

**DICOM 3.0 Conformance Statement for Varex Nexus DRF Systems**

Engineering  
Technical Support  
Quality Assurance



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## 0.0 Revisions

[Click Here to view Revisions](#)

## 1.0 Purpose

Define the DICOM Conformance statement associated with Varex Nexus DRF systems.

## 2.0 Scope

This document describes the DICOM Conformance statement in accordance with the document DICOM PS 3.2 Conformance.

## 3.0 References and Forms

DICOM 2011

DICOM PS 3.1 Introduction and Overview

DICOM PS 3.2 Conformance

DICOM PS 3.3 Information Object Definitions

DICOM PS 3.4 Service Class Specifications

DICOM PS 3.5 Data Structures and Encoding

DICOM PS 3.6 Data Dictionary

DICOM PS 3.7 Message Exchange

DICOM PS 3.8 Network Communication Support for Message Exchange

DICOM PS 3.10 Media Storage and File Format for Media Interchange

DICOM PS 3.11 Media Storage Application Profiles

DICOM PS 3.12 Media Formats and Physical Media for Media Interchange

DICOM PS 3.14 Grayscale Standard Display Function

## 4.0 Equipment and Materials


N/A

## 5.0 Responsibilities

N/A


## 6.0 Definitions

|            |                               |
|------------|-------------------------------|
| <b>AE</b>  | Application Entity            |
| <b>FSC</b> | File Sector Creator           |
| <b>FSR</b> | File Sector Reader            |
| <b>FSU</b> | File Sector Updater           |
| <b>IOD</b> | Information Object Definition |
| <b>SCU</b> | Service Class User            |
| <b>SCP</b> | Service Class Provider        |
| <b>SOP</b> | Service Object Pair           |
| <b>UID</b> | Unique Identifier             |

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## 7.0 Instructions

The rest of this document is written in the format specified for DICOM Conformance statements in the DICOM PS 3.2 Conformance standard document.

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## **8.0 Introduction**

This conformance statement details the Varex Nexus DRF system’s compliance to DICOM 3.0. It covers all service class roles that are supported by this product:

- Storage Service Class (SCU) roles
- Storage Commitment Service Class (SCU) roles
- Verification Service Class (SCU) roles
- Modality Worklist Management Service Class (SCU) roles

## **8.1 Implementation Model**

DICOM capabilities of the NEXUS system include:

The NEXUS system can send images to a remote AE by initiating the DICOM C-STORE request as a SCU.

The NEXUS system can act as a Storage Commitment SCU to request commitment for images transferred to a remote AE.

The NEXUS system supports the DICOM Verification operation as a SCU.

The NEXUS system can query DICOM Modality Worklist SCP systems for patient/study information using the Modality Worklist Management Service Class.

The NEXUS system can report back Performed Procedure information to a Modality Worklist SCP using the Modality Performed Procedure Step service.

The NEXUS system can send images to a DICOM Print Server AE by utilizing the services of the Basic Grayscale Print Management Meta SOP Class as a SCU.

The NEXUS system can store images for interchange using the General Purpose CD-R Image Interchange Profile Class.

### **8.1.1 Application Data Flow Diagrams**

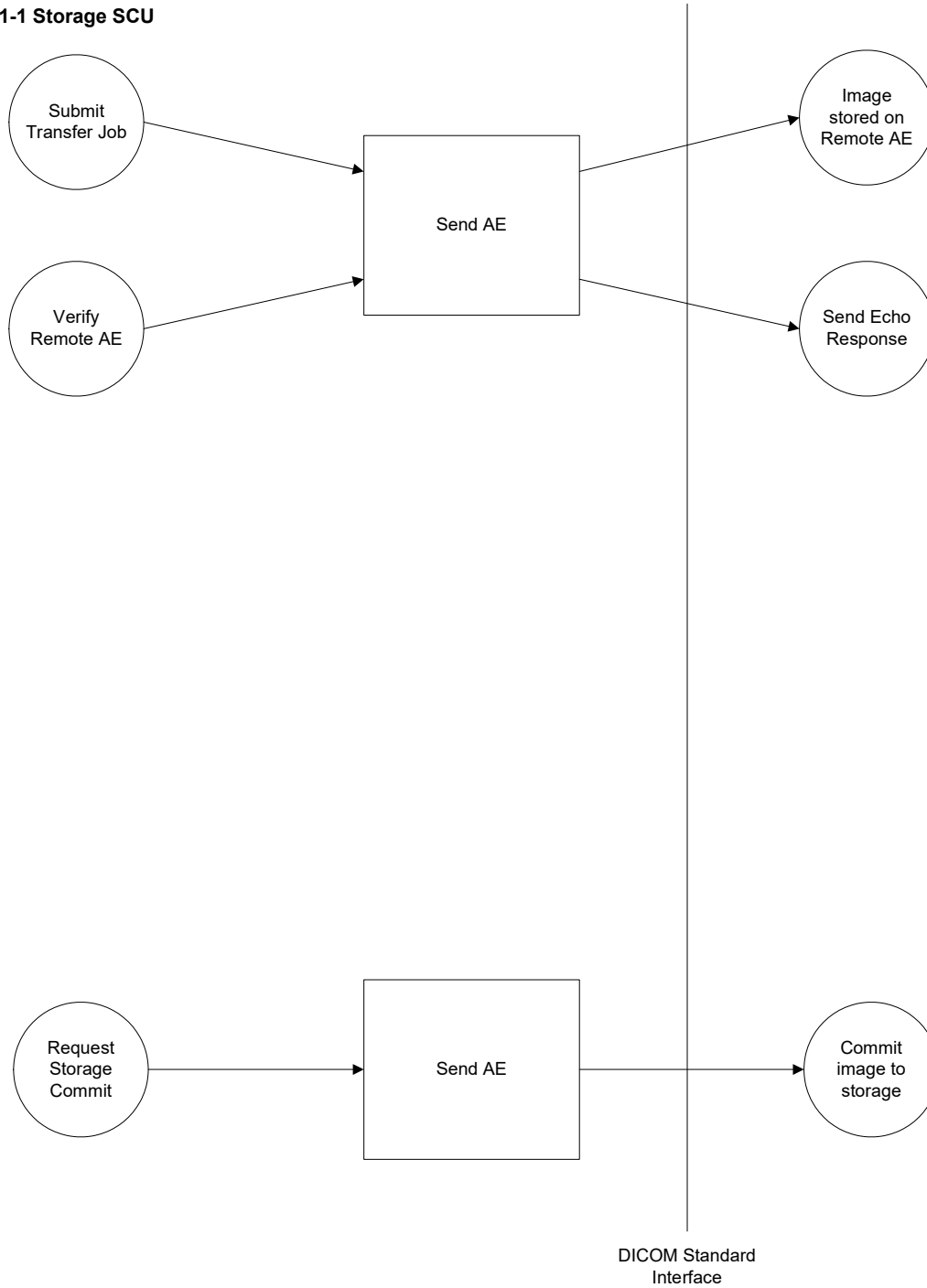
See figures 8.1.1-1, 8.1.1-2.

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**Figure 8.1.1-1 Storage SCU**

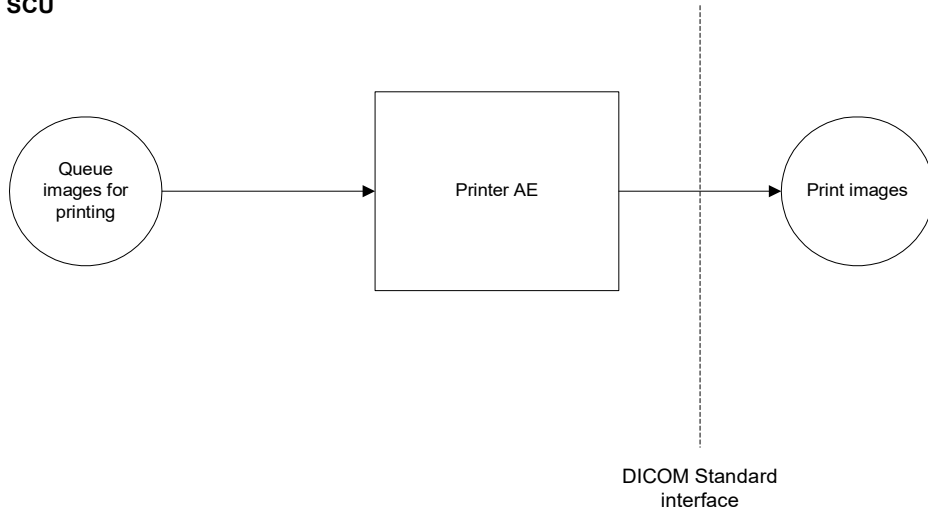


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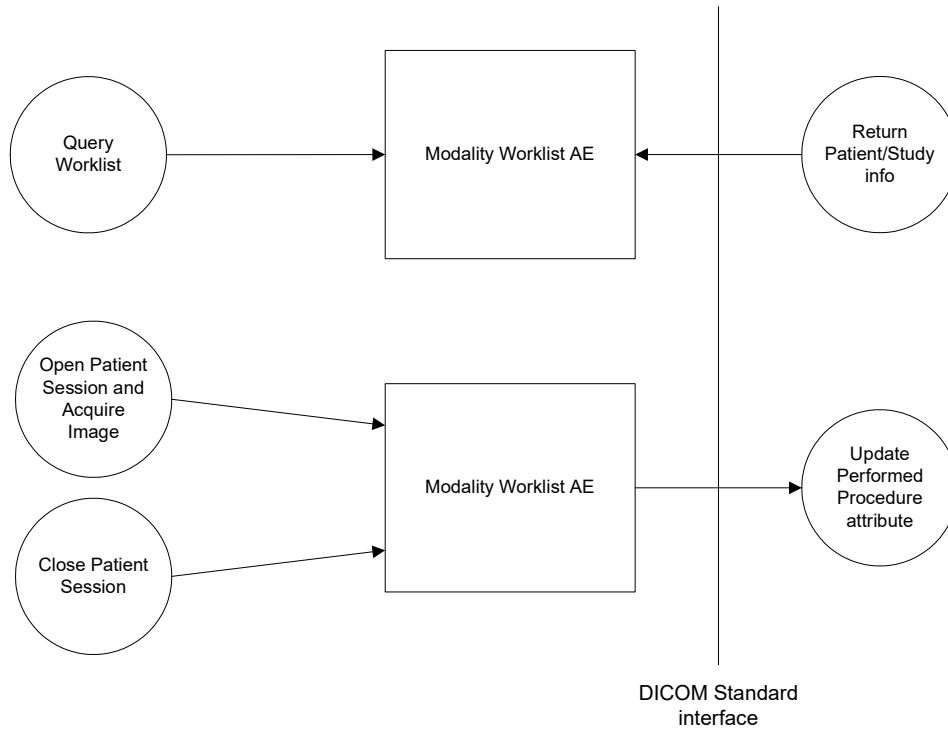
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## 8.1.1-2 Print SCU



