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# DICOM

## Conformance Statement

Intera R10.6

Intera R11

Intera R1.2

Achieva R1.2



***Issued by:***

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# 1. DICOM CONFORMANCE STATEMENT OVERVIEW

This document is the DICOM Conformance Statement for the Intera R10.6, Intera R11, Intera R1.2 and Achieva R1.2, later referred to as Intera Achieva. The Intera Achieva is an embedded modality system for DICOM MR images. It provides, amongst other things, the following features:

- DICOM Verification service (for both SCU and SCP).
- Storage of images (and presentation states) on a remote DICOM system.
- Commitment of stored images on a remote DICOM system (Push Model).
- Querying for data on a remote DICOM system.
- Retrieval of images from a remote DICOM system.
- Basic Worklist Management (BWLMM).
- Implementation of Modality Performed Procedure Step (MPPS).
- Storage and retrieval of images per DICOM media.
- Printing of hardcopies on a remote DICOM printer.

**Table 1: Network Services**

| SOP Class  |                              | User of Service (SCU) | Provider of Service (SCP) |
|--|------------------------------|-----------------------|---------------------------|
| Name   | UID                          |                       |                           |
| <b>Transfer</b>                                      |                              |                       |                           |
| MR Image Storage                                     | 1.2.840.10008.5.1.4.1.1.4    | Yes                   | Yes                       |
| Secondary Capture Image Storage                      | 1.2.840.10008.5.1.4.1.1.7    | Yes                   | Yes                       |
| Grayscale Softcopy Presentation State Storage        | 1.2.840.10008.5.1.4.1.1.11.1 | Yes                   | Yes                       |
| Private MR Spectrum Storage                          | 1.3.46.670589.11.0.0.12.1    | Yes                   | Yes                       |
| Private MR Series Data Storage                       | 1.3.46.670589.11.0.0.12.2    | Yes                   | Yes                       |
| <b>Query/Retrieve</b>                                |                              |                       |                           |
| 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                        |
| <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 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                        |
| Basic Grayscale Print Management (Meta)              | 1.2.840.10008.5.1.1.9        | Yes                   | No                        |
| Printer  | 1.2.840.10008.5.1.1.16       | Yes                   | No                        |

The Modality Worklist, Modality Performed Procedure Step and Storage Commitment support are part of the IHE Scheduled Workflow option package.

The following table lists the supported media storage Application Profiles (with roles).

**Table 2: Media Services**

| Media Storage Application Profile | Write Files (FSC or FSU)* | Read Files (FSR) |
|-----------------------------------|---------------------------|------------------|
| <b>Magneto-Optical Disk</b>       |                           |                  |
| CT/MR Studies on 2.3GB MOD        | Option                    | Yes              |
| CT/MR Studies on 4.1GB MOD        | Option                    | Yes              |
| <b>DVD</b>                        |                           |                  |
| CT/MR Studies on DVD Media*       | Option                    | Option           |

\* Note that the media used to write files is configurable. The Intera R10.6 offers standard support to write files to MOD with an option for DVD; all other systems offer standard support for DVD with an option for MOD. However, during configuration only one media can be selected as the supported media to write files; either DVD or MOD.

Support to read files from MOD is always implemented for backwards compatibility. However, if MOD is configured as media to write files then DVD cannot be used – neither to read files nor to write files.

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## 3. INTRODUCTION

### 3.1. Revision History

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

**Table 3: Revision History**

| Document Version | Date of Issue | Author        | Description  |
|------------------|---------------|---------------|--|
| 1.0              | 17 March 2005 | PMS<br>MIT-IO | Initial release version of the DICOM Conformance Statement for Intera R10.6, Intera R11, Intera R1.2 and Achieva R1.2. |

### 3.2. Audience

This Conformance Statement is intended for:

- (potential) customers
- system integrators of medical equipment
- marketing staff interested in system functionality
- software designers implementing DICOM interfaces

It is assumed that the reader is familiar with the DICOM standard.

### 3.3. Remarks

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

This DICOM Conformance Statement by itself does not guarantee successful interoperability of Philips equipment with non-Philips equipment. The user (or user's agent) should be aware of the following issues:

- **Interoperability**  
Interoperability refers to the ability of application functions, distributed over two or more systems, to work successfully together. The integration of medical devices into an IT environment may require application functions that are not specified within the scope of DICOM. Consequently, using only the information provided by this Conformance Statement does not guarantee interoperability of Philips equipment with non-Philips equipment.  
It is the user's responsibility to analyze thoroughly the application requirements and to specify a solution that integrates Philips equipment with non-Philips equipment.
- **Validation**  
Philips equipment has been carefully tested to 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 following definitions and terms are used in this document.

|                |  |
|----------------|--|
| Examination    | Part of a Study, being a collection of direct related Series of Images (originating from the same modality/SOP class). The user interface – Patient Administration – of the Intera Achieva shall present all data per Examination. A study shall contain one or more Examinations. |
| Intera Achieva | Intera R10.6, Intera R11, Intera R1.2 and Achieva R1.2   |
| Philips        | Philips Medical Systems Nederland B.V.   |

The following acronyms and abbreviations are used in this document.

|       |   |
|-------|---|
| AE    | Application Entity                                  |
| AP    | Application Profile                                 |
| BWLM  | Basic Worklist Management                           |
| DHCP  | Dynamic Host Configuration Protocol                 |
| DICOM | Digital Imaging and Communications in Medicine      |
| DIMSE | DICOM Message Service Element                       |
| DVD   | Digital Versatile Disc                              |
| EBE   | DICOM Explicit VR Big Endian                        |
| ELE   | DICOM Explicit VR Little Endian                     |
| FSC   | File-set Creator                                    |
| FSR   | File-set Reader                                     |
| FSU   | File-set Updater                                    |
| HIPAA | Health Insurance Portability and Accountability Act |
| HIS   | Hospital Information System                         |
| IHE   | Integrating the Healthcare Enterprise               |
| ILE   | DICOM Implicit VR Little Endian                     |
| IOD   | Information Object Definition                       |
| MOD   | Magneto-Optical Disk                                |
| MPPS  | Modality Performed Procedure Step                   |
| MR    | Magnetic Resonance                                  |
| NEMA  | National Electrical Manufacturers Association       |
| PACS  | Picture Archiving and Communication System          |
| PDU   | Protocol Data Unit                                  |
| PR    | Presentation State                                  |
| RIS   | Radiology Information System                        |
| RWA   | Real-World Activity                                 |
| SC    | Secondary Capture                                   |
| SCP   | Service Class Provider                              |
| SCU   | Service Class User                                  |

---

|        |   |
|--------|---|
| SOP    | Service Object Pair                             |
| TCP/IP | Transmission Control Protocol/Internet Protocol |
| TLS    | Transport Layer Security                        |
| UID    | Unique Identifier                               |

### 3.5. References

- [DICOM] Digital Imaging and Communications in Medicine (DICOM), Part 1 – 18 (NEMA PS 3.1-XXXX – PS 3.18-XXXX), National Electrical Manufacturers Association (NEMA) Publication Sales 1300 N. 17<sup>th</sup> Street, Suite 1847 Rosslyn, Virginia. 22209, United States of America

## 4. NETWORKING

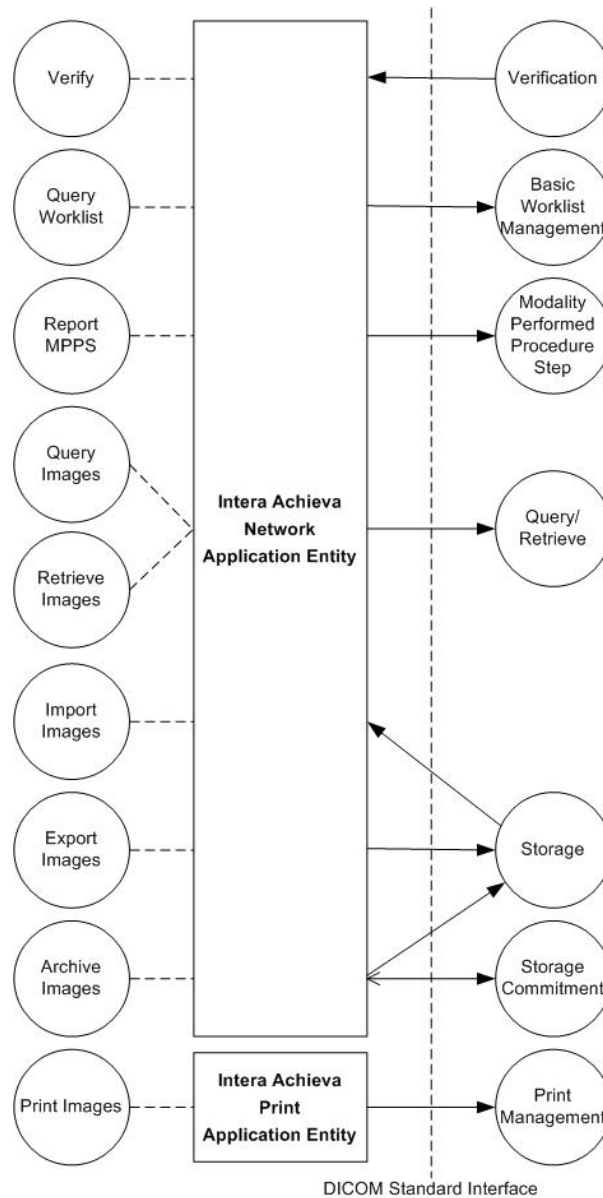
### 4.1. Implementation model

The implementation model consists of three sections:

- the application data flow diagram, specifying the relationship between the Application Entities and the “external world” or Real-World Activities,
- a functional description of each Application Entity, and
- the sequencing constraints among them.

#### 4.1.1. Application Data Flow

Intera Achieva incorporates two networking Application Entities (AE). The related implementation model is shown in Figure 1.



**Figure 1: Application Data Flow Diagram**

## 4.1.2. Functional Definition of AE's

This section describes in general terms the functions to be performed by the AE, and the DICOM services used to accomplish these functions.

### 4.1.2.1. Functional Definition of the Network AE

Note that Query Worklist, Report MPPS, and Archive Images (Storage Commitment) functionality are part of the IHE Scheduled Workflow option package.

#### 4.1.2.1.1. Verify

The Intera Achieva Network AE as Verification SCP implements the RWA Verify to handle verification requests.

#### 4.1.2.1.2. Query Worklist

The Intera Achieva Network AE as Basic Worklist Management SCU implements the RWA Query Worklist to request the worklist from a DICOM Radiology Information System (RIS).

The function is initiated on the Intera Achieva by clicking the "RIS" button. After receiving the worklist data from the RIS the Intera Achieva will display the worklist on the user interface.

After selection of the relevant patient record the received patient data is displayed, and missing data may be manually added or invalid data may be modified before the patient data is stored in the local database.

#### 4.1.2.1.3. Report MPPS

The Intera Achieva Network AE as Study Management SCU implements the RWA Report MPPS to create and update a Modality Performed Procedure Step object. The RWA is initiated at the start of a new examination to inform the DICOM Radiology Information System (RIS) (status "IN-PROGRESS").

When the image object has been acquired and archived one may click the "Ready" button when the MPPS is completed or the "Incomplete" button if the MPPS is discontinued. The Intera Achieva Network AE will send a new MPPS notification with the status "COMPLETED" or "DISCONTINUED".

#### 4.1.2.1.4. Query Images

The Intera Achieva Network AE as Query/Retrieve SCU implements the RWA Query Images to find Examinations on a remote system (e.g. PACS).

#### 4.1.2.1.5. Retrieve Images

The Intera Achieva Network AE as Query/Retrieve SCU implements the RWA Retrieve Images to initiate import images from a remote system (e.g. PACS).

#### 4.1.2.1.6. Import Images

The Intera Achieva Network AE as Storage SCP implements the RWA Import Images to store images from a remote archive using the relevant image storage and/or Grayscale Softcopy Presentation State SOP class.

The Intera Achieva Network AE will respond to a remote request and store the images in the patient database. DICOM instances (Secondary Capture and native MR, Grayscale Softcopy Presentation State, and private SOP classes) may be imported for reference purposes only; when these are exported again then consistency and completeness cannot be guaranteed.

#### **4.1.2.1.7. Export Images**

The Intera Achieva Network AE as Storage SCU implements the RWA Export Images to store images and related object data on a remote system using the relevant image storage or Grayscale Softcopy Presentation State SOP class.

The MR images and object data, as selected per Examinations, can be sent to a selected remote system, either manually or by acquisition protocol.

The Intera Achieva can be configured to send Grayscale Softcopy Presentation State data for the selected Examinations.

Depending on the capabilities of the application receiving the MR images a large amount of information can be stored in private data elements. When modifying/processing those images such application is responsible for data consistency and therefore must remove the private data elements. Note that the Intera Achieva can be configured to suppress the storage of private data elements.

#### **4.1.2.1.8. Archive Images**

The Intera Achieva Network AE implements the RWA Archive Images to store (as Storage SCU) and, if configured, commit (as Storage Commitment SCU) images on the configured remote archive (e.g. PACS) using the Storage and Storage Commitment Push Model SOP class.

After sending a series of images to the archive, the Intera Achieva will request a storage commitment from this archive. The Storage Commitment status is indicated on the Patient Administration User Interface.

After commitment the user may decide to delete the images locally.

### **4.1.2.2. Functional Definition of the Print AE**

#### **4.1.2.2.1. Print Images**

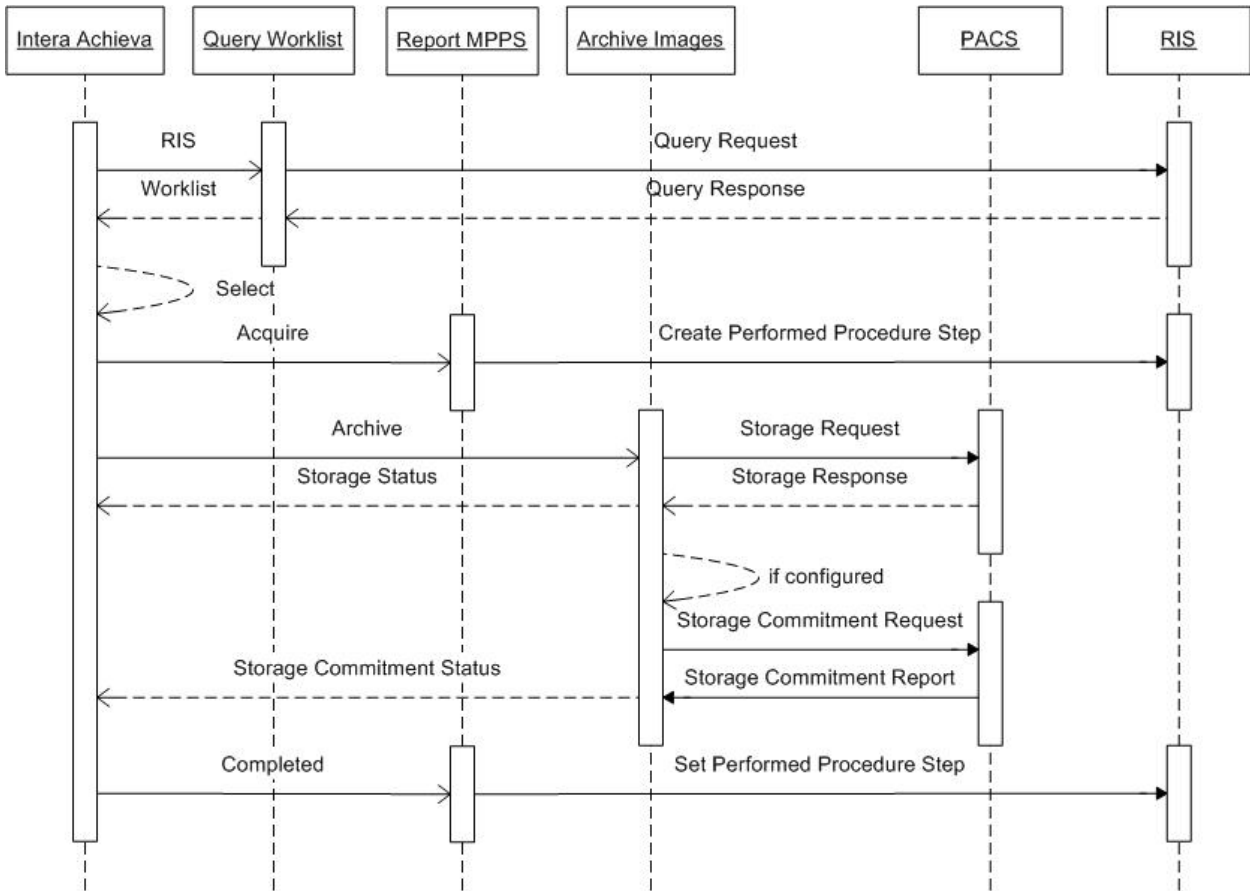
The Intera Achieva Print AE as Print Management SCU implements the RWA Print Images to send and print images on a DICOM network printer using the Basic Grayscale Print Management Meta SOP class.

After selecting the images these can be sent to a DICOM network printer.

### **4.1.3. Sequencing of Real World Activities**

#### **4.1.3.1. Integrated Workflow**

The sequence diagram in Figure 2 shows a typical example of a workflow (using a single acquisition, a single storage with commitment, without pre-fetching).



**Figure 2: Sequencing of Integrated Workflow**

The Intera Achieva workflow is initiated by clicking the “RIS” button. After receiving the worklist data from the RIS the Intera Achieva will display the worklist on the user interface.

Then one may select a relevant patient record and add missing data or modify invalid data (as specified) before the received patient data is stored in the local database. At the start and at the end of the acquisition/processing the configured MPPS system (RIS) is informed of the progress of the selected procedure step.

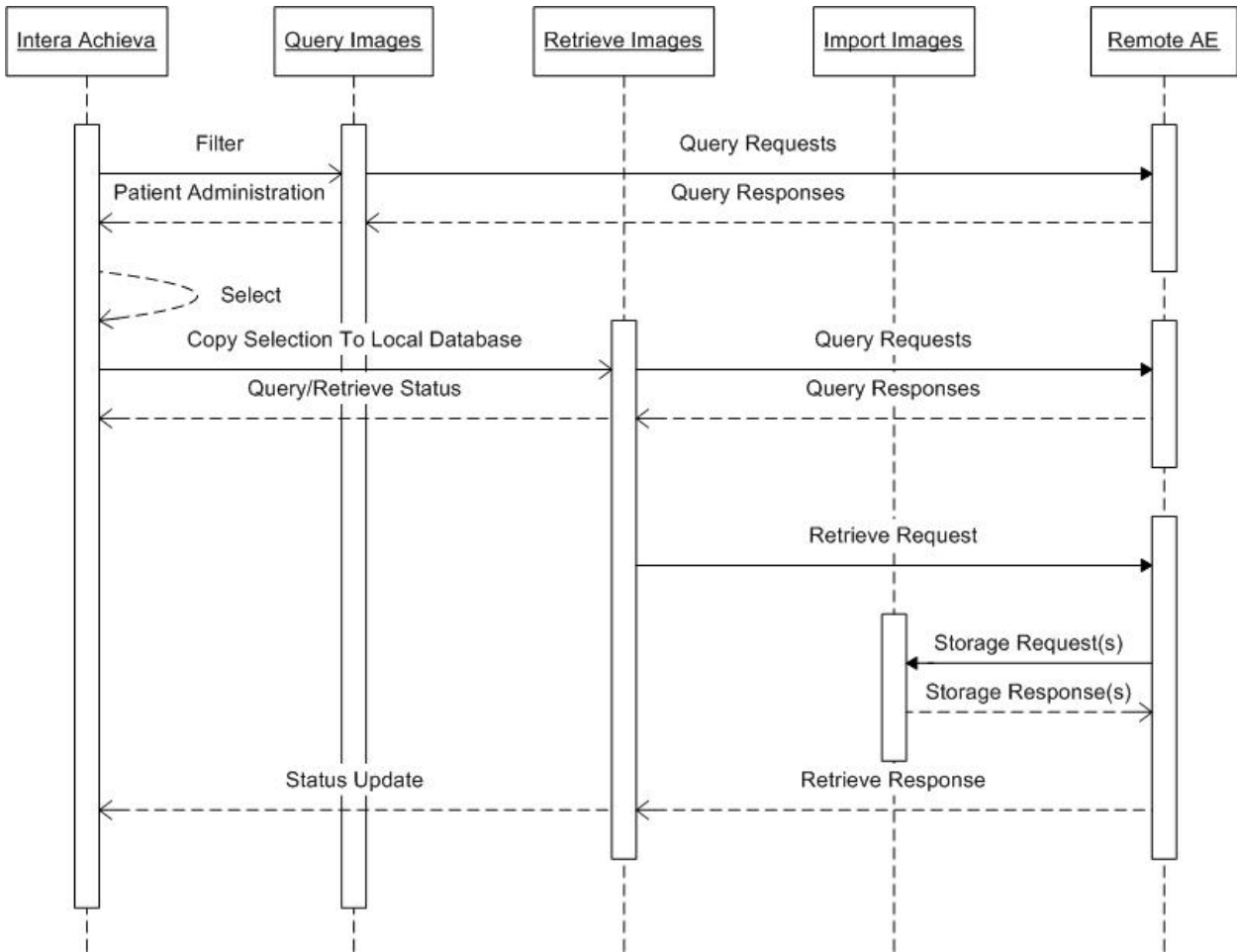
Before or after an acquisition a remote system can send related images of one or more of the scheduled patients to the Intera Achieva (pre-fetching, for reference only). The created images are converted into a DICOM message that can be sent to the remote system, or can be written onto DVD, MOD, or local disk. After storage to a remote archive the Intera Achieva will request a storage commitment (as configured).

Note that, if no RIS is configured or no connection is possible, data can be introduced manually via the user interface.

After preparation of the scanner and the patient, the operator will perform the requested, or on his own initiative modified, procedure steps. Results may be MR images, Presentation State objects, and screen-grabs stored as Secondary Capture images, as well as Private MR Spectrum and Private MR Series Data.

**4.1.3.2. Import Images per Query/Retrieve**

The sequence diagram in Figure 3 shows a typical example of an import of a series of images per Query/Retrieve (e.g. pre-fetching).



**Figure 3: Sequencing of Import Images per Query/Retrieve**

The Intera Achieva sends initial query requests to the remote AE to find all Examinations matching the specified filter. After selecting the Examinations to be retrieved the copy selection to local database is initiated. New query requests are sent to find the Series related to the selected Examinations. This is followed by retrieve requests to the remote AE to move all required Series of Images. Then for each retrieve request the remote AE will store the related Images on the Intera Achieva.



## 4.2. AE Specifications

The network capability of the system consists of two DICOM Application Entities:

- Intera Achieva Network AE
- Intera Achieva Print AE

These are specified in section 4.2.1 and section 4.2.2.

The media services are described in section 5.

### 4.2.1. Network AE

#### 4.2.1.1. SOP Classes

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

**Table 4: SOP Classes for the Network AE**

| SOP Class Name                                       | SOP Class UID                | SCU | SCP |
|--|------------------------------|-----|-----|
| Verification   | 1.2.840.10008.1.1            | No* | Yes |
| 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  |
| MR Image Storage                                     | 1.2.840.10008.5.1.4.1.1.4    | Yes | Yes |
| Secondary Capture Image Storage                      | 1.2.840.10008.5.1.4.1.1.7    | Yes | Yes |
| Grayscale Softcopy Presentation State Storage        | 1.2.840.10008.5.1.4.1.1.11.1 | Yes | 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  |
| Modality Worklist Information Model – FIND           | 1.2.840.10008.5.1.4.31       | Yes | No  |
| Private MR Spectrum Storage                          | 1.3.46.670589.11.0.0.12.1    | Yes | Yes |
| Private MR Series Data Storage                       | 1.3.46.670589.11.0.0.12.2    | Yes | Yes |

\*The Verification SCU functionality is incorporated in the configuration tool.

#### 4.2.1.2. Association Policies

This section describes the general association establishment and acceptance policies of the Network AE.

##### 4.2.1.2.1. General

The following DICOM standard application context is specified.

**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 number of simultaneous associations that the Network AE may support as a SCU or SCP is specified as follows.

**Table 6: Number of Associations as an Association Initiator for the Network AE**

|   |   |
|---|---|
| Maximum number of simultaneous associations | 2 |
|---|---|

**Table 7: Number of Associations as an Association Acceptor for the Network AE**

|   |                            |
|---|----------------------------|
| Maximum number of simultaneous associations | Configurable, default is 2 |
|---|----------------------------|

**4.2.1.2.3. Asynchronous Nature**

Not applicable.

**4.2.1.2.4. Implementation Identifying Information**

The following values are used for Implementation Class UID and Implementation Version Name.

**Table 8: DICOM Implementation Class and Version for the Network AE**

|                             |                               |
|-----------------------------|-------------------------------|
| Implementation Class UID    | 1.3.46.670589.11.0.0.51.4.3.0 |
| Implementation Version Name | MR DICOM 3.0                  |

**4.2.1.2.5. Communication Failure Handling**

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

**Table 9: Communication Failure Behavior**

| Exception      | Behavior  |
|----------------|---|
| ARTIM Time-out | The association setup fails, the reason is logged and reported to the user. |

#### 4.2.1.3. Association Initiation Policy

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

The behavior of the Network AE during association rejection is summarized in Table 10.

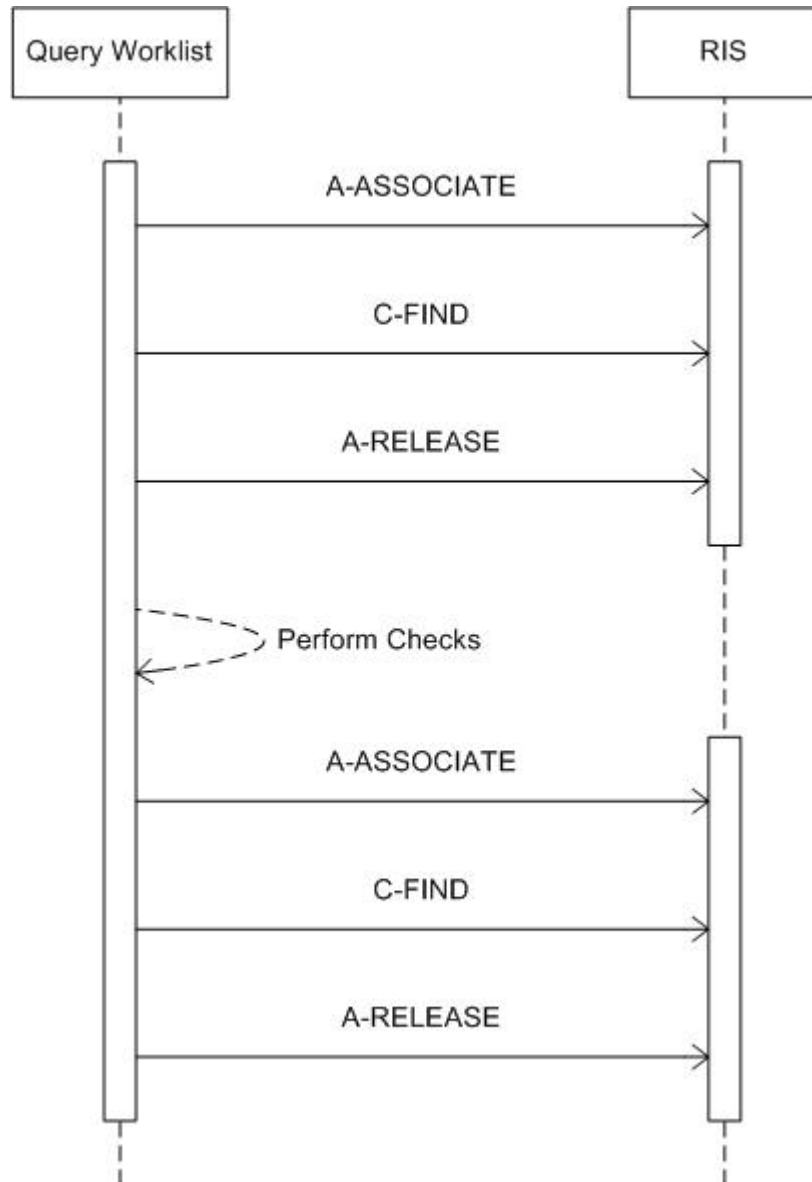
**Table 10: DICOM Association Rejection Handling**

| Result  | Source  | Reason/Diagnosis                           | Behavior   |  |
|---|---|--|--|--|
| 1 – rejected-permanent  | 1 – DICOM UL service-user                                     | 1 – no-reason-given                        | The user is notified (via pop-up). If applicable the command will be retried. Log entry. |  |
|   |   | 2 – application-context-name-not-supported | The user is notified (via pop-up). If applicable the command will be retried. Log entry. |  |
|   |   | 3 – calling-AE-title-not-recognized        | The user is notified (via pop-up). If applicable the command will be retried. Log entry. |  |
|   |   | 7 – called-AE-title-not-recognized         | The user is notified (via pop-up). If applicable the command will be retried. Log entry. |  |
|   | 2 – DICOM UL service-provider (ACSE related function)         | 1 – no-reason-given                        | The user is notified (via pop-up). If applicable the command will be retried. Log entry. |  |
|   |   | 2 – protocol-version-not-supported         | The user is notified (via pop-up). If applicable the command will be retried. Log entry. |  |
|   | 3 – DICOM UL service-provider (presentation related function) | 1 – temporary-congestion                   | The user is notified (via pop-up). If applicable the command will be retried. Log entry. |  |
|   |   | 2 – local-limit-exceeded                   | The user is notified (via pop-up). If applicable the command will be retried. Log entry. |  |
|   | 2 – rejected-transient  | 1 – DICOM UL service-user                  | 1 – no-reason-given  | The user is notified (via pop-up). If applicable the command will be retried. Log entry. |
|   |   |  | 2 – application-context-name-not-supported   | The user is notified (via pop-up). If applicable the command will be retried. Log entry. |
| 3 – calling-AE-title-not-recognized                           |   |  | The user is notified (via pop-up). If applicable the command will be retried. Log entry. |  |
| 7 – called-AE-title-not-recognized                            |   |  | The user is notified (via pop-up). If applicable the command will be retried. Log entry. |  |
| 2 – DICOM UL service-provider (ACSE related function)         |   | 1 – no-reason-given                        | The user is notified (via pop-up). If applicable the command will be retried. Log entry. |  |
|   |   | 2 – protocol-version-not-supported         | The user is notified (via pop-up). If applicable the command will be retried. Log entry. |  |
| 3 – DICOM UL service-provider (presentation related function) |   | 1 – temporary-congestion                   | The user is notified (via pop-up). If applicable the command will be retried. Log entry. |  |
|   |   | 2 – local-limit-exceeded                   | The user is notified (via pop-up). If applicable the command will be retried. Log entry. |  |

#### 4.2.1.3.1. Query Worklist

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

Query Worklist may be used to update the worklist for the Intera Achieva.



