AUTO   | -       |
| Smallest Image Pixel Value                  | 0028,0106 | SS /<br>US | ANAP              | AUTO   | -       |
| Largest Image Pixel Value                   | 0028,0107 | SS /<br>US | ANAP              | AUTO   | -       |
| Red Palette Color Lookup Table Descriptor   | 0028,1101 | SS /<br>US | ANAP              | AUTO   | -       |
| Green Palette Color Lookup Table Descriptor | 0028,1102 | SS /<br>US | ANAP              | AUTO   | -       |
| Blue Palette Color Lookup Table Descriptor  | 0028,1103 | SS /<br>US | ANAP              | AUTO   | -       |
| Red Palette Color Lookup Table Data         | 0028,1201 | OW         | ANAP              | AUTO   | -       |
| Green Palette Color Lookup Table Data       | 0028,1202 | OW         | ANAP              | AUTO   | -       |
| Blue Palette Color Lookup Table Data        | 0028,1203 | OW         | ANAP              | AUTO   | -       |
| Pixel Data                                  | 7FE0,0010 | OW         | ALWAYS            | AUTO   | -       |

| Name                                      | Tag       | VR                 | Presence of Value | Source | Comment                                     |
|---|-----------|--------------------|-------------------|--------|---|
| <b>SC Image Module (ALWAYS)</b>           |           |                    |                   |        |   |
| Date of Secondary Capture                 | 0018,1012 | DA                 | ALWAYS            | AUTO   | -   |
| Time of Secondary Capture                 | 0018,1014 | TM                 | ALWAYS            | AUTO   | -   |
| <b>Overlay Plane Module (CONDITIONAL)</b> |           |                    |                   |        |   |
| Overlay Rows                              | 60xx,0010 | US                 | ALWAYS            | AUTO   | -   |
| Overlay Columns                           | 60xx,0011 | US                 | ALWAYS            | AUTO   | -   |
| Overlay Description                       | 60xx,0022 | LO                 | ANAP              | AUTO   | -   |
| Overlay Type                              | 60xx,0040 | CS                 | ALWAYS            | AUTO   | -   |
| Overlay Subtype                           | 60xx,0045 | LO                 | ANAP              | AUTO   | -   |
| Overlay Origin                            | 60xx,0050 | SS                 | ALWAYS            | AUTO   | -   |
| Overlay Bits Allocated                    | 60xx,0100 | US                 | ALWAYS            | AUTO   | -   |
| Overlay Bits Position                     | 60xx,0102 | US                 | ALWAYS            | AUTO   | -   |
| ROI Area                                  | 60xx,1301 | IS                 | ANAP              | AUTO   | -   |
| ROI Mean                                  | 60xx,1302 | DS                 | ANAP              | AUTO   | -   |
| ROI Standard Deviation                    | 60xx,1303 | DS                 | ANAP              | AUTO   | -   |
| Overlay Label                             | 60xx,1500 | LO                 | ANAP              | AUTO   | -   |
| Overlay Data                              | 60xx,3000 | OB /<br>OW         | ALWAYS            | AUTO   | -   |
| <b>Modality LUT Module (CONDITIONAL)</b>  |           |                    |                   |        |   |
| Modality LUT Sequence                     | 0028,3000 | SQ                 | ANAP              | AUTO   | -   |
| > LUT Descriptor                          | 0028,3002 | SS /<br>US         | ALWAYS            | AUTO   | -   |
| > LUT Explanation                         | 0028,3003 | LO                 | ANAP              | AUTO   | -   |
| > Modality LUT Type                       | 0028,3004 | LO                 | ALWAYS            | AUTO   | -   |
| > LUT Data                                | 0028,3006 | SS /<br>US /<br>OW | ALWAYS            | AUTO   | -   |
| Rescale Intercept                         | 0028,1052 | DS                 | ANAP              | AUTO   | -   |
| Rescale Slope                             | 0028,1053 | DS                 | ANAP              | AUTO   | -   |
| <b>VOI LUT Module (CONDITIONAL)</b>       |           |                    |                   |        |   |
| VOI LUT Sequence                          | 0028,3010 | SQ                 | ANAP              | AUTO   | -   |
| >LUT Descriptor                           | 0028,3002 | SS /<br>US         | ALWAYS            | AUTO   | -   |
| >LUT Explanation                          | 0028,3003 | LO                 | ANAP              | AUTO   | -   |
| >LUT Data                                 | 0028,3006 | SS /<br>US /<br>OW | ALWAYS            | AUTO   | -   |
| Window Center                             | 0028,1050 | DS                 | ANAP              | AUTO   | -   |
| Window Width                              | 0028,1051 | DS                 | ANAP              | AUTO   | -   |
| Window Center & Width Explanation         | 0028,1055 | LO                 | ANAP              | AUTO   | -   |
| <b>SOP Common Module (ALWAYS)</b>         |           |                    |                   |        |   |
| Specific Character Set                    | 0008,0005 | CS                 | ANAP              | AUTO   | Applied values:<br>ISO_IR 100               |
| SOP Class UID                             | 0008,0016 | UI                 | ALWAYS            | AUTO   | Applied value:<br>1.2.840.1000<br>8.5.1.1.7 |
| SOP Instance UID                          | 0008,0018 | UI                 | ALWAYS            | AUTO   | -   |

### 9.1.1.2. Grayscale Softcopy Presentation State Storage SOP Class

**Table 103: Modules of the Grayscale Softcopy Presentation State Storage SOP Class**

| Information Entity | Module Name                              | Usage       |
|--------------------|--|-------------|
| Patient            | Patient module                           | ALWAYS      |
| Study              | General Study module                     | ALWAYS      |
| Series             | General Series module                    | ALWAYS      |
|                    | Presentation Series module               | ALWAYS      |
| Equipment          | General Equipment module                 | ALWAYS      |
| Presentation State | Displayed Area module                    | ALWAYS      |
|                    | Graphic Layer module                     | CONDITIONAL |
|                    | Softcopy Presentation LUT module         | ALWAYS      |
|                    | Softcopy VOI LUT module                  | CONDITIONAL |
|                    | Presentation State Identification module | ALWAYS      |
|                    | Presentation State Relationship module   | ALWAYS      |
|                    | Presentation State Shutter module        | ALWAYS      |
|                    | SOP Common module                        | ALWAYS      |