## 8.1.1-3 Worklist and MPPS SCU

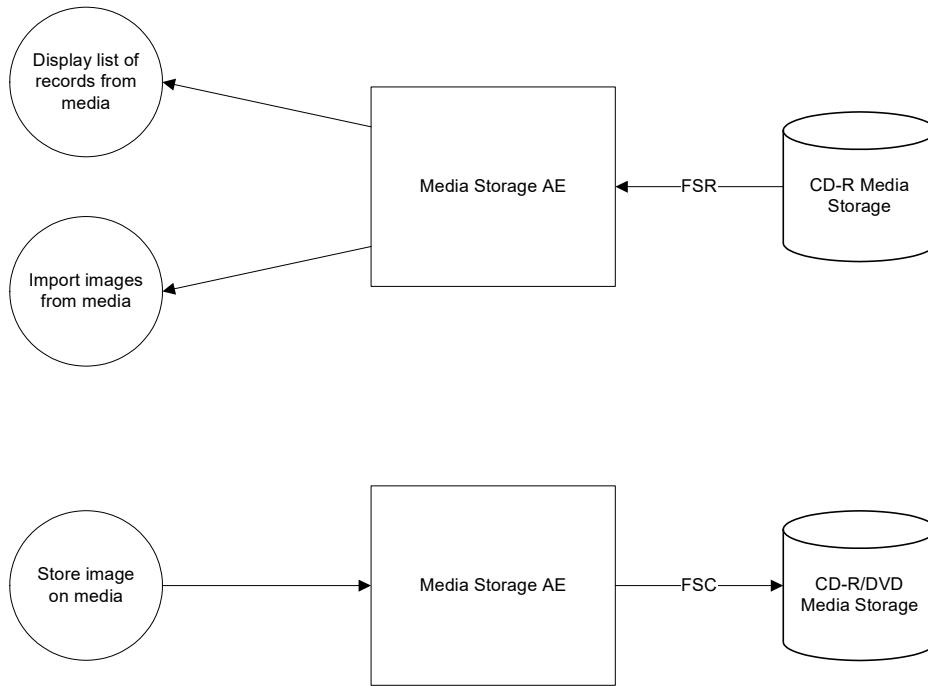


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## 8.1.1-4 Media Storage AE



## 8.1.2 Functional definition of AEs

### Send AE:

The Send AE initiates an association with a remote AE and acts as a SCU of the Storage Service Class to store images on a remote AE that acts as a SCP of the Storage Service Class. When the image transfer is completed, the send function waits for the DIMSE-C-STORE Response from the receiving AE to indicate the status of the transfer (success or fail). The Send AE can also request Storage Commitment for images that it transfers to a remote AE if the remote AE is configured for the Storage Commit Service as a SCP. When the Send AE system initiates the DICOM Echo Request, it first proposes an Association with the Verification Class Presentation Context. When the DICOM Association Accept message

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is received, the system sends the DIMSE-C-ECHO Request message to initiate the Verification function on the receiving AE. The status of the Verification response (success or fail) is displayed.

Modality Worklist AE:

The Modality Worklist AE initiates an Association with a user selected remote Worklist AE and acts as a SCU of the Modality Worklist Management Service Class. The Modality Worklist AE sends a C-FIND request based on parameters set by the user. The user can configure the Modality Worklist AE to query for any/all modalities supported by the local system. The user can configure the Worklist to query for exams scheduled for any AE configured in the system as a Worklist SCU. One request is sent for each modality/AE title pair configured by the user.

If the remote Worklist AE supports the Modality Performed Procedure Step service then the Modality Worklist AE can be used to notify the remote AE of Performed Procedure Step updates (In Progress, Discontinued, Completed).

Print AE:

The Print AE initiates an Association with a user selected remote Print AE and acts as a SCU of the Basic Grayscale Print Management Service Class. When all of the images for a particular Film Session have been transferred, the Association is closed.

Media Storage AE:

The Media Storage AE can perform the following functions:

1. It can initialize a piece of media, writing a new DICOM File-set onto the media.
2. It can display a directory listing of the File-set on a piece of media.
3. It can copy SOP instances from the media onto local storage.

**8.1.3 Sequencing of Real World Activities**

**8.1.3.1 Print Operations**

The following describes the sequence of events that occurs when performing a print operation:

1. The user queues up a print job from the GUI.
2. The Print AE sends a DICOM Association Request to the print server AE.
3. If the DICOM Association request fails then the print job is aborted.
4. If the DICOM Association request is successful then the Print AE requests the printer status with the Printer N-GET message.
  - a. NORMAL – Continue with print operation.
  - b. FAILURE – The print job is aborted.
5. The Print AE sends the Basic Film Session N-CREATE message to the print server and waits for the N-CREATE Response.
  - a. SUCCESS – Continue print operation.
  - b. FAILURE – The print job is aborted.
6. The Print AE sends the Basic Film Box N-CREATE message to the print server and waits for the N-CREATE Response.
  - a. SUCCESS – Continue print operation.
  - b. FAILURE (C616) – The print job is aborted.



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7. The Print AE sends an Image Box N-SET message to the print server and waits for the N-SET response.
  - a. SUCCESS – Continue print operation.
  - b. FAILURE (C603, C605, C613) – The print job is aborted.
8. When the Film Box is full or the last image in the print job has been added to the Film Box then the Print AE sends a Film Box N-ACTION message to the print server and waits for the N-ACTION response.
  - a. SUCCESS – Continue with print operation.
  - b. FAILURE (C602, C603, C613) – The print job is aborted.
9. When the print job is completed (or aborted) the Print AE sends a DICOM Association Release Request to the print server.

### **8.1.3.2 Storage Operations**

The following describes the sequence of events that occurs when performing a storage operation with a network storage server AE:

1. The user queues up a send job from the GUI.
2. The Send AE sends a DICOM Association Request to the storage server AE.
3. If the DICOM Association request fails then the send job is aborted.
4. If the DICOM Association request is successful then the Send AE sends a C-STORE Request message to the storage server and waits for the C-STORE response.
  - a. SUCCESS – Continue with send operation.
  - b. WARNING – Continue with send operation.
  - c. FAILURE (0110, A700, A900, C000, C002) – The send job is aborted. The Send AE sends a DICOM Association Abort Request message to the storage server AE.
5. When the send job is completed the Send AE sends a DICOM Association Release Request to the storage server AE.

### **8.1.3.3 Worklist Operations**

The following describes the sequence of events that occurs when performing a worklist operation with a worklist server AE:

1. The user initiates a Worklist query from the GUI.
2. The Worklist AE sends a DICOM Association Request to the worklist server AE.
3. If the DICOM Association request fails then the status display on the GUI indicates that the Association failed.
4. If the DICOM Association request is successful then the Worklist AE sends a C-FIND Request message to the worklist server and waits for a C-FIND response.
  - a. SUCCESS – C-FIND is completed.
  - b. PENDING (FF00, FF01) – Matches are continuing. If the number of matches exceeds the maximum defined by the user then the Worklist AE sends a C-CANCEL Request message to the worklist server.
  - c. CANCEL (FE00) – C-FIND is cancelled.
  - d. FAILED (A900, Cxxx) – The Worklist AE sends a DICOM Association Abort Request to the worklist server.
5. For the SUCCESS and CANCEL cases, the Worklist AE sends a DICOM Association Release Request to the worklist server. The status display on the GUI indicates that the worklist query is completed and the list of matching records is displayed.

### **8.1.3.4 Modality Performed Procedure Step Operations**

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The following describes the sequence of events that occurs when performing a MPPS operation with a MPPS server AE:

1. The user opens an empty Patient/Study and acquires the first image.
2. The MPPS AE sends a DICOM Association Request to the MPPS server AE.
3. If the DICOM Association request fails then the MPPS operation is aborted.
4. If the DICOM Association request is successful then the MPPS AE sends a Modality Performed Procedure Step N-CREATE Request message to the MPPS server AE and waits for a N-CREATE response.
  - a. SUCCESS – Continue with MPPS operation.
  - b. FAILURE – MPPS operation is terminated.
5. The MPPS AE sends a DICOM Association Release Request to the MPPS server AE.
6. The user acquires additional images into the Patient/Study and then closes the Patient/Study.
7. The MPPS AE sends a DICOM Association Request to the MPPS server AE.
8. If the DICOM Association request fails then the MPPS operation is aborted.
9. If the DICOM Association request is successful then the MPPS AE sends a Modality Performed Procedure Step N-SET Request message to the MPPS server AE and waits for the N-SET response.
  - a. SUCCESS – MPPS operation is successfully completed.
  - b. FAILURE – MPPS operation is terminated.
10. The MPPS AE sends a DICOM Association Release request to the MPPS server AE.

### **8.1.4 File Meta Information Options**

Implementation Class UID = “1.2.840.113698. 7.1”

Implementation Version Name = “InfiView\_101”

The Implementation Class UID is part of the File Meta Information written into every file and therefore necessary for any device that acts as an FSC.

## **8.2 AE Specifications**

### **8.2.1 Send AE - Specification**

The Send AE provides Standard Conformance to the following DICOM V3.0 SOP Classes as a SCU:

| <b>SOP Class Name</b>                       | <b>SOP Class UID</b>          |
|---|-------------------------------|
| Verification SOP Class                      | 1.2.840.10008.1.1             |
| Secondary Capture Image Storage             | 1.2.840.10008.5.1.4.1.1.7     |
| X-Ray Angiographic Image Store              | 1.2.840.10008.5.1.4.1.1.12.1  |
| X-Ray RF Image Store                        | 1.2.840.10008.5.1.4.1.1.12.2  |
| Storage Commitment Push Model               | 1.2.840.10008.1.20.1          |
| Key Object Selection Storage                | 1.2.840.10008.5.1.4.1.1.88.59 |
| Digital XRay Image Storage For Presentation | 1.2.840.10008.5.1.4.1.1.1.1   |
| Digital XRay Image Storage For Processing   | 1.2.840.10008.5.1.4.1.1.1.1.1 |
| X-Ray Radiation Dose SR Storage             | 1.2.840.10008.5.1.4.1.1.88.67 |

#### **8.2.1.1 Association establishment policies**

##### **8.2.1.1.1 General**

The DICOM Application Context name is 1.2.840.10008.3.1.1.1

The AE Title of the Send AE is a configurable parameter. The default title is “OEM\_StoreSCU”.