**Figure 4: Sequencing of Query Worklist**

The Query Worklist function will be accessible through the Intera Achieva user interface. An association will be initiated to the configured remote system (typically a RIS). After an initial worklist query the Intera Achieva will perform some checks on the received response data. Then it will send the actual worklist query. After receiving the worklist the association will be released.

**4.2.1.3.1.2. Proposed Presentation Contexts**

The presentation context proposed by the Network AE for Query Worklist is defined in Table 11.

**Table 11: Proposed Presentation Contexts for Query 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 | 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                 |

The order of the proposed transfer syntaxes is configurable; ELE is preferred.

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

Intera Achieva provides the RIS dialog to enter matching criteria for the following matching keys.

**Table 12: Matching Keys for Query Worklist**

| Matching Key      | DICOM Matching Key                    |             | Note                                      |
|-------------------|---------------------------------------|-------------|---|
|                   | Name                                  | Tag         |   |
| Accession Number  | Accession Number                      | (0008,0050) | Default value is empty.                   |
|                   | Scheduled Procedure Step Sequence     | (0040,0100) | -   |
| Modality          | > Modality                            | (0008,0060) | Default value is empty (*).               |
| Scheduled Station | > Scheduled Station AE Title          | (0040,0001) | Default value is the local AET (LOCAL).   |
| Start Date        | > Scheduled Procedure Step Start Date | (0040,0002) | Begin range; default value is today (0).  |
| End Date          |                                       |             | End range; default value is tomorrow (1). |

The complete set of matching keys for Query Worklist is specified in section 8.1.1 Created SOP Instances. The use of specific character set is as specified in section 6, Support of Character Sets.

Table 13 lists the attributes that are shown on the New Examination dialog, providing the mapping of the DICOM attribute to the UI entry.

**Table 13: Mapping between UI Fields and DICOM Attributes for Query Worklist**

| UI Entry           | DICOM Element                     |             | Examination Entry Editable |     |
|--------------------|-----------------------------------|-------------|----------------------------|-----|
|                    | Name                              | Tag         | Manual                     | RIS |
| <b>Examination</b> |                                   |             |                            |     |
| Accession number   | Accession Number                  | (0008,0050) | Yes                        | No  |
| Physician          | Referring Physician's Name        | (0008,0090) | Yes                        | No  |
| Patient's name     | Patient's Name                    | (0010,0010) | Yes                        | No  |
| Registration ID    | Patient ID                        | (0010,0020) | Yes                        | No  |
| Date of birth      | Patient's Birth Date              | (0010,0030) | Yes                        | No  |
| Sex                | Patient's Sex                     | (0010,0040) | Yes                        | No  |
| Patient weight     | Patient's Weight                  | (0010,1030) | Yes                        | Yes |
|                    | Scheduled Procedure Step Sequence | (0040,0100) | No                         | No  |

| UI Entry                        | DICOM Element                              |             | Examination Entry Editable |     |
|---------------------------------|--|-------------|----------------------------|-----|
|                                 | Name                                       | Tag         | Manual                     | RIS |
| Exam name                       | > Scheduled Procedure Step Description     | (0040,0007) | Yes                        | Yes |
| Exam date                       | Study Date                                 | (0008,0020) | Yes                        | Yes |
|                                 | Performed Procedure Step Start Date        | (0040,0244) |                            |     |
|                                 | Performed Procedure Step End Date          | (0040,0250) |                            |     |
| Comments                        | Comments on the Performed Procedure Step   | (0040,0280) | Yes                        | Yes |
| <b>General Worklist</b>         |  |             |                            |     |
| Medical Alerts                  | Medical Alerts                             | (0010,2000) | Yes                        | No  |
| Contrast Allergies              | Contrast Allergies                         | (0010,2110) | Yes                        | No  |
| Pregnancy Status                | Pregnancy Status                           | (0010,21C0) | Yes                        | No  |
| <b>Requested Procedure</b>      |  |             |                            |     |
|                                 | Requested Procedure Code Sequence          | (0032,1064) | No                         | No  |
| Code Value                      | > Code Value                               | (0008,0100) | No                         | No  |
| Code Scheme Designator          | > Coding Scheme Designator                 | (0008,0102) | No                         | No  |
| Code Scheme Version             | > Coding Scheme Version                    | (0008,0103) | No                         | No  |
| Code Meaning                    | > Code Meaning                             | (0008,0104) | No                         | No  |
| Procedure ID                    | Requested Procedure ID                     | (0040,1001) | No                         | No  |
| Comments                        | Requested Procedure Comments               | (0040,1400) | No                         | No  |
| <b>Scheduled Procedure Step</b> |  |             |                            |     |
|                                 | Scheduled Procedure Step Sequence          | (0040,0100) | No                         | No  |
| Modality                        | > Modality                                 | (0008,0060) | No                         | No  |
|                                 | > Scheduled Procedure Step Start Date      | (0040,0002) | No                         | No  |
|                                 | > Scheduled Procedure Step Start Time      | (0040,0003) | No                         | No  |
|                                 | > Scheduled Protocol Code Sequence         | (0040,0008) | No                         | No  |
| Code Value                      | >> Code Value                              | (0008,0100) | No                         | No  |
| Code Scheme Designator          | >> Coding Scheme Designator                | (0008,0102) | No                         | No  |
| Code Scheme Version             | >> Coding Scheme Version                   | (0008,0103) | No                         | No  |
| Code Meaning                    | >> Code Meaning                            | (0008,0104) | No                         | No  |
| Procedure Step Description      | > Scheduled Procedure Step Description     | (0040,0007) | No                         | No  |
| Procedure Step ID               | > Scheduled Procedure Step ID              | (0040,0009) | No                         | No  |
| Pre-Medication                  | > Pre-Medication                           | (0040,0012) | No                         | No  |
| Comments                        | > Comments on the Scheduled Procedure Step | (0040,0400) | No                         | No  |
| <b>Performed Procedure Step</b> |  |             |                            |     |
|                                 | Performed Protocol Code Sequence           | (0040,0260) | No                         | No  |
| Code Value                      | > Code Value                               | (0008,0100) | Yes                        | Yes |
| Code Scheme Designator          | > Coding Scheme Designator                 | (0008,0102) | Yes                        | Yes |
| Code Scheme Version             | > Coding Scheme Version                    | (0008,0103) | Yes                        | Yes |
| Code Meaning                    | > Code Meaning                             | (0008,0104) | Yes                        | Yes |
| Comments                        | Comments on the Performed Procedure Step   | (0040,0280) | Yes                        | Yes |

The details regarding the response behavior to status codes are provided in Table 14.

**Table 14: DICOM Command Response Status Handling Behavior**

| Service Status | Code | Further Meaning  | Behavior  |
|----------------|------|--|---|
| Refused        | A700 | Out of resources   | No query results are displayed. The association is released. The reason is logged and reported by message in console. |
| Failed         | A900 | Identifier does not match SOP class  | No query results are displayed. The association is released. The reason is logged and reported by message in console. |
|                | Cxxx | Unable to process  | No query results are displayed. The association is released. The reason is logged and reported by message in console. |
| Cancel         | FE00 | Matching terminated due to Cancel request  | No query results are displayed. The association is released. The reason is logged and reported by message in console. |
| Pending        | FF00 | Matches are continuing – Current match is supplied and any optional keys were supported in the same manner as required keys          | The Query Worklist job continues.   |
|                | FF01 | Matches are continuing – Warning that one or more optional keys were not supported for existence and/or matching for this identifier | The Query Worklist job continues.   |
| Success        | 0000 | Matching is complete   | The query results are displayed. The association is released. Report message in console.                              |

The behavior of the AE during communication failure is summarized in Table 15.

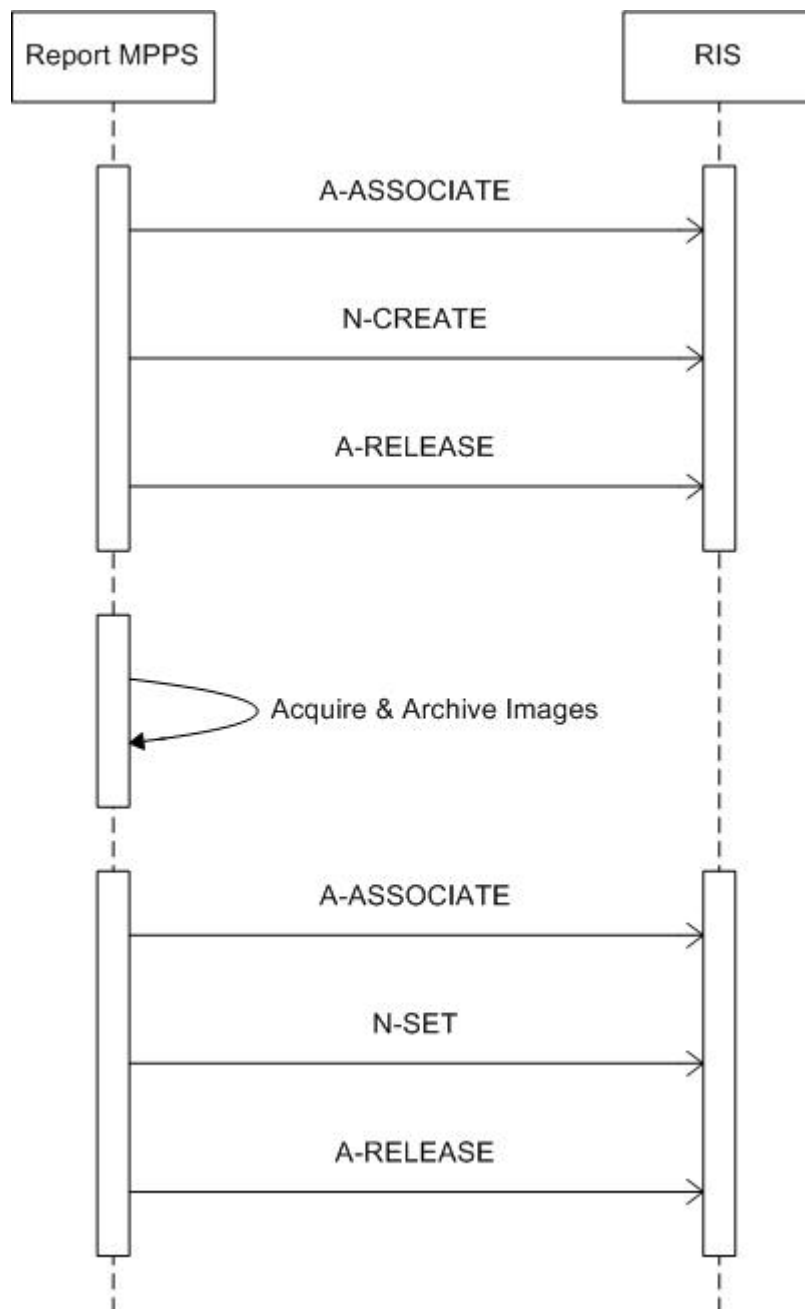
**Table 15: DICOM Command Communication Failure Behavior**

| Exception                | Behavior  |
|--------------------------|---|
| Reply Time-out           | The Query Worklist job fails and the association is aborted. The reason is logged and reported to the user. |
| Association Time-out SCU | The association is released.  |
| Association Aborted      | The Query Worklist job fails. The reason is logged and reported to the user.                                |

#### 4.2.1.3.2. Report MPPS

##### 4.2.1.3.2.1. Description and Sequencing of Activities

When the first scan of an examination is initiated the Network AE initiates an association to the MPPS server (typically a RIS) and sends an N-CREATE message with all appropriate information for the study; the status will be set to IN-PROGRESS. After clicking the "Ready" or "Incomplete" button the Network AE will Archive Images that were acquired (only those that have not been archived yet) and send an N-SET message with the end date and time and a status of respectively "COMPLETED" or "DISCONTINUED".





**Figure 5: Sequencing of Report MPPS**

**4.2.1.3.2.2. Proposed Presentation Contexts**

The presentation context proposed by Network AE for Report MPPS is defined in Table 16.

**Table 16: Proposed Presentation Contexts for Report MPPS**

| Presentation Context Table                  |                         |                   |   |      |                      |
|---|-------------------------|-------------------|---|------|----------------------|
| Abstract Syntax                             |                         | Transfer Syntax   |   | Role | Extended Negotiation |
| Name  | UID                     | Name List         | UID List  |      |                      |
| Modality Performed Procedure Step SOP Class | 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                 |

The order of the proposed transfer syntaxes is configurable; ELE is preferred.

**4.2.1.3.2.3. SOP Specific Conformance for SOP Classes**

The mapping of attributes for Report MPPS are specified in the in section 8.1.3 Attribute Mapping.

The details regarding the response behavior to status codes for the N-CREATE DIMSE are provided in Table 17.

**Table 17: DICOM N-CREATE Command Response Status Handling Behavior**

| Service Status | Code | Further Meaning     | Behavior  |
|----------------|------|---------------------|---|
| Success        | 0000 | Confirmation        | The association will be released. Message in console. |
| Failure        | xxxx | (any other failure) | Message in console. The reason is logged.             |

The behavior of the AE during an N-CREATE communication failure is summarized in Table 18.

**Table 18: DICOM N-CREATE Command Communication Failure Behavior**

| Exception                | Behavior  |
|--------------------------|---|
| Reply Time-out           | The N-CREATE command fails and the association is aborted. The reason is logged and reported to the user. |
| Association Time-out SCU | The association is released.  |
| Association Aborted      | The N-CREATE command fails. The reason is logged and reported to the user.                                |

The details regarding the response behavior to status codes for the N-SET DIMSE are provided in Table 19.

**Table 19: DICOM N-SET Command Response Status Handling Behavior**

| Service Status | Code | Further Meaning | Behavior  |
|----------------|------|-----------------|---|
| Success        | 0000 | Confirmation    | The association will be released. Message in console. |

| Service Status | Code | Further Meaning  | Behavior  |
|----------------|------|--|---|
| Failure        | 0110 | Performed procedure step object may no longer be updated | (Error ID A710)<br>Message in console. The reason is logged |
|                | xxxx | (any other failure)                                      | Message in console. The reason is logged.                   |

The behavior of the AE during an N-SET communication failure is summarized in Table 20.

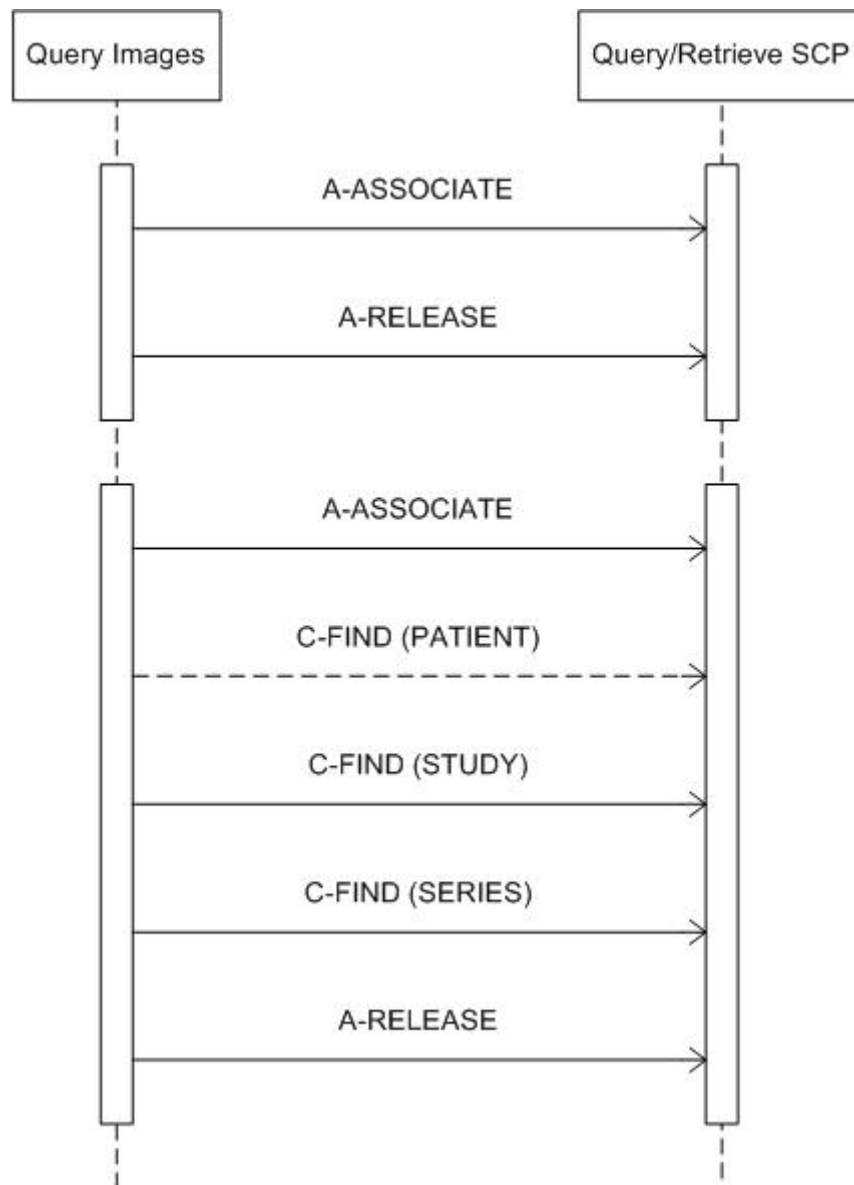
**Table 20: DICOM N-SET Command Communication Failure Behavior**

| Exception                | Behavior  |
|--------------------------|---|
| Reply Time-out           | The N-SET command fails and the association is aborted.<br>The reason is logged and reported to the user. |
| Association Time-out SCU | The association is released.  |
| Association Aborted      | The N-SET command fails.<br>The reason is logged and reported to the user.                                |

### 4.2.1.3.3. Query Images

#### 4.2.1.3.3.1. Description and Sequencing of Activities

Query Images may be used to find Examinations on a remote system. After clicking the Patient Administration – “Filter” button the Filter dialog offers the possibility to enter the required matching keys. One may now click the “Apply Filter” button to activate the specified filter settings or the “Proceed” button to reset the Patient Administration according to the specified filter settings.



**Figure 6: Sequencing of Query Images**

The query dialog is initiated when clicking either the Patient Administration dialog – “Connect” button or the Filter dialog – “Proceed” button. The Network AE will try and request an association at the Query/Retrieve SCP. Then a query filter can be

specified and the Network AE initiates a new association to send query requests (as specified in the Filter dialog) to the Query/Retrieve SCP, starting with Patient or Study level query (for Patient Root (preferred) or Study Root model respectively) through to Series level queries (i.e. no Image level queries).

**4.2.1.3.3.2. Proposed Presentation Contexts**

The presentation context proposed by Network AE for Query Images is defined in Table 21.

**Table 21: Proposed Presentation Contexts for Query Images**

| Presentation Context Table  |              |                   |   |      |                      |
|---|--------------|-------------------|---|------|----------------------|
| Abstract Syntax   |              | Transfer Syntax   |   | Role | Extended Negotiation |
| Name  | UID          | Name List         | UID List  |      |                      |
| All configured Query/Retrieve Information Model – FIND SOP classes. | See Table 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                 |

The order of the proposed transfer syntaxes is configurable; ELE is preferred.

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

Depending on the configuration the Intera Achieva shows the following behaviour.

If the remote system is configured as archive (PACS) then the Intera Achieva requires a non-universal matching query filter before performing a query on the remote system. Otherwise the Network AE will perform an initial universal matching query. After this initial query the subsequent queries will be as specified in the Patient Administration Filter.

Intera Achieva provides the Patient Administration – Filter dialog to enter matching criteria for the following matching keys.

**Table 22: Patient Administration Filter**

| Filter Key      | DICOM Matching Key                   |             | Note   |
|-----------------|--------------------------------------|-------------|--|
|                 | Name                                 | Tag         |  |
| Patient name    | Patient's Name                       | (0010,0010) | -  |
| Registration ID | Patient ID                           | (0010,0020) | The initial query will always perform a universal match on Patient ID, independent on the entered matching value. Next the Intera Achieva will filter the relevant data, and implement further queries based on this data. |
| Date of birth   | Patient's Birth Date                 | (0010,0030) | -  |
| Exam date       | Performed Procedure Step Start Date  | (0040,0244) | -  |
| Exam status     | Performed Procedure Step Status      | (0040,0252) | Enumerated value: Ready; Not ready.  |
| Exam name       | Performed Procedure Step Description | (0040,0254) | -  |

The complete set of matching keys for Query Images is specified in section 8.1.1 Created SOP Instances.

The use of specific character set is as specified in section 6, Support of Character Sets. The specific character set value is not checked.

The details regarding the response behavior to status codes are provided in Table 23.

**Table 23: DICOM Command Response Status Handling Behavior**

| Service Status | Code | Further Meaning  | Behavior  |
|----------------|------|--|---|
| Refused        | A700 | Out of resources – Unable to calculate number of matches   | No query results are displayed. The association is released. The reason is logged and reported by message in console. |
| Failed         | A900 | Identifier does not match SOP class  | No query results are displayed. The association is released. The reason is logged and reported by message in console. |
|                | Cxxx | Unable to process  | No query results are displayed. The association is released. The reason is logged and reported by message in console. |
| Cancel         | FE00 | Sub-operations terminated due to Cancel indication   | No query results are displayed. The association is released. The reason is logged and reported by message in console. |
| Pending        | FF00 | Matches are continuing – Current match is supplied and any optional keys were supported in the same manner as required keys          | The Query Images job continues.   |
|                | FF01 | Matches are continuing – Warning that one or more optional keys were not supported for existence and/or matching for this identifier | The Query Images job continues.   |
| Success        | 0000 | Matching is complete   | The query results are displayed. The association is released. Report message in console.                              |

The behavior of the AE during communication failure is summarized in Table 24.

**Table 24: DICOM Command Communication Failure Behavior**

| Exception                | Behavior  |
|--------------------------|---|
| Reply Time-out           | The Query Images job fails and the association is aborted. The reason is logged and reported to the user. |
| Association Time-out SCU | The association is released.  |
| Association Aborted      | The Query Images job fails. The reason is logged and reported to the user.                                |

#### 4.2.1.3.4. Retrieve Images

##### 4.2.1.3.4.1. Description and Sequencing of Activities

In order to be able to select any Examination one must first Query Images on the remote database. Then the Series of Images of the selected Examinations may be copied from the queried remote database to the local database by means of the "Local Database" button in the Intera Achieva Patient Administration – Destinations environment.

The Retrieve Images process includes the actions as shown in Figure 7. For each examination the Network AE initiates a new association to send move requests on series level only. The status of this retrieve is shown in the Queue Manager.

Figure 7 shows the diagram for the move request for only one Examination containing only one Series of Images.

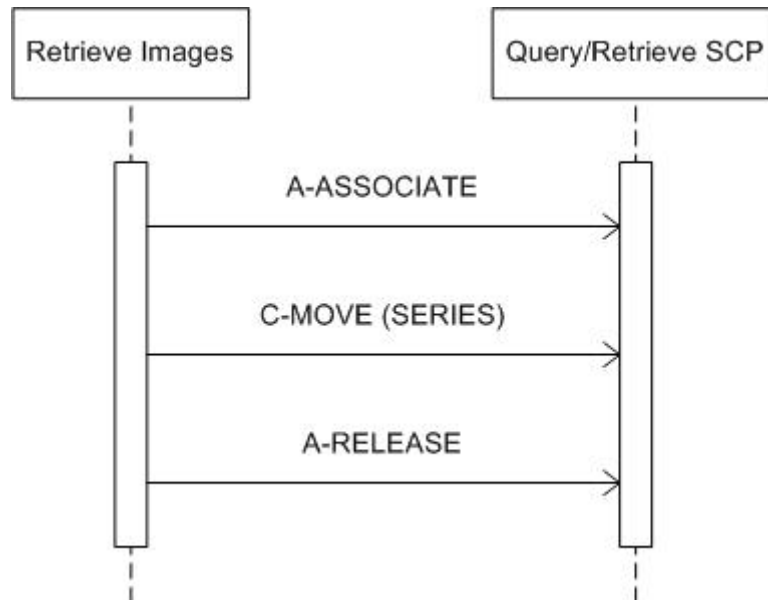


Figure 7: Sequencing of Retrieve Images

##### 4.2.1.3.4.2. Proposed Presentation Contexts

The presentation context proposed by Network AE for Retrieve Images is defined in Table 25.

**Table 25: Proposed Presentation Contexts for Retrieve Images**

| Presentation Context Table  |              |                   |   |      |                      |
|---|--------------|-------------------|---|------|----------------------|
| Abstract Syntax   |              | Transfer Syntax   |   | Role | Extended Negotiation |
| Name  | UID          | Name List         | UID List  |      |                      |
| All configured Query/Retrieve Information Model – FIND SOP classes. | See Table 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                 |
| All configured Query/Retrieve Information Model – MOVE SOP classes. | See Table 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                 |

The order of the proposed transfer syntaxes is configurable; ELE is preferred.

#### 4.2.1.3.4.3. SOP Specific Conformance for SOP Classes

All details regarding the C-FIND response behavior to status codes are provided in Table 23. The behavior of the AE during C-FIND communication failure is summarized in Table 24.

All details regarding the C-MOVE response behavior to status codes are provided in Table 26.

**Table 26: DICOM C-MOVE Command Response Status Handling Behavior**

| Service Status | Code | Further Meaning  | Behavior  |
|----------------|------|--|---|
| Refused        | A701 | Out of resources – Unable to calculate number of matches | The Retrieve Images job is marked as Failed at the queue manager. The association is released. The reason is logged and reported by message in console. |
|                | A702 | Out of resources – Unable to perform sub-operations      | The Retrieve Images job is marked as Failed at the queue manager. The association is released. The reason is logged and reported by message in console. |
|                | A801 | Destination unknown                                      | The Retrieve Images job is marked as Failed at the queue manager. The association is released. The reason is logged and reported by message in console. |
| Failed         | A900 | Identifier does not match SOP class                      | The Retrieve Images job is marked as Failed at the queue manager. The association is released. The reason is logged and reported by message in console. |
|                | Cxxx | Unable to process  | The Retrieve Images job is marked as Failed at the queue manager. The association is released. The reason is logged and reported by message in console. |
| Warning        | B000 | Sub-operations complete – One or more failures           | The Retrieve Images job is marked as Completed at the queue manager. The association is released.   |
| Cancel         | FE00 | Sub-operations terminated due to Cancel indication       | The Retrieve Images job is marked as Failed at the queue manager. The association is released. The reason is logged and reported by message in console. |
| Pending        | FF00 | Sub-operations are continuing                            | The Retrieve Images job continues.  |
| Success        | 0000 | Sub-operations complete – No failures                    | The Retrieve Images job is marked as Completed at the queue manager. The association is released.   |

The behavior of the AE during C-MOVE communication failure is summarized in Table 27.