**Table 104: Created Grayscale Softcopy Presentation State Storage SOP Class Attributes**

| Name                          | Tag       | VR | Present of Value | Source | Comment                                   |
|-------------------------------|-----------|----|------------------|--------|---|
| <b>Patient Module</b>         |           |    |                  |        |   |
| Patient's Name                | 0010,0010 | PN | ALWAYS           | COPY   | -   |
| Patient ID                    | 0010,0020 | LO | VNAP             | COPY   | -   |
| Patient's Birth Date          | 0010,0030 | DA | VNAP             | COPY   | -   |
| Patient's Sex                 | 0010,0040 | CS | VNAP             | COPY   | -   |
| <b>General Study Module</b>   |           |    |                  |        |   |
| Study Date                    | 0008,0020 | DA | ALWAYS           | COPY   | Date on which this study was created.     |
| Study Time                    | 0008,0030 | TM | ALWAYS           | COPY   | Time on which this Study was created.     |
| Accession Number              | 0008,0050 | SH | VNAP             | COPY   | -   |
| Referring Physician's Name    | 0008,0090 | PN | VNAP             | COPY   | -   |
| Study Description             | 0008,1030 | LO | VNAP             | COPY   | -   |
| Referenced Study Sequence     | 0008,1110 | SQ | ANAP             | AUTO   | -   |
| > Referenced SOP Class UID    | 0008,1150 | UI | ALWAYS           | AUTO   | Applied value:<br>1.2.840.10008.3.1.2.3.3 |
| > Referenced SOP Instance UID | 0008,1155 | UI | ALWAYS           | AUTO   | -   |
| Study Instance UID            | 0020,000D | UI | ALWAYS,<br>COPY  | COPY   | -   |
| Study ID                      | 0020,0010 | SH | VNAP,<br>COPY    | COPY   | -   |
| <b>General Series Module</b>  |           |    |                  |        |   |
| Series Date                   | 0008,0021 | DA | ANAP             | AUTO   | Date the Series started.                  |
| Series Time                   | 0008,0031 | TM | ANAP,<br>AUTO    | AUTO   | Time the Series started.                  |

| Name  | Tag       | VR | Present of Value | Source | Comment  |
|---|-----------|----|------------------|--------|--|
| Series Instance UID                             | 0020,000E | UI | ALWAYS           | AUTO   | -  |
| Series Number                                   | 0020,0011 | IS | VNAP             | COPY   | -  |
| Laterality                                      | 0020,0060 | CS | ANAP             | COPY   | Applied values:<br>L, R                            |
| <b>Presentation Series Module</b>               |           |    |                  |        |  |
| Modality  | 0008,0060 | CS | ALWAYS           | AUTO   | Applied value:<br>PR (Presentation State)          |
| <b>General Equipment Module</b>                 |           |    |                  |        |  |
| Manufacturer                                    | 0008,0070 | LO | ALWAYS           | AUTO   | Applied value:<br>Philips Medical Systems          |
| Manufacturer's Model Name                       | 0008,1090 | LO | ALWAYS           | AUTO   | -  |
| Software Version(s)                             | 0018,1020 | LO | ALWAYS           | AUTO   | -  |
| <b>Displayed Area Module</b>                    |           |    |                  |        |  |
| Displayed Area Selection Sequence               | 0070,005A | SQ | ALWAYS           | AUTO   | -  |
| > Displayed Area Top Left Hand Corner           | 0070,0052 | SL | ALWAYS           | FIXED  | Applied value:<br>1, 1                             |
| > Displayed Area Bottom Right Hand Corner       | 0070,0053 | SL | ALWAYS           | AUTO   | -  |
| > Presentation Size Mode                        | 0070,0100 | CS | ALWAYS           | FIXED  | Applied value:<br>SCALE TO FIT                     |
| <b>Graphic Layer Module</b>                     |           |    |                  |        |  |
| Graphic Layer Sequence                          | 0070,0060 | SQ | ALWAYS           | AUTO   | -  |
| > Graphic Layer                                 | 0070,0002 | CS | ALWAYS           | AUTO   | -  |
| > Graphic Layer Order                           | 0070,0062 | IS | ALWAYS           | AUTO   | -  |
| <b>Softcopy Presentation LUT Module</b>         |           |    |                  |        |  |
| Presentation LUT Sequence                       | 2050,0010 | SQ | ALWAYS           | AUTO   | -  |
| > LUT Descriptor                                | 0028,3002 | SS | ALWAYS           | AUTO   | -  |
| > LUT Data                                      | 0028,3006 | OW | ALWAYS           | AUTO   | -  |
| <b>Softcopy VOI LUT Module</b>                  |           |    |                  |        |  |
| Softcopy VOI LUT Sequence                       | 0028,3110 | SQ | ALWAYS           | AUTO   | -  |
| > Referenced Image Sequence                     | 0008,1140 | SQ | ANAP             | AUTO   | -  |
| >> Referenced SOP Class UID                     | 0008,1150 | UI | ALWAYS           | AUTO   | -  |
| >> Referenced SOP Instance UID                  | 0008,1155 | UI | ALWAYS           | AUTO   | -  |
| >> Referenced Frame Number                      | 0008,1160 | IS | ANAP             | AUTO   | -  |
| > Window Center                                 | 0028,1050 | DS | ANAP             | AUTO   | -  |
| > Window Width                                  | 0028,1051 | DS | ANAP             | AUTO   | -  |
| > Window Center & Width Explanation             | 0028,1055 | DS | ANAPCV           | AUTO   | -  |
| > VOI LUT Sequence                              | 0028,3010 | SQ | ANAP             | COPY   | -  |
| >> LUT Descriptor                               | 0028,3002 | SQ | ALWAYS           | COPY   | -  |
| >> LUT Explanation                              | 0028,3003 | SQ | ANAPCV           | COPY   | -  |
| >> LUT Data                                     | 0028,3006 | SQ | ALWAYS           | COPY   | -  |
| <b>Presentation State Identification Module</b> |           |    |                  |        |  |
| Instance Number                                 | 0020,0013 | IS | ALWAYS           | AUTO   | -  |
| Content Label                                   | 0070,0080 | CS | ALWAYS           | AUTO   | Applied values:<br>"AS LAST SEEN", "NEW AT IMPORT" |
| Content Description                             | 0070,0081 | LO | VNAP             | AUTO   | -  |
| Presentation Creation Date                      | 0070,0082 | DA | ALWAYS           | AUTO   | Current date.                                      |
| Presentation Creation Time                      | 0070,0083 | TM | ALWAYS           | AUTO   | Current time.                                      |