The Send AE establishes an association whenever a transfer job comes to the top of the transfer queue.

If the remote AE that stores the images is configured for the Storage Commit service then the Send AE establishes an association after a transfer job is successfully completed to request storage commitment.

The Send AE establishes an association whenever the user attempts to verify the DICOM connection with a remote AE.

The maximum PDU size is 30720 bytes.

##### **8.2.1.1.2 Number of Associations**

The Send AE attempts only one Association establishment at a time.

##### **8.2.1.1.3 Asynchronous nature**

The Send AE does not perform asynchronous operations.

##### **8.2.1.1.4 Implementation Identifying Information**

The Send AE provides a single Implementation Class UID which is “1.2.840.113698.7.1”.

#### **8.2.1.2 Association initiation policy**

The Send AE initiates a new association for the DIMSE-C-STORE service operation for each transfer job that comes to the top of the job queue.

The Send AE initiates a new association for the DIMSE-C-ECHO service operation.

### **8.2.1.2.1 Transfer Image Object to a Remote AE**

#### **8.2.1.2.1.1 Associated Real-World Activity – Queue image(s) for transfer to remote AE**

The associated Real-World activity is a C-Store Request initiated by the Send AE when a transfer job comes to the top of the job queue. A transfer job is created by the user selecting a study or group of studies to be sent to a remote AE.

#### **8.2.1.2.1.2 Proposed presentation contexts**

The Send AE proposes Presentation Contexts as shown in [Table 8.2.1.2.1.2-1](#).

The receiving AE returns which Presentation Contexts it supports in the Association Accept message.

**Table 8.2.1.2.1.2-1 Proposed Presentation Contexts for Send AE**

| <b>Presentation Context Table</b> |                              |   |                        |             |                             |
|-----------------------------------|------------------------------|---|------------------------|-------------|-----------------------------|
| <b>Abstract Syntax</b>            |                              | <b>Transfer Syntax</b>  |                        | <b>Role</b> | <b>Extended Negotiation</b> |
| <b>Name</b>                       | <b>UID</b>                   | <b>Name List</b>  | <b>UID List</b>        |             |                             |
| X-Ray Angiographic Image Store    | 1.2.840.10008.5.1.4.1.1.12.1 | DICOM Implicit VR Little Endian                               | 1.2.840.10008.1.2      | SCU         | None                        |
|                                   |                              | DICOM Explicit VR Little Endian                               | 1.2.840.10008.1.2.1    | SCU         | None                        |
|                                   |                              | DICOM JPEG Lossless, Nonhierarchical, First- Order Prediction | 1.2.840.10008.1.2.4.70 | SCU         | None                        |
|                                   |                              | DICOM RLE Lossless  | 1.2.840.10008.1.2.5    | SCU         | None                        |
| X-Ray RF Image Store              | 1.2.840.10008.5.1.4.1.1.12.2 | DICOM Implicit VR Little Endian                               | 1.2.840.10008.1.2      | SCU         | None                        |
|                                   |                              | DICOM Explicit VR Little Endian                               | 1.2.840.10008.1.2.1    | SCU         | None                        |
|                                   |                              | DICOM JPEG Lossless, Nonhierarchical, First- Order Prediction | 1.2.840.10008.1.2.4.70 | SCU         | None                        |

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| Presentation Context Table                  |                               |   |                        |      |                      |
|---|-------------------------------|---|------------------------|------|----------------------|
| Abstract Syntax                             |                               | Transfer Syntax   |                        | Role | Extended Negotiation |
| Name  | UID                           | Name List   | UID List               |      |                      |
|   |                               | DICOM RLE Lossless  | 1.2.840.10008.1.2.5    | SCU  | None                 |
| Storage Commitment Push Model               | 1.2.840.10008.1.20.1          | DICOM Implicit VR Little Endian                               | 1.2.840.10008.1.2      | SCU  | None                 |
|   |                               | DICOM Explicit VR Little Endian                               | 1.2.840.10008.1.2.1    | SCU  | None                 |
| Verification Service Class                  | 1.2.840.10008.1.1             | DICOM Implicit VR Little Endian                               | 1.2.840.10008.1.2      | SCU  | None                 |
|   |                               | DICOM Explicit VR Little Endian                               | 1.2.840.10008.1.2.1    | SCU  | None                 |
| Digital XRay Image Storage For Presentation | 1.2.840.10008.5.1.4.1.1.1.1   | DICOM Implicit VR Little Endian                               | 1.2.840.10008.1.2      | SCU  | None                 |
|   |                               | DICOM Explicit VR Little Endian                               | 1.2.840.10008.1.2.1    | SCU  | None                 |
|   |                               | DICOM JPEG Lossless, Nonhierarchical, First- Order Prediction | 1.2.840.10008.1.2.4.70 | SCU  | None                 |
|   |                               | DICOM RLE Lossless  | 1.2.840.10008.1.2.5    | SCU  | None                 |
| Digital XRay Image Storage For Presentation | 1.2.840.10008.5.1.4.1.1.1.1   | DICOM Implicit VR Little Endian                               | 1.2.840.10008.1.2      | SCU  | None                 |
|   |                               | DICOM Explicit VR Little Endian                               | 1.2.840.10008.1.2.1    | SCU  | None                 |
|   |                               | DICOM JPEG Lossless, Nonhierarchical, First- Order Prediction | 1.2.840.10008.1.2.4.70 | SCU  | None                 |
|   |                               | DICOM RLE Lossless  | 1.2.840.10008.1.2.5    | SCU  | None                 |
| X-Ray Radiation Dose SR Storage             | 1.2.840.10008.5.1.4.1.1.88.67 | DICOM Implicit VR Little Endian                               | 1.2.840.10008.1.2      | SCU  | None                 |
|   |                               | DICOM Explicit VR Little Endian                               | 1.2.840.10008.1.2.1    | SCU  | None                 |

**8.2.1.2.1.2.1 SOP Specific Conformance**

When a successful response to a C-STORE operation is received, the status display is updated to indicate that the percentage of job that has been transferred at that point .

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If an Association request fails or if a Failed, Refused or Warning response to a C-STORE operation is received then the currently active transfer job is put into an error state.

Extended negotiation is not supported.

See [Annex A](#) for a description of the IOD modules supported.

### **8.2.1.2.2 Send Storage Commit Request to Remote AE**

#### **8.2.1.2.2.1 Associated Real-World Activity – Request Storage Commit for previously transferred images**

The associated Real-World activity is a N-Action Request initiated by the Send AE with a list of UIDs for the images from a successfully completed transfer job.

##### **8.2.1.2.2.2 Proposed presentation contexts**

The Send AE proposes Presentation Contexts as shown in [Table 8.2.1.2.1.2-1](#).

The receiving AE returns which Presentation Contexts it supports in the Association Accept message.

##### **8.2.1.2.2.2.1 SOP Specific Conformance**

If a transfer job is completed successfully and the remote AE that the images were sent to is configured for the Storage Commit Service as a SCP then the Send AE initiates a Storage Commit Request message for the images in the transfer job. If the Storage Commit request is successful for an image then the local database record for that image indicates that the image has been archived.

Extended negotiation is not supported.

### **8.2.1.2.3 Send Echo Request to Remote AE**

#### **8.2.1.2.3.1 Associated Real-World Activity - Verify DICOM connection with remote AE**

The associated Real-World activity is a C-Echo Request initiated by the user to determine if a remote DICOM AE is responding.

##### **8.2.1.2.3.2 Proposed presentation contexts**

The Send AE proposes a Presentation Context as shown in [Table 8.2.1.2.1.2-1](#).

**8.2.1.2.3.2.1 SOP Specific Conformance**

The Send AE provides standard conformance to the DICOM Verification Service Class as a SCU.

**8.2.1.3 Association acceptance policy**

The Send AE is always ready to accept associations for the purpose of receiving a verification request or a storage commit response (N-EVENT-REPORT). The default port for listening for these events is 2400.

**8.2.2 Modality Worklist AE - Specification**

The Modality Worklist AE provides Standard Conformance to the following DICOM V3.0 SOP Classes as a SCU:

| SOP Class Name                    | SOP Class UID           |
|-----------------------------------|-------------------------|
| Modality Worklist Find            | 1.2.840.10008.5.1.4.3.1 |
| Modality Performed Procedure Step | 1.2.840.10008.3.1.2.3.3 |
| Verification SOP Class            | 1.2.840.10008.1.1       |

**8.2.2.1 Association establishment policies**

**8.2.2.1.1 General**

The DICOM Application Context name is 1.2.840.10008.3.1.1.1

The AE Title of the Modality Worklist AE is a configurable parameter. The default title is “OEM\_WorklistSCU”.

The Modality Worklist AE establishes associations under the following conditions:

1. When the user initiates a manual query.
2. To create a Modality Performed Procedure Step notification object
3. When the user attempts to verify the DICOM connection with a remote Worklist AE

The maximum PDU size is 30720 bytes.

**8.2.2.1.2 Number of Associations**

The Modality Worklist AE can have one Association open at one time.

**8.2.2.1.3 Asynchronous nature**

The Modality Worklist AE does not perform asynchronous operations.

**8.2.2.1.4 Implementation Identifying Information**

The Modality Worklist AE provides a single Implementation Class UID which is “1.2.840.113698.7.1”.

**8.2.2.2 Association initiation policy**

The Modality Worklist AE initiates a new association for the Worklist Management Class for each query session. A query session is defined as a group of queries required to completely satisfy the input from the user. The Association is closed when all of the results from the query session have been received.

If Patient/Study information was received from a worklist SCP then the Modality Worklist AE initiates a new association to handle the Performed Procedure Step Notification service when the Patient/Study record is “opened” for image acquisition and the first image is acquired.

The Modality Worklist AE initiates a new association to verify a DICOM connection with a remote Worklist AE when the user selects the echo option for the remote AE.

**8.2.2.2.1 Worklist Query Operations**

The Modality Worklist AE initiates associations to perform C-FINDs and Performed Procedure Step notifications. The association is closed after an error or when the initiator requests that it be closed.

**8.2.2.2.1.1 Associated Real-World Activity – Query for Scheduled Procedure information**

Once the Worklist Query association has been established, the Modality Worklist AE sends a series of Worklist C-FIND messages to the Worklist SCP. One C-FIND message is sent for each Modality selected by the user. After each C-FIND message is sent, the Modality Worklist AE waits for a C-FIND response from the SCP. If the total number of records received during the active association exceeds the maximum limit set by the user, a C-CANCEL-FIND message is sent to the SCP. Response messages are read in until a C-FIND response of Success is received.


**8.2.2.2.1.2 Proposed presentation contexts**

The Presentation Contexts proposed by the Modality Worklist AE are defined in [table 8.2.2.2.1.2-1](#).