**Table 27: DICOM C-MOVE Command Communication Failure Behavior**

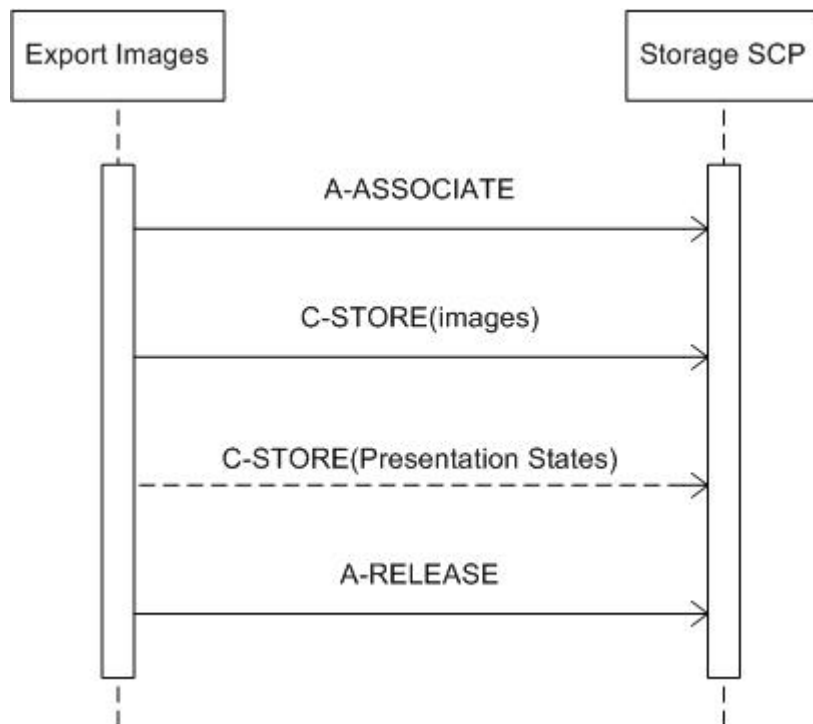
| Exception                   | Behavior  |
|-----------------------------|---|
| Reply Time-out              | The Retrieve Images job fails and the association is aborted.<br>The reason is logged and reported to the user. |
| Association Time-out<br>SCU | N/A   |
| Association Aborted         | The Retrieve Images job fails.<br>The reason is logged and reported to the user.                                |



**4.2.1.3.5. Export Images**

**4.2.1.3.5.1. Description and Sequencing of Activities**

Using the local patient database one may export Images to the selected network destination by clicking the Network button “Copy Selection To DICOM Node”. For each selected Examination the Network AE will then initiate a successive association with the selected network node. Within such association all images and applicable presentation state objects of the particular Examination will be exported consecutively. When the storage job has finished, either successful or not, the Network AE will release the association.



**Figure 8: Sequencing of Export Images**

**4.2.1.3.5.2. Proposed Presentation Contexts**

The presentation context proposed by Network AE for Export Images is defined in Table 28.

**Table 28: Proposed Presentation Contexts for Export Images**

| Presentation Context Table          |              |                   |   |      |                      |
|-------------------------------------|--------------|-------------------|---|------|----------------------|
| Abstract Syntax                     |              | Transfer Syntax   |   | Role | Extended Negotiation |
| Name                                | UID          | Name List         | UID List  |      |                      |
| All configured Storage SOP classes. | See Table 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                 |

The order of the proposed transfer syntaxes is configurable; ELE is preferred.

#### 4.2.1.3.5.3. SOP Specific Conformance for SOP Classes

When receiving a C-STORE response with Refused or Error status the Network AE will release the association. All the images associated with the job will be considered by the Network AE to have failed to transfer. The Network AE has the ability to automatically recover from this situation and will attempt to send all the images at a later time.

The details regarding the response behavior are provided in Table 29.

**Table 29: DICOM Command Response Status Handling Behavior**

| Service Status | Code | Further Meaning                   | Behavior  |
|----------------|------|-----------------------------------|---|
| Refused        | A7xx | Out of resources                  | The Export Images job fails and the association is released. The reason is logged and reported by message in console.   |
| Error          | A9xx | Data set does not match SOP class | The Export Images job fails and the association is released. The reason is logged and reported by message in console.   |
|                | Cxxx | Cannot understand                 | The Export Images job fails and the association is released. The reason is logged and reported by message in console.   |
| Warning        | B000 | Coercion of data elements         | Message in console.<br>The Export Images job continues. When the last image of the job has been stored the job is marked as Completed at the queue manager and the association is released. |
|                | B006 | Elements discarded                | Message in console.<br>The Export Images job continues. When the last image of the job has been stored the job is marked as Completed at the queue manager and the association is released. |
|                | B007 | Data set does not match SOP class | Message in console.<br>The Export Images job continues. When the last image of the job has been stored the job is marked as Completed at the queue manager and the association is released. |
| Success        | 0000 | Storage is complete               | Message in console.<br>The Export Images job continues. When the last image of the job has been stored the job is marked as Completed at the queue manager and the association is released. |

The behavior of the AE during communication failure is summarized in Table 30.

**Table 30: DICOM Command Communication Failure Behavior**

| Exception                | Behavior  |
|--------------------------|---|
| Reply Time-out           | The Export Images job fails and the association is aborted.<br>The reason is logged and reported to the user. |
| Association Time-out SCU | The association is released.  |
| Association Aborted      | The Export Images job fails.<br>The reason is logged and reported to the user.                                |

---

#### **4.2.1.3.6. Archive Images**

##### **4.2.1.3.6.1. Description and Sequencing of Activities**

Using the local patient database one may archive Images to the selected network destination by clicking the PACS button "Copy Selection To PACS". For each selected Examination the Network AE will then successively do the following.

First the Network AE will initiate an association with the configured PACS node. Within such association all images and applicable presentation state objects of the particular Examination will be exported consecutively. When the storage job has finished, either successful or not, the Network AE will release the association.

If the storage job failed then the storage job will have to be executed over again.

Otherwise, if storage commitment is configured then, for each exported Series of Images the Network AE will request storage commitment on the PACS. Each storage commitment request handles the storage commitment of one series of images within its own association.

The Network AE supports both synchronous and asynchronous storage commitment. When synchronous storage commitment is configured and the event report is not received within the configured time-out interval, the Network AE will release the association and the storage commitment will commence as asynchronous.

Figure 9 shows the sequence diagram for the storage and synchronous storage commitment of an Examination containing one Series of images.

Figure 10 shows the same using asynchronous storage commitment.

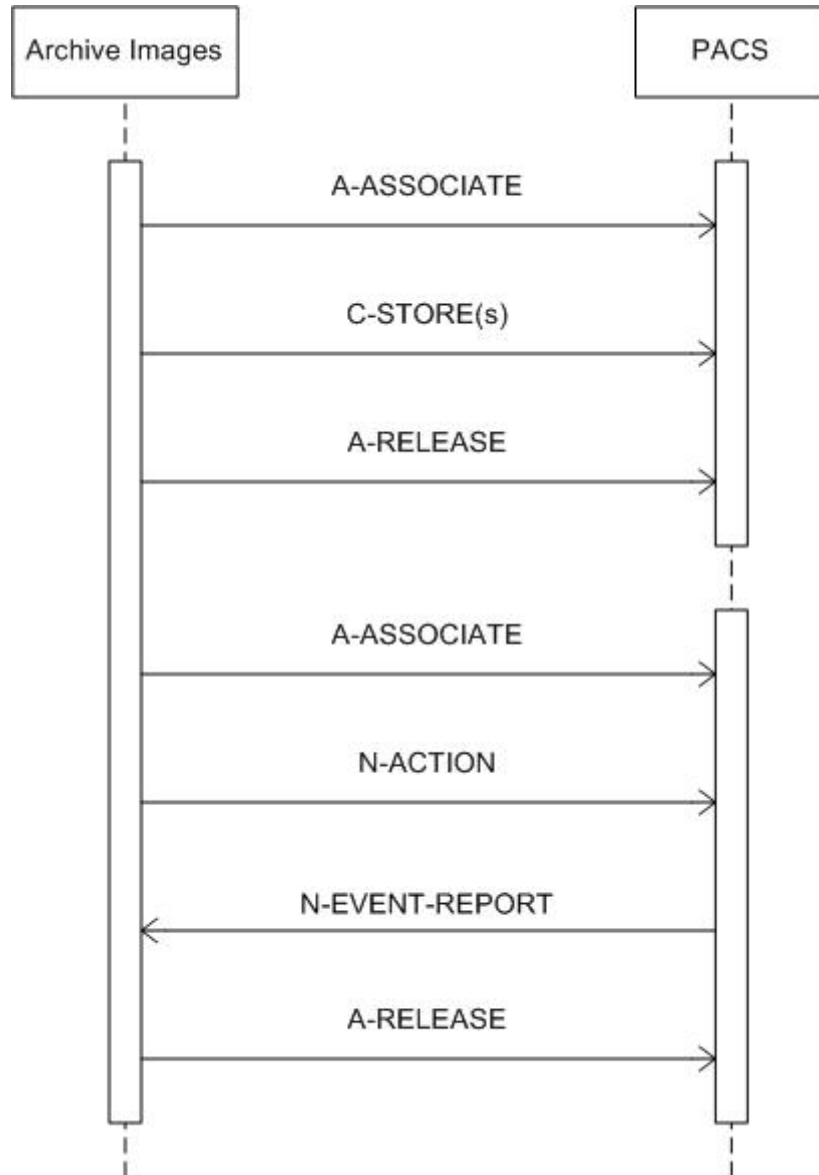


Figure 9: Sequencing of Synchronous Archive Images

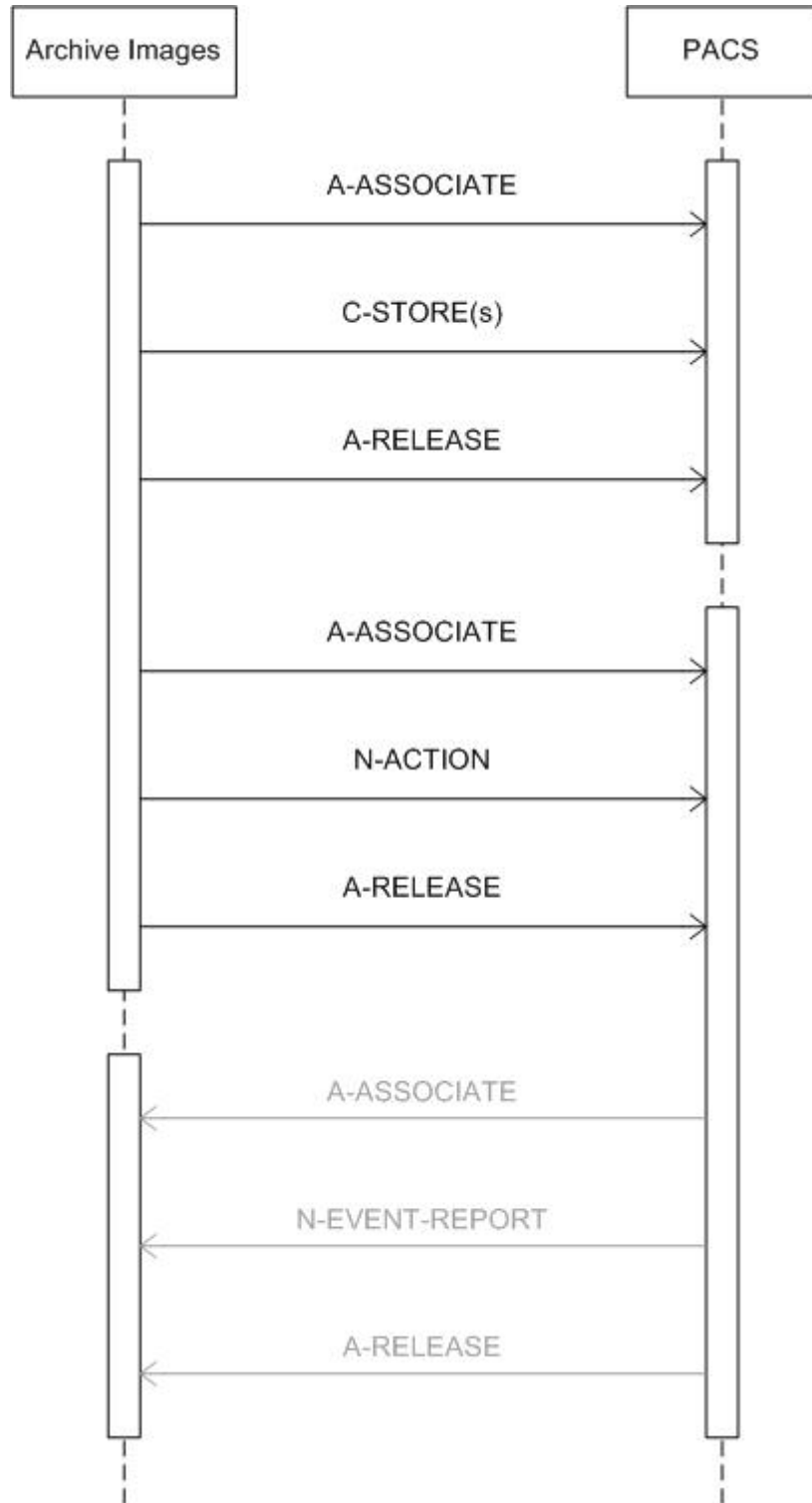


Figure 10: Sequencing of Asynchronous Archive Images

**4.2.1.3.6.2. Proposed Presentation Contexts**

The presentation context proposed by Network AE for Archive Images is defined in Table 31.

**Table 31: Proposed Presentation Contexts for Archive Images**

| Presentation Context Table              |                      |                   |   |      |                      |
|---|----------------------|-------------------|---|------|----------------------|
| Abstract Syntax                         |                      | Transfer Syntax   |   | Role | Extended Negotiation |
| Name                                    | UID                  | Name List         | UID List  |      |                      |
| All configured Storage SOP classes.     | See Table 1.         | ELE<br>EBE<br>ILE | 1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2<br>1.2.840.10008.1.2 | SCU  | None                 |
| Storage Commitment Push Model SOP Class | 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                 |

The order of the proposed transfer syntaxes is configurable; ELE is preferred.

**4.2.1.3.6.3. SOP Specific Conformance for SOP Classes**

As Grayscale Softcopy Presentation State objects are not stored in the same Series as the related Images, the Network AE will initiate separate associations for committing those Series – one after the other.

The details regarding the response behavior for the Archive Images storage are provided in Table 29.

The details regarding the response behavior for the Archive Images storage commitment request are provided in Table 32.

**Table 32: DICOM N-ACTION Command Response Status Handling Behavior**

| Service Status | Code | Further Meaning | Behavior  |
|----------------|------|-----------------|---|
| Success        | 0000 | Confirmation    | The association will be released. Message in console. |
| Failure        | xxxx | (any failure)   | Message in console. The reason is logged.             |

The details regarding the response behavior for the Archive Images storage commitment event report are provided in section 4.2.1.4.3.3.

The behavior of the Network AE during storage communication failure is summarized in Table 30.

The behavior of the Network AE during storage commitment request communication failure is summarized in Table 33.

**Table 33: DICOM N-ACTION Command Communication Failure Behavior**

| Exception                | Behavior  |
|--------------------------|---|
| Reply Time-out           | The association is released.<br>The Archive Images job expects storage commitment report. |
| Association Time-out SCU | The association is released.<br>The Archive Images job expects storage commitment report. |
| Association Aborted      | The Archive Images job expects storage commitment report.                                 |

#### 4.2.1.4. Association Acceptance Policy

This section describes the conditions under which the Network AE will accept an association.

The AE association rejection policies are summarized in Table 34.

**Table 34: DICOM Association Rejection Policies**

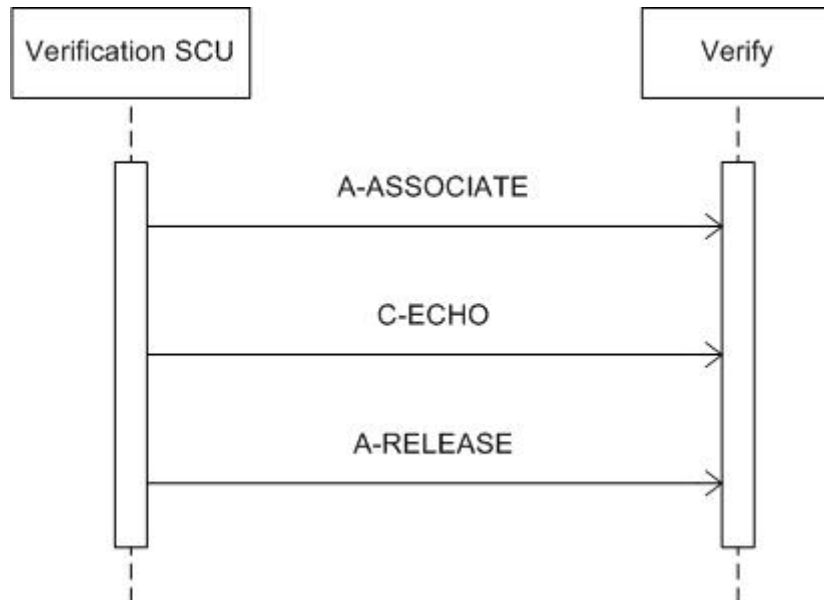
| Result                   | Source  | Reason/Diagnosis  | Explanation   |
|--------------------------|---|---|---|
| 1 – rejected-permanent   | 1 – DICOM UL service-user                                     | 1 – no-reason-given   | If applicable the command will be retried. Log entry. The user is notified via pop-up (in preview mode only). |
|                          |   | 2 – application-context-name-not-supported  | If applicable the command will be retried. Log entry. The user is notified via pop-up (in preview mode only). |
|                          |   | 3 – calling-AE-title-not-recognized   | If applicable the command will be retried. Log entry. The user is notified via pop-up (in preview mode only). |
|                          |   | 7 – called-AE-title-not-recognized  | If applicable the command will be retried. Log entry. The user is notified via pop-up (in preview mode only). |
|                          | 2 – DICOM UL service-provider (ACSE related function)         | 1 – no-reason-given   | If applicable the command will be retried. Log entry. The user is notified via pop-up (in preview mode only). |
|                          |   | 2 – protocol-version-not-supported  | If applicable the command will be retried. Log entry. The user is notified via pop-up (in preview mode only). |
|                          | 3 – DICOM UL service-provider (presentation related function) | 1 – temporary-congestion  | If applicable the command will be retried. Log entry. The user is notified via pop-up (in preview mode only). |
| 2 – local-limit-exceeded |   | If applicable the command will be retried. Log entry. The user is notified via pop-up (in preview mode only). |   |
| 2 – rejected-transient   | 1 – DICOM UL service-user                                     | 1 – no-reason-given   | If applicable the command will be retried. Log entry. The user is notified via pop-up (in preview mode only). |
|                          |   | 2 – application-context-name-not-supported  | If applicable the command will be retried. Log entry. The user is notified via pop-up (in preview mode only). |
|                          |   | 3 – calling-AE-title-not-recognized   | If applicable the command will be retried. Log entry. The user is notified via pop-up (in preview mode only). |
|                          |   | 7 – called-AE-title-not-recognized  | If applicable the command will be retried. Log entry. The user is notified via pop-up (in preview mode only). |
|                          | 2 – DICOM UL service-provider (ACSE related function)         | 1 – no-reason-given   | If applicable the command will be retried. Log entry. The user is notified via pop-up (in preview mode only). |

| Result | Source  | Reason/Diagnosis                   | Explanation   |
|--------|---|------------------------------------|---|
|        |   | 2 – protocol-version-not-supported | If applicable the command will be retried. Log entry. The user is notified via pop-up (in preview mode only). |
|        | 3 – DICOM UL service-provider (presentation related function) | 1 – temporary-congestion           | If applicable the command will be retried. Log entry. The user is notified via pop-up (in preview mode only). |
|        |   | 2 – local-limit-exceeded           | If applicable the command will be retried. Log entry. The user is notified via pop-up (in preview mode only). |

**4.2.1.4.1. Verify**

**4.2.1.4.1.1. Description and Sequencing of Activities**

The Network AE will act as a Verification SCP for any remote SCU.



**Figure 11: Sequencing of Verify**

The Network AE accepts associations to verify application level communication using the C-ECHO command.

**4.2.1.4.1.2. Accepted Presentation Contexts**

The Network AE may accept the following presentation contexts.

**Table 35: Acceptable Presentation Contexts for Verify**

| Presentation Context Table |                   |                 |                     |      |                      |
|----------------------------|-------------------|-----------------|---------------------|------|----------------------|
| Abstract Syntax            |                   | Transfer Syntax |                     | Role | Extended Negotiation |
| Name                       | UID               | Name List       | UID List            |      |                      |
| Verification               | 1.2.840.10008.1.1 | ELE             | 1.2.840.10008.1.2.1 | SCP  | None                 |
|                            |                   | EBE             | 1.2.840.10008.1.2.2 | SCP  | None                 |



| Presentation Context Table |     |                 |                   |      |                      |
|----------------------------|-----|-----------------|-------------------|------|----------------------|
| Abstract Syntax            |     | Transfer Syntax |                   | Role | Extended Negotiation |
| Name                       | UID | Name List       | UID List          |      |                      |
|                            |     | ILE             | 1.2.840.10008.1.2 | SCP  | None                 |

The preferred transfer syntax is ELE.

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

The status behavior of the Network AE is as shown in Table 36.

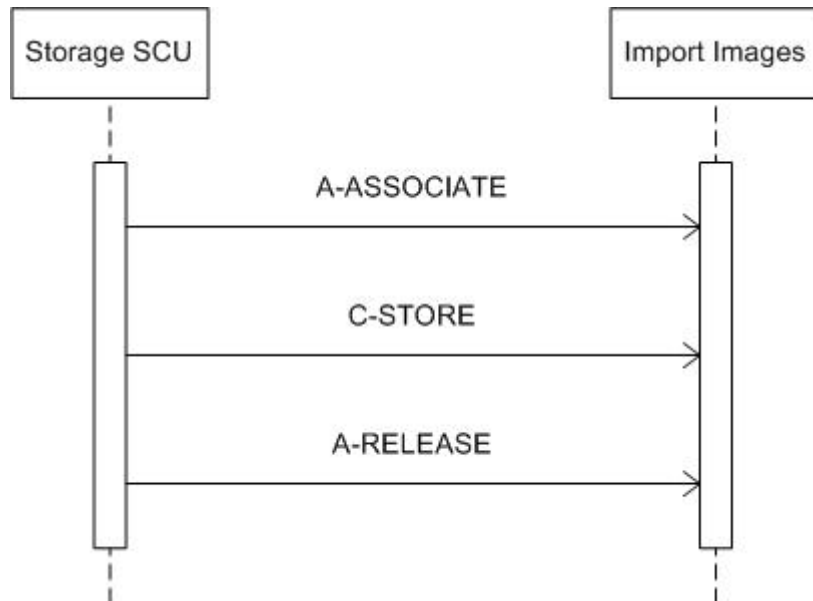
**Table 36: Network AE C-ECHO Status Response**

| Service Status | Code | Further Meaning | Description         |
|----------------|------|-----------------|---------------------|
| Success        | 0000 | Confirmation    | Message in console. |

**4.2.1.4.2. Import Images**

**4.2.1.4.2.1. Description and Sequencing of Activities**

The Network AE will act as a Storage SCP for any remote Storage SCU that is configured in the Intera Achieva configuration using an accepted presentation context.



**Figure 12: Sequencing of Import Images**

After the Network AE accepts an association from the Storage SCU it will receive images, send store responses including the relevant status, and finally release the association on SCU request.

**4.2.1.4.2.2. Accepted Presentation Contexts**

The Network AE may accept the following presentation contexts.

**Table 37: Acceptable Presentation Contexts for Import Images**

| Presentation Context Table         |                                    |                 |                     |      |                      |
|------------------------------------|------------------------------------|-----------------|---------------------|------|----------------------|
| Abstract Syntax                    |                                    | Transfer Syntax |                     | Role | Extended Negotiation |
| Name                               | UID                                | Name List       | UID List            |      |                      |
| All configured storage SOP classes | All storage SOP classes in table 2 | ELE             | 1.2.840.10008.1.2.1 | SCP  | None                 |
|                                    |                                    | EBE             | 1.2.840.10008.1.2.2 | SCP  | None                 |
|                                    |                                    | ILE             | 1.2.840.10008.1.2   | SCP  | None                 |

The preferred transfer syntax is ELE.

#### 4.2.1.4.2.3. SOP Specific Conformance for SOP Classes

Secondary Capture images may be imported at any time and from any source. However, the Network AE may only import MR images and Presentation State objects that were created on an Intera Achieva. These imported images may be used for reference only; it is not the intention to export them again. When the Network AE receives non-native MR images it may not import the images but respond with error status (C000) "Cannot understand" and abort the association.

The status behavior of the Network AE is as shown in Table 38.

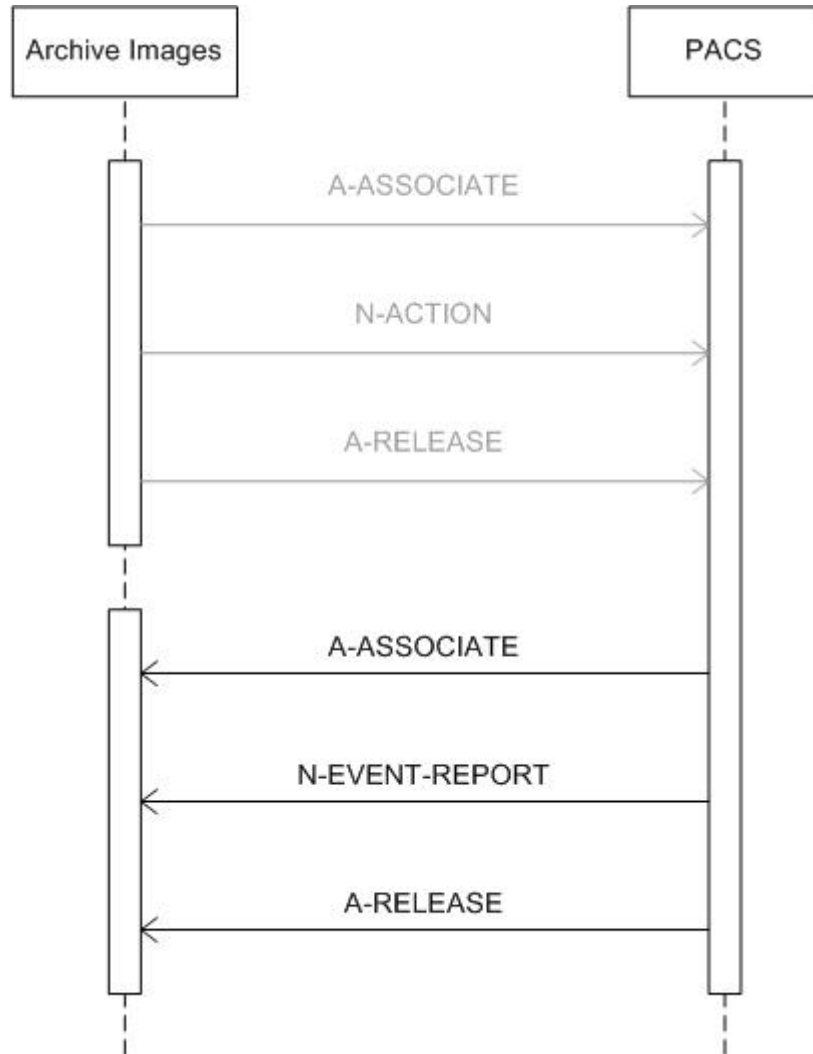
**Table 38: Network AE C-STORE Status Response**

| Service Status | Code | Further Meaning                   | Description  |
|----------------|------|-----------------------------------|--|
| Refused        | A700 | Out of resources                  | The local database is full; recovery from this condition is left to the SCU.<br>The Intera Achieva sends the failure response, logs the condition, and aborts the association. |
| Error          | A900 | Data set does not match SOP class | The SOP class of the image(s) does not match the negotiated abstract syntax.<br>The Intera Achieva sends the failure response, logs the condition, and aborts the association. |
|                | C000 | Cannot understand                 | The image(s) cannot be parsed.<br>The Intera Achieva sends the failure response, logs the condition, and aborts the association.   |
| Success        | 0000 | Storage is complete               | The image(s) shall be stored in the local database.  |

#### 4.2.1.4.3. Archive Images

##### 4.2.1.4.3.1. Description and Sequencing of Activities

The Network AE will act as a Storage Commitment SCU for the configured Storage Commitment SCP to receive asynchronous Storage Commitment reports from Storage Commitment requests send by Archive Images (as Storage Commitment SCU), using an accepted presentation context.