| Name  | Tag       | VR | Present of Value | Source | Comment                                     |
|---|-----------|----|------------------|--------|---|
| Content Creator's Name                        | 0070,0084 | PN | ALWAYS           | AUTO   | Applied value: "Surgery user"               |
| <b>Presentation State Relationship Module</b> |           |    |                  |        |   |
| Referenced Series Sequence                    | 0008,1115 | SQ | ALWAYS           | AUTO   | -   |
| > Referenced Image Sequence                   | 0008,1140 | SQ | ALWAYS           | AUTO   | -   |
| >> Referenced SOP Class UID                   | 0008,1150 | UI | ALWAYS           | COPY   | -   |
| >> Referenced SOP Instance UID                | 0008,1155 | UI | ALWAYS           | COPY   | -   |
| > Series Instance UID                         | 0020,000E | UI | ALWAYS           | AUTO   | -   |
| <b>Presentation State Shutter Module</b>      |           |    |                  |        |   |
| Shutter Presentation Value                    | 0018,1622 | US | ANAP             | AUTO   | Applied value: 0                            |
| <b>SOP Common Module</b>                      |           |    |                  |        |   |
| Specific Character Set                        | 0008,0005 | CS | ANAP,            | AUTO   | Applied value: ISO_IR 100                   |
| SOP Class UID                                 | 0008,0016 | UI | ALWAYS           | AUTO   | Applied value: 1.2.840.10008.5.1.4.1.1.11.1 |
| SOP Instance UID                              | 0008,0018 | UI | ALWAYS           | AUTO   | -   |

### 9.1.2. Usage of Attributes from Received IOD's

None specific.

### 9.1.3. Attribute Mapping

Not applicable.

### 9.1.4. Coerced/Modified fields

In general, the VF Surgical Workstation AE will try and optimize the imported image data. This may involve the removal of redundant data, either or not due to the creation of a Presentation State object for the image data. This may also involve the creation of extra attributes. As it is not the intention of the VF Surgical Workstation AE to export this data as such, the SOP Instance UID shall not be changed.

If not available at import then the VF Surgical Workstation AE will create the additional attributes as listed in **Table 105**.

**Table 105: Additional Attributes for Image Storage**

| Attribute Name                       | Tag       | VR | Generated Value                            |
|--------------------------------------|-----------|----|--|
| Performed Procedure Step Start Date  | 0040,0244 | DA | Copied from (0008,0020) Study Date.        |
| Performed Procedure Step Start Time  | 0040,0245 | TM | Copied from (0008,0030) Study Time.        |
| Performed Procedure Step ID          | 0040,0253 | SH | Copied from (0020,0010) Study ID.          |
| Performed Procedure Step Description | 0040,0254 | LO | Copied from (0008,1030) Study Description. |

If the SCU does not propose a presentation context for the Grayscale Softcopy Presentation State storage SOP class, then the VF Surgical Workstation AE will derive Presentation State data from the imported image data and store this data in a new series within the examination of the imported image.

However, if during import the image is accompanied by Presentation State data, the VF Surgical Workstation AE database shall avoid data overlap by only storing the relevant data from the first object received; either the first image or its Presentation State!

Thus it will omit data received by succeeding objects concerning the optional attributes (VT=3) listed in **Table 106**, and clear all mandatory attributes (VT=2) listed in Table 107.

**Table 106: Omitted Attributes for Image Storage**

| Attribute Name                                     | Tag       | VR      | Value | Presence of Value | Source |
|--|-----------|---------|-------|-------------------|--------|
| <b>Patient Module</b>                              |           |         |       |                   |        |
| Referenced Patient Sequence                        | 0008,1120 | SQ      |       | ANAP              | AUTO   |
| Patient's Birth Time                               | 0010,0032 | TM      |       | ANAP              | AUTO   |
| Other Patient Ids                                  | 0010,1000 | LO      |       | ANAP              | AUTO   |
| Other Patient Names                                | 0010,1001 | PN      |       | ANAP              | AUTO   |
| Ethnic Group                                       | 0010,2160 | SH      |       | ANAP              | AUTO   |
| Patient Comments                                   | 0010,4000 | LT      |       | ANAP              | AUTO   |
| <b>General Study Module</b>                        |           |         |       |                   |        |
| Referring Physician Identification Sequence        | 0008,0096 | SQ      |       | ANAP              | AUTO   |
| Study Description                                  | 0008,1030 | LO      |       | ANAP              | AUTO   |
| Procedure Code Sequence                            | 0008,1032 | SQ      |       | ANAP              | AUTO   |
| Physician(s) of Record                             | 0008,1048 | PN      |       | ANAP              | AUTO   |
| Physician(s) of Record Identification Sequence     | 0008,1049 | SQ      |       | ANAP              | AUTO   |
| Name of Physician(s) Reading Study                 | 0008,1060 | PN      |       | ANAP              | AUTO   |
| Physician(s) Reading Study Identification Sequence | 0008,1062 | SQ      |       | ANAP              | AUTO   |
| Referenced Study Sequence                          | 0008,1110 | SQ      |       | ANAP              | AUTO   |
| <b>Patient Study Module</b>                        |           |         |       |                   |        |
| Admitting Diagnoses Description                    | 0008,1080 | UI      |       | ANAP              | AUTO   |
| Admitting Diagnoses Code Sequence                  | 0008,1084 | SQ      |       | ANAP              | AUTO   |
| Patient's Age                                      | 0010,1010 | AS      |       | ANAP              | AUTO   |
| Patient's Size                                     | 0010,1020 | DS      |       | ANAP              | AUTO   |
| Patient's Weight                                   | 0010,1030 | DS      |       | ANAP              | AUTO   |
| Occupation   | 0010,2180 | SH      |       | ANAP              | AUTO   |
| Additional Patient History                         | 0010,21B0 | LT      |       | ANAP              | AUTO   |
| <b>Clinical Trial Study Module</b>                 |           |         |       |                   |        |
| Clinical Trial Time Point Description              | 0012,0051 |         |       | ANAP              | AUTO   |
| <b>General Series Module</b>                       |           |         |       |                   |        |
| Series Date  | 0008,0021 | DA      |       | ANAP              | AUTO   |
| Series Time  | 0008,0031 | TM      |       | ANAP              | AUTO   |
| Series Description                                 | 0008,103E | LO      |       | ANAP              | AUTO   |
| Performing Physicians' Name                        | 0008,1050 | PN      |       | ANAP              | AUTO   |
| Performing Physician Identification Sequence       | 0008,1052 | SQ      |       | ANAP              | AUTO   |
| Operators' Name                                    | 0008,1070 | PN      |       | ANAP              | AUTO   |
| Operators Identification Sequence                  | 0008,1072 | SQ      |       | ANAP              | AUTO   |
| Referenced Performed Procedure Step Sequence       | 0008,1111 | SQ      |       | ANAP              | AUTO   |
| Body Part Examined                                 | 0018,0015 | CS      |       | ANAP              | AUTO   |
| Protocol Name                                      | 0018,1030 | LO      |       | ANAP              | AUTO   |
| Smallest Pixel Value in Series                     | 0028.0108 | US / SS |       | ANAP              | AUTO   |
| Largest Pixel Value in Series                      | 0028.0109 | US / SS |       | ANAP              | AUTO   |
| Performed Procedure Step Start Date                | 0040,0244 | DA      |       | ANAP              | AUTO   |