**Table 8.2.2.2.1.2-1 Proposed Presentation Contexts for Modality Worklist AE**

| Presentation Context Table        |                         |                                 |                     |      |                      |
|-----------------------------------|-------------------------|---------------------------------|---------------------|------|----------------------|
| Abstract Syntax                   |                         | Transfer Syntax                 |                     | Role | Extended Negotiation |
| Name                              | UID                     | Name List                       | UID List            |      |                      |
| Modality Worklist Find            | 1.2.840.10008.5.1.4.31  | DICOM Implicit VR Little Endian | 1.2.840.10008.1.2   | SCU  | None                 |
|                                   |                         | DICOM Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCU  | None                 |
| Modality Performed Procedure Step | 1.2.840.10008.3.1.2.3.3 | DICOM Implicit VR Little Endian | 1.2.840.10008.1.2   | SCU  | None                 |
|                                   |                         | DICOM Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCU  | None                 |
| Verification Service Class        | 1.2.840.10008.1.1       | DICOM Implicit VR Little Endian | 1.2.840.10008.1.2   | SCU  | None                 |
|                                   |                         | DICOM Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCU  | None                 |



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**8.2.2.2.1.2.1 SOP Specific Conformance**

The Modality Worklist AE provides standard conformance to the DICOM Modality Worklist Find Service Class as a SCU.

See Annex B for a description of the attribute values for the Modality Worklist Find operation proposed by the Modality Worklist AE.

Extended negotiation is not supported.

**8.2.2.2.2 Worklist Performed Procedure Step Operations**

**8.2.2.2.2.1 Associated Real-World Activity – Notify Remote AE of Performed Procedure Step Status**

**8.2.2.2.2.2 Proposed presentation contexts**

The Presentation Contexts proposed by the Modality Worklist AE are defined in [table 8.2.2.2.1.2-1](#).

**8.2.2.2.2.2.1 SOP Specific Conformance**

The Modality Worklist AE provides standard conformance to the DICOM Modality Performed Procedure Step Service Class as a SCU.

When the system opens a Patient/Study/Series record for image acquisition and acquires an image, if the patient information was received from a remote Worklist AE and if the system has been configured for the Performed Procedure Step service then the Modality Worklist AE will attempt to establish an Association to create and update a Performed Procedure Step object.

When the patient is closed, a new association is created to update the Performed Procedure Step object with a status of “completed” or “discontinued.”

Extended negotiation is not supported.


**8.2.2.2.2.2 Verify DICOM Connection with Worklist SCP**

**8.2.2.2.2.2.1 Associated Real-World Activity – User selects verify option for a remote Worklist AE**

When the user selects the Echo option for a selected remote Worklist AE the Modality Worklist AE initiates an Association to execute the Verification Service class.

**8.2.2.2.2.2.2 Proposed presentation contexts**

The Presentation Contexts proposed by the Modality Worklist AE are defined in [table 8.2.2.2.1.2-1](#).

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**8.2.2.2.2.1 SOP Specific Conformance**

The Modality Worklist AE provides standard conformance to the DICOM Verification Service Class as a SCU.

The status of a C-ECHO request message is displayed (SUCCESS or FAIL).

Extended negotiation is not supported.

**8.2.2.3 Association acceptance policy**

The Modality Worklist AE never accepts associations.

Extended negotiation is not supported.

**8.3 Network Communication Profiles**

**8.3.1 Supported Communication Stacks**

The NEXUS system provides DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard (PS 3.8).

**8.3.2 OSI Stack**

No OSI Stack communications are provided.

**8.3.3 TCP/IP Stack**

The NEXUS system supports the TCP/IP stack.

**8.3.3.2 Physical media support**

The NEXUS system is indifferent to the physical medium over which TCP/IP executes.

**8.3.4 Point-to-Point Stack**

No Point-to-Point Stack communications are provided.

**8.4 Extensions/Specializations/Privatizations**

The Storage AEs do not support any private attributes.

**8.5 Configuration**

The NEXUS system obtains its configuration information for SQL Server 2008 configuration database.

**8.5.1 AE title/presentation address mapping**

The presentation address mapping is defined in the configuration database. The destination AE title, host name, listen port and service list for each remote AE that the NEXUS system can connect to are defined in this database. The mapping of the hostname to an IP address is defined in the ‘hosts’ file.

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### **8.5.2 Configurable Parameters**

The following parameters may be configured:

Local AE Titles

1. Station name
2. Remote AEs:
  - a. AE Title
  - b. Hostname
  - c. Port number
3. Timeouts
  - a. Storage Commit timeout

In the 'hosts' file:

1. IP Addresses of remote AEs

The local network address, netmask and gateway are configured via the standard Windows Network configuration utility.

### **8.6 Support of Extended Character Sets**

The NEXUS system supports the ISO\_IR 100 Character set.

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**ANNEX A – DICOM Data Elements Supported  
 MODULES COMMON TO XA,RF, DX and SR IODs**

| <b>Patient Module</b> |            |             | <b>PS3.3 section C.7.1.1</b>                       |
|-----------------------|------------|-------------|--|
| <b>Attribute Name</b> | <b>Tag</b> | <b>Type</b> | <b>Description</b>                                 |
| Patient's name        | 0010,0010  | 2           | Patient's full legal name                          |
| Patient ID            | 0010,0020  | 2           | Primary hospital ID number or code for the patient |
| Patient's birth date  | 0010,0030  | 2           | Birth date of patient                              |
| Patient's sex         | 0010,0040  | 2           | Sex of patient                                     |

| <b>General Study Module</b> |            |             | <b>PS3.3 section C.7.2.1</b>  |
|-----------------------------|------------|-------------|---|
| <b>Attribute Name</b>       | <b>Tag</b> | <b>Type</b> | <b>Description</b>  |
| Study Instance UID          | 0020,000D  | 1           | Unique identifier for study   |
| Study Date                  | 0008,0020  | 2           | Date the Study started  |
| Study Time                  | 0008,0030  | 2           | Time the Study started  |
| Referring Physician's name  | 0008,0090  | 2           | Patient's referring physician   |
| Study ID                    | 0020,0010  | 2           | User or equipment generated Study Identifier  |
| Accession Number            | 0008,0050  | 2           | A RIS generated study number  |
| Study Description           | 0018,1030  | 3           | Institution-generated description or classification of the Study (component) performed. |

| <b>Patient Study Module</b> |            |             | <b>PS3.3 section C.7.2.2</b>            |
|-----------------------------|------------|-------------|---|
| <b>Attribute Name</b>       | <b>Tag</b> | <b>Type</b> | <b>Description</b>                      |
| Patient's Age               | 0010,1010  | 3           | Age of the patient                      |
| Patient's Size              | 0010,1020  | 3           | Height – only if received from worklist |
| Patient's Weight            | 0010,1030  | 3           | Weight – only if received from worklist |
| Occupation                  | 0010,2180  | 3           | Occupation of the Patient.              |

| <b>General Series Module</b> |            |             | <b>PS3.3 section C.7.3.1</b>  |
|------------------------------|------------|-------------|---|
| <b>Attribute Name</b>        | <b>Tag</b> | <b>Type</b> | <b>Description</b>  |
| Modality                     | 0008,0060  | 1           | Type of equipment that acquired image data                              |
| Series instance UID          | 0020,000E  | 1           | Unique identifier of the Series   |
| Series number                | 0020,0011  | 2           | A number that identifies this Series                                    |
| Laterality                   | 0020,0060  | 2C          | Laterality of (paired) body part examined                               |
| Series Date                  | 0008,0021  | 3           | Date the Series started   |
| Series Time                  | 0008,0031  | 3           | Time the Series started   |
| Performing physician's name  | 0008,1050  | 3           | Name of physician administering the Series                              |
| Protocol Name                | 0018,1030  | 3           | User defined description of conditions under which Series was performed |
| Series Description           | 0008,103E  | 3           | User defined description of Series                                      |
| Operator's Name              | 0008,1070  | 3           | Technologist(s) supporting the Series                                   |
| Body Part Examined           | 0018,0015  | 3           | Text description of the part of the body examined                       |
| Patient Position             | 0018,5100  | 3           | Patient position descriptor relative to the Equipment                   |
| Requested Procedure ID       | 0040,1001  | 3           | ID of the Requested Procedure in the Imaging Service Request            |

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|-----------------------------|-----------|---|---|
| Scheduled Procedure Step ID | 0040,0009 | 3 | ID of the Scheduled Procedure Step  |
| Performed Procedure Step ID | 0040,0253 | 3 | ID of that part of a Procedure that has been carried out within this step |

| General Equipment Module  |           | PS3.3 section C.7.5.1 |  |
|---------------------------|-----------|-----------------------|--|
| Attribute Name            | Tag       | Type                  | Description  |
| Manufacturer              | 0008,0070 | 2                     | Manufacturer of equipment that produced images   |
| Institution name          | 0008,0080 | 3                     | Institution where equipment that produced images is located  |
| Institution Address       | 0008,0081 | 3                     | Mailing address of the institution where the equipment is located that produced the digital images |
| Station name              | 0008,1010 | 3                     | User defined name identifying the machine that produced the images                                 |
| Manufacturer's model name | 0008,1090 | 3                     | Manufacturer's model number of the equipment that produced the images                              |
| Device Serial Number      | 0018,1000 | 3                     | Manufacturer's serial number of the equipment that produced the digital images                     |
| Software version          | 0018,1020 | 3                     | Manufacturer's designation of software version of equipment that produced images                   |

| General Image Module             |           | PS3.3 section C.7.6.1 |   |
|----------------------------------|-----------|-----------------------|---|
| Attribute Name                   | Tag       | Type                  | Description   |
| Image (instance) number          | 0020,0013 | 2                     | A number that identifies the image  |
| Patient Orientation              | 0020,0020 | 2C                    | Patient direction of the rows and columns of the image  |
| Image (content) date             | 0008,0023 | 2C                    | Date the image pixel data creation started  |
| Image (content) time             | 0008,0033 | 2C                    | Time the image pixel data creation started  |
| Image type                       | 0008,0008 | 3                     | See IOD specific Image Module   |
| Acquisition Number               | 0020,0012 | 3                     | A number identifying the single continuous gathering of data over a period of time which resulted in this image                       |
| Acquisition Date                 | 0008,0022 | 3                     | The date the acquisition of data that resulted in this image started  |
| Acquisition Time                 | 0008,0032 | 3                     | The time the acquisition of data that resulted in this image started  |
| Images in Acquisition            | 0020,1002 | 3                     | Number of images that resulted from this acquisition of data  |
| Image comments                   | 0020,4000 | 3                     | User defined comments about image   |
| Lossy Image Compression          | 0028,2110 | 3                     | Specifies whether an image has undergone lossy compression  |
| Attribute Derivation Description | 0008,2111 | 3                     | Only sent when image was sent compressed, Note: Only sent when image was sent compressed using transfer syntax 1.2.840.10008.1.2.4.70 |
| Source Image Sequence            | 0008,2112 | 3                     | The set of Image SOP Class/Instance pairs of the images that were used to derive this image - only sent for derived image             |