**Figure 13: Sequencing of Archive Images**

After the Network AE accepts an association from the remote Storage Commitment SCP it will receive Storage Commitment reports, send responses including the relevant status, and finally release the association on SCP request.

**4.2.1.4.3.2. Accepted Presentation Contexts**

The Network AE may accept the following presentation contexts.

**Table 39: Acceptable Presentation Contexts for Archive Images**

| Presentation Context Table              |             |                 |                     |      |                      |
|---|-------------|-----------------|---------------------|------|----------------------|
| Abstract Syntax                         |             | Transfer Syntax |                     | Role | Extended Negotiation |
| Name                                    | UID         | Name List       | UID List            |      |                      |
| Storage Commitment Push Model SOP Class | 1.2.840     | ELE             | 1.2.840.10008.1.2.1 | SCU  | None                 |
|   | .10008.1.20 | EBE             | 1.2.840.10008.1.2.2 | SCU  | None                 |
|   | .1          | ILE             | 1.2.840.10008.1.2   | SCU  | None                 |

The preferred transfer syntax is ELE.

#### 4.2.1.4.3.3. SOP Specific Conformance for SOP Classes

The storage commitment status is reflected in the Patient Administration Examination status. If the storage commitment failed, the operator is responsible to retry Archive Images.

On receiving a storage commitment result with Event Type ID 1 (Storage Commitment Request Successful) the Intera Achieva Patient Administration Examination status shall be updated to reflect the successful storage commitment.

On receiving a storage commitment result with Event Type ID 2 (Storage Commitment Request Complete – Failures Exist) the Network AE shall behave as summarized in Table 40.

**Table 40: Network AE N-EVENT-REPORT Failure Handling Behavior**

| Failure Reason |                                    | Behavior                                    |
|----------------|------------------------------------|---|
| Code           | Semantic                           |   |
| 0110           | Processing failure                 | Retry storage commitment request.           |
| 0112           | No such object instance            | Retry store and storage commitment request. |
| 0119           | Class / Instance conflict          | Inform user and abort.                      |
| 0122           | Referenced SOP class not supported | Inform user and abort.                      |
| 0131           | Duplicate transaction UID          | Inform user and abort.                      |
| 0213           | Resource limitation                | Retry storage commitment request.           |

The status processing behavior of the Network AE is summarized in Table 41.

**Table 41: Network AE N-EVENT-REPORT Status Processing Behavior**

| Service Status | Code | Further Meaning | Description                        |
|----------------|------|-----------------|------------------------------------|
| Success        | 0000 | Confirmation    | The Intera Achieva logs the event. |

## 4.2.2. Print AE

### 4.2.2.1. SOP Classes

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

**Table 42: SOP Classes for the Print AE**

| SOP Class Name                          | SOP Class UID          | SCU | SCP |
|---|------------------------|-----|-----|
| 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  |

### 4.2.2.2. Association Policies

This section describes the general association establishment and acceptance policies of the Print AE.

#### 4.2.2.2.1. General

The following DICOM standard application context is specified.

**Table 43: DICOM Application Context**

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

#### 4.2.2.2.2. Number of Associations

The number of simultaneous associations that the Print AE may support is specified as follows. The Print AE does not accept any associations.

**Table 44: Number of Associations as an Association Initiator for the Print AE**

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

#### 4.2.2.2.3. Asynchronous Nature

Not applicable.

#### 4.2.2.2.4. Implementation Identifying Information

The following values are used for Implementation Class UID and Implementation Version Name.

**Table 45: DICOM Implementation Class and Version for the Print AE**

|                             |                       |
|-----------------------------|-----------------------|
| Implementation Class UID    | 2.16.124.113531.1.1.1 |
| Implementation Version Name | MR PRINT 1.2          |

#### 4.2.2.2.5. Communication Failure Handling

The behavior of the Print AE during communication failure is summarized in Table 46.

**Table 46: Communication Failure Behavior**

| Exception      | Behavior  |
|----------------|---|
| ARTIM Time-out | The association setup fails, the reason is logged and reported to the user. |

#### 4.2.2.3. Association Initiation Policy

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

The behavior of the Print AE during association rejection is summarized in Table 47.

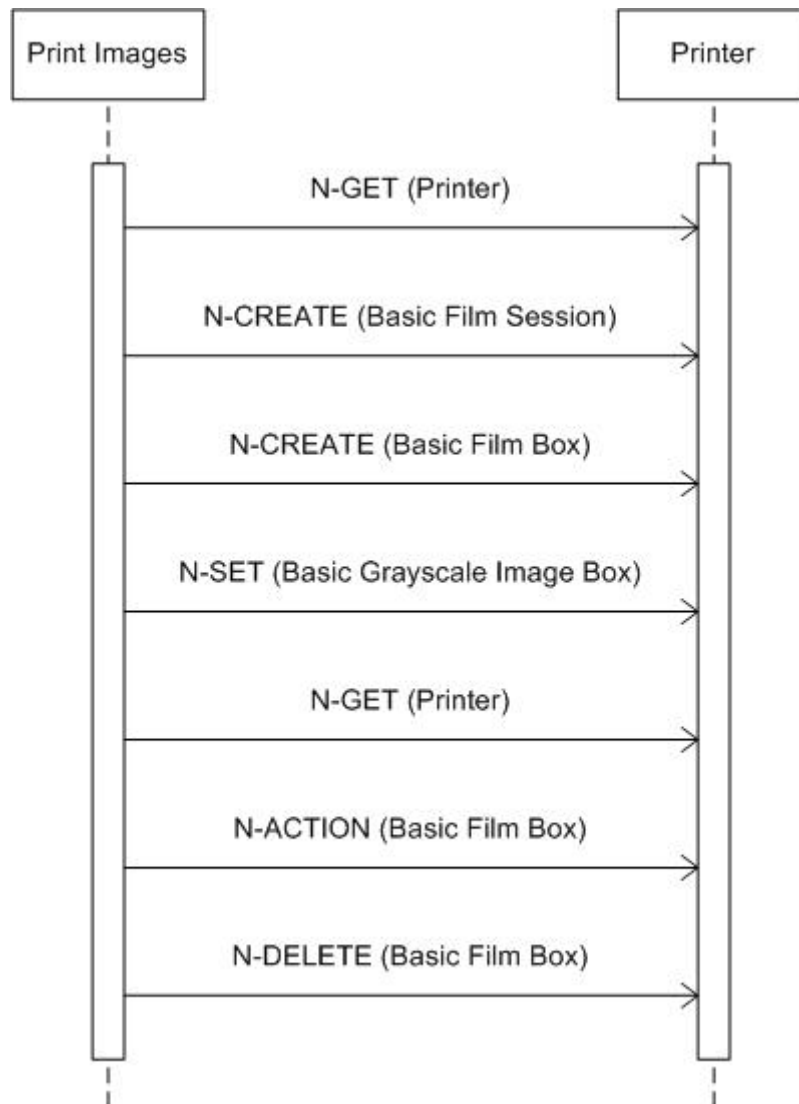
**Table 47: DICOM Association Rejection Handling**

| Result                   | Source  | Reason/Diagnosis   | Behavior   |
|--------------------------|---|--|--|
| 1 – rejected-permanent   | 1 – DICOM UL service-user                                     | 1 – no-reason-given  | The user is notified (via pop-up). If applicable the command will be retried. Log entry. |
|                          |   | 2 – application-context-name-not-supported   | The user is notified (via pop-up). If applicable the command will be retried. Log entry. |
|                          |   | 3 – calling-AE-title-not-recognized  | The user is notified (via pop-up). If applicable the command will be retried. Log entry. |
|                          |   | 7 – called-AE-title-not-recognized   | The user is notified (via pop-up). If applicable the command will be retried. Log entry. |
|                          | 2 – DICOM UL service-provider (ACSE related function)         | 1 – no-reason-given  | The user is notified (via pop-up). If applicable the command will be retried. Log entry. |
|                          |   | 2 – protocol-version-not-supported   | The user is notified (via pop-up). If applicable the command will be retried. Log entry. |
|                          | 3 – DICOM UL service-provider (presentation related function) | 1 – temporary-congestion   | The user is notified (via pop-up). If applicable the command will be retried. Log entry. |
| 2 – local-limit-exceeded |   | The user is notified (via pop-up). If applicable the command will be retried. Log entry. |  |
| 2 – rejected-transient   | 1 – DICOM UL service-user                                     | 1 – no-reason-given  | The user is notified (via pop-up). If applicable the command will be retried. Log entry. |
|                          |   | 2 – application-context-name-not-supported   | The user is notified (via pop-up). If applicable the command will be retried. Log entry. |
|                          |   | 3 – calling-AE-title-not-recognized  | The user is notified (via pop-up). If applicable the command will be retried. Log entry. |
|                          |   | 7 – called-AE-title-not-recognized   | The user is notified (via pop-up). If applicable the command will be retried. Log entry. |
|                          | 2 – DICOM UL service-provider (ACSE related function)         | 1 – no-reason-given  | The user is notified (via pop-up). If applicable the command will be retried. Log entry. |
|                          |   | 2 – protocol-version-not-supported   | The user is notified (via pop-up). If applicable the command will be retried. Log entry. |
|                          | 3 – DICOM UL service-provider (presentation related function) | 1 – temporary-congestion   | The user is notified (via pop-up). If applicable the command will be retried. Log entry. |
|                          |   | 2 – local-limit-exceeded   | The user is notified (via pop-up). If applicable the command will be retried. Log entry. |

### 4.2.2.3.1. Print Images

#### 4.2.2.3.1.1. Description and Sequencing of Activities

Before Print Images the Print AE must have an open association with the Printer. If no association is opened yet, the operator may initiate an association manually by selecting "On" in the printer queue manager dialog; otherwise the Print AE may try and initiate an association automatically at certain time intervals.



**Figure 14: Sequencing of Print Images**

Note that the first N-GET message is used to inquire for general printer information, where the second N-GET message is used to inquire for printer status information only.

#### 4.2.2.3.1.2. Proposed Presentation Contexts

The presentation context proposed by Print AE for Print Images is defined in Table 48.

**Table 48: Proposed Presentation Contexts for Print Images**

| 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             | 1.2.840.10008.1.2 | SCU  | None                 |
| Presentation LUT                        | 1.2.840.10008.5.1.1.23 | ILE             | 1.2.840.10008.1.2 | SCU  | None                 |

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

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

The Print AE cannot handle any N-EVENT-REPORT messages.

The details regarding the response behavior to all status codes, both from an application level and communication errors are provided in Table 49 to Table 54.

**Table 49: DICOM Command Response Status Handling Behavior for Printer N-GET**

| Service Status | Code | Further Meaning      | Behavior  |
|----------------|------|----------------------|---|
| Success        | 0000 | Successful operation | The print job continues.  |
| Warning        | xxxx | (any warning)        | The print job continues and the warning is logged.                    |
| Failure        | xxxx | (any failure)        | The print job is marked as failed, the reason is reported and logged. |

**Table 50: DICOM Command Response Status Handling Behavior for Basic Film Session N-CREATE**

| Service Status | Code | Further Meaning                   | Behavior   |
|----------------|------|-----------------------------------|--|
| Success        | 0000 | Film session successfully created | The print job continues.                           |
| Warning        | B600 | Memory allocation not supported   | The print job continues and the warning is logged. |

**Table 51: DICOM Command Response Status Handling Behavior for Basic Film Box N-CREATE**

| Service Status | Code | Further Meaning   | Behavior   |
|----------------|------|---|--|
| Success        | 0000 | Successful operation  | The print job continues.                                 |
| Warning        | B605 | Requested Min Density or Max Density outside of printer's operating range | The print job continues and the warning is logged.       |
| Failure        | C616 | There is an existing Film Box that has not been printed                   | The print job is marked as failed, the reason is logged. |



**Table 52: DICOM Command Response Status Handling Behavior for Basic Grayscale Image Box N-SET**

| Service Status | Code | Further Meaning   | Behavior  |
|----------------|------|---|---|
| Success        | 0000 | Successful operation  | The print job continues.  |
| Warning        | B604 | Image size is larger than image box size – the image has been de-magnified  | The print job continues and the warning is reported and logged.       |
|                | B605 | Requested Min Density or Max Density outside of printer's operating range   | The print job continues and the warning is reported and logged.       |
|                | B609 | Image size is larger than image box size – the image has been cropped to fit  | The print job continues and the warning is reported and logged.       |
|                | B60A | Image size or combined print image size is larger than image box size – the image or combined print image has been decimated to fit | The print job continues and the warning is reported and logged.       |
| Failure        | C603 | Image size is larger than image box size  | The print job is marked as failed, the reason is reported and logged. |
|                | C605 | Insufficient memory in printer to store the image   | The print job is marked as failed, the reason is reported and logged. |
|                | C613 | Combined print image size is larger than image box size   | The print job is marked as failed, the reason is reported and logged. |

**Table 53: DICOM Command Response Status Handling Behavior for Basic Film Box N-ACTION**

| Service Status | Code | Further Meaning   | Behavior  |
|----------------|------|---|---|
| Success        | 0000 | Successful operation  | The print job continues.  |
| Warning        | B603 | Film Box SOP instance hierarchy does not contain Image Box SOP instances  | The print job continues and the warning is reported and logged.       |
|                | B604 | Image size is larger than image box size – the image has been de-magnified  | The print job continues and the warning is reported and logged.       |
|                | B609 | Image size is larger than image box size – the image has been cropped to fit  | The print job continues and the warning is reported and logged.       |
|                | B60A | Image size or combined print image size is larger than image box size – the image or combined print image has been decimated to fit | The print job continues and the warning is reported and logged.       |
| Failure        | C602 | Unable to create print job SOP instance – print queue is full   | The print job is marked as failed, the reason is reported and logged. |
|                | C603 | Image size is larger than image box size  | The print job is marked as failed, the reason is reported and logged. |

| Service Status | Code | Further Meaning   | Behavior  |
|----------------|------|---|---|
|                | C613 | Combined print image size is larger than image box size | The print job is marked as failed, the reason is reported and logged. |

**Table 54: DICOM Command Response Status Handling Behavior for Basic Film Box N-DELETE**

| Service Status | Code | Further Meaning         | Behavior              |
|----------------|------|-------------------------|-----------------------|
| Success        | 0000 | Successful operation    | The status is logged. |
| Failure        | 0110 | Processing failure      | The status is logged. |
|                | 0112 | No such object instance | The status is logged. |
|                | 0117 | Invalid object instance | The status is logged. |
|                | 0118 | No such SOP class       | The status is logged. |
|                | 0119 | Class instance conflict | The status is logged. |
|                | 0210 | Duplicate invocation    | The status is logged. |
|                | 0211 | Unrecognized operation  | The status is logged. |
|                | 0212 | Mistyped argument       | The status is logged. |
|                | 0213 | Resource limitation     | The status is logged. |

The behavior of the AE during communication failure is summarized in Table 55.

**Table 55: DICOM Command Communication Failure Behavior**

| Exception                | Behavior  |
|--------------------------|---|
| Reply Time-out           | The association is released.  |
| Association Time-out SCU | The association is released.  |
| Association Aborted      | The Print Images job is marked as failed.<br>The reason is logged and reported to the user. |

#### 4.2.2.4. Association Acceptance Policy

The Intera Achieva Print AE does not accept any associations.

## **4.3. Network Interfaces**

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

The Intera Achieva provides DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM standard. No OSI stack communications are provided with this implementation.

The Intera Achieva supports Ethernet v2.0 and IEEE 802.3, 10/100/1000 Base-T, depending on the system hardware.

### **4.3.2. Additional Protocols**

Not applicable.

## 4.4. Configuration

The Intera Achieva is configured by means of a configuration program. This program is accessible from the login prompt of the operating system. It is password protected and intended to be used by Philips Customer Support Engineers only. The program allows the Customer Support Engineer to enter configuration information needed by the Intera Achieva applications.

### 4.4.1. AE Title/Presentation Address Mapping

#### 4.4.1.1. Local AE Titles

The Intera Achieva can be configured in two ways for the local IP network:

- Automatically via DHCP (hospital provided).
- By assigning a dedicated IP address, (sub)net mask and gateway (if necessary) manually.

This is determined upon installation time of the Intera Achieva.

The Intera Achieva host name is configurable.

The local AE title mapping and configuration is as specified in the following table.

**Table 56: AE Title Configuration Table**

| Application Entity | Default AE Title | Default TCP/IP Port |
|--------------------|------------------|---------------------|
| Network AE         | NODENAME         | 3010                |
| Print AE           | NODENAME         | 3010                |

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

##### 4.4.1.2.1. Remote SCP Configuration

All relevant remote applications that are able to accept an association from the Intera Achieva must be configured on the Intera Achieva with the following information:

- IP Address.
- Host name and listening port number.
- AE Title.
- The SOP classes and transfer syntaxes that are supported by the remote application.

##### 4.4.1.2.2. Remote SCU Configuration

All relevant remote applications that are able to initiate an association with the Intera Achieva must be configured on the Intera Achieva with the following information:

- IP Address.
- Host name and listening port number.
- AE Title.
- The SOP classes and transfer syntaxes for which the Intera Achieva accepts associations.

### 4.4.2. Parameters

This section specifies any important operational parameters and, if configurable, their default value and range.

**Table 57: Configuration Parameters table**

| 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           | 180 [s]               |
| General DIMSE level time-out values   | No           | 300 [s]               |
| Time-out waiting for response to TCP/IP connect request. (Low-level timeout)                                      | No           | ref. operating system |
| Time-out waiting for acceptance of a TCP/IP message over the network. (Low-level timeout)                         | No           | ref. operating system |
| Time-out for waiting for data between TCP/IP packets. (Low-level timeout)   | No           | ref. operating system |
| Any changes to default TCP/IP settings, such as configurable stack parameters.                                    | No           | ref. operating system |
| <b>AE Specific Parameters</b>   |              |                       |
| Size constraint in maximum object size  | No           | -                     |
| Maximum PDU size the AE can receive   | Yes          | 32768                 |
| Maximum PDU size the AE can send  | Yes          | 32768                 |
| AE specific DIMSE level time-out values   | No           | 300 [s]               |
| Number of simultaneous SCP associations   | Yes          | 2                     |
| SOP Class support   | Yes          | per template          |
| Convert MR image to Secondary Capture   | No           | No                    |
| Transfer Syntax support   | Yes          | ELE, EBE, ILE         |

#### 4.4.2.1. Configuration of the Local System

The following items are configurable per Intera Achieva installation:

**Table 58: Installation Configuration Items of Intera Achieva**

| Parameter               | Explanation  | Default         |
|-------------------------|--|-----------------|
| Maximum data PDU size   | For associations initiated by the Intera Achieva; value must be greater than 0 | 32768           |
| Allow incoming queries? | Not used – should not be changed   | No              |
| ARTIM timeout           | Max. time Intera Achieva waits for an incoming association                     | 60 seconds      |
| Max nbr of associations | Simultaneous incoming connections to the Intera Achieva                        | 1               |
| Image number direction  | Instance number given upon storage export                                      | H-F / R-L / A-P |
| Institution name        | Must be shorter than 40 characters   | -               |

The following DICOM services are only supported when a software key has been purchased:

- RIS (Modality Worklist Management).
- Storage Commitment and Modality Performed Procedure Step (MPPS).

#### 4.4.2.2. Configuration per Remote System

All relevant remote applications are defined through selection of one of the available preconfigured templates. Each defined remote application can be fine-tuned (if necessary) through several configurable parameters. What parameters are configurable depends on the selected template.

**Table 59: Configurable Parameters for Remote Systems of Intera Achieva**

| Parameter | Explanation   | Default |
|-----------|---|---------|
| IsArchive | If set to Yes then the network node plays role of archive | -       |

| Parameter                                  | Explanation  | Default    |
|--|--|------------|
| Storage Commitment Network Node Name       | Only when IsArchive is Yes;  | -          |
| Storage Commitment Max. Reply Waiting Time | Only when IsArchive is Yes;<br>For asynchronous storage commitment use -1                              | -          |
| Supported SOP classes                      | Depends on used template;<br>SOP classes can be unconfigured   | -          |
| Supported Transfer Syntaxes                | Depends on used template; the preference can be configured by ordering the supported transfer syntaxes | -          |
| ARTIM timeout                              | Max. time Intera Achieva waits for association acknowledge   | 60 seconds |
| Split multiple day range                   | Only with RIS template   | Yes        |
| Pure DICOM                                 | Do not send private attributes: only standard attributes   | No         |
| Combine MR Rescaling                       | Rescaling for pixel calibration is discarded (combined with window)                                    | Yes        |
| Send logging                               | For trouble shooting purposes  | No         |
| Receive logging                            | For trouble shooting purposes  | No         |
| Add group length attributes                | For trouble shooting purposes  | No         |

- The Basic Worklist Management services may be configured for one node only.
- A worklist query can be configured in two ways:
  - Intera Achieva requests one worklist: for today till tomorrow
  - Intera Achieva requests two worklists: one for today and one for tomorrow (default)
 This is configurable through the parameter 'Split multiple day range'.
- The MPPS service may be configured for one node only.
- If IsArchive is set to Yes then the following statements apply:
  - Only complete series can be sent;
  - Storage commitment will be enabled;
  - A committed image will be marked in the Patient Administration UI with "archive" flag set;
  - Query filter must be specified and applied.
- The Intera Achieva can autopush MR images to the selected remote application. Whether or not to autopush a scan is defined in the scan protocol.

#### 4.4.2.3. Print Configuration

Configurable per Intera Achieva installation:

- The DICOM printers to be selected by the operator.

Configurable for each defined DICOM printer:

All relevant DICOM printers are defined through selection of one of the available preconfigured templates. Each defined DICOM printer can be fine-tuned (if necessary) through several configurable parameters.

The following list shows all the configurable printer parameters. Depending on the type of printer not all parameters may be present.

- Medium type
- Film formats
- Destination
- Photometric Interpretation
- Film size ID
- Orientation
- Magnification
- Smoothing
- Border density

- 
- Empty image density
  - Min. density
  - Max. density
  - Trim
  - Configuration Info
  - Polarity

The Intera Achieva can print to only one DICOM printer at a time.

## 5. MEDIA INTERCHANGE

### 5.1. Implementation Model

#### 5.1.1. Application Data Flow Diagram

Figure 15 shows the application data flow diagram presenting all of the Application Entities present in an implementation and graphically depicting the relationship of the AE's use of DICOM to Real-World Activities.

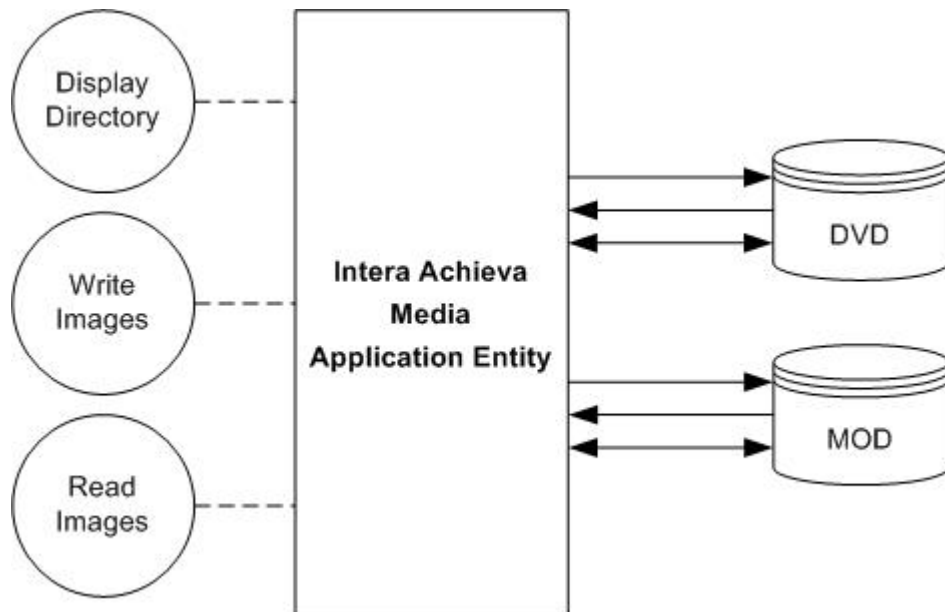


Figure 15: Application Data Flow Diagram

Note: If MOD is configured to Write Images then DVD is not supported, neither to Read Images nor to Write Images. If DVD is configured to Write Images then MOD is only supported to Read Images, not to Write Images. (Ref. section 5.4)

#### 5.1.2. Functional Definitions of AE's

This section describes in general terms the functions to be performed by the AE, and the DICOM services used to accomplish these functions.

##### 5.1.2.1. Functional Definition of the Media AE

The Media AE is the one and only Media application entity within the Intermedia. It includes the following service class.

###### Media Storage Service Class

The Media AE can perform the 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).

Using an initialized DVD or MOD, Write Images can be initiated by selecting the requested images and clicking the media copy button.



### 5.1.3. Sequencing of Real World Activities

Whenever a DVD or MOD has to be written the Media AE first tries to read the DICOMDIR. Then the Media AE will write the images of the selected Examinations and the updated DICOMDIR to the DICOM media.

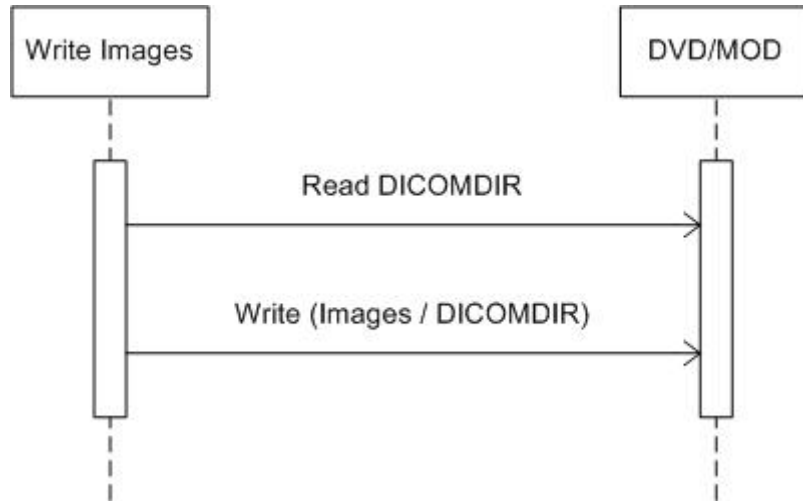


Figure 16: Sequencing of Media Write

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

The following values are assigned to the File Meta Information attributes (see PS 3.10) that pertain to the Implementation Class and Version.

Table 60: DICOM Implementation Class and Version for Intera Achieva

|                               |                               |
|-------------------------------|-------------------------------|
| File Meta Information Version | 00, 01                        |
| Implementation Class UID      | 1.3.46.670589.11.0.0.51.4.3.0 |
| Implementation Version Name   | MR DICOM 3.0                  |

## 5.2. AE Specifications

### 5.2.1. Media AE

The following table lists the Application Profiles and their Real-World Activities, the roles required for each of these Real-World Activities, and the Service Class option.

Table 61: AE Related Application Profiles, Real-World Activities, and Roles

| Supported Application Profile | Real-World Activity | Roles    | SC Option   |
|-------------------------------|---------------------|----------|-------------|
| AUG-CTMR-MOD23                | Display Directory   | FSR      | Interchange |
|                               | Write Images        | FSC, FSU | Interchange |
|                               | Read Images         | FSR      | Interchange |
| AUG-CTMR-MOD41                | Display Directory   | FSR      | Interchange |
|                               | Write Images        | FSC, FSU | Interchange |
|                               | Read Images         | FSR      | Interchange |
| AUG-CTMR-DVD                  | Display Directory   | FSR      | Interchange |
|                               | Write Images        | FSC, FSU | Interchange |
|                               | Read Images         | FSR      | Interchange |

The next table gives an overview of the supported SOP Classes that can be read and written according the Application Profiles in Table 61.