|  |           |         |  |      |      |
|--|-----------|---------|--|------|------|
| Performed Procedure Step Start Time          | 0040,0245 | TM      |  | ANAP | AUTO |
| Performed Procedure Step ID                  | 0040,0253 | SH      |  | ANAP | AUTO |
| Performed Procedure Step Description         | 0040,0254 | LO      |  | ANAP | AUTO |
| Performed Protocol Code Sequence             | 0040,0260 | SQ      |  | ANAP | AUTO |
| Request Attributes Sequence                  | 0040,0275 | SQ      |  | ANAP | AUTO |
| Comments on the Performed Procedure Step     | 0040,0280 | ST      |  | ANAP | AUTO |
| <b>General Equipment Module</b>              |           |         |  |      |      |
| Institution Name                             | 0008,0080 | LO      |  | ANAP | AUTO |
| Institution Address                          | 0008,0081 | ST      |  | ANAP | AUTO |
| Station Name                                 | 0008,1010 | SH      |  | ANAP | AUTO |
| Institutional Department Name                | 0008,1040 | LO      |  | ANAP | AUTO |
| Manufacturer's Model Name                    | 0008,1090 | LO      |  | ANAP | AUTO |
| Device Serial Number                         | 0018,1000 | LO      |  | ANAP | AUTO |
| Software Versions                            | 0018,1020 | LO      |  | ANAP | AUTO |
| Spatial Resolution                           | 0018,1050 | DS      |  | ANAP | AUTO |
| Date of Last Calibration                     | 0018,1200 | DA      |  | ANAP | AUTO |
| Time of Last Calibration                     | 0018,1201 | TM      |  | ANAP | AUTO |
| Pixel Padding Value                          | 0028,0120 | US / SS |  | ANAP | AUTO |
| <b>Display Shutter Module</b>                |           |         |  |      |      |
| Shutter Presentation Value                   | 0018,1622 | US      |  | ANAP | AUTO |
| <b>Overlay Plane Module</b>                  |           |         |  |      |      |
| Overlay Description                          | 60xx,0022 | LO      |  | ANAP | AUTO |
| Overlay Subtype                              | 60xx,0045 | LO      |  | ANAP | AUTO |
| ROI Area                                     | 60xx,1301 | IS      |  | ANAP | AUTO |
| ROI Mean                                     | 60xx,1302 | DS      |  | ANAP | AUTO |
| ROI Standard Deviation                       | 60xx,1303 | DS      |  | ANAP | AUTO |
| Overlay Label                                | 60xx,1500 | LO      |  | ANAP | AUTO |
| <b>SOP Common Module</b>                     |           |         |  |      |      |
| Instance Creation Date                       | 0008,0012 | DA      |  | ANAP | AUTO |
| Instance Creation Time                       | 0008,0013 | TM      |  | ANAP | AUTO |
| Instance Creator UID                         | 0008,0014 | UI      |  | ANAP | AUTO |
| Coding Scheme Identification Sequence        | 0008,0110 | SQ      |  | ANAP | AUTO |
| Timezone Offset From UTC                     | 0008,0201 | SH      |  | ANAP | AUTO |
| Contributing Equipment Sequence              | 0018,A001 | SQ      |  | ANAP | AUTO |
| Instance Number                              | 0020,0013 | IS      |  | ANAP | AUTO |
| SOP Authorization Date and Time              | 0100,0420 | DT      |  | ANAP | AUTO |
| SOP Authorization Comment                    | 0100,0424 | LT      |  | ANAP | AUTO |
| Authorization Equipment Certification Number | 0100,0426 | LO      |  | ANAP | AUTO |
| MAC Parameters Sequence                      | 4FFE,0001 | SQ      |  | ANAP | AUTO |
| Digital Signatures Sequence                  | FFFA,FFFA | SQ      |  | ANAP | AUTO |

**Table 107: Cleared Attributes for Image Storage**

| Attribute Name        | Tag       | VR | Value | Presence of Value | Source |
|-----------------------|-----------|----|-------|-------------------|--------|
| <b>Patient Module</b> |           |    |       |                   |        |
| Patient's Name        | 0010,0010 | PN |       | VNAP              | AUTO   |
| Patient ID            | 0010,0020 | LO |       | VNAP              | AUTO   |
| Patient's Birth Date  | 0010,0030 | DA |       | VNAP              | AUTO   |