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|--------------------------|-----------|----|---|
| >Instance Number         | 0020,0013 | 1  | A number that identifies the SOP Instance   |
| >Content Label           | 0070,0080 | 1  | A label that is used to identify this SOP Instance - Series and Image number  |
| >Content Description     | 0070,0081 | 2  | A description of the content of the SOP Instance – Exam Name  |
| >Content Creator's Name  | 0070,0084 | 2  | Name of operator (such as a technologist or physician) creating the content of the SOP Instance – Tech Initials if enabled, otherwise blank   |
| >Referenced Frame Number | 0008,1160 | 1C | Identifies the frame numbers within the Referenced SOP Instance to which the reference applies. The first frame shall be denoted as frame number 1. Note This Attribute may be multi-valued. Required if the Referenced SOP Instance is a multi-frame image |

| Image Pixel Module         |           | PS3.3 section C.7.6.3 |   |
|----------------------------|-----------|-----------------------|---|
| Attribute Name             | Tag       | Type                  | Description   |
| Samples per pixel          | 0028,0002 | 1                     | Number of samples (planes) in this image (1)                          |
| Photometric interpretation | 0028,0004 | 1                     | Specifies the intended interpretation of the pixel data (MONOCHROME2) |
| Rows                       | 0028,0010 | 1                     | Number of rows in image   |
| Columns                    | 0028,0011 | 1                     | Number of columns in image  |
| Bits allocated             | 0028,0100 | 1                     | See IOD Image Module  |
| Bits stored                | 0028,0101 | 1                     | See IOD Image Module  |
| High bit                   | 0028,0102 | 1                     | See IOD Image Module  |
| Pixel representation       | 0028,0103 | 1                     | See IOD Image Module  |
| Pixel data                 | 7FE0,0010 | 1                     | Data stream of pixel samples which comprise the image                 |

| Modality LUT Module (Optional) |           | PS3.3 section C.11.1 |   |
|--------------------------------|-----------|----------------------|---|
| Attribute Name                 | Tag       | Type                 | Description   |
| Modality LUT Sequence          | 0028,3000 | 1C                   | Sequence of Modality LUTs (Not present if Rescale Intercept (0028,1052) is present) |
| > LUT Descriptor               | 0028,3002 | 1C                   | Format of LUT Data in Sequence  |
| > LUT Explanation              | 0028,3003 | 3                    | Free Form Text  |
| > LUT Type                     | 0028,3004 | 1C                   | Specifies output values of this Modality LUT  |
| > LUT Data                     | 0028,3006 | 1C                   | LUT Data (Mapping of pixel value to pixel intensity)                                |
| Rescale Intercept              | 0028,1052 | 1C                   | Required if Modality LUT sequence is not present.                                   |
| Rescale Slope                  | 0028,1053 | 1C                   | Required if Rescale Intercept is present.   |
| Rescale Type                   | 0028,1054 | 1C                   | Required if Rescale Intercept is present.   |

| VOI LUT Module (Optional) |           | PS3.3 section C.11.2 |   |
|---------------------------|-----------|----------------------|---|
| Attribute Name            | Tag       | Type                 | Description   |
| Window center             | 0028,1050 | 3                    | Window center for display. (512)  |
| Window width              | 0028,1051 | 1C                   | Window width for display. Required if Window center (0028,1050) is sent. (1024) |
| VOI LUT Sequence          | 0028,3010 | 3                    | Sequence of VOI LUT   |

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|-------------------|-----------|----|--|
| > LUT Descriptor  | 0028,3002 | 1C | Format of LUT Data in Sequence                       |
| > LUT Explanation | 0028,3003 | 3  | Free Form Text                                       |
| > LUT Data        | 0028,3006 | 1C | LUT Data (Mapping of pixel value to pixel intensity) |

## MODULES COMMON TO XA and RF IODs

| <b>Contrast/Bolus Module (Conditional) PS3.3 section C.7.6.4</b> |            |             |                         |
|--|------------|-------------|-------------------------|
| <b>Required if contrast media used in this image</b>             |            |             |                         |
| <b>Attribute Name</b>  | <b>Tag</b> | <b>Type</b> | <b>Description</b>      |
| Contrast/Bolus agent   | 0018,0010  | 2           | Contrast or bolus agent |

| <b>Multi-Frame Module (Conditional) PS3.3 section C.7.6.6</b> |            |             |  |
|---|------------|-------------|--|
| <b>Required if pixel data is Multi-Frame Cine data</b>        |            |             |  |
| <b>Attribute Name</b>   | <b>Tag</b> | <b>Type</b> | <b>Description</b>   |
| Number of frames  | 0028,0008  | 1           | Number of frames in a Multi-frame image  |
| Frame increment pointer                                       | 0028,0009  | 1           | Contains the Data Element Tag of the attribute which is used as the frame increment in Multi-frame pixel data. |

| <b>Mask Module (Conditional) PS3.3 section C.7.6.10</b> |            |             |   |
|---|------------|-------------|---|
| <b>Required if image may be subtracted</b>              |            |             |   |
| <b>Attribute Name</b>                                   | <b>Tag</b> | <b>Type</b> | <b>Description</b>  |
| Mask Subtraction Sequence                               | 0028,6100  | 1           | Defines a sequence which describes mask subtraction operations for a multi-frame image. |
| >Mask Operation   | 0028,6101  | 1           | Identify the type of mask operation to be performed ("AVG_SUB").                        |
| >Mask Frame Numbers                                     | 0028,6110  | 1C          | Specifies the frame numbers of the pixel data used to generate the mask.                |
| Recommended Viewing Mode                                | 0028,1090  | 2           | Specifies recommended viewing protocols ("SUB")   |

| <b>X-Ray Image Module PS3.3 section C.8.7.1</b> |            |             |  |
|---|------------|-------------|--|
| <b>Attribute Name</b>                           | <b>Tag</b> | <b>Type</b> | <b>Description</b>   |
| Frame increment pointer                         | 0028,0009  | 1C          | Required if Multi-frame image. Contains Data Element Tag of the attribute which is used as the Frame increment in Multi-frame image pixel data |
| Image type                                      | 0008,0008  | 1           | Image identification characteristics   |
| Pixel intensity relationship                    | 0028,1040  | 1           | The relationship between the pixel sample values and the X-Ray beam intensity.   |
| Samples per pixel                               | 0028,0002  | 1           | Number of samples (planes) in the image (1)  |
| Photometric interpretation                      | 0028,0004  | 1           | Specifies the intended interpretation of the pixel data (MONOCHROME2)  |
| Bits allocated                                  | 0028,0100  | 1           | Number of bits allocated for each pixel sample (8 or 16)   |

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|----------------------|-----------|---|---|
| Bits stored          | 0028,0101 | 1 | Number of bits stored for each pixel sample (8 or 10) |
| High bit             | 0028,0102 | 1 | Most significant bit for pixel sample data (7 or 9)   |
| Pixel representation | 0028,0103 | 1 | Data representation of the pixel samples (0)          |

| X-Ray Acquisition Module      |           |      | PS3.3 section C.8.7.2   |
|-------------------------------|-----------|------|---|
| Attribute Name                | Tag       | Type | Description   |
| KVP                           | 0018,0060 | 2    | Peak kilo voltage output of the X-Ray generator used  |
| Exposure                      | 0018,1150 | 2C   | Duration of X-Ray exposure in msec. See 8.7.2.1.1. Required if Exposure (0018,1152) is not present  |
| Tube Current                  | 0018,1151 | 2C   | X-Ray Tube Current in mA  |
| Exposure                      | 0018,1152 | 2C   | The product of exposure time and X-Ray tube current expressed in mAs. Required if either Exposure Time (0018,1150) or X-Ray Tube Current (0018,1151) are not present. |
| Exposure In $\mu$ As          | 0018,1153 | 3    | The product of exposure time and X-Ray tube current expressed in $\mu$ As   |
| Radiation setting             | 0018,1155 | 1    | Identify the general level of X-Ray dose exposure   |
| ImageAreaDoseProduct          | 0018,115e | 3    | Total area-dose-product to which the patient was exposed, accumulated over the complete Performed Procedure Step and measured in $dGy*cm*cm$ , including fluoroscopy  |
| X-Ray Tube Current in $\mu$ A | 0018,8151 | 3    | X-Ray Tube Current in $\mu$ A   |
| Exposure Time in $\mu$ s      | 0018,8150 | 3    | Duration of X-Ray exposure in $\mu$ sec.  |

| Display Shutter Module (Optional) |           |      | PS3.3 section C.7.6.11                              |
|-----------------------------------|-----------|------|---|
| Attribute Name                    | Tag       | Type | Description   |
| Shutter shape                     | 0018,1600 | 1    | Shape of the shutter defined for display (CIRCULAR) |
| Center of circular shutter        | 0018,1610 | 1C   | Required if shutter shape is CIRCULAR               |
| Radius of circular shutter        | 0018,1612 | 1C   | Required if shutter shape is CIRCULAR               |

| X-Ray Collimator Module (Optional) |           |      | PS3.3 section C.8.7.3                          |
|------------------------------------|-----------|------|--|
| Attribute Name                     | Tag       | Type | Description                                    |
| Collimator shape                   | 0018,1700 | 1    | Shape of collimator (RECTANGULAR or POLYGONAL) |
| Collimator left vertical edge      | 0018,1702 | 1C   | Required if collimator shape is RECTANGULAR    |
| Collimator right vertical edge     | 0018,1704 | 1C   | Required if collimator shape is RECTANGULAR    |
| Collimator upper horizontal edge   | 0018,1706 | 1C   | Required if collimator shape is RECTANGULAR    |
| Collimator lower horizontal edge   | 0018,1708 | 1C   | Required if collimator shape is RECTANGULAR    |
| Vertices of polygonal shutter      | 0018,1720 | 1C   | Required if collimator shape is POLYGONAL      |