**Table 62: Supported SOP Classes by the Media AE**

| SOP Class                                     |                              |
|---|------------------------------|
| Name  | UID                          |
| MR Image Storage                              | 1.2.840.10008.5.1.4.1.1.4    |
| 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 |
| Private MR Spectrum Storage                   | 1.3.46.670589.11.0.0.12.1    |
| Private MR Series Data Storage                | 1.3.46.670589.11.0.0.12.2    |

Note that the Grayscale Softcopy Presentation State object is not in the application profile but is written as an additional SOP class (extended Application profile).

#### 5.2.1.1. File Meta Information for the Media AE

The Media AE has no specific File Meta Information.

#### 5.2.1.2. Real-World Activities

##### 5.2.1.2.1. Display Directory

The Media AE supports the FSR role to interchange stored data on DICOM media.

##### 5.2.1.2.1.1. Media Storage Application Profiles

The Media AE will act as a FSR when reading the directory of DICOM media. This will result in an overview of the Examinations on the Intera Achieva Patient Administration.

##### 5.2.1.2.2. Write Images

##### 5.2.1.2.2.1. Media Storage Application Profile

The Media AE supports the FSC role to interchange stored data on DICOM media.

The Media AE will act as a FSC when writing all images of the selected Examinations onto DICOM media.

##### 5.2.1.2.2.1.1. Options

The DICOMDIR file will be extended when new images are written. In case some attributes are not present in the images but are specified Mandatory in the DICOMDIR definition in DICOM Media, a generated dummy value will be filled in.

##### Implementation remarks and restriction:

- When writing the DICOMDIR records the following key values are generated if no value of the corresponding attribute is supplied:
  - Patient ID;
  - Study ID;
  - Study Instance UID;
  - Series Number;
  - Series Instance UID;
  - Image Number;
  - SOP Instance UID.

- The mechanism of generating a value for Patient ID creates each time a new value based on Patient's Name for each new study written to DICOM media, even if this study belongs to a patient recorded earlier.
- The default value for the Pixel Intensity Relationship (0028,1040) is set to DISP.
- A number of attributes (e.g., Window Width and Window Centre) can be formatted as floating point numbers.

#### **5.2.1.2.3. Read Images**

The Media AE supports the FSR role to interchange stored data on DICOM media.

##### **5.2.1.2.3.1. Media Storage Application Profiles**

The Intera Achieva Media AE will act as a FSR when reading all images of the selected Examinations from DICOM media. Only images made on an Intera Achieva are allowed to be imported again; these imported images are to be used for reference only, it is not intended to export them again.

###### **5.2.1.2.3.1.1. Options**

The mandatory attributes of the DICOM images are required for the correct storage of the images in the Intera Achieva internal image database. For conformance see section 8.

### **5.3. Augmented and Private Application Profiles**

This section describes any augmented and private Application Profiles.

#### **5.3.1. Augmented Application Profiles**

##### **5.3.1.1. Augmented Application Profile AUG-CTMR-MOD23**

###### **5.3.1.1.1. SOP Class Augmentations**

As an augmentation to the STD-CTMR-MOD23 application profiles, also grayscale softcopy presentation state and private objects shall be interchanged per MOD.

###### **5.3.1.1.2. Directory Augmentations**

Not applicable.

###### **5.3.1.1.3. Other Augmentations**

Not applicable.

##### **5.3.1.2. Augmented Application Profile AUG-CTMR-MOD41**

###### **5.3.1.2.1. SOP Class Augmentations**

As an augmentation to the STD-CTMR-MOD41 application profiles, also grayscale softcopy presentation state and private objects shall be interchanged per MOD.

###### **5.3.1.2.2. Directory Augmentations**

Not applicable.

###### **5.3.1.2.3. Other Augmentations**

Not applicable.

---

### 5.3.1.3. Augmented Application Profile AUG-CTMR-DVD

#### 5.3.1.3.1. SOP Class Augmentations

As an augmentation to the STD-CTMR-DVD application profiles, also grayscale softcopy presentation state and private objects shall be interchanged per DVD.

#### 5.3.1.3.2. Directory Augmentations

Not applicable.

#### 5.3.1.3.3. Other Augmentations

Not applicable.

### 5.3.2. Private Application Profiles

Not applicable.

## 5.4. Media Configuration

If applicable, it is possible to configure either the MOD or DVD for writing.

#### Note

The Intera R10.6 offers standard support to write files to MOD with an option for DVD; all other systems offer standard support for DVD with an option for MOD. However, during configuration only one media can be selected as the supported media to write files; either DVD or MOD.

Support to read files from MOD is always implemented for backwards compatibility. However, if MOD is configured as media to write files then DVD cannot be used – neither to read files nor to write files.

## 6. SUPPORT OF CHARACTER SETS

The Intera Achieva supports the following character sets.

**Table 63: Supported Character Sets of the Intera Achieva**

| Character Set Description | Defined Term    | ESC Sequence          | ISO Registration Number | Code Element | Character Set                       |
|---------------------------|-----------------|-----------------------|-------------------------|--------------|-------------------------------------|
| Latin alphabet No. 1      | ISO_IR 100      | -                     | ISO-IR 6                | G0           | ISO 646                             |
|                           |                 | -                     | ISO-IR 100              | G1           | Supplementary set of ISO 8859       |
|                           | 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_IR 13       | -                     | ISO-IR 13               | G1           | JIS X 0201: Katakana                |
|                           |                 | -                     | ISO-IR 14               | G0           | JIS X 0201: Romaji                  |
|                           | ISO 2022 IR 13  | ESC 02/09 04/09       | ISO-IR 13               | G1           | JIS X 0201: Katakana                |
|                           |                 | ESC 02/08 04/10       | ISO-IR 14               | G0           | JIS X 0201: Romaji                  |
|                           | ISO 2022 IR 87  | ESC 02/04 04/02       | ISO-IR 87               | G0           | JIS X 0208: Kanji                   |
|                           | ISO 2022 IR 159 | ESC 02/04 02/08 04/04 | ISO-IR 159              | G0           | JIS X 0212: Supplementary Kanji set |

Note that the Intera Achieva supports Japanese character sets only for use in the Patient's Name attribute (0010,0010).

Internally the Intera Achieva only uses Unicode characters. This implies that text will be displayed as Unicode too.

If the Intera Achieva receives a Specific Character Set that is not supported then the related association will be aborted.

However, if a RIS Worklist contains a Specific Character Set attribute that is not empty and not supported according Table 63 then the Intera Achieva will send a C-CANCEL request to the RIS and a "RIS ERROR" message will be displayed; the Intera Achieva will reject the RIS import.

The Print AE provides no support for extended character sets in the communication with DICOM SCP's.

## 7. SECURITY

### 7.1. Transport Layer Security (TLS)

Secure communication is a “mode of operation” of the Intera Achieva supported by the implementation of the Transport Layer Security (TLS). This functionality will be used by nodes that can authenticate each other before exchanging DICOM information over a secure connection.

For secure communication the TLS protocol v1.0 is used, providing message authentication, integrity, confidentiality, and replay protection. Confidentiality is optional and can be controlled by the encryption settings.

The Intera Achieva is capable of communicating using the following Cipher Suites:

- TLS\_RSA\_WITH\_NULL\_SHA (Node authentication without encryption);
- TLS\_RSA\_WITH\_3DES\_SHA (Node authentication with encryption).

### 7.2. Association Level Security

The Intera Achieva accepts associations only from known applications or an application whose “calling AE Title” is defined in its configuration file. The Intera Achieva will reject association requests from unknown applications, i.e. applications that offer an unknown “calling AE title”. An application entity (AE) is known if – and only if – it is defined during configuration of Intera Achieva, which is done via the configuration application.

### 7.3. Application Level Security

The Intera Achieva allows the use of either conventional (non-secure) communication or secure communication based on the Transport Layer Security (TLS) protocol. If configured, the Intera Achieva supports security measures for:

- secure authentication of a node;
- integrity and confidentiality of transmitted data;
- replay protection;
- generation of audit trail records;
- access control and user authentication.

### 7.4. HIPAA

Among the list of HIPAA requirements to be supported the security mechanisms outlined below have been implemented.

**Table 64: Security Mechanisms**

| Requirement    | Implementation    | Technical Solution   |
|----------------|-------------------|--|
| Access Control | Role-based access | The Intera Achieva system enables applications to provide access to functionality based on roles.  |
|                | User-based access | The Intera Achieva system protects files, applications, and other system resources from unauthorized use based on user roles.  |
|                | Encryption        | The Intera Achieva system is capable of encrypting data prior to transmission using public key or private key encryption (over TLS) using TLS_RSA_WITH_3DES_SHA. It is also capable of secure communication without encryption (also over TLS) using TLS_RSA_WITH_NULL_SHA.  |
| Audit Trail    | -                 | The Intera Achieva system provides the ability to audit a variety of system and security events (logon, logoff, startscan, stopscan, etc.). In absence of a central syslog server these audit trail messages are logged locally. The syslog server can be configured via the configuration application of the Intera Achieva system. |

| Requirement           | Implementation             | Technical Solution   |
|-----------------------|----------------------------|--|
| Data Authentication   | -                          | The Intera Achieva system provides digital signatures in the form of digital certificates (Base-64 encoded X.509 certificates). For secure transmission the Intera Achieva system uses the standard TLS protocols to ensure message integrity.                   |
| Entity Authentication | Unique user identification | The number of users and their privileges are limited based on predefined user roles. In addition, the Intera Achieva system supports hardware dongle, SmartCard based user privilege allocation, and user authentication across a secure communications channel. |
|                       | Password                   | Requirements for Intera Achieva user passwords can be configured via the Group Policy management application. Options include minimum password length, maximum password age, password re-use, etc.   |
|                       | Token                      | Windows 2000 operating system supports authentication via both hardware dongle and SmartCard.  |

## 8. ANNEXES

### 8.1. IOD Contents

#### 8.1.1. Created SOP Instances

This section specifies each IOD created by the Intera Achieva Network AE.

Used abbreviations are:

##### For module Usage

|          |   |
|----------|---|
| ALWAYS   | the module is always present                            |
| EMPTY    | the (mandatory) module does not contain any attributes  |
| MAYBE    | the module is present under specified condition         |
| NEVER    | the module is not present                               |
| NOT      | the module is not present for actual condition          |
| OPTIONAL | the module may be available, depending on source object |

##### For attribute Definition

The first value is about the presence of the attribute and the next value(s) tell something about the source. In case the source contains multiple values, then either one of these may be applicable depending on the use of the system.

##### Presence

|     |   |
|-----|---|
| 1   | conform (VT=1); the attribute shall be unconditionally present, always with value   |
| 1C  | conform (VT=1C); the attribute shall be conditionally present, and then always with value (thus the attribute may be omitted from module due to condition)                                |
| 2   | conform (VT=2); the attribute shall be unconditionally present, either with or without value (thus possibly empty)  |
| 2C  | conform (VT=2C); the attribute shall be conditionally present, and then either with or without value (thus possibly empty, and the attribute may be omitted from module due to condition) |
| 2E  | the attribute shall be unconditionally present, always empty  |
| 2CE | the attribute shall be conditionally present, and then always empty (thus the attribute may be omitted from module due to condition)  |

Note that the condition applies on the presence of the attribute in the module; it does not apply to the presence of a value for the attribute! For the value the "E" "condition" in "2E" and "2CE" is included; this "E" states that the attribute (if present) per definition shall be empty; otherwise the presence of the value is undefined (i.e. "2" or "2C"). The abbreviation "1" specifies that the attribute value shall always be present at all times (i.e. when the attribute itself is present) – this rounds off the definitions for presence.

##### Source

|      |   |
|------|---|
| AUTO | the attribute value is generated automatically                    |
| CONF | the attribute value source is a configurable parameter            |
| IMPL | 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                 |
| SPEC | the attribute value source is a specific DICOM object             |
| USER | the attribute value source is explicit user input                 |



8.1.1.1. **Magnetic Resonance Image Storage SOP Class**

**Table 65: Modules of the Magnetic Resonance Image Storage SOP Class**

| Information Entity | Module Name                          | Usage  |
|--------------------|--------------------------------------|--|
| Patient            | Patient                              | ALWAYS   |
|                    | Patient Medical                      | ALWAYS   |
| Study              | General Study                        | ALWAYS   |
|                    | Patient Study                        | ALWAYS   |
|                    | Study Classification                 | ALWAYS   |
|                    | Study Scheduling                     | ALWAYS   |
|                    | Requested Procedure                  | ALWAYS   |
|                    | Imaging Service Request              | ALWAYS   |
|                    | Performed Procedure Step Information | ALWAYS   |
|                    | Series                               | General Series   |
| Frame of Reference | Frame of Reference                   | ALWAYS   |
| Equipment          | General Equipment                    | ALWAYS   |
| Image              | General Image                        | ALWAYS   |
|                    | Image Plane                          | ALWAYS   |
|                    | Image Pixel                          | ALWAYS   |
|                    | MR Image                             | ALWAYS   |
|                    | Overlay Plane                        | MAYBE, not if Presentation State objects are supported |
|                    | Modality LUT                         | MAYBE, not for combined MR rescaling                   |
|                    | VOI LUT                              | ALWAYS   |
|                    | SOP Common                           | ALWAYS   |
|                    | Private Group                        | MAYBE, not for pure DICOM images                       |

**Table 66: Created Magnetic Resonance Image Storage SOP Class Attributes**

| Name                          | Tag       | VR | Definition    | Comment                                  |
|-------------------------------|-----------|----|---------------|--|
| <b>Patient Module</b>         |           |    |               |  |
| Patient's Name                | 0010,0010 | PN | 1, MWL / USER | -  |
| Patient ID                    | 0010,0020 | LO | 1, MWL / USER | -  |
| Patient's Birth Date          | 0010,0030 | DA | 1, MWL / USER | -  |
| Patient's Sex                 | 0010,0040 | CS | 1, MWL / USER | Applied Value(s): F, M, O                |
| Ethnic Group                  | 0010,2160 | SH | 2, MWL / USER | -  |
| Patient Comments              | 0010,4000 | LT | 2, MWL        | -  |
| <b>Patient Medical Module</b> |           |    |               |  |
| Medical Alerts                | 0010,2000 | LO | 2, MWL / USER | -  |
| Contrast Allergies            | 0010,2110 | LO | 2, MWL / USER | -  |
| Additional Patient History    | 0010,21B0 | LT | 2, MWL        | -  |
| Pregnancy Status              | 0010,21C0 | US | 2, MWL / USER | Applied Value(s): 0001, 0002, 0003, 0004 |
| Special Needs                 | 0038,0050 | LO | 2, MWL        | -  |
| Patient State                 | 0038,0500 | LO | 2, MWL        | -  |
| <b>General Study Module</b>   |           |    |               |  |
| Study Date                    | 0008,0020 | DA | 1, AUTO / MWL | -  |

| Name                                   | Tag       | VR | Definition           | Comment  |
|--|-----------|----|----------------------|--|
| Study Time                             | 0008,0030 | TM | 1, AUTO / MWL        | -  |
| Accession Number                       | 0008,0050 | SH | 1, AUTO / MWL / USER | -  |
| Referring Physician's Name             | 0008,0090 | PN | 2, MWL / USER        | -  |
| Study Description                      | 0008,1030 | LO | 2, MWL / USER        | -  |
| Procedure Code Sequence                | 0008,1032 | SQ | 1C, MWL / USER       | If not empty.                                      |
| >Code Value                            | 0008,0100 | SH | 1, MWL / USER        | -  |
| >Coding Scheme Designator              | 0008,0102 | SH | 1, MWL / USER        | -  |
| >Coding Scheme Version                 | 0008,0103 | SH | 1C, MWL / USER       | -  |
| >Code Meaning                          | 0008,0104 | LO | 1, MWL / USER        | -  |
| >Context Group Local Version           | 0008,0107 | DT | 1C, MWL              | -  |
| >Code Set Extension Flag               | 0008,010B | CS | 1, MWL               | Applied Value(s): N, Y                             |
| >Code Set Extension Creator UID        | 0008,010D | UI | 1C, MWL              | -  |
| Referenced Study Sequence              | 0008,1110 | SQ | 1C, MWL              | If received from RIS.                              |
| >Referenced SOP Class UID              | 0008,1150 | UI | 1, AUTO / MWL        | -  |
| >Referenced SOP Instance UID           | 0008,1155 | UI | 1, AUTO / MWL        | -  |
| Study Instance UID                     | 0020,000D | UI | 1, AUTO / MWL        | -  |
| Study ID                               | 0020,0010 | SH | 2, AUTO / MWL        | -  |
| <b>Patient Study Module</b>            |           |    |                      |  |
| Admitting Diagnoses Description        | 0008,1080 | LO | 2, MWL               | -  |
| Patient's Weight                       | 0010,1030 | DS | 1, MWL / USER        | -  |
| Occupation                             | 0010,2180 | SH | 2, MWL               | -  |
| <b>Study Classification Module</b>     |           |    |                      |  |
| Study Comments                         | 0032,4000 | LT | 2, MPPS              | -  |
| <b>Study Scheduling Module</b>         |           |    |                      |  |
| Requesting Physician                   | 0032,1032 | PN | 2, MWL               | -  |
| Requesting Service                     | 0032,1033 | LO | 2, MWL               | -  |
| Requested Procedure Description        | 0032,1060 | LO | 2, MWL               | -  |
| Requested Contrast Agent               | 0032,1070 | LO | 2, MWL               | -  |
| <b>Requested Procedure Module</b>      |           |    |                      |  |
| Requested Procedure ID                 | 0040,1001 | SH | 2, MWL               | -  |
| Reason for the Requested Procedure     | 0040,1002 | LO | 2, MWL               | -  |
| Requested Procedure Priority           | 0040,1003 | SH | 2, MWL               | Applied Value(s): HIGH, LOW, MEDIUM, ROUTINE, STAT |
| Patient Transport Arrangements         | 0040,1004 | LO | 2, MWL               | -  |
| Requested Procedure Location           | 0040,1005 | LO | 2, MWL               | -  |
| Requested Procedure Comments           | 0040,1400 | LT | 2, MWL               | -  |
| <b>Imaging Service Request Module</b>  |           |    |                      |  |
| Reason for the Imaging Service Request | 0040,2001 | LO | 2, MWL               | -  |
| Issue Date of Imaging Service Request  | 0040,2004 | DA | 2, MWL               | -  |
| Issue Time of Imaging Service Request  | 0040,2005 | TM | 2, MWL               | -  |
| Order Enterer's Location               | 0040,2009 | SH | 2, MWL               | -  |

| Name   | Tag       | VR | Definition | Comment  |
|--|-----------|----|------------|--|
| Order Callback Phone Number                        | 0040,2010 | SH | 2, MWL     | -  |
| Imaging Service Request Comments                   | 0040,2400 | LT | 2, MWL     | -  |
| <b>Performed Procedure Step Information Module</b> |           |    |            |  |
| Performed Station AE Title                         | 0040,0241 | AE | 1, CONFIG  | -  |
| Performed Station Name                             | 0040,0242 | SH | 2, CONFIG  | -  |
| Performed Location                                 | 0040,0243 | SH | 2, CONFIG  | -  |
| Performed Procedure Step End Date                  | 0040,0250 | DA | 2, AUTO    | -  |
| Performed Procedure Step End Time                  | 0040,0251 | TM | 2, AUTO    | -  |
| Performed Procedure Step Status                    | 0040,0252 | CS | 1, IMPL    | Applied Value(s):<br>COMPLETED,<br>DISCONTINUED,<br>IN PROGRESS  |
| Performed Procedure Type Description               | 0040,0255 | LO | 2, IMPL    | -  |
| <b>General Series Module</b>                       |           |    |            |  |
| Series Date  | 0008,0021 | DA | 1, AUTO    | -  |
| Series Time  | 0008,0031 | TM | 1, AUTO    | -  |
| Modality   | 0008,0060 | CS | 1, AUTO    | Applied Value(s): MR   |
| Series Description                                 | 0008,103E | LO | 2, AUTO    | Contains Sub-anatomy<br>and Scan name  |
| Operator's Name                                    | 0008,1070 | PN | 2E, AUTO   | -  |
| Referenced Study Component<br>Sequence             | 0008,1111 | SQ | 1, AUTO    | -  |
| >Specific Character Set                            | 0008,0005 | CS | 1, SPEC    | Applied Value(s):<br>ISO_IR 13,<br>ISO_IR 100,<br>ISO 2022 IR 13,<br>ISO 2022 IR 87,<br>ISO 2022 IR 100,<br>ISO 2022 IR 159  |
| >Instance Creation Date                            | 0008,0012 | DA | 1, AUTO    | -  |
| >Instance Creation Time                            | 0008,0013 | TM | 1, AUTO    | -  |
| >Instance Creator UID                              | 0008,0014 | UI | 1, AUTO    | -  |
| >Referenced SOP Class UID                          | 0008,1150 | UI | 1, MPPS    | Applied Value(s):<br>1.2.840.10008.3.1.2.3.3   |
| >Referenced SOP Instance UID                       | 0008,1155 | UI | 1, MPPS    | -  |
| >Instance Number                                   | 0020,0013 | IS | 1, AUTO    | -  |
| Body Part Examined                                 | 0018,0015 | CS | 2, AUTO    | Applied Value(s):<br>ABDOMEN, ANKLE,<br>BREAST, CHEST,<br>CLAVICLE, COCCYX,<br>CSPINE, ELBOW,<br>EXTREMITY, FOOT,<br>HAND, HIP, KNEE,<br>LSPINE, PELVIS,<br>SHOULDER, SKULL,<br>SSPINE, TSPINE |
| Protocol Name                                      | 0018,1030 | LO | 1, USER    | Scan name.   |
| Patient Position                                   | 0018,5100 | CS | 1, AUTO    | -  |
| Series Instance UID                                | 0020,000E | UI | 1, AUTO    | Generated by Intera<br>Achieva system.   |
| Series Number                                      | 0020,0011 | IS | 1, AUTO    | Created dynamically at<br>export. Contains the<br>concatenation of the<br>acquisition number and<br>the private<br>reconstruction number.  |
| Laterality   | 0020,0060 | CS | 2C, USER   | -  |

| Name                                      | Tag       | VR | Definition     | Comment                                   |
|---|-----------|----|----------------|---|
| Performed Procedure Step Start Date       | 0040,0244 | DA | 1, MPPS        | -   |
| Performed Procedure Step Start Time       | 0040,0245 | TM | 1, MPPS        | -   |
| Performed Procedure Step ID               | 0040,0253 | SH | 1, AUTO        | -   |
| Performed Procedure Step Description      | 0040,0254 | LO | 2, MWL / USER  | -   |
| Performed Action Item Code Sequence       | 0040,0260 | SQ | 2, MWL / USER  | Filled if scheduled, otherwise empty.     |
| >Code Value                               | 0008,0100 | SH | 1, MWL / USER  | -   |
| >Coding Scheme Designator                 | 0008,0102 | SH | 1, MWL / USER  | -   |
| >Coding Scheme Version                    | 0008,0103 | SH | 1C, MWL / USER | -   |
| >Code Meaning                             | 0008,0104 | LO | 1, MWL / USER  | -   |
| >Mapping Resource                         | 0008,0105 | CS | 1C, MWL        | -   |
| >Context Group Version                    | 0008,0106 | DT | 1C, MWL        | -   |
| >Context Group Local Version              | 0008,0107 | DT | 1C, MWL        | -   |
| >Code Set Extension Flag                  | 0008,010B | CS | 1, MWL         | Applied Value(s): N, Y                    |
| >Private Coding Scheme Creator UID        | 0008,010C | UI | 2E, AUTO       | -   |
| >Code Set Extension Creator UID           | 0008,010D | UI | 1C, MWL        | -   |
| >Context Identifier                       | 0008,010F | CS | 2, MWL         | -   |
| Request Attributes Sequence               | 0040,0275 | SQ | 2, MWL         | -   |
| >Scheduled Procedure Step Description     | 0040,0007 | LO | 2, MWL         | -   |
| >Scheduled Procedure Step ID              | 0040,0009 | SH | 1, MWL         | -   |
| >Requested Procedure ID                   | 0040,1001 | SH | 1, MWL         | -   |
| Comments on the Performed Procedure Steps | 0040,0280 | ST | 2, MWL / USER  | -   |
| <b>Frame of Reference Module</b>          |           |    |                |   |
| Frame of Reference UID                    | 0020,0052 | UI | 1, AUTO        | -   |
| Position Reference Indicator              | 0020,1040 | LO | 2E, AUTO       | -   |
| <b>General Equipment Module</b>           |           |    |                |   |
| Manufacturer                              | 0008,0070 | LO | 1, AUTO / CONF | Applied Value(s): Philips Medical Systems |
| Institution Name                          | 0008,0080 | LO | 1, CONF        | Configured on the system.                 |
| Station Name                              | 0008,1010 | SH | 1, CONF        | Same as the Host Name.                    |
| Institutional Department Name             | 0008,1040 | LO | 2, AUTO        | -   |
| Manufacturer's Model Name                 | 0008,1090 | LO | 1, AUTO        | Applied Value(s): Intera Achieva          |
| Device Serial Number                      | 0018,1000 | LO | 1, AUTO        | System serial number.                     |
| Software Version(s)                       | 0018,1020 | LO | 1, AUTO        | The release text of the original image.   |
| <b>General Image Module</b>               |           |    |                |   |
| Acquisition Date                          | 0008,0022 | DA | 1, AUTO        | Copy of Content Date.                     |
| Content Date                              | 0008,0023 | DA | 1, AUTO        | -   |
| Acquisition Time                          | 0008,0032 | TM | 1, AUTO        | Copy of Content Time.                     |
| Content Time                              | 0008,0033 | TM | 1, AUTO        | -   |
| Referenced Image Sequence                 | 0008,1140 | SQ | 2, AUTO        | -   |
| >Referenced SOP Class UID                 | 0008,1150 | UI | 1, IMPL        | -   |
| >Referenced SOP Instance UID              | 0008,1155 | UI | 1, IMPL        | -   |
| Acquisition Number                        | 0020,0012 | IS | 1, AUTO        | Scan Number.                              |
| Instance Number                           | 0020,0013 | IS | 1, AUTO        | -   |
| Patient Orientation                       | 0020,0020 | CS | 2C, AUTO       | -   |
| Image Comments                            | 0020,4000 | LT | 2E, AUTO       | -   |

| Name                           | Tag       | VR | Definition      | Comment   |
|--------------------------------|-----------|----|-----------------|---|
| Lossy Image Compression        | 0028,2110 | CS | 1, AUTO         | Applied Value(s): 00  |
| <b>Image Plane Module</b>      |           |    |                 |   |
| Slice Thickness                | 0018,0050 | DS | 1, AUTO         | -   |
| Image Position (Patient)       | 0020,0032 | DS | 1, AUTO         | -   |
| Image Orientation (Patient)    | 0020,0037 | DS | 1, AUTO         | -   |
| Slice Location                 | 0020,1041 | DS | 1, AUTO         | -   |
| Pixel Spacing                  | 0028,0030 | DS | 1, AUTO         | -   |
| <b>Image Pixel Module</b>      |           |    |                 |   |
| Planar Configuration           | 0028,0006 | US | 1C, AUTO        | -   |
| Rows                           | 0028,0010 | US | 1, AUTO         | -   |
| Columns                        | 0028,0011 | US | 1, AUTO         | -   |
| Pixel Aspect Ratio             | 0028,0034 | IS | 1, AUTO         | Applied Value(s): (1,1)   |
| Bits Stored                    | 0028,0101 | US | 1, SPEC         | -   |
| High Bit                       | 0028,0102 | US | 1, SPEC         | -   |
| Pixel Representation           | 0028,0103 | US | 1, AUTO         | -   |
| Pixel Data                     | 7FE0,0010 | OW | 1, SPEC         | -   |
| <b>MR Image Module</b>         |           |    |                 |   |
| Image Type                     | 0008,0008 | CS | 1, AUTO         | -   |
| Scanning Sequence              | 0018,0020 | CS | 1, AUTO         | -   |
| Sequence Variant               | 0018,0021 | CS | 1, AUTO         | -   |
| Scan Options                   | 0018,0022 | CS | 2, IMPL         | -   |
| MR Acquisition Type            | 0018,0023 | CS | 1, AUTO         | -   |
| Sequence Name                  | 0018,0024 | SH | 1, AUTO         | User defined name for the Scanning Sequence (0018,0020) and Sequence Variant (0018,0021) combination. |
| Repetition Time                | 0018,0080 | DS | 1C, IMPL / USER | -   |
| Echo Time                      | 0018,0081 | DS | 1, IMPL / USER  | -   |
| Inversion Time                 | 0018,0082 | DS | 1C, IMPL / USER | -   |
| Number of Averages             | 0018,0083 | DS | 1, IMPL / USER  | -   |
| Imaging Frequency              | 0018,0084 | DS | 1, CONF         | -   |
| Imaged Nucleus                 | 0018,0085 | SH | 1, IMPL         | -   |
| Echo Number(s)                 | 0018,0086 | IS | 2, IMPL         | -   |
| Magnetic Field Strength        | 0018,0087 | DS | 2, CONF         | -   |
| Spacing Between Slices         | 0018,0088 | DS | 1, IMPL / USER  | -   |
| Number of Phase Encoding Steps | 0018,0089 | IS | 2, IMPL / USER  | -   |
| Echo Train Length              | 0018,0091 | IS | 2, IMPL / USER  | -   |
| Percent Sampling               | 0018,0093 | DS | 2, IMPL / USER  | -   |
| Percent Phase Field of View    | 0018,0094 | DS | 2, IMPL / USER  | -   |
| Trigger Time                   | 0018,1060 | DS | 2C, IMPL / USER | -   |
| Low R-R Value                  | 0018,1081 | IS | 2C, IMPL        | -   |
| High R-R Value                 | 0018,1082 | IS | 2C, IMPL        | -   |
| Intervals Acquired             | 0018,1083 | IS | 1C, IMPL        | -   |
| Intervals Rejected             | 0018,1084 | IS | 2C, IMPL        | -   |