|   |           |    |  |        |      |
|---|-----------|----|--|--------|------|
| Patient's Sex                           | 0010,0040 | CS |  | VNAP   | AUTO |
| <b>Clinical Trial Subject Module</b>    |           |    |  |        |      |
| Clinical Trial Protocol Name            | 0012,0021 | LO |  | VNAP   | AUTO |
| Clinical Trial Site ID                  | 0012,0030 | LO |  | VNAP   | AUTO |
| Clinical Trial Site Name                | 0012,0031 | LO |  | VNAP   | AUTO |
| <b>General Study Module</b>             |           |    |  |        |      |
| Study Date                              | 0008,0020 | DA |  | VNAP   | AUTO |
| Study Time                              | 0008,0030 | TM |  | VNAP   | AUTO |
| Accession Number                        | 0008,0050 | SH |  | VNAP   | AUTO |
| Referring Physician's Name              | 0008,0090 | PN |  | VNAP   | AUTO |
| Study ID                                | 0020,0010 | SH |  | VNAP   | AUTO |
| <b>Clinical Trial Study Module</b>      |           |    |  |        |      |
| Clinical Trial Time Point ID            | 0012,0050 | LO |  | VNAP   | AUTO |
| <b>General Series Module</b>            |           |    |  |        |      |
| Patient Position                        | 0018,5100 | CS |  | ANAPCV | AUTO |
| Series Number                           | 0020,0011 | IS |  | VNAP   | AUTO |
| Laterality                              | 0020,0060 | CS |  | ANAPCV | AUTO |
| <b>Clinical Trial Series Module</b>     |           |    |  |        |      |
| Clinical Trial Coordinating Center Name | 0012,0060 | LO |  | VNAP   | AUTO |
| <b>General Equipment Module</b>         |           |    |  |        |      |
| Manufacturer                            | 0008,0070 | LO |  | VNAP   | AUTO |
| <b>Mask Module</b>                      |           |    |  |        |      |
| Recommended Viewing Mode                | 0028,1090 | CS |  | VNAP   | AUTO |
| <b>Overlay/Curve Activation Module</b>  |           |    |  |        |      |
| Curve Activation Layer                  | 50xx,1001 | CS |  | ANAP   | AUTO |
| Overlay Activation Layer                | 60xx,1001 | CS |  | ANAP   | AUTO |

The VF Surgical Workstation AE allows the operator (USER) to modify attributes of the stored images in the GUI; see Table 108.

The VF Surgical Workstation AE does not modify the pixel values of the stored images. Modified images retain their original Study, Series and Image UID.

**Table 108: Modifiable Attributes**

| Attribute Name                     | Tag       | VR | Value | Presence of Value | Source |
|------------------------------------|-----------|----|-------|-------------------|--------|
| <b>Patient</b>                     |           |    |       |                   |        |
| Patient's Name                     | 0010,0010 | PN |       | VNAP              | USER   |
| Patient ID                         | 0010,0020 | LO |       | VNAP              | USER   |
| Patient's Birth Date               | 0010,0030 | DA |       | VNAP              | USER   |
| Patient's Sex                      | 0010,0040 | CS |       | VNAP              | USER   |
| Medical Alerts                     | 0010,2000 | LO | 1-N   | VNAP              | USER   |
| Contrast Allergies                 | 0010,2110 | LO | 1-N   | VNAP              | USER   |
| Patient Comments                   | 0010,4000 | LT |       | ANAP              | USER   |
| <b>Study</b>                       |           |    |       |                   |        |
| Accession Number                   | 0008,0050 | SH |       | VNAP              | USER   |
| Referring Physician's Name         | 0008,0090 | PN |       | VNAP              | USER   |
| Study Description                  | 0008,1030 | LO |       | ANAP              | USER   |
| Physician(s) of Record             | 0008,1048 | PN | 1-N   | ANAP              | USER   |
| Name of Physician(s) Reading Study | 0008,1060 | PN | 1-N   | ANAP              | USER   |
| Admitting Diagnoses Description    | 0008,1080 | LO | 1-N   | ANAP              | USER   |
| Patient's Age                      | 0010,1010 | AS |       | ANAP              | USER   |

|  |           |    |   |      |                  |
|--|-----------|----|---|------|------------------|
| Occupation                               | 0010,2180 | SH |   | ANAP | USER             |
| Additional Patient History               | 0010,21B0 | LT |   | ANAP | USER             |
| <b>Examination</b>                       |           |    |   |      |                  |
| Performed Station Name                   | 0040,0242 | SH | An institution defined name for the modality on which the Performed Procedure Step was performed.         | ANAP | CONF, MPPS, USER |
| Performed Location                       | 0040,0243 | SH | Description of the location at which the Performed Procedure Step was performed.                          | ANAP | MPPS, USER       |
| Performed Procedure Step Description     | 0040,0254 | LO | From Modality Worklist or user input. The user can modify the description provided via Modality Worklist. | ANAP | MPPS, USER       |
| Performed Procedure Type Description     | 0040,0255 | LO | A description of the type of procedure performed.   | ANAP | MPPS, USER       |
| Comments on the Performed Procedure Step | 0040,0280 | ST | User-defined comments on the Performed Procedure Step.  | ANAP | MPPS, USER       |
| <b>Series</b>                            |           |    |   |      |                  |
| -  |           |    |   |      |                  |

**9.2. Data Dictionary of Private Attributes**

Not applicable.

**9.3. Coded Terminology and Templates**

Not applicable.

**9.4. Grayscale Image consistency**

The high-resolution display monitor attached to the product can be calibrated by using the service tool together with a light probe. See the [VFRB] for details on the calibration procedure.

**9.5. Standard Extended/Specialized/Private SOPs**

The VF Surgical Workstation AE supports the following standard specialized SOP classes as SCP.

**Table 109: Standard Specialized SOP Classes of VF Surgical Workstation AE**

| SOP Class Name       | SOP Class UID          |
|----------------------|------------------------|
| X-Ray Specialization | 1.3.46.670589.2.3.1.1  |
| Stack of X-Ray       | 1.3.46.670589.2.4.1.1  |
| Volume               | 1.3.46.670589.5.0.1.1  |
| 3D Volume Object     | 1.3.46.670589.5.0.2.1  |
| Surface              | 1.3.46.670589.5.0.3.1  |
| Cardio               | 1.3.46.670589.5.0.8.1  |
| CT Synthetic Image   | 1.3.46.670589.5.0.9    |
| MR Synthetic Image   | 1.3.46.670589.5.0.10   |
| MR Cardio Analysis   | 1.3.46.670589.5.0.11.1 |
| CX Synthetic Image   | 1.3.46.670589.5.0.12   |
| Perfusion            | 1.3.46.670589.5.0.13   |

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| SOP Class Name     | SOP Class UID        |
|--------------------|----------------------|
| Perfusion Analysis | 1.3.46.670589.5.0.14 |

## 9.6. Private Transfer Syntaxes

Not applicable.

## 10. ANNEXES 3D-RX SURGICAL WORKSTATION AE

### 10.1. IOD Contents

#### 10.1.1. Created SOP Instances

This section specifies each IOD created by the 3D-RX Surgical Workstation AE.