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| <b>X-Ray Acquisition Dose Module</b> |            | <b>PS3.3 section C.8.7.8</b> |   |
|--------------------------------------|------------|------------------------------|---|
| <b>Attribute Name</b>                | <b>Tag</b> | <b>Type</b>                  | <b>Description</b>  |
| Exposure Index                       | 0018,1411  | 3                            | Measure of the detector response to radiation in the relevant image region of an image acquired with a digital x-ray imaging system as defined in IEC 62494-1.<br><br>Notes: 1. A string rather than binary Value Representation is used for this Attribute, in order to allow the sender to control the precision of the value as suggested in the report of AAPM Task Group 116.<br>2. This index value is scaled |
| Target Exposure Index                | 0018,1412  | 3                            | The target value used to calculate the Deviation Index (0018,1413) as defined in IEC 62494-1.   |
| Deviation Index                      | 0018,1413  | 3                            | A scaled representation of the difference of the Exposure Index compared to the Target Exposure Index as defined in IEC 62494-1 and the report of AAPM TG 116.  |

**X-Ray XA IOD**

| <b>X-Ray Table Module (Conditional)</b>               |            | <b>PS3.3 section C.8.7.4</b> |                        |
|---|------------|------------------------------|------------------------|
| <b>Required if image is created with table motion</b> |            |                              |                        |
| <b>Attribute Name</b>                                 | <b>Tag</b> | <b>Type</b>                  | <b>Description</b>     |
| Table motion  | 0018,1134  | 2                            | Is table moving or not |

| <b>XA Positioner Module</b> |            | <b>PS3.3 section C.8.7.7</b> |   |
|-----------------------------|------------|------------------------------|---|
| <b>Attribute Name</b>       | <b>Tag</b> | <b>Type</b>                  | <b>Description</b>  |
| Distance Source to Detector | 0018,1110  | 3                            | Distance in mm from source to isocenter   |
| Distance Source to Patient  | 0018,1111  | 3                            | Distance in mm from source to detector center   |
| Positioner motion           | 0018,1500  | 2C                           | Used to describe activity of imaging device   |
| Positioner primary angle    | 0018,1510  | 2                            | Position of the X-Ray image intensifier about the patient from the RAO to LAO direction |
| Positioner secondary angle  | 0018,1511  | 2                            | Position of the X-Ray image intensifier about the patient from the CAU to CRA direction |

| <b>SOP Common Module</b> |            | <b>PS3.3 section C.12.1</b>   |  |
|--------------------------|------------|---|--|
| <b>Attribute Name</b>    | <b>Tag</b> | <b>Description</b>  |  |
| SOP class UID            | 0008,0016  | Uniquely identifies the SOP class X-Ray Angiographic Image Storage "1.2.840.10008.5.1.4.1.1.12.1" |  |
| SOP instance UID         | 0008,0018  | Uniquely identifies the SOP instance  |  |

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**X-Ray RF IOD**

| <b>SOP Common Module</b> |            | <b>PS3.3 section C.12.1</b>  |
|--------------------------|------------|--|
| <b>Attribute Name</b>    | <b>Tag</b> | <b>Description</b>   |
| SOP class UID            | 0008,0016  | Uniquely identifies the SOP class X-Ray Radiofluoroscopic Image Storage "1.2.840.10008.5.1.4.1.1.12.2" |
| SOP instance UID         | 0008,0018  | Uniquely identifies the SOP instance   |

**X-Ray DX IOD**

| <b>DX SERIES MODULE ATTRIBUTES PS3.3 section C.8-68</b> |            |             |   |
|---|------------|-------------|---|
| <b>Attribute Name</b>                                   | <b>Tag</b> | <b>Type</b> | <b>Description</b>  |
| Modality  | 0008,0060  | 1           | Type of equipment that originally acquired the data used to create the images in this Series.<br>Enumerated Values:<br>DX<br>PX<br>IO<br>MG<br>See section C.7.3.1.1.1 for further explanation. |
| Presentation Intent Type                                | 0008,0068  | 1           | Identifies the intent of the images that are contained within this Series.<br>Enumerated Values:<br>FOR PRESENTATION<br>FOR PROCESSING  |

| <b>DX ANATOMY IMAGED MODULE ATTRIBUTES PS3.3 section C.8-69</b> |            |             |   |
|---|------------|-------------|---|
| <b>Attribute Name</b>   | <b>Tag</b> | <b>Type</b> | <b>Description</b>  |
| Image Laterality  | 0020,0062  | 1           | Enumerated Values:<br>R = right<br>L = left<br>U = unpaired<br>B = both left and right  |
| Anatomic Region Sequence  | 0008,2218  | 2           | Sequence that identifies the anatomic region of interest in this Instance (i.e., external anatomy, surface anatomy, or general region of the body).<br><br>Zero or one Item shall be included in this Sequence. |

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|  |  |  |                          |
|--|--|--|--------------------------|
|  |  |  | Nexus always sends empty |
|--|--|--|--------------------------|

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| <b>DX IMAGE MODULE ATTRIBUTES PS3.3 section C.8-70</b> |             |             |  |
|--|-------------|-------------|--|
| <b>Attribute Name</b>                                  | <b>Tag</b>  | <b>Type</b> | <b>Description</b>   |
| Image Type   | (0008,0008) | 1           | Image identification characteristics.<br>See C.8.11.3.1.1 for specialization.  |
| Samples per Pixel                                      | (0028,0002) | 1           | Number of samples in this image. Shall have an Enumerated Value of 1.  |
| Photometric Interpretation                             | (0028,0004) | 1           | Specifies the intended interpretation of the pixel data.<br>Enumerated Values:<br>MONOCHROME1<br>MONOCHROME2   |
| Bits Allocated   | (0028,0100) | 1           | Number of bits allocated for each pixel sample.<br>Enumerated Values: 8, 16  |
| Bits Stored  | (0028,0101) | 1           | Number of bits stored for each pixel sample.<br>Enumerated Values: 6 to 16   |
| High Bit   | (0028,0102) | 1           | Most significant bit for pixel sample data.<br>Shall have an Enumerated Value of one less than the value in Bit Stored (0028,0101).  |
| Pixel Representation                                   | (0028,0103) | 1           | Data representation of the pixel samples.<br>Shall have the Enumerated Value:<br>0000H = Unsigned Integer.   |
| Pixel Intensity Relationship                           | (0028,1040) | 1           | The relationship between the Pixel sample values and the X-Ray beam intensity.<br>Enumerated Values:<br>LIN = Linearly proportional to X-Ray beam intensity<br>LOG = Logarithmically proportional to X-Ray beam intensity<br>See C.8.11.3.1.2 for further explanation. |
| Image Type   | (0008,0008) | 1           | Image identification characteristics.<br>See C.8.11.3.1.1 for specialization.  |
| Samples per Pixel                                      | (0028,0002) | 1           | Number of samples in this image. Shall have an Enumerated Value of 1.  |
| Photometric Interpretation                             | (0028,0004) | 1           | Specifies the intended interpretation of the pixel data.<br>Enumerated Values:<br>MONOCHROME1<br>MONOCHROME2   |
| Bits Allocated   | (0028,0100) | 1           | Number of bits allocated for each pixel sample.<br>Enumerated Values: 8, 16  |
| Bits Stored  | (0028,0101) | 1           | Number of bits stored for each pixel   |

# DICOM 3.0 Conformance Statement for Varex Nexus DRF Systems



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|                                   |             |   |  |
|-----------------------------------|-------------|---|--|
|                                   |             |   | sample.<br>Enumerated Values: 6 to 16  |
| High Bit                          | (0028,0102) | 1 | Most significant bit for pixel sample data.<br>Shall have an Enumerated Value of one less than the value in Bit Stored (0028,0101).  |
| Pixel Representation              | (0028,0103) | 1 | Data representation of the pixel samples.<br>Shall have the Enumerated Value:<br>0000H = Unsigned Integer.   |
| Pixel Intensity Relationship      | (0028,1040) | 1 | The relationship between the Pixel sample values and the X-Ray beam intensity.<br>Enumerated Values:<br>LIN = Linearly proportional to X-Ray beam intensity<br>LOG = Logarithmically proportional to X-Ray beam intensity<br>See C.8.11.3.1.2 for further explanation.   |
| Pixel Intensity Relationship Sign | (0028,1041) | 1 | The sign of the relationship between the Pixel sample values stored in Pixel Data (7FE0,0010) and the X-Ray beam intensity.<br>Enumerated Values;<br>1 = Lower pixel values correspond to less X-Ray beam intensity<br>-1 = Higher pixel values correspond to less X-Ray beam intensity<br>See C.8.11.3.1.2 for further explanation. |
| Rescale Intercept                 | (0028,1052) | 1 | The value b in the relationship between stored values (SV) in Pixel Data (7FE0,0010) and the output units specified in Rescale Type (0028,1054).<br>Output units = m*SV + b.<br>Enumerated Value: 0<br>See C.8.11.3.1.2 for further explanation.   |

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| Rescale Slope                 | (0028,1053) | 1  | m in the equation specified by Rescale Intercept (0028,1052).<br>Enumerated Value: 1<br>See C.8.11.3.1.2 for further explanation.   |
| Rescale Type                  | (0028,1054) | 1  | Specifies the output units of Rescale Slope (0028,1053) and Rescale Intercept (0028,1052).<br>Enumerated Value: US = Unspecified<br>See C.8.11.3.1.2 for further explanation.   |
| Presentation LUT Shape        | (2050,0020) | 1  | Specifies an identity transformation for the Presentation LUT, other than to account for the value of Photometric Interpretation (0028,0004), such that the output of all grayscale transformations defined in the IOD containing this Module are defined to be P-Values.<br>Enumerated Values:<br>IDENTITY – output is in P-Values – shall be used if Photometric Interpretation (0028,0004) is MONOCHROME2.<br>INVERSE – output after inversion is in P-Values – shall be used if Photometric Interpretation (0028,0004) is MONOCHROME1.<br>See C.8.11.3.1.2 for further explanation. |
| Lossy Image Compression       | (0028,2110) | 1  | Specifies whether an Image has undergone lossy compression.<br>Enumerated Values:<br>00 = Image has NOT been subjected to lossy compression.<br>01 = Image has been subjected to lossy compression.<br>See C.7.6.1.1.5 for further explanation.   |
| Lossy Image Compression Ratio | (0028,2112) | 1C | See C.7.6.1.1.5 for further explanation.<br>Required if Lossy Compression has been performed on the Image.  |