| Name                              | Tag       | VR | Definition      | Comment   |
|-----------------------------------|-----------|----|-----------------|---|
| Heart Rate                        | 0018,1088 | IS | 2C, IMPL / USER | -   |
| Trigger Window                    | 0018,1094 | IS | 2C, IMPL        | -   |
| Reconstruction Diameter           | 0018,1100 | DS | 2, CONF         | -   |
| Receiving Coil                    | 0018,1250 | SH | 1, IMPL / USER  | -   |
| Transmitting Coil                 | 0018,1251 | SH | 1, IMPL / USER  | -   |
| Acquisition Matrix                | 0018,1310 | US | 2, IMPL         | -   |
| In-plane Phase Encoding Direction | 0018,1312 | CS | 2, IMPL         | -   |
| Flip Angle                        | 0018,1314 | DS | 2, IMPL / USER  | -   |
| Temporal Position Identifier      | 0020,0100 | IS | 2, IMPL         | -   |
| Number of Temporal Positions      | 0020,0105 | IS | 2, IMPL / USER  | -   |
| Samples per Pixel                 | 0028,0002 | US | 1, AUTO         | Applied Value(s): 1   |
| Photometric Interpretation        | 0028,0004 | CS | 1, AUTO         | Applied Value(s): MONOCHROME2   |
| Bits Allocated                    | 0028,0100 | US | 1, AUTO         | Applied Value(s): 16  |
| <b>Overlay Plane Module</b>       |           |    |                 |   |
| Overlay Rows                      | 6000,0010 | US | 1, AUTO         | -   |
| Overlay Columns                   | 6000,0011 | US | 1, AUTO         | -   |
| Overlay Description               | 6000,0022 | LO | 2E, AUTO        | -   |
| Overlay Type                      | 6000,0040 | CS | 1, AUTO         | Applied Value(s): G, R  |
| Overlay Subtype                   | 6000,0045 | LO | 2E, AUTO        | -   |
| Overlay Origin                    | 6000,0050 | SS | 1, AUTO         | -   |
| Overlay Bits Allocated            | 6000,0100 | US | 1, AUTO         | Applied Value(s): 1   |
| Overlay Bit Position              | 6000,0102 | US | 1, AUTO         | Applied Value(s): 0   |
| ROI Area                          | 6000,1301 | IS | 2E, AUTO        | -   |
| ROI Mean                          | 6000,1302 | DS | 2E, AUTO        | -   |
| ROI Standard Deviation            | 6000,1303 | DS | 2E, AUTO        | -   |
| Overlay Label                     | 6000,1500 | LO | 2E, AUTO        | -   |
| Overlay Data                      | 6000,3000 | OW | 1, AUTO         | -   |
| <b>Modality LUT Module</b>        |           |    |                 |   |
| Rescale Intercept                 | 0028,1052 | DS | 1, AUTO         | -   |
| Rescale Slope                     | 0028,1053 | DS | 1, AUTO         | -   |
| Rescale Type                      | 0028,1054 | LO | 1, AUTO         | Applied Value(s): cm/sec, milliradians, milliseconds, mm <sup>2</sup> /sec, normalized, seconds, US       |
| <b>VOI LUT Module</b>             |           |    |                 |   |
| Window Center                     | 0028,1050 | DS | 1, AUTO         | -   |
| Window Width                      | 0028,1051 | DS | 1, AUTO         | -   |
| <b>SOP Common Module</b>          |           |    |                 |   |
| Specific Character Set            | 0008,0005 | CS | 1, AUTO         | Applied Value(s): ISO_IR 13, ISO_IR 100, ISO 2022 IR 13, ISO 2022 IR 87, ISO 2022 IR 100, ISO 2022 IR 159 |
| Instance Creation Date            | 0008,0012 | DA | 1, AUTO         | -   |
| Instance Creation Time            | 0008,0013 | TM | 1, AUTO         | -   |
| Instance Creator UID              | 0008,0014 | UI | 1, AUTO         | -   |
| SOP Class UID                     | 0008,0016 | UI | 1, AUTO         | Applied Value(s): 1.2.840.10008.5.1.4.1.1.4   |

| Name                       | Tag       | VR | Definition     | Comment  |
|----------------------------|-----------|----|----------------|--|
| SOP Instance UID           | 0008,0018 | UI | 1, AUTO        | -  |
| <b>Private Group</b>       |           |    |                |  |
| Private Creator Group 2001 | 2001,0010 | LO | 1, AUTO        | -  |
| Chemical Shift             | 2001,1001 | FL | 2C, USER       | Only applicable for spectro 2dsi.  |
| Chemical Shift Number MR   | 2001,1002 | IS | 2C, IMPL       | Only applicable for spectro 2dsi.  |
| Diffusion B-Factor         | 2001,1003 | FL | 2C, USER       | Only applicable for diffusion scans.                                       |
| Diffusion Direction        | 2001,1004 | CS | 2C, USER       | Only applicable for diffusion scans.                                       |
| Image Enhanced             | 2001,1006 | CS | 2, IMPL / USER | -  |
| Image Type ED ES           | 2001,1007 | CS | 2, IMPL / USER | -  |
| Phase Number               | 2001,1008 | IS | 1, IMPL        | When cardiac synchronization used.   |
| Slice Number MR            | 2001,100A | IS | 1, IMPL        | -  |
| Diffusion Echo Time        | 2001,1011 | FL | 2C, IMPL       | Only applicable for diffusion scans.                                       |
| Dynamic Series             | 2001,1012 | CS | 2, USER        | -  |
| EPI Factor                 | 2001,1013 | SL | 1, IMPL / USER | Default value is 1.  |
| Number of Echoes           | 2001,1014 | SL | 2, USER        | -  |
| Number of Locations        | 2001,1015 | SS | 2, IMPL / USER | -  |
| Number of PC Directions    | 2001,1016 | SS | 2, USER        | -  |
| Number of Phases MR        | 2001,1017 | SL | 2, IMPL / USER | -  |
| Number of Slices MR        | 2001,1018 | SL | 2, IMPL / USER | -  |
| Partial Matrix Scanned     | 2001,1019 | CS | 2, IMPL / USER | -  |
| PC Velocity                | 2001,101A | FL | 1, IMPL / USER | Default value is 0.  |
| Prepulse Delay             | 2001,101B | FL | 2, IMPL / USER | -  |
| Prepulse Type              | 2001,101C | CS | 2, USER        | -  |
| Reconstruction Number MR   | 2001,101D | IS | 2, IMPL        | -  |
| Respiration Sync           | 2001,101F | CS | 2, USER        | -  |
| SPIR                       | 2001,1021 | CS | 2, USER        | -  |
| Water Fat Shift            | 2001,1022 | FL | 2, IMPL / USER | -  |
| Flip Angle Philips         | 2001,1023 | DS | 1, IMPL / USER | -  |
| Number of Stacks           | 2001,1060 | SL | 2, USER        | -  |
| Number of Dynamic Scans    | 2001,1081 | IS | 2, IMPL / USER | -  |
| Acquisition Number         | 2001,107B | IS | 1, IMPL        | -  |
| Private Creator Group 2005 | 2005,0010 | LO | 1, AUTO        | -  |
| Number of Chemical Shift   | 2005,1020 | SL | 2C, USER       | Only applicable for spectro 2dsi.  |
| Syncra Scan Type           | 2005,10A1 | CS | 2C, USER       | If syncra scan.<br>Applied Value(s):<br>SENSE,<br>SYN_CLASSIC,<br>SYN_COCA |

8.1.1.2. Secondary Capture Image Storage SOP Class

Table 67: Modules of the Secondary Capture Image Storage SOP Class

| Information Entity | Module Name       | Usage  |
|--------------------|-------------------|--------|
| Patient            | Patient           | ALWAYS |
|                    | Patient Medical   | ALWAYS |
| Study              | General Study     | ALWAYS |
|                    | Patient Study     | ALWAYS |
| Series             | General Series    | ALWAYS |
| Equipment          | General Equipment | ALWAYS |
|                    | SC Equipment      | ALWAYS |
| Image              | General Image     | ALWAYS |
|                    | Image Pixel       | ALWAYS |
|                    | SC Image          | ALWAYS |
|                    | Overlay Plane     | ALWAYS |
|                    | SOP Common        | ALWAYS |

Table 68: Created Secondary Capture Image Storage SOP Class Attributes

| Name                            | Tag       | VR | Definition | Comment                                  |
|---------------------------------|-----------|----|------------|--|
| <b>Patient Module</b>           |           |    |            |  |
| Patient's Name                  | 0010,0010 | PN | 1, SPEC    | -  |
| Patient ID                      | 0010,0020 | LO | 1, SPEC    | -  |
| Patient's Birth Date            | 0010,0030 | DA | 1, SPEC    | -  |
| Patient's Sex                   | 0010,0040 | CS | 1, SPEC    | Applied Value(s): F, M, O                |
| Ethnic Group                    | 0010,2160 | SH | 2, SPEC    | -  |
| Patient Comments                | 0010,4000 | LT | 2, SPEC    | -  |
| <b>Patient Medical Module</b>   |           |    |            |  |
| Medical Alerts                  | 0010,2000 | LO | 2, SPEC    | -  |
| Contrast Allergies              | 0010,2110 | LO | 2, SPEC    | -  |
| Additional Patient History      | 0010,21B0 | LT | 2, SPEC    | -  |
| Pregnancy Status                | 0010,21C0 | US | 2, SPEC    | Applied Value(s): 0001, 0002, 0003, 0004 |
| Special Needs                   | 0038,0050 | LO | 2, SPEC    | -  |
| Patient State                   | 0038,0500 | LO | 2, SPEC    | -  |
| <b>General Study Module</b>     |           |    |            |  |
| Study Date                      | 0008,0020 | DA | 1, SPEC    | -  |
| Study Time                      | 0008,0030 | TM | 1, SPEC    | -  |
| Accession Number                | 0008,0050 | SH | 1, SPEC    | -  |
| Referring Physician's Name      | 0008,0090 | PN | 2, SPEC    | -  |
| Study Description               | 0008,1030 | LO | 2, SPEC    | -  |
| Procedure Code Sequence         | 0008,1032 | SQ | 1C, SPEC   | If present in original study.            |
| >Code Value                     | 0008,0100 | SH | 1, SPEC    | -  |
| >Coding Scheme Designator       | 0008,0102 | SH | 1, SPEC    | -  |
| >Coding Scheme Version          | 0008,0103 | SH | 1C, SPEC   | -  |
| >Code Meaning                   | 0008,0104 | LO | 1, SPEC    | -  |
| >Context Group Local Version    | 0008,0107 | DT | 1C, SPEC   | -  |
| >Code Set Extension Flag        | 0008,010B | CS | 1, SPEC    | Applied Value(s): N, Y                   |
| >Code Set Extension Creator UID | 0008,010D | UI | 1C, SPEC   | -  |
| Referenced Study Sequence       | 0008,1110 | SQ | 1C, SPEC   | If present in original study.            |
| >Referenced SOP Class UID       | 0008,1150 | UI | 1, SPEC    | -  |
| >Referenced SOP Instance UID    | 0008,1155 | UI | 1, SPEC    | -  |



| Name                                      | Tag       | VR | Definition | Comment  |
|---|-----------|----|------------|--|
| Study Instance UID                        | 0020,000D | UI | 1, SPEC    | -  |
| Study ID                                  | 0020,0010 | SH | 2, SPEC    | -  |
| <b>Patient Study Module</b>               |           |    |            |  |
| Admitting Diagnoses Description           | 0008,1080 | LO | 2, SPEC    | -  |
| Patient's Weight                          | 0010,1030 | DS | 1, SPEC    | -  |
| Occupation                                | 0010,2180 | SH | 2, SPEC    | -  |
| <b>General Series Module</b>              |           |    |            |  |
| Series Date                               | 0008,0021 | DA | 1, AUTO    | -  |
| Series Time                               | 0008,0031 | TM | 1, AUTO    | -  |
| Series Description                        | 0008,103E | LO | 2, AUTO    | -  |
| Performing Physician's Name               | 0008,1050 | PN | 2, USER    | -  |
| Operator's Name                           | 0008,1070 | PN | 2E, AUTO   | -  |
| Referenced Study Component Sequence       | 0008,1111 | SQ | 1, AUTO    | -  |
| >Referenced SOP Class UID                 | 0008,1150 | UI | 1, AUTO    | -  |
| >Referenced SOP Instance UID              | 0008,1155 | UI | 1, AUTO    | -  |
| Body Part Examined                        | 0018,0015 | CS | 1, SPEC    | Applied Value(s):<br>ABDOMEN, ANKLE,<br>BREAST, CHEST,<br>CLAVICLE, COCCYX,<br>CSPINE, ELBOW,<br>EXTREMITY, FOOT,<br>HAND, HIP, KNEE,<br>LSPINE, PELVIS,<br>SHOULDER, SKULL,<br>SSPINE, TSPINE |
| Protocol Name                             | 0018,1030 | LO | 1, SPEC    | -  |
| Patient Position                          | 0018,5100 | CS | 1, SPEC    | -  |
| Series Instance UID                       | 0020,000E | UI | 1, AUTO    | -  |
| Series Number                             | 0020,0011 | IS | 1, AUTO    | -  |
| Laterality                                | 0020,0060 | CS | 2C, SPEC   | -  |
| Performed Procedure Step Start Date       | 0040,0244 | DA | 1, SPEC    | -  |
| Performed Procedure Step Start Time       | 0040,0245 | TM | 1, SPEC    | -  |
| Performed Procedure Step ID               | 0040,0253 | SH | 1, SPEC    | -  |
| Performed Procedure Step Description      | 0040,0254 | LO | 2, SPEC    | -  |
| Performed Action Item Code Sequence       | 0040,0260 | SQ | 2, SPEC    | -  |
| >Code Value                               | 0008,0100 | SH | 1, SPEC    | -  |
| >Coding Scheme Designator                 | 0008,0102 | SH | 1, SPEC    | -  |
| >Coding Scheme Version                    | 0008,0103 | SH | 1C, SPEC   | -  |
| >Code Meaning                             | 0008,0104 | LO | 1, SPEC    | -  |
| >Context Group Local Version              | 0008,0107 | DT | 1C, SPEC   | -  |
| >Code Set Extension Flag                  | 0008,010B | CS | 1, SPEC    | Applied Value(s): N, Y   |
| >Code Set Extension Creator UID           | 0008,010D | UI | 1C, SPEC   | -  |
| Request Attributes Sequence               | 0040,0275 | SQ | 2, SPEC    | -  |
| >Scheduled Procedure Step Description     | 0040,0007 | LO | 2, SPEC    | -  |
| >Scheduled Procedure Step ID              | 0040,0009 | SH | 1, SPEC    | -  |
| >Requested Procedure ID                   | 0040,1001 | SH | 1, SPEC    | -  |
| Comments on the Performed Procedure Steps | 0040,0280 | ST | 2, SPEC    | -  |
| <b>General Equipment Module</b>           |           |    |            |  |
| Manufacturer                              | 0008,0070 | LO | 1, CONF    | Applied Value(s):<br>Philips Medical Systems   |
| Institution Name                          | 0008,0080 | LO | 1, CONF    | -  |
| Station Name                              | 0008,1010 | SH | 1, CONF    | -  |
| Institutional Department Name             | 0008,1040 | LO | 2, AUTO    | -  |

| Name  | Tag       | VR | Definition   | Comment                               |
|---|-----------|----|--------------|---------------------------------------|
| Manufacturer's Model Name                             | 0008,1090 | LO | 1, AUTO      | Applied Value(s):<br>Intera Achieva   |
| Device Serial Number                                  | 0018,1000 | LO | 1, AUTO      | -                                     |
| Software Version(s)                                   | 0018,1020 | LO | 1, AUTO      | -                                     |
| <b>SC Equipment Module</b>                            |           |    |              |                                       |
| Modality  | 0008,0060 | CS | 1, AUTO      | Applied Value(s): MR                  |
| Conversion Type                                       | 0008,0064 | CS | 1, AUTO      | Applied Value(s): WSD                 |
| Secondary Capture Device ID                           | 0018,1010 | LO | 2, AUTO      | -                                     |
| Secondary Capture Device<br>Manufacturer              | 0018,1016 | LO | 2, AUTO      | -                                     |
| Secondary Capture Device<br>Manufacturer's Model Name | 0018,1018 | LO | 2, AUTO      | -                                     |
| Secondary Capture Device Software<br>Version(s)       | 0018,1019 | LO | 2, AUTO      | -                                     |
| Video Image Format Acquired                           | 0018,1022 | SH | 2, AUTO      | -                                     |
| Digital Image Format Acquired                         | 0018,1023 | LO | 2, AUTO      | -                                     |
| <b>General Image Module</b>                           |           |    |              |                                       |
| Image Type  | 0008,0008 | CS | 1, AUTO      | -                                     |
| Content Date  | 0008,0023 | DA | 1, AUTO      | -                                     |
| Content Time  | 0008,0033 | TM | 1, AUTO      | -                                     |
| Acquisition Number                                    | 0020,0012 | IS | 1, AUTO      | -                                     |
| Instance Number                                       | 0020,0013 | IS | 1, AUTO      | -                                     |
| Patient Orientation                                   | 0020,0020 | CS | 2CE,<br>AUTO | -                                     |
| Image Comments  | 0020,4000 | LT | 2E, AUTO     | -                                     |
| Lossy Image Compression                               | 0028,2110 | CS | 1, AUTO      | Applied Value(s): 00                  |
| <b>Image Pixel Module</b>                             |           |    |              |                                       |
| Samples per Pixel                                     | 0028,0002 | US | 1, AUTO      | Applied Value(s): 1, 3                |
| Photometric Interpretation                            | 0028,0004 | CS | 1, IMPL      | Applied Value(s):<br>MONOCHROME2, RGB |
| Planar Configuration                                  | 0028,0006 | US | 1C, AUTO     | -                                     |
| Rows  | 0028,0010 | US | 1, AUTO      | -                                     |
| Columns   | 0028,0011 | US | 1, AUTO      | -                                     |
| Pixel Aspect Ratio                                    | 0028,0034 | IS | 1, AUTO      | Applied Value(s): (1,1)               |
| Bits Allocated  | 0028,0100 | US | 1, AUTO      | -                                     |
| Bits Stored   | 0028,0101 | US | 1, AUTO      | -                                     |
| High Bit  | 0028,0102 | US | 1, AUTO      | -                                     |
| Pixel Representation                                  | 0028,0103 | US | 1, AUTO      | -                                     |
| Pixel Data  | 7FE0,0010 | OW | 1, AUTO      | -                                     |
| <b>SC Image Module</b>                                |           |    |              |                                       |
| Date of Secondary Capture                             | 0018,1012 | DA | 2, AUTO      | -                                     |
| Time of Secondary Capture                             | 0018,1014 | TM | 2, AUTO      | -                                     |
| <b>Overlay Plane Module</b>                           |           |    |              |                                       |
| Overlay Rows  | 6000,0010 | US | 1, AUTO      | -                                     |
| Overlay Columns                                       | 6000,0011 | US | 1, AUTO      | -                                     |
| Overlay Description                                   | 6000,0022 | LO | 2E, AUTO     | -                                     |
| Overlay Type  | 6000,0040 | CS | 1, AUTO      | Applied Value(s): G, R                |
| Overlay Subtype                                       | 6000,0045 | LO | 2E, AUTO     | -                                     |
| Overlay Origin  | 6000,0050 | SS | 1, AUTO      | -                                     |
| Overlay Bits Allocated                                | 6000,0100 | US | 1, AUTO      | -                                     |
| Overlay Bit Position                                  | 6000,0102 | US | 1, AUTO      | -                                     |
| ROI Area  | 6000,1301 | IS | 2E, AUTO     | -                                     |
| ROI Mean  | 6000,1302 | DS | 2E, AUTO     | -                                     |
| ROI Standard Deviation                                | 6000,1303 | DS | 2E, AUTO     | -                                     |
| Overlay Label   | 6000,1500 | LO | 2E, AUTO     | -                                     |

| Name                     | Tag       | VR | Definition | Comment   |
|--------------------------|-----------|----|------------|---|
| Overlay Data             | 6000,3000 | OW | 1, AUTO    | -   |
| <b>SOP Common Module</b> |           |    |            |   |
| Specific Character Set   | 0008,0005 | CS | 1, AUTO    | Applied Value(s):<br>ISO_IR 13,<br>ISO_IR 100,<br>ISO 2022 IR 13,<br>ISO 2022 IR 87,<br>ISO 2022 IR 100,<br>ISO 2022 IR 159 |
| Instance Creation Date   | 0008,0012 | DA | 1, AUTO    | -   |
| Instance Creation Time   | 0008,0013 | TM | 1, AUTO    | -   |
| Instance Creator UID     | 0008,0014 | UI | 1, AUTO    | -   |
| SOP Class UID            | 0008,0016 | UI | 1, AUTO    | Applied Value(s):<br>1.2.840.10008.5.1.4.1.1.7  |
| SOP Instance UID         | 0008,0018 | UI | 1, AUTO    | -   |

**8.1.1.3. Grayscale Softcopy Presentation State Storage SOP Class**

**Table 69: Modules of the Grayscale Softcopy Presentation State Storage SOP Class**

| Information Entity | Module Name               | Usage   |
|--------------------|---------------------------|---|
| Patient            | Patient                   | ALWAYS  |
|                    | Patient Medical           | ALWAYS  |
| Study              | General Study             | ALWAYS  |
|                    | Patient Study             | ALWAYS  |
| Series             | General Series            | ALWAYS  |
|                    | Presentation Series       | ALWAYS  |
| Equipment          | General Equipment         | ALWAYS  |
| Presentation State | Overlay Plane             | MAYBE – Required if an Overlay is to be applied to referenced images            |
|                    | Displayed Area            | ALWAYS  |
|                    | Graphic Annotation        | MAYBE – Required if Graphic Annotations are to be applied to referenced images  |
|                    | Spatial Transformation    | MAYBE – Required if Rotation or Flipping are to be applied to referenced images |
|                    | Graphic Layer             | ALWAYS  |
|                    | Modality LUT              | MAYBE – Required if a Modality LUT is to be applied to referenced images        |
|                    | Softcopy Presentation LUT | ALWAYS  |
|                    | Overlay/Curve Activation  | ALWAYS  |
|                    | Softcopy VOI LUT          | ALWAYS  |
|                    | Presentation State        | ALWAYS  |
| SOP Common         | ALWAYS                    |   |

**Table 70: Created Grayscale Softcopy Presentation State Storage SOP Class Attributes**

| Name                  | Tag       | VR | Definition | Comment |
|-----------------------|-----------|----|------------|---------|
| <b>Patient Module</b> |           |    |            |         |
| Patient's Name        | 0010,0010 | PN | 1, SPEC    | -       |
| Patient ID            | 0010,0020 | LO | 1, SPEC    | -       |
| Patient's Birth Date  | 0010,0030 | DA | 1, SPEC    | -       |

| Name                                   | Tag       | VR | Definition | Comment  |
|--|-----------|----|------------|--|
| Patient's Sex                          | 0010,0040 | CS | 1, SPEC    | Applied Value(s):<br>F, M, O   |
| Ethnic Group                           | 0010,2160 | SH | 2, SPEC    | -  |
| Patient Comments                       | 0010,4000 | LT | 2, SPEC    | -  |
| <b>Patient Medical Module</b>          |           |    |            |  |
| Medical Alerts                         | 0010,2000 | LO | 2, SPEC    | -  |
| Contrast Allergies                     | 0010,2110 | LO | 2, SPEC    | -  |
| Additional Patient History             | 0010,21B0 | LT | 2, SPEC    | -  |
| Pregnancy Status                       | 0010,21C0 | US | 2, SPEC    | Applied Value(s):<br>0001, 0002, 0003, 0004  |
| Special Needs                          | 0038,0050 | LO | 2, SPEC    | -  |
| Patient State                          | 0038,0500 | LO | 2, SPEC    | -  |
| <b>General Study Module</b>            |           |    |            |  |
| Study Date                             | 0008,0020 | DA | 1, SPEC    | -  |
| Study Time                             | 0008,0030 | TM | 1, SPEC    | -  |
| Accession Number                       | 0008,0050 | SH | 1, SPEC    | -  |
| Referring Physician's Name             | 0008,0090 | PN | 2, SPEC    | -  |
| Study Description                      | 0008,1030 | LO | 2, SPEC    | -  |
| Procedure Code Sequence                | 0008,1032 | SQ | 1C, SPEC   | If present in original<br>study.   |
| >Code Value                            | 0008,0100 | SH | 1, SPEC    | -  |
| >Coding Scheme Designator              | 0008,0102 | SH | 1, SPEC    | -  |
| >Coding Scheme Version                 | 0008,0103 | SH | 1C, SPEC   | -  |
| >Code Meaning                          | 0008,0104 | LO | 1, SPEC    | -  |
| >Context Group Local Version           | 0008,0107 | DT | 1C, SPEC   | -  |
| >Code Set Extension Flag               | 0008,010B | CS | 1, SPEC    | Applied Value(s): N, Y   |
| >Code Set Extension Creator UID        | 0008,010D | UI | 1C, SPEC   | -  |
| Referenced Study Sequence              | 0008,1110 | SQ | 1C, SPEC   | If present in original<br>study.   |
| >Referenced SOP Class UID              | 0008,1150 | UI | 1, SPEC    | -  |
| >Referenced SOP Instance UID           | 0008,1155 | UI | 1, SPEC    | -  |
| Study Instance UID                     | 0020,000D | UI | 1, SPEC    | -  |
| Study ID                               | 0020,0010 | SH | 2, SPEC    | -  |
| <b>Patient Study Module</b>            |           |    |            |  |
| Admitting Diagnoses Description        | 0008,1080 | LO | 2, SPEC    | -  |
| Patient's Weight                       | 0010,1030 | DS | 1, SPEC    | -  |
| Occupation                             | 0010,2180 | SH | 2, SPEC    | -  |
| <b>General Series Module</b>           |           |    |            |  |
| Series Date                            | 0008,0021 | DA | 1, AUTO    | -  |
| Series Time                            | 0008,0031 | TM | 1, AUTO    | -  |
| Series Description                     | 0008,103E | LO | 2, AUTO    | -  |
| Operator's Name                        | 0008,1070 | PN | 2E, AUTO   | -  |
| Referenced Study Component<br>Sequence | 0008,1111 | SQ | 1, AUTO    | -  |
| >Referenced SOP Class UID              | 0008,1150 | UI | 1, AUTO    | -  |
| >Referenced SOP Instance UID           | 0008,1155 | UI | 1, AUTO    | -  |
| Body Part Examined                     | 0018,0015 | CS | 1, SPEC    | Applied Value(s):<br>ABDOMEN, ANKLE,<br>BREAST, CHEST,<br>CLAVICLE, COCCYX,<br>CSPINE, ELBOW,<br>EXTREMITY, FOOT,<br>HAND, HIP, KNEE,<br>LSPINE, PELVIS,<br>SHOULDER, SKULL,<br>SSPINE, TSPINE |
| Protocol Name                          | 0018,1030 | LO | 1, SPEC    | -  |