Defined abbreviations for the presence of IOD modules are:

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

Defined abbreviations for the presence of module attributes in the tables 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  
 ANAPCV          the attribute is present under specified condition – if present then its Value is Not Always Present (attribute sent zero length if condition applies and no value is present)  
 ANAPEV          the attribute is present under specified condition – if present then it will not have any value

Defined abbreviations for the source of the attribute data values in the tables 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 source is a Modality Performed Procedure Step  
 MWL             the attribute value source is a Modality Worklist  
 USER            the attribute value source is explicit user input

#### 10.1.1.1. Secondary Capture Image Storage SOP Class

Below an overview for the SC Image Storage SOP Class Attributes can be found.

**Table 110: Modules of the Secondary Capture Image Storage SOP Class**

| Information Entity | Module Name              | Usage  |
|--------------------|--------------------------|--------|
| Patient            | Patient module           | ALWAYS |
| Study              | General Study module     | ALWAYS |
| Series             | General Series module    | ALWAYS |
| Equipment          | General Equipment module | ALWAYS |
|                    | SC Equipment module      | ALWAYS |

| Information Entity | Module Name          | Usage  |
|--------------------|----------------------|--------|
| Image              | General Image module | ALWAYS |
|                    | Image Pixel module   | ALWAYS |
|                    | SC Image module      | ALWAYS |
|                    | VOI LUT module       | ALWAYS |
|                    | SOP Common module    | ALWAYS |

Table 111: Created Secondary Capture Image Storage SOP Class Attributes

| Name   | Tag       | VR | Present of Value | Source | Comment  |
|--|-----------|----|------------------|--------|--|
| <b>Patient Module</b>                        |           |    |                  |        |  |
| Patient's Name                               | 0010,0010 | PN | ALWAYS           | COPY   | -  |
| Patient ID                                   | 0010,0020 | LO | ALWAYS           | COPY   | -  |
| Patient's Birth Date                         | 0010,0030 | DA | ALWAYS           | COPY   | -  |
| Patient's Sex                                | 0010,0040 | CS | ALWAYS           | COPY   | Applied value: F, M or O   |
| <b>General Study Module</b>                  |           |    |                  |        |  |
| Study Date                                   | 0008,0020 | DA | ALWAYS           | AUTO   | -  |
| Study Time                                   | 0008,0030 | TM | ALWAYS           | AUTO   | -  |
| Accession Number                             | 0008,0050 | SH | ALWAYS           | COPY   | -  |
| Referring Physician's Name                   | 0008,0090 | PN | VNAP             | COPY   | -  |
| Study Instance UID                           | 0020,000D | UI | ALWAYS           | COPY   | -  |
| Study ID                                     | 0020,0010 | SH | ALWAYS           | AUTO   | -  |
| <b>General Series Module</b>                 |           |    |                  |        |  |
| Series Date                                  | 0008,0021 | DA | ALWAYS           | AUTO   | -  |
| Series Time                                  | 0008,0031 | TM | ALWAYS           | AUTO   | -  |
| Performing Physician's Name                  | 0008,1050 | PN | VNAP             | COPY   | -  |
| Referenced Performed Procedure Step Sequence | 0008,1111 | SQ | ALWAYS           | AUTO   | -  |
| > Referenced SOP Class UID                   | 0008,1150 | UI |                  |        | Uniquely identifies the referenced Modality Performed Procedure SOP Class.<br>Applied value: 1.2.840.10008.3.1.2.3.3 |
| > Referenced SOP Instance UID                | 0008,1155 | UI | ALWAYS           | AUTO   | -  |
| Patient Position                             | 0018,5100 | CS | ANAP             | AUTO   | -  |
| Series Instance UID                          | 0020,000E | UI | ALWAYS           | AUTO   | -  |
| Series Number                                | 0020,0011 | IS | ALWAYS           | AUTO   | -  |
| Performed Procedure Step Start Date          | 0040,0244 | DA | ANAP             | AUTO   | -  |
| Performed Procedure Step Start Time          | 0040,0245 | TM | ANAP             | AUTO   | -  |
| Performed Procedure Step ID                  | 0040,0253 | SH | ANAP             | AUTO   | -  |
| Performed Procedure Step Description         | 0040,0254 | LO | ANAP             | AUTO   | -  |
| Request Attributes Sequence                  | 0040,0275 | SQ | ANAP             | AUTO   | -  |
| > Scheduled Procedure Step Description       | 0040,0007 | LO | ANAP             | AUTO   | -  |