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| Derivation Description                    | (0008,2111) | 3  | A text description of how this image was derived.<br>See C.8.11.3.1.4 for further explanation.   |
| Acquisition Device Processing Description | (0018,1400) | 3  | Indicates any visual processing performed on the images prior to exchange.<br>See C.8.11.3.1.3 for further explanation.  |
| Acquisition Device Processing Code        | (0018,1401) | 3  | Code representing the device-specific processing associated with the image (e.g. Organ Filtering code)<br><br>Note: This Code is manufacturer specific but provides useful annotation information to the knowledgeable observer.   |
| Patient Orientation                       | (0020,0020) | 1C | Patient direction of the rows and columns of the image.<br>See C.7.6.1.1.1 for further explanation.<br><br>Required if View Code Sequence (0054,0220) is not present or is present with an Item value other than (G-8300, SRT, "tissue specimen") or (G-8310, SRT, "tissue specimen from breast"). May be present otherwise. |
| Calibration Image                         | (0050,0004) | 3  | Indicates whether a reference object (phantom) of known size is present in the image and was used for calibration.<br>Enumerated Values:<br>YES<br>NO<br><br>Device is identified using the Device module. See C.7.6.12 for further explanation.   |
| Burned In Annotation                      | (0028,0301) | 1  | Indicates whether or not image contains sufficient burned in annotation to identify the patient and date the image was acquired.<br>Enumerated Values:<br>YES<br>NO  |

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|                                   |             |    |   |
|-----------------------------------|-------------|----|---|
| Window Center                     | (0028,1050) | 1C | Defines a Window Center for display. See C.8.11.3.1.5 for further explanation.<br><br>Required if Presentation Intent Type (0008,0068) is FOR PRESENTATION and VOI LUT Sequence (0028,3010) is not present. May also be present if VOI LUT Sequence (0028,3010) is present. |
| Window Width                      | (0028,1051) | 1C | Window Width for display. See C.8.11.3.1.5 for further explanation.<br><br>Required if Window Center (0028,1050) is sent.   |
| Window Center & Width Explanation | (0028,1055) | 3  | Free form explanation of the meaning of the Window Center and Width. Multiple values correspond to multiple Window Center and Width values.   |

**DX DETECTOR MODULE ATTRIBUTES PS3.3 section C.8-71**

| Attribute Name       | Tag         | Type | Description   |
|----------------------|-------------|------|---|
| Imager Pixel Spacing | (0018,1164) | 1    | Physical distance measured at the front plane of the detector housing between the center of each image pixel specified by a numeric pair - row spacing value (delimiter) column spacing value in mm. See 10.7.1.3 for further explanation of the value order.<br><br>The value of this attribute shall never be adjusted to account for correction for the effect of geometric magnification or calibration against an object of known size; Pixel Spacing (0028,0030) is specified for that purpose. |
| Detector Type        | 0018,7004   | 2    | The type of detector used to acquire this image. Defined Terms: DIRECT = X-Ray photoconductor, SCINTILLATOR = Phosphor used, STORAGE = Storage phosphor, FILM = Scanned film/screen   |
| Detector Description | 0018,7006   | 3    | Free text description of detector.  |



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**X-Ray Radiation Dose SR IOD**

| <b>SR DOCUMENT PATIENT MODULE ATTRIBUTES PS3.3 section C.7.1.1</b> |             |             |                                    |
|--|-------------|-------------|------------------------------------|
| <b>Attribute Name</b>  | <b>Tag</b>  | <b>Type</b> | <b>Description</b>                 |
| Patient's Name   | (0010,0010) | 2           | Patient's full name                |
| Patient ID   | (0010,0020) | 2           | Primary identifier for the patient |
| Patient's Birth Date   | (0010,0030) | 2           | Birth date of the patient          |

| <b>SR DOCUMENT GENERAL STUDY MODULE ATTRIBUTES PS3.3 section C.7.2.1</b> |             |             |   |
|--|-------------|-------------|---|
| <b>Attribute Name</b>  | <b>Tag</b>  | <b>Type</b> | <b>Description</b>  |
| Study Instance UID   | (0020,000D) | 1           | Unique identifier for the Study.  |
| Study Date   | (0008,0020) | 2           | Date the Study started.   |
| Study Time   | (0008,0030) | 2           | Time the Study started.   |
| Referring Physician's Name   | (0008,0090) | 2           | Name of the patient's referring physician   |
| Study ID   | (0020,0010) | 2           | User or equipment generated Study identifier.   |
| Accession Number   | (0008,0050) | 2           | A RIS generated number that identifies the order for the Study.                         |
| Study Description  | (0008,1030) | 3           | Institution-generated description or classification of the Study (component) performed. |

| <b>SR DOCUMENT PATIENT STUDY MODULE ATTRIBUTES PS3.3 section C.7.2.2</b> |             |             |                               |
|--|-------------|-------------|-------------------------------|
| <b>Attribute Name</b>  | <b>Tag</b>  | <b>Type</b> | <b>Description</b>            |
| Patient's Size   | (0010,1020) | 3           | Length or size of the Patient |
| Patient's Weight   | (0010,1030) | 3           | Weight of the Patient         |

| <b>SR DOCUMENT GENERAL SERIES MODULE ATTRIBUTES PS3.3 section C.7.3.1</b> |             |             |  |
|---|-------------|-------------|--|
| <b>Attribute Name</b>   | <b>Tag</b>  | <b>Type</b> | <b>Description</b>   |
| Modality  | (0008,0060) | 1           | Type of equipment that originally acquired the data used to create the images in this Series. See Section C.7.3.1.1.1 for Defined Terms. |
| Series Instance UID   | (0020,000E) | 1           | Unique identifier of the Series  |
| Series Number   | (0020,0011) | 2           | A number that identifies this Series   |
| Performing Physician's Name   | (0008,1050) | 3           | Name of the physician(s) administering the Series.   |
| Protocol Name   | (0018,1030) | 3           | Work Procedure Name  |
| Operators' Name   | (0008,1070) | 3           | Tech Initials  |

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| <b>SR DOCUMENT SERIES MODULE ATTRIBUTES PS3.3 section C.17.1</b> |             |             |  |
|--|-------------|-------------|--|
| <b>Attribute Name</b>  | <b>Tag</b>  | <b>Type</b> | <b>Description</b>   |
| Modality   | (0008,0060) | 1           | Modality type.<br>Enumerated Values:<br><b>SR</b> SR Document  |
| Series Instance UID  | (0020,000E) | 1           | Unique identifier of the Series.<br>Note<br>No SR-specific semantics are specified.  |
| Series Number  | (0020,0011) | 1           | A number that identifies the Series.<br>Note<br>No SR-specific semantics are specified.<br><br>Note: Nexus DRF always sends 1  |
| Referenced Performed Procedure Step Sequence                     | (0008,1111) | 2           | Uniquely identifies the Performed Procedure Step SOP Instance for which the Series is created.<br>Zero or one Item shall be included in this Sequence.<br>Note<br><ol style="list-style-type: none"> <li>1. The Performed Procedure Step referred to by this Attribute is the Step during which this Document is generated.</li> <li>2. If this Document is generated during the same Performed Procedure Step as the evidence in the current interpretation procedure, this Attribute may contain reference to that Performed Procedure Step.</li> <li>3. This Attribute is not used to convey reference to the evidence in the current interpretation procedure. See Current Requested Procedure Evidence Sequence (0040,A375).</li> <li>4. This Sequence may be zero length if the Performed Procedure Step is unknown.</li> </ol><br>Note: Nexus DRF always sends NULL |

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| SR DOCUMENT GENERAL EQUIPMENT MODULE ATTRIBUTES PS3.3 section C.7.5.1 |             |      |   |
|---|-------------|------|---|
| Attribute Name  | Tag         | Type | Description   |
| Manufacturer  | (0008,0070) | 2    | Manufacturer of the equipment that produced the composite instances.  |
| Institution Name  | (0008,0080) | 3    | Institution where the equipment that produced the composite instances is located.   |
| Station Name  | (0008,1010) | 3    | User defined name identifying the machine that produced the Composite Instances   |
| Manufacturer's Model Name   | (0008,1090) | 3    | Manufacturer's model name of the equipment that produced the composite instances.   |
| Device Serial Number  | (0018,1000) | 3    | Manufacturer's serial number of the equipment that produced the composite instances   |
| Software Versions   | (0018,1020) | 3    | Manufacturer's designation of software version of the equipment that produced the composite instances. See Section C.7.5.1.1.3. |

| SR DOCUMENT GENERAL MODULE ATTRIBUTES PS3.3 section C.17.2 |             |      |  |
|--|-------------|------|--|
| Attribute Name   | Tag         | Type | Description  |
| Instance Number  | (0020,0013) | 1    | A number that identifies the SR Document.<br><br>Note: Nexus DRF always sends 1  |
| Completion Flag  | (0040,A491) | 1    | The estimated degree of completeness of this SR Document. See Section C.17.2.7. Enumerated Values:<br><b>PARTIAL</b> Partial content.<br><b>COMPLETE</b> Complete content.<br><br>Note: Nexus DRF always sends Complete  |
| Verification Flag  | (0040,A493) | 1    | Indicates whether this SR Document is Verified.<br>Enumerated Values:<br><b>UNVERIFIED</b> Not attested to.<br><b>VERIFIED</b> Attested to by a Verifying Observer Name (0040,A075) who is accountable for its content.<br>A value of "VERIFIED" shall be used only when the value of Completion Flag (0040,A491) is "COMPLETE". |

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|                                    |             |   |   |
|------------------------------------|-------------|---|---|
|                                    |             |   | <p>Note<br/>                 The intent of this specification is that the "prevailing final version" of an SR Document is the version having the most recent Verification DateTime (0040,A030), Verification Flag (0040,A493) of VERIFIED and Preliminary Flag (0040,A496) of FINAL.</p> <p>Note: Nexus DRF always sends Unverified</p> |
| Content Date                       | (0008,0023) | 1 | The date the document content creation started.   |
| Content Time                       | (0008,0033) | 1 | The time the document content creation started.   |
| Performed Procedure Code Sequence  | (0040,A372) | 2 | <p>A Sequence that conveys the codes of the performed procedures pertaining to this SOP Instance. Zero or more Items shall be included in this Sequence.</p> <p>Note: Nexus DRF always sends this as Null</p>   |
| Reason for the Requested Procedure | (0040,1002) | 3 | <p>Reason for requesting this procedure.</p> <p>Note: Nexus DRF only sends this if it is received from the WL</p>   |

**SR Templates**

| TID 10001 Projection X-Ray Radiation Dose |    |                 |           |  |    |          |           |                                   |
|---|----|-----------------|-----------|--|----|----------|-----------|-----------------------------------|
|   | NL | Rel with Parent | VT        | Concept Name                                   | VM | Req Type | Condition | Value Set Constraint              |
| 1   |    |                 | CONTAINER | EV(113701, DCM, "X-Ray Radiation Dose Report") | 1  | M        |           |                                   |
| 2   | >  | HAS CONCEPT MOD | CODE      | EV(121058, DCM, "Procedure reported")          | 1  | M        |           | 113704, DCM, "Projection X-Ray"   |
| 3   | >> | HAS CONCEPT MOD | CODE      | EV(363703001, SCT, "Has                        | 1  | M        |           | R-408C3, SRT, "Diagnostic Intent" |