| Name                                      | Tag       | VR | Definition | Comment                                   |
|---|-----------|----|------------|---|
| Patient Position                          | 0018,5100 | CS | 1, SPEC    | -   |
| Series Instance UID                       | 0020,000E | UI | 1, AUTO    | -   |
| Series Number                             | 0020,0011 | IS | 1, AUTO    | -   |
| Laterality                                | 0020,0060 | CS | 2C, SPEC   | -   |
| Performed Procedure Step Start Date       | 0040,0244 | DA | 1, SPEC    | -   |
| Performed Procedure Step Start Time       | 0040,0245 | TM | 1, SPEC    | -   |
| Performed Procedure Step ID               | 0040,0253 | SH | 1, SPEC    | -   |
| Performed Procedure Step Description      | 0040,0254 | LO | 2, SPEC    | -   |
| Performed Action Item Code Sequence       | 0040,0260 | SQ | 2, SPEC    | -   |
| >Code Value                               | 0008,0100 | SH | 1, SPEC    | -   |
| >Coding Scheme Designator                 | 0008,0102 | SH | 1, SPEC    | -   |
| >Coding Scheme Version                    | 0008,0103 | SH | 1C, SPEC   | -   |
| >Code Meaning                             | 0008,0104 | LO | 1, SPEC    | -   |
| >Context Group Local Version              | 0008,0107 | DT | 1C, SPEC   | -   |
| >Code Set Extension Flag                  | 0008,010B | CS | 1, SPEC    | Applied Value(s): N, Y                    |
| >Code Set Extension Creator UID           | 0008,010D | UI | 1C, SPEC   | -   |
| Request Attributes Sequence               | 0040,0275 | SQ | 2, SPEC    | -   |
| >Scheduled Procedure Step Description     | 0040,0007 | LO | 2, SPEC    | -   |
| >Scheduled Procedure Step ID              | 0040,0009 | SH | 1, SPEC    | -   |
| >Requested Procedure ID                   | 0040,1001 | SH | 1, SPEC    | -   |
| Comments on the Performed Procedure Steps | 0040,0280 | ST | 2, SPEC    | -   |
| <b>Presentation Series Module</b>         |           |    |            |   |
| Modality                                  | 0008,0060 | CS | 1, AUTO    | Applied Value(s): PR                      |
| <b>General Equipment Module</b>           |           |    |            |   |
| Manufacturer                              | 0008,0070 | LO | 1, CONF    | Applied Value(s): Philips Medical Systems |
| Institution Name                          | 0008,0080 | LO | 1, CONF    | -   |
| Station Name                              | 0008,1010 | SH | 1, CONF    | Same as the Host Name.                    |
| Institutional Department Name             | 0008,1040 | LO | 2, AUTO    | -   |
| Manufacturer's Model Name                 | 0008,1090 | LO | 1, AUTO    | Applied Value(s): Intera Achieva          |
| Device Serial Number                      | 0018,1000 | LO | 1, AUTO    | -   |
| Software Version(s)                       | 0018,1020 | LO | 1, AUTO    | -   |
| <b>Overlay Plane Module</b>               |           |    |            |   |
| Overlay Rows                              | 6000,0010 | US | 1, AUTO    | -   |
| Overlay Columns                           | 6000,0011 | US | 1, AUTO    | -   |
| Overlay Description                       | 6000,0022 | LO | 2E, AUTO   | -   |
| Overlay Type                              | 6000,0040 | CS | 1, AUTO    | Applied Value(s): G, R                    |
| Overlay Subtype                           | 6000,0045 | LO | 2E, AUTO   | -   |
| Overlay Origin                            | 6000,0050 | SS | 1, AUTO    | -   |
| Overlay Bits Allocated                    | 6000,0100 | US | 1, AUTO    | Applied Value(s): 1                       |
| Overlay Bit Position                      | 6000,0102 | US | 1, AUTO    | Applied Value(s): 0                       |
| ROI Area                                  | 6000,1301 | IS | 2E, AUTO   | -   |
| ROI Mean                                  | 6000,1302 | DS | 2E, AUTO   | -   |
| ROI Standard Deviation                    | 6000,1303 | DS | 2E, AUTO   | -   |
| Overlay Label                             | 6000,1500 | LO | 2E, AUTO   | -   |
| Overlay Data                              | 6000,3000 | OW | 1, AUTO    | -   |
| <b>Displayed Area Module</b>              |           |    |            |   |
| Displayed Area Selection Sequence         | 0070,005A | SQ | 1, IMPL    | -   |
| >Referenced Image Sequence                | 0008,1140 | SQ | 1C, IMPL   | -   |
| >>Referenced SOP Class UID                | 0008,1150 | UI | 1, IMPL    | -   |
| >>Referenced SOP Instance UID             | 0008,1155 | UI | 1, IMPL    | -   |

| Name                                     | Tag       | VR | Definition | Comment  |
|--|-----------|----|------------|--|
| >Displayed Area Top Left Hand Corner     | 0070,0052 | SL | 1, IMPL    | -  |
| >Displayed Area Bottom Right Hand Corner | 0070,0053 | SL | 1, IMPL    | -  |
| >Presentation Size Mode                  | 0070,0100 | CS | 1, IMPL    | Applied Value(s):<br>MAGNIFY,<br>SCALE TO FIT  |
| >Presentation Pixel Spacing              | 0070,0101 | DS | 1C, IMPL   | Applied Value(s):<br>(0.0, 0.0)  |
| >Presentation Pixel Aspect Ratio         | 0070,0102 | IS | 1C, IMPL   | Applied Value(s): (1, 1)   |
| >Presentation Pixel Magnification Ratio  | 0070,0103 | IS | 1C, IMPL   | Applied Value(s): 1.0  |
| >Zoom Mode                               | 2001,103F | CS | 2, IMPL    | -  |
| <b>Graphic Annotation Module</b>         |           |    |            |  |
| Graphic Annotation Sequence              | 0070,0001 | SQ | 1, IMPL    | -  |
| >Referenced Image Sequence               | 0008,1140 | SQ | 1C, IMPL   | -  |
| >>Referenced SOP Class UID               | 0008,1150 | UI | 1, IMPL    | -  |
| >>Referenced SOP Instance UID            | 0008,1155 | UI | 1, IMPL    | -  |
| >Graphic Layer                           | 0070,0002 | CS | 1, IMPL    | -  |
| >Text Object Sequence                    | 0070,0008 | SQ | 1C, IMPL   | -  |
| >>Anchor Point Annotation Units          | 0070,0004 | CS | 1, IMPL    | Applied Value(s):<br>DISPLAY, PIXEL  |
| >>Unformatted Text Value                 | 0070,0006 | ST | 1, IMPL    | -  |
| >>Anchor Point                           | 0070,0014 | FL | 1, IMPL    | -  |
| >>Anchor Point Visibility                | 0070,0015 | CS | 1, IMPL    | Applied Value(s): N, Y   |
| >Graphic Object Sequence                 | 0070,0009 | SQ | 1C, IMPL   | -  |
| >>Graphic Annotation Units               | 0070,0005 | CS | 1, IMPL    | Applied Value(s):<br>DISPLAY, PIXEL  |
| >>Graphic Dimensions                     | 0070,0020 | US | 1, IMPL    | Applied Value(s): 2  |
| >>Number of Graphics Points              | 0070,0021 | US | 1, IMPL    | -  |
| >>Graphic Data                           | 0070,0022 | FL | 1, IMPL    | -  |
| >>Graphic Type                           | 0070,0023 | CS | 1, IMPL    | Applied Value(s):<br>CIRCLE, ELLIPSE,<br>INTERPOLATED,<br>POINT, POLYLINE                                    |
| >>Graphic Filled                         | 0070,0024 | CS | 1, IMPL    | Applied Value(s): N, Y   |
| <b>Spatial Transformation Module</b>     |           |    |            |  |
| Image Horizontal Flip                    | 0070,0041 | CS | 1, IMPL    | -  |
| Image Rotation                           | 0070,0042 | US | 1, IMPL    | -  |
| <b>Graphic Layer Module</b>              |           |    |            |  |
| Graphic Layer Sequence                   | 0070,0060 | SQ | 1, IMPL    | -  |
| >Graphic Layer                           | 0070,0002 | CS | 1, IMPL    | -  |
| >Graphic Layer Order                     | 0070,0062 | IS | 1, IMPL    | -  |
| <b>Modality LUT Module</b>               |           |    |            |  |
| Rescale Intercept                        | 0028,1052 | DS | 1, SPEC    | -  |
| Rescale Slope                            | 0028,1053 | DS | 1, SPEC    | -  |
| Rescale Type                             | 0028,1054 | LO | 1, SPEC    | Applied Value(s):<br>cm/sec, milliradials,<br>milliseconds, mm <sup>2</sup> /sec,<br>normalized, seconds, US |
| <b>Softcopy Presentation LUT Module</b>  |           |    |            |  |
| Presentation LUT Shape                   | 2050,0020 | CS | 1, AUTO    | -  |
| <b>Overlay/Curve Activation Module</b>   |           |    |            |  |
| Overlay Activation Layer                 | 6000,1001 | CS | 1, AUTO    | Applied Value(s): 1  |
| <b>Softcopy VOI LUT Module</b>           |           |    |            |  |
| Softcopy VOI LUT Sequence                | 0028,3110 | SQ | 1, AUTO    | -  |
| >Referenced Image Sequence               | 0008,1140 | SQ | 1C, AUTO   | -  |
| >>Referenced SOP Class UID               | 0008,1150 | UI | 1, AUTO    | -  |

| Name                             | Tag       | VR | Definition | Comment   |
|----------------------------------|-----------|----|------------|---|
| >>Referenced SOP Instance UID    | 0008,1155 | UI | 1, AUTO    | -   |
| >Window Center                   | 0028,1050 | DS | 1, AUTO    | -   |
| >Window Width                    | 0028,1051 | DS | 1, AUTO    | -   |
| <b>Presentation State Module</b> |           |    |            |   |
| Referenced Series Sequence       | 0008,1115 | SQ | 1, AUTO    | -   |
| >Referenced Image Sequence       | 0008,1140 | SQ | 1C, AUTO   | -   |
| >>Referenced SOP Class UID       | 0008,1150 | UI | 1, AUTO    | -   |
| >>Referenced SOP Instance UID    | 0008,1155 | UI | 1, AUTO    | -   |
| >Series Instance UID             | 0020,000E | UI | 1, AUTO    | -   |
| Shutter Presentation Value       | 0018,1622 | US | 1C, AUTO   | Applied Value(s): 0   |
| Instance Number                  | 0020,0013 | IS | 1, AUTO    | -   |
| Presentation Label               | 0070,0080 | CS | 1, AUTO    | Applied Value(s): AS LAST SEEN, NEW AT IMPORT   |
| Presentation Description         | 0070,0081 | LO | 2, AUTO    | -   |
| Presentation Creation Date       | 0070,0082 | DA | 1, AUTO    | -   |
| Presentation Creation Time       | 0070,0083 | TM | 1, AUTO    | -   |
| Presentation Creator's Name      | 0070,0084 | PN | 2, AUTO    | Same as Manufacturer's Model Name.  |
| <b>SOP Common Module</b>         |           |    |            |   |
| Specific Character Set           | 0008,0005 | CS | 1, AUTO    | Applied Value(s): ISO_IR 13, ISO_IR 100, ISO 2022 IR 13, ISO 2022 IR 87, ISO 2022 IR 100, ISO 2022 IR 159 |
| Instance Creation Date           | 0008,0012 | DA | 1, AUTO    | -   |
| Instance Creation Time           | 0008,0013 | TM | 1, AUTO    | -   |
| Instance Creator UID             | 0008,0014 | UI | 1, AUTO    | -   |
| SOP Class UID                    | 0008,0016 | UI | 1, AUTO    | Applied Value(s): 1.2.840.10008.5.1.4.1.1.11.1  |
| SOP Instance UID                 | 0008,0018 | UI | 1, AUTO    | -   |

**8.1.1.4. Patient Root Query/Retrieve Information Model – FIND SOP Class**

**Table 71: Created Patient Root Query/Retrieve Information Model – FIND SOP Class Attributes**

| Name                   | Tag       | VR | Definition | Comment                      |
|------------------------|-----------|----|------------|------------------------------|
| <b>Patient Level</b>   |           |    |            |                              |
| Specific Character Set | 0008,0005 | CS | 1, AUTO    | Applied Value(s): ISO_IR 100 |
| Query/Retrieve Level   | 0008,0052 | CS | 1, AUTO    | Applied Value(s): PATIENT    |
| Patient's Name         | 0010,0010 | PN | 2, USER    | Filter value.                |
| Patient ID             | 0010,0020 | LO | 2E, AUTO   | Not Filter value.            |
| Patient's Birth Date   | 0010,0030 | DA | 2, USER    | Filter value.                |
| Patient's Sex          | 0010,0040 | CS | 2E, AUTO   | -                            |
| Ethnic Group           | 0010,2160 | SH | 2E, AUTO   | -                            |
| <b>Study Level</b>     |           |    |            |                              |
| Specific Character Set | 0008,0005 | CS | 1, AUTO    | Applied Value(s): ISO_IR 100 |
| Study Date             | 0008,0020 | DA | 2E, AUTO   | -                            |
| Study Time             | 0008,0030 | TM | 2E, AUTO   | -                            |

| Name                                 | Tag       | VR | Definition | Comment                                  |
|--------------------------------------|-----------|----|------------|--|
| Accession Number                     | 0008,0050 | SH | 2E, AUTO   | -  |
| Query/Retrieve Level                 | 0008,0052 | CS | 1, AUTO    | Applied Value(s): STUDY                  |
| Study Description                    | 0008,1030 | LO | 2E, AUTO   | -  |
| Patient ID                           | 0010,0020 | LO | 1, SPEC    | Filter value.                            |
| Study Instance UID                   | 0020,000D | UI | 2E, AUTO   | -  |
| Study ID                             | 0020,0010 | SH | 2E, AUTO   | -  |
| Performed Procedure Step Start Date  | 0040,0244 | DA | 2, USER    | Filter value.                            |
| Performed Procedure Step Status      | 0040,0252 | CS | 2, USER    | Filter value.                            |
| Performed Procedure Step Description | 0040,0254 | LO | 2, USER    | Filter value.                            |
| Private Creator Group 2001           | 2001,0010 | LO | 1, AUTO    | Applied Value(s): Philips Imaging DD 001 |
| Examination Source                   | 2001,1063 | CS | 2E, AUTO   | -  |
| <b>Series Level</b>                  |           |    |            |  |
| Specific Character Set               | 0008,0005 | CS | 1, AUTO    | Applied Value(s): ISO_IR 100             |
| Series Date                          | 0008,0021 | DA | 2E, AUTO   | -  |
| Series Time                          | 0008,0031 | TM | 2E, AUTO   | -  |
| Query/Retrieve Level                 | 0008,0052 | CS | 1, AUTO    | Applied Value(s): SERIES                 |
| Modality                             | 0008,0060 | CS | 2E, AUTO   | -  |
| Series Description                   | 0008,103E | LO | 2E, AUTO   | -  |
| Patient ID                           | 0010,0020 | LO | 1, SPEC    | Filter value.                            |
| Body Part Examined                   | 0018,0015 | CS | 2E, AUTO   | -  |
| Protocol Name                        | 0018,1030 | LO | 2E, AUTO   | -  |
| Study Instance UID                   | 0020,000D | UI | 1, SPEC    | -  |
| Series Instance UID                  | 0020,000E | UI | 2E, AUTO   | -  |
| Series Number                        | 0020,0011 | IS | 2E, AUTO   | -  |
| Number of Series Related Instances   | 0020,1209 | IS | 2E, AUTO   | -  |
| <b>Image Level</b>                   |           |    |            |  |
| Specific Character Set               | 0008,0005 | CS | 1, AUTO    | Applied Value(s): ISO_IR 100             |
| SOP Instance UID                     | 0008,0018 | UI | 2E, AUTO   | -  |
| Query/Retrieve Level                 | 0008,0052 | CS | 1, AUTO    | Applied Value(s): IMAGE                  |
| Patient ID                           | 0010,0020 | LO | 1, SPEC    | -  |
| Study Instance UID                   | 0020,000D | UI | 1, SPEC    | -  |
| Series Instance UID                  | 0020,000E | UI | 1, SPEC    | -  |
| Instance Number                      | 0020,0013 | IS | 2E, AUTO   | -  |

**8.1.1.5. Patient Root Query/Retrieve Information Model – MOVE SOP Class**

**Table 72: Created Patient Root Query/Retrieve Information Model – MOVE SOP Class Attributes**

| Name                 | Tag       | VR | Definition | Comment                  |
|----------------------|-----------|----|------------|--------------------------|
| <b>Series Level</b>  |           |    |            |                          |
| Query/Retrieve Level | 0008,0052 | CS | 1, AUTO    | Applied Value(s): SERIES |
| Patient ID           | 0010,0020 | LO | 1, SPEC    | -                        |
| Study Instance UID   | 0020,000D | UI | 1, SPEC    | -                        |
| Series Instance UID  | 0020,000E | UI | 1, SPEC    | -                        |



## 8.1.1.6. Study Root Query/Retrieve Information Model – FIND SOP Class

Table 73: Created Study Root Query/Retrieve Information Model – FIND SOP Class Attributes

| Name                                 | Tag       | VR | Definition | Comment                                  |
|--------------------------------------|-----------|----|------------|--|
| <b>Study Level</b>                   |           |    |            |  |
| Specific Character Set               | 0008,0005 | CS | 1, AUTO    | Applied Value(s): ISO_IR 100             |
| Study Date                           | 0008,0020 | DA | 2E, AUTO   | -  |
| Study Time                           | 0008,0030 | TM | 2E, AUTO   | -  |
| Accession Number                     | 0008,0050 | SH | 2E, AUTO   | -  |
| Query/Retrieve Level                 | 0008,0052 | CS | 1, AUTO    | Applied Value(s): STUDY                  |
| Study Description                    | 0008,1030 | LO | 2E, AUTO   | -  |
| Patient's Name                       | 0010,0010 | PN | 2, USER    | Filter value.                            |
| Patient ID                           | 0010,0020 | LO | 2, USER    | Filter value                             |
| Patient's Birth Date                 | 0010,0030 | DA | 2, USER    | Filter value.                            |
| Patient's Sex                        | 0010,0040 | CS | 2E, AUTO   | -  |
| Ethnic Group                         | 0010,2160 | SH | 2E, AUTO   | -  |
| Study Instance UID                   | 0020,000D | UI | 2E, AUTO   | -  |
| Study ID                             | 0020,0010 | SH | 2E, AUTO   | -  |
| Performed Procedure Step Start Date  | 0040,0244 | DA | 2, USER    | Filter value.                            |
| Performed Procedure Step Status      | 0040,0252 | CS | 2, USER    | Filter value.                            |
| Performed Procedure Step Description | 0040,0254 | LO | 2, USER    | Filter value.                            |
| Private Creator Group 2001           | 2001,0010 | LO | 1, AUTO    | Applied Value(s): Philips Imaging DD 001 |
| Examination Source                   | 2001,1063 | CS | 2E, AUTO   | -  |
| <b>Series Level</b>                  |           |    |            |  |
| Specific Character Set               | 0008,0005 | CS | 1, AUTO    | Applied Value(s): ISO_IR 100             |
| Series Date                          | 0008,0021 | DA | 2E, AUTO   | -  |
| Series Time                          | 0008,0031 | TM | 2E, AUTO   | -  |
| Query/Retrieve Level                 | 0008,0052 | CS | 1, AUTO    | Applied Value(s): SERIES                 |
| Modality                             | 0008,0060 | CS | 2E, AUTO   | -  |
| Series Description                   | 0008,103E | LO | 2E, AUTO   | -  |
| Body Part Examined                   | 0018,0015 | CS | 2E, AUTO   | -  |
| Protocol Name                        | 0018,1030 | LO | 2E, AUTO   | -  |
| Study Instance UID                   | 0020,000D | UI | 1, SPEC    | -  |
| Series Instance UID                  | 0020,000E | UI | 2E, AUTO   | -  |
| Series Number                        | 0020,0011 | IS | 2E, AUTO   | -  |
| Number of Series Related Instances   | 0020,1209 | IS | 2E, AUTO   | -  |
| <b>Image Level</b>                   |           |    |            |  |
| Specific Character Set               | 0008,0005 | CS | 1, AUTO    | Applied Value(s): ISO_IR 100             |
| SOP Instance UID                     | 0008,0018 | UI | 2E, AUTO   | -  |
| Query/Retrieve Level                 | 0008,0052 | CS | 1, AUTO    | Applied Value(s): IMAGE                  |
| Study Instance UID                   | 0020,000D | UI | 1, SPEC    | -  |
| Series Instance UID                  | 0020,000E | UI | 1, SPEC    | -  |
| Instance Number                      | 0020,0013 | IS | 2E, AUTO   | -  |

**8.1.1.7. Study Root Query/Retrieve Information Model – MOVE SOP Class**

**Table 74: Created Study Root Query/Retrieve Information Model – MOVE SOP Class Attributes**

| Name                 | Tag       | VR | Definition | Comment                     |
|----------------------|-----------|----|------------|-----------------------------|
| <b>Series Level</b>  |           |    |            |                             |
| Query/Retrieve Level | 0008,0052 | CS | 1, AUTO    | Applied Value(s):<br>SERIES |
| Study Instance UID   | 0020,000D | UI | 1, SPEC    | -                           |
| Series Instance UID  | 0020,000E | UI | 1, SPEC    | -                           |

**8.1.1.8. Storage Commitment Push Model SOP Class**

**Table 75: Modules of the Storage Commitment Push Model SOP Class**

| Information Entity | Module Name        | Usage  |
|--------------------|--------------------|--------|
| -                  | SOP Common         | NEVER  |
| -                  | Storage Commitment | ALWAYS |

**Table 76: Created Storage Commitment Push Model SOP Class Attributes**

| Name                                | Tag       | VR | Definition | Comment |
|-------------------------------------|-----------|----|------------|---------|
| <b>Storage Commitment Module</b>    |           |    |            |         |
| Referenced Study Component Sequence | 0008,1111 | SQ | 1, AUTO    | -       |
| >Referenced SOP Class UID           | 0008,1150 | UI | 1, SPEC    | -       |
| >Referenced SOP Instance UID        | 0008,1155 | UI | 1, SPEC    | -       |
| Transaction UID                     | 0008,1195 | UI | 1, AUTO    | -       |
| Referenced SOP Sequence             | 0008,1199 | SQ | 1, AUTO    | -       |
| >Referenced SOP Class UID           | 0008,1150 | UI | 1, SPEC    | -       |
| >Referenced SOP Instance UID        | 0008,1155 | UI | 1, SPEC    | -       |

**8.1.1.9. Modality Performed Procedure Step SOP Class**

**Table 77: Modules of the Modality Performed Procedure Step SOP Class – N-CREATE**

| Information Entity | Module Name                           | Usage  |
|--------------------|---------------------------------------|--------|
| Study              | Performed Procedure Step Relationship | ALWAYS |
|                    | Performed Procedure Step Information  | ALWAYS |
|                    | Image Acquisition Results             | ALWAYS |
|                    | Radiation Dose                        | NEVER  |
|                    | Billing and Material Management Code  | NEVER  |
| General            | SOP Common                            | ALWAYS |

**Table 78: Created Modality Performed Procedure Step SOP Class N-CREATE Attributes**

| Name  | Tag       | VR | Definition    | Comment   |
|---|-----------|----|---------------|---|
| <b>SOP Common Module</b>                            |           |    |               |   |
| Specific Character Set                              | 0008,0005 | CS | 2, IMPL       | Applied Value(s):<br>ISO_IR 13,<br>ISO_IR 100,<br>ISO 2022 IR 13,<br>ISO 2022 IR 87,<br>ISO 2022 IR 100,<br>ISO 2022 IR 159 |
| <b>Performed Procedure Step Relationship Module</b> |           |    |               |   |
| Referenced Patient Sequence                         | 0008,1120 | SQ | 2, AUTO       | Always empty  |
| Patient's Name                                      | 0010,0010 | PN | 1, MWL / USER | -   |
| Patient ID  | 0010,0020 | LO | 1, MWL / USER | -   |
| Patient's Birth Date                                | 0010,0030 | DA | 1, MWL / USER | -   |
| Patient's Sex                                       | 0010,0040 | CS | 1, MWL / USER | Applied Value(s):<br>F, M, O  |
| Scheduled Step Attribute Sequence                   | 0040,0270 | SQ | 1, AUTO       | -   |
| >Accession Number                                   | 0008,0050 | SH | 2, MWL / USER | -   |
| >Referenced Study Sequence                          | 0008,1110 | SQ | 2E, AUTO      | -   |
| >Study Instance UID                                 | 0020,000D | UI | 1, AUTO       | -   |
| >Requested Procedure Description                    | 0032,1060 | LO | 2, MWL        | -   |
| >Scheduled Procedure Step Description               | 0040,0007 | LO | 2, MWL        | -   |
| >Scheduled Action Item Code Sequence                | 0040,0008 | SQ | 2E, AUTO      | -   |
| >Scheduled Procedure Step ID                        | 0040,0009 | SH | 2, MWL        | -   |
| >Requested Procedure ID                             | 0040,1001 | SH | 2, MWL        | -   |
| <b>Performed Procedure Step Information Module</b>  |           |    |               |   |
| Procedure Code Sequence                             | 0008,1032 | SQ | 2E, AUTO      | Attribute always empty.   |
| Performed Station AE Title                          | 0040,0241 | AE | 1, CONFIG     | -   |
| Performed Station Name                              | 0040,0242 | SH | 2, CONFIG     | -   |
| Performed Location                                  | 0040,0243 | SH | 2, CONFIG     | -   |
| Performed Procedure Step Start Date                 | 0040,0244 | DA | 1, AUTO       | -   |
| Performed Procedure Step Start Time                 | 0040,0245 | TM | 1, AUTO       | -   |
| Performed Procedure Step End Date                   | 0040,0250 | DA | 2, AUTO       | -   |
| Performed Procedure Step End Time                   | 0040,0251 | TM | 2, AUTO       | -   |
| Performed Procedure Step Status                     | 0040,0252 | CS | 1, AUTO       | Applied Value(s):<br>IN PROGRESS  |
| Performed Procedure Step ID                         | 0040,0253 | SH | 1, SPEC       | -   |
| Performed Procedure Step Description                | 0040,0254 | LO | 2, MWL / USER | -   |
| Performed Procedure Type Description                | 0040,0255 | LO | 2E, AUTO      | -   |
| <b>Image Acquisition Results Module</b>             |           |    |               |   |
| Modality  | 0008,0060 | CS | 1, AUTO       | Applied Value(s): MR  |
| Study ID  | 0020,0010 | SH | 2, MWL / USER | -   |
| Performed Action Item Code Sequence                 | 0040,0260 | SQ | 2, IMPL       | -   |
| >Code Value   | 0008,0100 | SH | 1, MWL / USER | -   |

| Name                      | Tag       | VR | Definition    | Comment |
|---------------------------|-----------|----|---------------|---------|
| >Coding Scheme Designator | 0008,0102 | SH | 1, MWL / USER | -       |
| >Coding Scheme Version    | 0008,0103 | SH | 2, MWL / USER | -       |
| >Code Meaning             | 0008,0104 | LO | 2, MWL / USER | -       |
| Performed Series Sequence | 0040,0340 | SQ | 2E, AUTO      | -       |

**Table 79: Modules of the Modality Performed Procedure Step SOP Class – N-SET**

| Information Entity | Module Name                           | Usage  |
|--------------------|---------------------------------------|--------|
| Study              | Performed Procedure Step Relationship | NEVER  |
|                    | Performed Procedure Step Information  | ALWAYS |
|                    | Image Acquisition Results             | ALWAYS |
|                    | Radiation Dose                        | NEVER  |
|                    | Billing and Material Management Code  | NEVER  |
| General            | SOP Common                            | NEVER  |