| Name                               | Tag       | VR     | Present of Value | Source | Comment  |
|------------------------------------|-----------|--------|------------------|--------|--|
| > Scheduled Protocol Code Sequence | 0040,0008 | SQ     | ANAP             | AUTO   | -  |
| >> Code Value                      | 0008,0100 | SH     | ANAP             | AUTO   | -  |
| >> Coding Scheme Designator        | 0008,0102 | SH     | ANAP             | AUTO   | -  |
| >> Coding Scheme Version           | 0008,0103 | SH     | ANAP             | AUTO   | -  |
| >> Code Meaning                    | 0008,0104 | LO     | ANAP             | AUTO   | -  |
| > Scheduled Procedure Step ID      | 0040,0009 | SH     | ANAP             | AUTO   | -  |
| > Requested Procedure ID           | 0040,1001 | SH     | ANAP             | AUTO   | -  |
| >> Code Value                      | 0008,0100 | SH     | ANAP             | AUTO   | -  |
| >> Coding Scheme Designator        | 0008,0102 | SH     | ANAP             | AUTO   | -  |
| <b>General Equipment Module</b>    |           |        |                  |        |  |
| Manufacturer                       | 0008,0070 | LO     | ALWAYS           | FIXED  | Applied value: Philips Medical Systems (Netherlands) |
| Institution Name                   | 0008,0080 | LO     | ALWAYS           | CONFIG | Configured on the modality                           |
| Station Name                       | 0008,1010 | SH     | ALWAYS           | CONFIG | -  |
| Manufacturer's Model Name          | 0008,1090 | LO     | ALWAYS           | CONFIG | -  |
| Software Version(s)                | 0018,1020 | LO     | ALWAYS           | CONFIG | Applied value: R_7.2                                 |
| Institution Name                   | 0008,0080 | LO     | ALWAYS           | CONFIG | Configured on the modality                           |
| <b>SC Equipment Module</b>         |           |        |                  |        |  |
| Conversion Type                    | 0008,0064 | CS     | ALWAYS           | AUTO   | Applied value: WSD                                   |
| Modality                           | 0008,0060 | CS     | ALWAYS           | AUTO   | Applied value: XA                                    |
| <b>General Image Module</b>        |           |        |                  |        |  |
| Image Type                         | 0008,0008 | CS     | ALWAYS           | FIXED  | Applied value: DERIVED, SECONDARY                    |
| Instance Number                    | 0020,0013 | IS     | ALWAYS           | AUTO   | -  |
| Patient Orientation                | 0020,0020 | CS     | EMPTY            | FIXED  | -  |
| <b>Image Pixel Module</b>          |           |        |                  |        |  |
| Samples per Pixel                  | 0028,0002 | US     | ALWAYS           | FIXED  | Applied value: 1                                     |
| Photometric Interpretation         | 0028,0004 | CS     | ALWAYS           | FIXED  | Applied value: MONOCHROME 2                          |
| Rows                               | 0028,0010 | US     | ALWAYS           | AUTO   | Size of the snapshot                                 |
| Columns                            | 0028,0011 | US     | ALWAYS           | AUTO   | Size of the snapshot                                 |
| Bits Allocated                     | 0028,0100 | US     | ALWAYS           | FIXED  | Applied value: 8                                     |
| Bits Stored                        | 0028,0101 | US     | ALWAYS           | FIXED  | Applied value: 8                                     |
| High Bit                           | 0028,0102 | US     | ALWAYS           | FIXED  | Applied value: 7                                     |
| Pixel Representation               | 0028,0103 | US     | ALWAYS           | FIXED  | Applied value: 0000                                  |
| Pixel Data                         | 7FE0,0010 | OW /OB | ALWAYS           | AUTO   | -  |
| <b>SC Image Module</b>             |           |        |                  |        |  |
| Date of Secondary Capture          | 0018,1012 | DA     | ALWAYS           | AUTO   | -  |
| Time of Secondary Capture          | 0018,1014 | TM     | ALWAYS           | AUTO   | -  |
| <b>VOI LUT Module</b>              |           |        |                  |        |  |
| Window Center                      | 0028,1050 | DS     | ALWAYS           | AUTO   | Applied value: 127.5                                 |

| Name                     | Tag       | VR | Present of Value | Source | Comment                                |
|--------------------------|-----------|----|------------------|--------|--|
| Window Width             | 0028,1051 | DS | ALWAYS           | AUTO   | Applied value: 255                     |
| <b>SOP Common Module</b> |           |    |                  |        |  |
| Specific Character Set   | 0008,0005 | CS | ALWAYS           | AUTO   | Applied value: ISO_IR 100              |
| SOP Class UID            | 0008,0016 | UI | ALWAYS           | AUTO   | Applied value: 1.2.840.10008.5.4.1.1.7 |
| SOP Instance UID         | 0008,0018 | UI | ALWAYS           | AUTO   | -                                      |

**10.1.1.2. CT Image Storage SOP Class**

Below an overview for the CT Image Storage SOP Class Attributes can be found.

**Table 112: Modules of CT Image Storage SOP Class Attributes**

| Information Entity | Module Name               | Usage  |
|--------------------|---------------------------|--------|
| Patient            | Patient module            | ALWAYS |
| Study              | General Study module      | ALWAYS |
| Series             | General Series module     | ALWAYS |
| Frame of Reference | Frame of Reference module | ALWAYS |
| Equipment          | General Equipment module  | ALWAYS |
| Image              | General Image module      | ALWAYS |
|                    | Image Plane module        | ALWAYS |
|                    | Image Pixel module        | ALWAYS |
|                    | VOI LUT module            | ALWAYS |
|                    | SOP Common module         | ALWAYS |
|                    | Contrast/Bolus module     | ALWAYS |
|                    | CT Image Module           | ALWAYS |

**Table 113: Modules of CT Image Storage SOP Class Attributes**

| Name                         | Tag       | VR | Present of Value | Source | Comment |
|------------------------------|-----------|----|------------------|--------|---------|
| <b>Patient Module</b>        |           |    |                  |        |         |
| Patient's Name               | 0010,0010 | PN | ALWAYS           | COPY   | -       |
| Patient ID                   | 0010,0020 | LO | ALWAYS           | COPY   | -       |
| Patient's Birth Date         | 0010,0030 | DA | VNAP             | COPY   | -       |
| Patient's Sex                | 0010,0040 | CS | ALWAYS           | COPY   | -       |
| <b>General Study Module</b>  |           |    |                  |        |         |
| Study Date                   | 0008,0020 | DA | ALWAYS           | AUTO   | -       |
| Study Time                   | 0008,0030 | TM | ALWAYS           | AUTO   | -       |
| Accession Number             | 0008,0050 | SH | VNAP             | COPY   | -       |
| Referring Physician's Name   | 0008,0090 | PN | VNAP             | COPY   | -       |
| Study Instance UID           | 0020,000D | UI | ALWAYS           | COPY   | -       |
| Study ID                     | 0020,0010 | SH | ALWAYS           | AUTO   | -       |
| <b>General Series Module</b> |           |    |                  |        |         |
| Series Date                  | 0008,0021 | DA | ALWAYS           | AUTO   | -       |