**Table 80: Created Modality Performed Procedure Step SOP Class N-SET Attributes**

| Name   | Tag       | VR | Definition    | Comment                                   |
|--|-----------|----|---------------|---|
| <b>Performed Procedure Step Information Module</b> |           |    |               |   |
| Performed Procedure Step End Date                  | 0040,0250 | DA | 1, AUTO       | -   |
| Performed Procedure Step End Time                  | 0040,0251 | TM | 1, AUTO       | -   |
| Performed Procedure Step Status                    | 0040,0252 | CS | 1, IMPL       | Applied Value(s): COMPLETED, DISCONTINUED |
| Performed Procedure Step Description               | 0040,0254 | LO | 2, MWL / USER | -   |
| <b>Image Acquisition Results Module</b>            |           |    |               |   |
| Performed Action Item Code Sequence                | 0040,0260 | SQ | 2, IMPL       | -   |
| >Code Value  | 0008,0100 | SH | 1, MWL / USER | -   |
| >Coding Scheme Designator                          | 0008,0102 | SH | 1, MWL / USER | -   |
| >Coding Scheme Version                             | 0008,0103 | SH | 2, MWL / USER | -   |
| >Code Meaning                                      | 0008,0104 | LO | 2, MWL / USER | -   |
| Performed Series Sequence                          | 0040,0340 | SQ | 2, IMPL       | -   |
| >Retrieve AE Title                                 | 0008,0054 | AE | 2E, AUTO      | -   |
| >Series Description                                | 0008,103E | LO | 2, SPEC       | -   |
| >Performing Physician's Name                       | 0008,1050 | PN | 2E, AUTO      | -   |
| >Operator's Name                                   | 0008,1070 | PN | 2E, AUTO      | -   |
| >Referenced Image Sequence                         | 0008,1140 | SQ | 2, IMPL       | Empty while in progress.                  |
| >>Referenced SOP Class UID                         | 0008,1150 | UI | 1, IMPL       | -   |
| >>Referenced SOP Instance UID                      | 0008,1155 | UI | 1, IMPL       | -   |
| >Protocol Name                                     | 0018,1030 | LO | 1, SPEC       | -   |
| >Series Instance UID                               | 0020,000E | UI | 2, SPEC       | -   |
| >Referenced Standalone SOP Instance Sequence       | 0040,0220 | SQ | 2E, AUTO      | -   |

8.1.1.10. Modality Worklist Information Model – FIND SOP Class

Table 81: Modules of the Modality Worklist Information Model – FIND SOP Class

| Information Entity | Module Name              | Usage  |
|--------------------|--------------------------|--------|
| Patient            | Patient Relationship     | NEVER  |
|                    | Patient Identification   | ALWAYS |
|                    | Patient Demographic      | ALWAYS |
|                    | Patient Medical          | ALWAYS |
| Visit              | Visit Relationship       | NEVER  |
|                    | Visit Identification     | NEVER  |
|                    | Visit Status             | ALWAYS |
|                    | Visit Admission          | NEVER  |
| Study              | Scheduled Procedure Step | ALWAYS |
|                    | Requested Procedure      | ALWAYS |
|                    | Imaging Service Request  | ALWAYS |
| General            | SOP Common               | NEVER  |

Table 82: Created Modality Worklist Information Model – FIND SOP Class Attributes

| Name                                   | Tag       | VR | Definition | Comment                            |
|--|-----------|----|------------|------------------------------------|
| <b>Patient Identification Module</b>   |           |    |            |                                    |
| Patient's Name                         | 0010,0010 | PN | 2E, AUTO   | -                                  |
| Patient ID                             | 0010,0020 | LO | 2E, AUTO   | -                                  |
| Other Patient IDs                      | 0010,1000 | LO | 2E, AUTO   | -                                  |
| <b>Patient Demographic Module</b>      |           |    |            |                                    |
| Patient's Birth Date                   | 0010,0030 | DA | 2E, AUTO   | -                                  |
| Patient's Sex                          | 0010,0040 | CS | 2E, AUTO   | -                                  |
| Patient's Weight                       | 0010,1030 | DS | 2E, AUTO   | -                                  |
| Ethnic Group                           | 0010,2160 | SH | 2E, AUTO   | -                                  |
| Patient Comments                       | 0010,4000 | LT | 2E, AUTO   | -                                  |
| <b>Patient Medical Module</b>          |           |    |            |                                    |
| Medical Alerts                         | 0010,2000 | LO | 2E, AUTO   | -                                  |
| Contrast Allergies                     | 0010,2110 | LO | 2E, AUTO   | -                                  |
| Additional Patient History             | 0010,21B0 | LT | 2E, AUTO   | -                                  |
| Pregnancy Status                       | 0010,21C0 | US | 2E, AUTO   | -                                  |
| <b>Visit Status Module</b>             |           |    |            |                                    |
| Current Patient Location               | 0038,0300 | LO | 2E, AUTO   | -                                  |
| <b>Scheduled Procedure Step Module</b> |           |    |            |                                    |
| Scheduled Procedure Step Sequence      | 0040,0100 | SQ | 1, AUTO    | -                                  |
| >Modality                              | 0008,0060 | CS | 2, USER    | Can be used as matching key.       |
| >Requested Contrast Agent              | 0032,1070 | LO | 2E, AUTO   | -                                  |
| >Scheduled Station AE Title            | 0040,0001 | AE | 2, USER    | Can be used as matching key.       |
| >Scheduled Procedure Step Start Date   | 0040,0002 | DA | 2, USER    | Can be used as range matching key. |
| >Scheduled Procedure Step Start Time   | 0040,0003 | TM | 2E, AUTO   | -                                  |
| >Scheduled Procedure Step End Date     | 0040,0004 | DA | 2E, AUTO   | -                                  |
| >Scheduled Procedure Step End Time     | 0040,0005 | TM | 2E, AUTO   | -                                  |
| >Scheduled Performing Physician's Name | 0040,0006 | PN | 2E, AUTO   | -                                  |
| >Scheduled Procedure Step Description  | 0040,0007 | LO | 2E, AUTO   | -                                  |
| >Scheduled Action Item Code Sequence   | 0040,0008 | SQ | 1, AUTO    | -                                  |

| Name                                      | Tag       | VR | Definition | Comment                      |
|---|-----------|----|------------|------------------------------|
| >>Code Value                              | 0008,0100 | SH | 2E, AUTO   | -                            |
| >>Coding Scheme Designator                | 0008,0102 | SH | 2E, AUTO   | -                            |
| >>Coding Scheme Version                   | 0008,0103 | SH | 2E, AUTO   | -                            |
| >>Code Meaning                            | 0008,0104 | LO | 2E, AUTO   | -                            |
| >Scheduled Procedure Step ID              | 0040,0009 | SH | 2E, AUTO   | -                            |
| >Scheduled Station Name                   | 0040,0010 | SH | 2E, AUTO   | -                            |
| >Scheduled Procedure Step Location        | 0040,0011 | SH | 2E, AUTO   | -                            |
| >Pre-Medication                           | 0040,0012 | LO | 2E, AUTO   | -                            |
| >Scheduled Procedure Step Status          | 0040,0020 | CS | 2E, AUTO   | -                            |
| >Comments on the Scheduled Procedure Step | 0040,0400 | LT | 2E, AUTO   | -                            |
| <b>Requested Procedure Module</b>         |           |    |            |                              |
| Referenced Study Sequence                 | 0008,1110 | SQ | 1, AUTO    | -                            |
| >Referenced SOP Class UID                 | 0008,1150 | UI | 2E, AUTO   | -                            |
| >Referenced SOP Instance UID              | 0008,1155 | UI | 2E, AUTO   | -                            |
| Study Instance UID                        | 0020,000D | UI | 2E, AUTO   | -                            |
| Requested Procedure Description           | 0032,1060 | LO | 2E, AUTO   | -                            |
| Requested Procedure Code Sequence         | 0032,1064 | SQ | 1, AUTO    | -                            |
| >Code Value                               | 0008,0100 | SH | 2E, AUTO   | -                            |
| >Coding Scheme Designator                 | 0008,0102 | SH | 2E, AUTO   | -                            |
| >Coding Scheme Version                    | 0008,0103 | SH | 2E, AUTO   | -                            |
| >Code Meaning                             | 0008,0104 | LO | 2E, AUTO   | -                            |
| Requested Procedure ID                    | 0040,1001 | SH | 2E, AUTO   | -                            |
| Names of Intended Recipients of Results   | 0040,1010 | PN | 2E, AUTO   | -                            |
| Requested Procedure Comments              | 0040,1400 | LT | 2E, AUTO   | -                            |
| <b>Imaging Service Request Module</b>     |           |    |            |                              |
| Accession Number                          | 0008,0050 | SH | 2, USER    | Can be used as matching key. |
| Referring Physician's Name                | 0008,0090 | PN | 2E, AUTO   | -                            |
| Requesting Physician                      | 0032,1032 | PN | 2E, AUTO   | -                            |
| Requesting Service                        | 0032,1033 | LO | 2E, AUTO   | -                            |
| Imaging Service Request Comments          | 0040,2400 | LT | 2E, AUTO   | -                            |

**8.1.1.11. Basic Film Session SOP Class**

**Table 83: Modules of the Basic Film Session SOP Class – N-CREATE**

| Information Entity | Module Name                     | Usage  |
|--------------------|---------------------------------|--------|
| General            | SOP Common                      | NEVER  |
| Print Management   | Basic Film Session Presentation | ALWAYS |
|                    | Basic Film Session Relationship | NEVER  |

**Table 84: Created Basic Film Session SOP Class N-CREATE Attributes**

| Name  | Tag       | VR | Definition     | Comment                               |
|---|-----------|----|----------------|---------------------------------------|
| <b>Basic Film Session Presentation Module</b> |           |    |                |                                       |
| Number of Copies                              | 2000,0010 | IS | 1, IMPL / USER | Between 1 and 99. Applied Value(s): 1 |
| Medium Type                                   | 2000,0030 | CS | 1, IMPL        | Applied Value(s): BLUE FILM           |

8.1.1.12. Basic Film Box SOP Class

Table 85: Modules of the Basic Film Box SOP Class – N-CREATE

| Information Entity | Module Name                 | Usage  |
|--------------------|-----------------------------|--------|
| General            | SOP Common                  | NEVER  |
| Print Management   | Basic Film Box Presentation | ALWAYS |
|                    | Basic Film Box Relationship | ALWAYS |

Table 86: Created Basic Film Box SOP Class N-CREATE Attributes

| Name                                      | Tag       | VR | Definition | Comment   |
|---|-----------|----|------------|---|
| <b>Basic Film Box Presentation Module</b> |           |    |            |   |
| Image Display Format                      | 2010,0010 | ST | 1, CONF    | Applied Value(s): COL, CUSTOM, CUSTOM\1, ROW, SLIDE, STANDARD, STANDARD\1,1, SUPERSLIDE   |
| Film Orientation                          | 2010,0040 | CS | 1, CONF    | Applied Value(s): PORTRAIT  |
| Film Size ID                              | 2010,0050 | CS | 1, CONF    | Applied Value(s): 10INX12IN, 10INX14IN, 11INX14IN, 14INX14IN, 14INX17IN, 24CMX24CM, 24CMX30CM, 8INX10IN   |
| Magnification Type                        | 2010,0060 | CS | 1, CONF    | Applied Value(s): CUBIC   |
| Smoothing Type                            | 2010,0080 | CS | 1, AUTO    | SCP specific. Applied Value(s): 140   |
| Border Density                            | 2010,0100 | CS | 1, AUTO    | The desired density in hundredths of OD. Applied Value(s): BLACK  |
| Empty Image Density                       | 2010,0110 | CS | 1, AUTO    | <i> where <i> represents the desired density in hundredths of OD. Applied Value(s): BLACK   |
| Min Density                               | 2010,0120 | US | 1, CONF    | Maximum density of the images on the film, expressed in hundredths of OD. If Max Density is higher than maximum printer density than Max Density is set to maximum printer density. |
| Max Density                               | 2010,0130 | US | 1, CONF    | Minimum density of the images on the film, expressed in hundredths of OD. If Min Density is lower than minimum printer density than Min Density is set to minimum printer density.  |
| Trim                                      | 2010,0140 | CS | 1, CONF    | Applied Value(s): NO  |
| Configuration Information                 | 2010,0150 | ST | 1, CONF    | LUT.  |
| <b>Basic Film Box Relationship Module</b> |           |    |            |   |
| Referenced Film Session Sequence          | 2010,0500 | SQ | 1, AUTO    | Parent Film Session.  |
| >Referenced SOP Class UID                 | 0008,1150 | UI | 1, AUTO    | Applied Value(s): 1.2.840.10008.5.1.1.1   |
| >Referenced SOP Instance UID              | 0008,1155 | UI | 1, AUTO    | -   |

8.1.1.13. Basic Grayscale Image Box SOP Class

Table 87: Modules of the Basic Grayscale Image Box SOP Class – N-SET

| Information Entity | Module Name                  | Usage  |
|--------------------|------------------------------|--------|
| General            | SOP Common                   | NEVER  |
| Print Management   | Image Box Pixel Presentation | ALWAYS |

Table 88: Created Basic Grayscale Image Box SOP Class N-SET Attributes

| Name                                       | Tag       | VR | Definition | Comment   |
|--|-----------|----|------------|---|
| <b>Image Box Pixel Presentation Module</b> |           |    |            |   |
| Magnification Type                         | 2010,0060 | CS | 1, CONF    | Applied Value(s): CUBIC                               |
| Smoothing Type                             | 2010,0080 | CS | 1, CONF    | SCP specific. Applied Value(s): 140                   |
| Image Position                             | 2020,0010 | US | 1, AUTO    | Applied Value(s): 1                                   |
| Polarity                                   | 2020,0020 | CS | 1, AUTO    | Applied Value(s): NORMAL                              |
| Preformatted Grayscale Image Sequence      | 2020,0110 | SQ | 1, AUTO    | -   |
| >Samples per Pixel                         | 0028,0002 | US | 1, AUTO    | Applied Value(s): 1                                   |
| >Photometric Interpretation                | 0028,0004 | CS | 1, AUTO    | Applied Value(s): MONOCHROME2                         |
| >Rows                                      | 0028,0010 | US | 1, IMPL    | Depending on the selected printer type and film size. |
| >Columns                                   | 0028,0011 | US | 1, IMPL    | Depending on the selected printer type and film size. |
| >Pixel Aspect Ratio                        | 0028,0034 | IS | 1, AUTO    | Applied Value(s): (1,1)                               |
| >Bits Allocated                            | 0028,0100 | US | 1, AUTO    | Applied Value(s): 8                                   |
| >Bits Stored                               | 0028,0101 | US | 1, AUTO    | Applied Value(s): 8                                   |
| >High Bit                                  | 0028,0102 | US | 1, AUTO    | Applied Value(s): 7                                   |
| >Pixel Representation                      | 0028,0103 | US | 1, AUTO    | Applied Value(s): 0x0000                              |
| >Pixel Data                                | 7FE0,0010 | OW | 1, AUTO    | -   |

8.1.1.14. Printer SOP Class

Table 89: Modules of the Printer SOP Class – N-GET

| Information Entity | Module Name | Usage  |
|--------------------|-------------|--------|
| General            | SOP Common  | NEVER  |
| Print Management   | Printer     | ALWAYS |

Table 90: Created Printer SOP Class N-GET Attributes

| Name                      | Tag       | VR | Definition | Comment               |
|---------------------------|-----------|----|------------|-----------------------|
| <b>Printer Module</b>     |           |    |            |                       |
| Manufacturer              | 0008,0070 | LO | 2CE, AUTO  | Initial message only. |
| Manufacturer's Model Name | 0008,1090 | LO | 2CE, AUTO  | Initial message only. |
| Device Serial Number      | 0018,1000 | LO | 2CE, AUTO  | Initial message only. |
| Software Version(s)       | 0018,1020 | LO | 2CE, AUTO  | Initial message only. |



| Name                | Tag       | VR | Definition | Comment               |
|---------------------|-----------|----|------------|-----------------------|
| Printer Status      | 2110,0010 | CS | 2CE, AUTO  | Final message only.   |
| Printer Status Info | 2110,0020 | CS | 2CE, AUTO  | Final message only.   |
| Printer Name        | 2110,0030 | LO | 2CE, AUTO  | Initial message only. |

### 8.1.1.15. Media Storage Directory Storage SOP Class

**Table 91: Modules of the Media Storage Directory Storage SOP Class**

| Information Entity | Module Name             | Usage  |
|--------------------|-------------------------|--------|
| Media              | File-set Identification | ALWAYS |
|                    | Directory Information   | ALWAYS |

**Table 92: Created Media Storage Directory Storage SOP Class Attributes**

| Name  | Tag       | VR | Definition | Comment |
|---|-----------|----|------------|---------|
| <b>File-set Identification Module</b>                             |           |    |            |         |
| File-set ID   | 0004,1130 | CS | 1, AUTO    | -       |
| <b>Directory Information Module</b>                               |           |    |            |         |
| Offset of the First Directory Record of the Root Directory Entity | 0004,1200 | UL | 1, AUTO    | -       |
| Offset of the Last Directory Record of the Root Directory Entity  | 0004,1202 | UL | 1, AUTO    | -       |
| File-set Consistency Flag   | 0004,1212 | US | 1, AUTO    | -       |
| Directory Record Sequence   | 0004,1220 | SQ | 2, AUTO    | -       |
| > Offset of the Next Directory Record                             | 0004,1400 | UL | 1, AUTO    | -       |
| > Record In-use Flag  | 0004,1410 | US | 1, AUTO    | -       |
| > Offset of Referenced Lower-Level Directory Entity               | 0004,1420 | UL | 1, AUTO    | -       |
| > Directory Record Type   | 0004,1430 | CS | 1, AUTO    | -       |
| > Private Record UID  | 0004,1432 | UI | 1C, AUTO   | -       |
| > Referenced File ID  | 0004,1500 | CS | 1C, AUTO   | -       |
| > MRDR Directory Record Offset                                    | 0004,1504 | UL | 1C, AUTO   | -       |
| > Referenced SOP Class UID in File                                | 0004,1510 | UI | 1C, AUTO   | -       |
| > Referenced SOP Instance UID in File                             | 0004,1511 | UI | 1C, AUTO   | -       |
| > Referenced Transfer Syntax UID in File                          | 0004,1512 | UI | 1C, AUTO   | -       |
| <b>&gt; Patient Keys</b>  |           |    |            |         |
| > Patient's Name  | 0010,0010 | PN | 1, SPEC    | -       |
| > Patient ID  | 0010,0020 | LO | 1, SPEC    | -       |
| > Patient's Birth Date  | 0010,0030 | DA | 1, SPEC    | -       |
| > Patient's Sex   | 0010,0040 | CS | 1, SPEC    | -       |
| <b>&gt; Study Keys</b>  |           |    |            |         |
| > Study Date  | 0008,0020 | DA | 1, SPEC    | -       |
| > Study Time  | 0008,0030 | TM | 1, SPEC    | -       |
| > Accession Number  | 0008,0050 | SH | 2, SPEC    | -       |
| > Study Description   | 0008,1030 | LO | 2, SPEC    | -       |
| > Study Instance UID  | 0020,000D | UI | 1, SPEC    | -       |
| > Study ID  | 0020,0010 | SH | 1, SPEC    | -       |
| > Performed Procedure Step Start Date                             | 0040,0244 | DA | 2, SPEC    | -       |
| > Performed Procedure Step Description                            | 0040,0254 | LO | 2, SPEC    | -       |

| Name                                | Tag       | VR | Definition | Comment       |
|-------------------------------------|-----------|----|------------|---------------|
| <b>&gt; Series Keys</b>             |           |    |            |               |
| > Series Date                       | 0008,0021 | DA | 2, SPEC    | -             |
| > Series Time                       | 0008,0031 | TM | 2, SPEC    | -             |
| > Modality                          | 0008,0060 | CS | 1, SPEC    | -             |
| > Protocol Name                     | 0018,1030 | LO | 2, SPEC    | -             |
| > Series Instance UID               | 0020,000E | UI | 1, SPEC    | -             |
| > Series Number                     | 0020,0011 | IS | 1, SPEC    | -             |
| <b>&gt; Image Keys</b>              |           |    |            |               |
| > Image Type                        | 0008,0008 | CS | 2, SPEC    | -             |
| > SOP Class UID                     | 0008,0016 | UI | 2, SPEC    | -             |
| > SOP Instance UID                  | 0008,0018 | UI | 2, SPEC    | -             |
| > Referenced Image Sequence         | 0008,1140 | SQ | 2, SPEC    | -             |
| >> Referenced SOP Class UID         | 0008,1150 | UI | 2, SPEC    | -             |
| >> Referenced SOP Instance UID      | 0008,1155 | UI | 2, SPEC    | -             |
| > Instance Number                   | 0020,0013 | IS | 1, SPEC    | -             |
| > Image Position (Patient)          | 0020,0032 | DS | 2, SPEC    | -             |
| > Image Orientation (Patient)       | 0020,0037 | DS | 2, SPEC    | -             |
| > Frame of Reference UID            | 0020,0052 | UI | 2, SPEC    | -             |
| > Photometric Interpretation        | 0028,0004 | CS | 2, SPEC    | -             |
| > Rows                              | 0028,0010 | US | 2, SPEC    | -             |
| > Cols                              | 0028,0011 | US | 2, SPEC    | -             |
| > Pixel Spacing                     | 0028,0030 | DS | 2, SPEC    | -             |
| > Bits Stored                       | 0028,0101 | US | 2, SPEC    | -             |
| > High Bit                          | 0028,0102 | US | 2, SPEC    | -             |
| <b>&gt; Presentation Keys</b>       |           |    |            |               |
| > SOP Instance UID                  | 0008,0018 | UI | 2, SPEC    | -             |
| > Referenced Series Sequence        | 0008,1115 | SQ | 1, SPEC    | -             |
| >> Referenced Image Sequence        | 0008,1140 | SQ | 1C, SPEC   | If available. |
| >>> Referenced SOP Class UID        | 0008,1150 | UI | 1, SPEC    | -             |
| >>> Referenced SOP Instance UID     | 0008,1155 | UI | 1, SPEC    | -             |
| >> Series Instance UID              | 0020,000E | UI | 1, SPEC    | -             |
| > Instance Number                   | 0020,0013 | IS | 1, SPEC    | -             |
| > Content Label                     | 0070,0080 | CS | 1, SPEC    | -             |
| > Content Description               | 0070,0081 | LO | 2, SPEC    | -             |
| > Presentation Creation Date        | 0070,0082 | DA | 1, SPEC    | -             |
| > Presentation Creation Time        | 0070,0083 | TM | 1, SPEC    | -             |
| > Content Creator's Name            | 0070,0084 | PN | 2, SPEC    | -             |
| <b>&gt; Private Keys</b>            |           |    |            |               |
| > Private Creator Group 2001        | 2001,0010 | LO | 1, AUTO    | -             |
| > Number of Echoes                  | 2001,1014 | SL | 2, SPEC    | -             |
| > Number of Phases MR               | 2001,1017 | SL | 2, SPEC    | -             |
| > Number of Slices MR               | 2001,1018 | SL | 2, SPEC    | -             |
| > Reconstruction Number MR          | 2001,101D | IS | 2, SPEC    | -             |
| > Scanning Technique Description MR | 2001,1020 | LO | 2, SPEC    | -             |
| > Echo Time Display MR              | 2001,1025 | SH | 2, SPEC    | -             |
| > Stack Sequence                    | 2001,105F | SQ | 2, SPEC    | -             |
| >> Stack Number Of Slices           | 2001,102D | SS | 2, SPEC    | -             |
| >> Stack Radial Angle               | 2001,1032 | FL | 2, SPEC    | -             |
| >> Stack Radial Axis                | 2001,1033 | CS | 2, SPEC    | -             |
| >> Stack Slice Number               | 2001,1035 | SS | 2, SPEC    | -             |
| >> Stack Type                       | 2001,1036 | CS | 2, SPEC    | -             |
| > Examination Source                | 2001,1063 | CS | 2, SPEC    | -             |
| > Private Creator Group 2005        | 2005,0010 | LO | 1, AUTO    | -             |
| > Number of Chemical Shift          | 2005,1020 | SL | 2, SPEC    | -             |

| Name               | Tag       | VR | Definition | Comment |
|--------------------|-----------|----|------------|---------|
| > Syncra Scan Type | 2005,10A1 | CS | 2, SPEC    | -       |

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

The Intera Achieva will only function correctly on native images. It is not the intention to operate on non-native images other than Secondary Captures.

### 8.1.3. Attribute Mapping

The following table shows the relation between MWL and MPPS attributes and image storage attributes.

**Table 93: Correlation of DICOM Object**

| Nr. | Level   | Attribute  | MWL Find Tag              | MPPS Create Tag | Related Store Tag | MPPS Set Tag |
|-----|---|--|---------------------------|-----------------|-------------------|--------------|
| 1   | Patient   | Patient's Name   | 0010,0010                 | 0010,0010       | 0010,0010         | -            |
| 2   |   | Patient ID   | 0010,0020                 | 0010,0020       | 0010,0020         | -            |
| 3   |   | Patient's Birth Date                                   | 0010,0030                 | 0010,0030       | 0010,0030         | -            |
| 4   |   | Patient's Sex  | 0010,0040                 | 0010,0040       | 0010,0040         | -            |
| 5   | Study   | Accession Number                                       | 0008,0050                 | 0008,0050       | 0008,0050         | -            |
| 6   |   | Study Instance UID                                     | 0020,000D                 | 0020,000D       | 0020,000D         | -            |
| 7   |   | Request Procedure Description                          | 0032,1060                 | -               | -                 | -            |
| 8   |   | Request Procedure ID                                   | 0040,1001                 | 0040,1001       | 0040,1001         | -            |
| 9   | Exam  | Code Value   | 0008,0100                 | -               | -                 | -            |
| 10  |   | Code Scheme Designator                                 | 0008,0102                 | -               | -                 | -            |
| 11  |   | Code Meaning   | 0008,0104                 | -               | -                 | -            |
| 12  |   | Scheduled Procedure Step Description                   | 0040,0007                 | 0040,0007       | 0040,0007         | -            |
| 13  |   | Scheduled Procedure Step ID                            | 0040,0009                 | 0040,0009       | 0040,0009         | -            |
| 14  |   | Examination Comments                                   | -                         | 0040,0280       | 0040,0280         | 0040,0280    |
| 15  |   | Series / Image / Grayscale softcopy presentation state | Performed Series Sequence | -               | -                 | -            |
| 16  | >Referenced Image Sequence  |  | -                         | -               | -                 | 0008,1140    |
| 17  | >>Referenced SOP Class UID  |  | -                         | -               | 0008,0016         | 0008,1150    |
| 18  | >>Referenced SOP Instance UID   |  | -                         | -               | 0008,0018         | 0008,1155    |
| 19  | >Referenced Stand Alone SOP Inst. Seq for the grayscale softcopy presentation state objects |  | -                         | -               | -                 | 0040,0220    |
| 20  | >>Referenced SOP Class UID  |  | -                         | -               | 0008,0016         | 0008,1150    |
| 21  | >>Referenced SOP Instance UID   |  | -                         | -               | 0008,0018         | 0008,1155    |
| 22  | >Series Protocol Name   |  | -                         | -               | 0018,1030         | 0018,1030    |
| 23  | >Series Description   |  | -                         | -               | 0008,103E         | 0008,103E    |
| 24  | >Series Instance UID  |  | -                         | -               | 0020,000E         | 0020,000E    |

### 8.1.4. Coerced/Modified fields

The Network AE will only import MR images and Presentation State objects that were created on an Intera Achieva. These imported images may be coerced or modified and are to be used for reference only; it is not the intention to export them again.

## 8.2. Data Dictionary of Private Attributes

Refer to section 8.1.1.

## 8.3. Coded Terminology and Templates

The Intera Achieva has no specific support for coded terminology or templates.

## 8.4. Grayscale Image consistency

The Intera Achieva has no specific support for any DICOM Grayscale Standard Display Function.

## 8.5. Standard Extended/Specialized/Private SOPs

### 8.5.1. Standard Extended MR Image SOP Class

The following standard extensions are applied for the MR Image Storage SOP class. See also the overview of the applied MR Image IOD in section 8.1.1.1.

**Table 94: Applied Standard Extensions**

| Module                                      | Note   |
|---|--|
| Patient Medical Module                      | -  |
| Study Classification Module                 | -  |
| Study Scheduling Module                     | -  |
| Requested Procedure Module                  | Additional attribute:<br>Requested Contrast Agent  |
| Imaging Service Request Module              | -  |
| Performed Procedure Step Information Module | -  |
| Billing and Material Management Code Module | -  |
| General Series Module                       | Additional attributes in Referenced Performed Procedure Step Sequence:<br>>Specific Character Set<br>>Instance Creation Date<br>>Instance Creation Time<br>>Instance Creator UID<br>>Instance Number |
| Modality LUT Module                         | Present if configured.<br>Must be applied when viewing the image.  |
| Private Group                               | Private MR attributes.   |

### 8.5.2. Private SOP Classes

The Intera Achieva system supports private SOP classes; for the C-STORE services these private SOP classes are listed in the following table.

**Table 95: Supported Private SOP Classes as SCU and SCP by the Intera Achieva**

| SOP Class Name                 | UID                       |
|--------------------------------|---------------------------|
| Private MR Spectrum Storage    | 1.3.46.670589.11.0.0.12.1 |
| Private MR Series Data Storage | 1.3.46.670589.11.0.0.12.2 |

## 8.6. Private Transfer Syntaxes

The Intera Achieva does not support any private transfer syntaxes.