| Name                                   | Tag       | VR | Present of Value | Source | Comment  |
|--|-----------|----|------------------|--------|--|
| Series Time                            | 0008,0031 | TM | ALWAYS           | AUTO   | -  |
| Modality                               | 0008,0060 | CS | ALWAYS           | AUTO   | Applied value: XA                                    |
| Performing Physician's Name            | 0008,1050 | PN | VNAP             | COPY   | -  |
| Patient Position                       | 0018,5100 | CS | VNAP             | AUTO   | -  |
| Series Instance UID                    | 0020,000E | UI | ALWAYS           | AUTO   | -  |
| Series Number                          | 0020,0011 | IS | ALWAYS           | AUTO   | -  |
| Performed Procedure Step Start Date    | 0040,0244 | DA | ALWAYS           | AUTO   | -  |
| Performed Procedure Step Start Time    | 0040,0245 | TM | ALWAYS           | AUTO   | -  |
| Performed Procedure Step ID            | 0040,0253 | SH | ALWAYS           | AUTO   | -  |
| Performed Procedure Step Description   | 0040,0254 | LO | VNAP             | AUTO   | -  |
| Request Attributes Sequence            | 0040,0275 | SQ | ANAP             | AUTO   | -  |
| > Scheduled Procedure Step Description | 0040,0007 | LO | ALWAYS           | AUTO   | -  |
| > Scheduled Procedure Step ID          | 0040,0009 | SH | ALWAYS           | AUTO   | -  |
| > Requested Procedure ID               | 0040,1001 | SH | ALWAYS           | AUTO   | -  |
| <b>Frame of Reference Module</b>       |           |    |                  |        |  |
| Frame of Reference UID                 | 0020,0052 | UI | ALWAYS           | AUTO   | -  |
| Position Reference Indicator           | 0020,1040 | LO | VNAP             | AUTO   | -  |
| <b>General Equipment Module</b>        |           |    |                  |        |  |
| Manufacturer                           | 0008,0070 | LO | ALWAYS           | FIXED  | Applied value: Philips Medical Systems (Netherlands) |
| Institution Name                       | 0008,0080 | LO | VNAP             | AUTO   | -  |
| Station Name                           | 0008,1010 | SH | ALWAYS           | CONFIG | -  |
| Manufacturer's Model Name              | 0008,1090 | LO | ALWAYS           | CONFIG | Applied value: XtraVision                            |
| Software Version(s)                    | 0018,1020 | LO | ALWAYS           | CONFIG | Applied value: R_7.2                                 |
| <b>General Image Module</b>            |           |    |                  |        |  |
| Instance Number                        | 0020,0013 | IS | ALWAYS           | AUTO   | -  |
| <b>Image Plane Module</b>              |           |    |                  |        |  |
| Slice Thickness                        | 0018,0050 | DS | ALWAYS           | AUTO   | -  |
| Image Position (Patient)               | 0020,0032 | DS | ALWAYS           | AUTO   | -  |
| Image Orientation (Patient)            | 0020,0037 | DS | ALWAYS           | AUTO   | -  |
| Slice Location                         | 0020,1041 | DS | ALWAYS           | AUTO   | -  |
| Pixel Spacing                          | 0028,0030 | DS | ALWAYS           | AUTO   | -  |
| <b>CT Image Module</b>                 |           |    |                  |        |  |
| Image Type                             | 0008,0008 | CS | ALWAYS           | FIXED  | Applied value: DERIVED, SECONDARY                    |
| Rescale Intercept                      | 0028,1052 | DS | ALWAYS           | AUTO   | -  |
| Rescale Slope                          | 0028,1053 | DS | ALWAYS           | AUTO   | -  |
| KVP                                    | 0018,0060 | DS | VNAP             | AUTO   | -  |
| Samples per Pixel                      | 0028,0002 | US | ALWAYS           | FIXED  | Applied value: 1                                     |
| Photometric Interpretation             | 0028,0004 | CS | ALWAYS           | FIXED  | Applied value: MONOCHROME2                           |
| Bits Allocated                         | 0028,0100 | US | ALWAYS           | FIXED  | Applied value: 16                                    |
| Bits Stored                            | 0028,0101 | US | ALWAYS           | FIXED  | Applied value: 16                                    |

| Name                         | Tag       | VR      | Present of Value | Source | Comment   |
|------------------------------|-----------|---------|------------------|--------|---|
| High Bit                     | 0028,0102 | US      | ALWAYS           | FIXED  | Applied value: 15                                   |
| <b>Image Pixel Module</b>    |           |         |                  |        |   |
| Rows                         | 0028,0010 | US      | ALWAYS           | AUTO   |   |
| Columns                      | 0028,0011 | US      | ALWAYS           | AUTO   |   |
| Pixel Representation         | 0028,0103 | US      | ALWAYS           | AUTO   | Applied value: 0000                                 |
| Pixel Data                   | 7FE0,0010 | OB / OW | ALWAYS           | AUTO   | -   |
| <b>Contrast/Bolus Module</b> |           |         |                  |        |   |
| Contrast/Bolus Agent         | 0018,0010 | LO      | VNAP             | AUTO   |   |
| <b>VOI LUT Module</b>        |           |         |                  |        |   |
| Window Center                | 0028,1050 | DS      | ALWAYS           | AUTO   | Applied value: Nero:40, Abdominal:60, Default:0     |
| Window Width                 | 0028,1051 | DS      | ALWAYS           | AUTO   | Applied value: Nero:200, Abdominal:800, Default:200 |
| <b>SOP Common Module</b>     |           |         |                  |        |   |
| Specific Character Set       | 0008,0005 | CS      | ALWAYS           | AUTO   | Applied value: ISO_IR 100                           |
| SOP Class UID                | 0008,0016 | UI      | ALWAYS           | AUTO   | Applied value: 1.2.840.10008.5.1.4.1.1.2            |
| SOP Instance UID             | 0008,0018 | UI      | ALWAYS           | AUTO   | -   |

### 10.1.2. Usage of Attributes from Received IOD's

Not applicable.

### 10.1.3. Attribute Mapping

The following mapping applies for attributes of the 3D-RX Surgical Workstation AE.

**Table 114: Attribute Mapping of the 3D-RX Surgical Workstation AE**

| Attribute Name              | BV Family AE | SC Tag    | CT Tag    |
|-----------------------------|--------------|-----------|-----------|
| Accession Number            | 0008,0050    | 0008,0050 | 0008,0050 |
| Referring Physician's Name  | 0008,0090    | 0008,0090 | 0008,0090 |
| Patient's Name              | 0010,0010    | 0010,0010 | 0010,0010 |
| Patient ID                  | 0010,0020    | 0010,0020 | 0010,0020 |
| Patient's Birth Date        | 0010,0030    | 0010,0030 | 0010,0030 |
| Patient's Sex               | 0010,0040    | 0010,0040 | 0010,0040 |
| Study Instance UID          | 0020,000D    | 0020,000D | 0020,000D |
| Performing Physician's Name | 0008,1050    | 0008,1050 | 0008,1050 |

### 10.1.4. Coerced/Modified fields

Not applicable.

## 10.2. Data Dictionary of Private Attributes

Not applicable.

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### **10.3. Coded Terminology and Templates**

Not applicable.

### **10.4. Grayscale Image consistency**

Not applicable.

### **10.5. Standard Extended/Specialized/Private SOPs**

#### **10.5.1. CT Image Storage SOP Class**

The CT Image Storage SOP Class is a standard specialized SOP class as specified in section 10.1.1.2

### **10.6. Private Transfer Syntaxes**

Not applicable.