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|    |    |                 |         |   |     |    |  |   |
|----|----|-----------------|---------|---|-----|----|--|---|
|    |    |                 |         | Intent")  |     |    |  |   |
| 4  | >  | CONTAINS        | CODE    | EV (122142, DCM, "Acquisition Device Type")         | 1   | U  |  | 113957, DCM, "Fluoroscopy-Guided Projection Radiography System" |
| 5  | >  |                 | INCLUDE | DTID 1002 "Observer Context"                        | 1-n | M  |  |   |
| 6  | >  | HAS OBS CONTEXT | CODE    | EV (113705, DCM, "Scope of Accumulation")           | 1   | M  |  | 113014, DCM, "Study"  |
| 7  | >> | HAS PROPERTIES  | UIDREF  | DCID 10001 "UID Types"                              | 1   | M  |  | 110180, DCM, "Study Instance UID"                               |
| 8  | >  | CONTAINS        | CODE    | EV (113945, DCM, "X-Ray Detector Data Available")   | 1   | U  |  | R-00339, SRT, "No"  |
| 9  | >  | CONTAINS        | CODE    | EV (113943, DCM, "X-Ray Source Data Available")     | 1   | U  |  | R-0038D, SRT, "Yes"   |
| 10 | >  | CONTAINS        | CODE    | EV (113944, DCM, "X-Ray Mechanical Data Available") | 1   | U  |  | R-00339, SRT, "No"  |
| 11 | >  | CONTAINS        | INCLUDE | DTID 10002 "Accumulated X-Ray Dose"                 | 1   | MC | IFF Single Plane system  |   |
| 14 | >  | CONTAINS        | INCLUDE | DTID 10003 "Irradiation Event X-Ray Data"           | 1-n | MC | IF any of the values of TID (10001) Row 18 are not (113858, DCM, "MPPS Content"), (113866, DCM, "Copied From Image Attributes") or |   |

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|    |   |          |      |  |     |   |  |
|----|---|----------|------|--|-----|---|--|
|    |   |          |      |  |     | (113867, DCM, "Computed From Image Attributes") |  |
| 18 | > | CONTAINS | CODE | EV (113854, DCM, "Source of Dose Information") | 1-n | M   | 113856, DCM, "Automated Data Collection" |

| TID 1002 Observer Context |    |                 |         |  |    |          |   |                       |
|---------------------------|----|-----------------|---------|--|----|----------|---|-----------------------|
|                           | NL | Rel with Parent | VT      | Concept Name                                       | VM | Req Type | Condition                                 | Value We Set          |
| 1                         |    | HAS OBS CONTEXT | CODE    | EV (121005, DCM, "Observer Type")                  | 1  | MC       | IF Observer type is device                | 121007, DCM, "Device" |
| 3                         |    | HAS OBS CONTEXT | INCLUDE | DTID 1004 "Device Observer Identifying Attributes" | 1  | MC       | IFF Row 1 value = (121007, DCM, "Device") |                       |

| TID 1004 Observer Identifying Attributes |    |                 |        |   |    |          |           |                            |
|--|----|-----------------|--------|---|----|----------|-----------|----------------------------|
|  | NL | Rel with Parent | VT     | Concept Name                                      | VM | Req Type | Condition | Value We Set               |
| 1  |    |                 | UIDREF | EV (121012, DCM, "Device Observer UID")           | 1  | M        |           | Dicom Base UID + System SN |
| 2  |    |                 | TEXT   | EV (121013, DCM, "Device Observer Name")          | 1  | U        |           | Institution Name           |
| 3  |    |                 | TEXT   | EV (121014, DCM, "Device Observer Manufacturer")  | 1  | U        |           | System Manufacturer        |
| 4  |    |                 | TEXT   | EV (121015, DCM, "Device Observer Model Name")    | 1  | U        |           | System Model Name          |
| 5  |    |                 | TEXT   | EV (121016, DCM, "Device Observer Serial Number") | 1  | U        |           | System SN                  |

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| TID 10002 Accumulated X-Ray Dose |    |                 |           |  |    |          |  |                             |
|----------------------------------|----|-----------------|-----------|--|----|----------|--|-----------------------------|
|                                  | NL | Rel with Parent | VT        | Concept Name   | VM | Req Type | Condition  | Value We Set                |
| 1                                |    |                 | CONTAINER | EV (113702, DCM, "Accumulated X-Ray Dose Data")                            | 1  | M        |  |                             |
| 2                                | >  | HAS CONCEPT MOD | CODE      | EV (113764, DCM, "Acquisition Plane")                                      | 1  | M        |  | 113622, DCM, "Single Plane" |
| 10                               | >  | CONTAINS        | INCLUDE   | DTID 10004 "Accumulated Fluoroscopy and Acquisition Projection X-Ray Dose" | 1  | MC       | IFF TID 10001 Row 4 = (113957, DCM, "Fluoroscopy-Guided Projection Radiography System") or TID 10001 Row 2 = (113704, DCM, "Projection X-Ray") and TID 10001 Row 4 is absent)  |                             |
| 12                               | >  | CONTAINS        | INCLUDE   | DTID 10007 "Accumulated Total Projection Radiography Dose"                 | 1  | MC       | IFF TID 10001 Row 4 = (113958, DCM, "Integrated Projection Radiography System") or TID (10001) Row 4 = (113957, DCM, "Fluoroscopy-Guided Projection Radiography System") or TID (10001) Row 2 = (113704, DCM, "Projection X-Ray") and TID (10001) Row 4 is absent) |                             |

| TID 10004 Accumulated Fluoroscopy and Acquisition Projection X-Ray Dose |    |                 |    |              |    |          |           |              |
|---|----|-----------------|----|--------------|----|----------|-----------|--------------|
|   | NL | Rel with Parent | VT | Concept Name | VM | Req Type | Condition | Value We Set |

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|   |  |  |     |   |   |    |  |  |
|---|--|--|-----|---|---|----|--|--|
| 1 |  |  | NUM | EV (113726, DCM, "Fluoro Dose Area Product Total")      | 1 | MC | IFF TID 10003 Row 7 value = (P5-06000, SRT, "Fluoroscopy") for at least one irradiation event  | ("Gy.m2", "UCUM", "Gray meters-squared") |
| 2 |  |  | NUM | EV (113728, DCM, "Fluoro Dose (RP) Total")              | 1 | MC | IFF TID 10003 Row 7 value = (P5-06000, SRT, "Fluoroscopy") for at least one irradiation event AND any of the values of TID (10001) Row 18 are not (113858, DCM, "MPPS Content"). | ("Gy", "UCUM", "Grays")                  |
| 3 |  |  | NUM | EV (113730, DCM, "Total Fluoro Time")                   | 1 | MC | IFF TID 10003 Row 7 value = (P5-06000, SRT, "Fluoroscopy") for at least one irradiation event.   | UNITS = EV (s, UCUM, "seconds")          |
| 4 |  |  | NUM | EV (113727, DCM, "Acquisition Dose Area Product Total") | 1 | MC | IF any of the values of TID (10001) Row 18 are not (113858, DCM, "MPPS Content").  | ("Gy.m2", "UCUM", "Gray meters-squared") |
| 5 |  |  | NUM | EV (113729, DCM, "Acquisition Dose (RP) Total")         | 1 | MC | IF any of the values of TID (10001) Row 18 are not (113858, DCM, "MPPS Content").  | ("Gy", "UCUM", "Grays")                  |
| 6 |  |  | NUM | EV (113855, DCM, "Total Acquisition Time")              | 1 | MC | IF any of the values of TID (10001) Row 18 are not (113858, DCM, "MPPS Content").  | UNITS = EV (s, UCUM, "seconds")          |

**TID 10007 Accumulated Total Projection Radiography Dose**

|   | NL | Rel with Parent | VT  | Concept Name                                | VM | Req Type | Condition  | Value We Set  |
|---|----|-----------------|-----|---|----|----------|--|---|
| 1 |    |                 | NUM | EV (113722, DCM, "Dose Area Product Total") | 1  | M        |  | UNITS = EV ("Gy.m2", "UCUM", "Gray meters-squared") |
| 2 |    |                 | NUM | EV (113725, DCM, "Dose (RP) Total")         | 1  | MC       | IF TID 10001 Row 4 = (113958, DCM, "Integrated Projection Radiography System") or any of the | UNITS = EV ("Gy", "UCUM", "Grays")                  |



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|   |  |  |      |   |   |    |  |  |
|---|--|--|------|---|---|----|--|--|
|   |  |  |      |   |   |    | values of TID (10001) Row 18 are not (113858, DCM, "MPPS Content").  |  |
| 4 |  |  | NUM  | EV (113731, DCM, "Total Number of Radiographic Frames") | 1 | U  |  | UNITS = EV (frames, UCUM, "frames")              |
| 5 |  |  | CODE | EV (113780, DCM, "Reference Point Definition")          | 1 | MC | IF any of (113725, DCM, "Dose (RP) Total"), (113728, DCM, "Fluoro Dose (RP) Total") or (113729, DCM, "Acquisition Dose (RP) Total") are present, and Row 6 is not present. | 113860, DCM, "15cm from Isocenter toward Source" |

**TID 10003 Irradiation Event X-Ray Data**

|   | NL | Rel with Parent | VT        | Concept Name                                     | VM | Req Type | Condition | Value We Set  |
|---|----|-----------------|-----------|--|----|----------|-----------|---|
| 1 |    |                 | CONTAINER | EV (113706, DCM, "Irradiation Event X-Ray Data") | 1  | M        |           |   |
| 2 | >  | HAS CONCEPT MOD | CODE      | EV (113764, DCM, "Acquisition Plane")            | 1  | M        |           | DCM, 113622, Single Plane<br><br>Note: Report may rearrange or not show all the data listed     |
| 3 | >  | CONTAINS        | DATETIME  | DT (111526, DCM, "DateTime Started")             | 1  | M        |           |   |
| 7 | >  | CONTAINS        | CODE      | EV (113721, DCM, "Irradiation Event Type")       | 1  | M        |           | SRT, P5-06000, Fluoroscopy<br>or<br>DCM, 113611, Stationary Acquisition<br><br>Note: Report may |

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|    |    |                 |      |   |   |    |                         |  |
|----|----|-----------------|------|---|---|----|-------------------------|--|
|    |    |                 |      |   |   |    |                         | rearrange or not show all the data listed  |
| 8  | >  | CONTAINS        | TEXT | EV (125203, DCM, "Acquisition Protocol")    | 1 | U  |                         | Region/Exam/Position   |
| 9  | >  | CONTAINS        | CODE | EV (T-D0005, SRT, "Anatomical structure")   | 1 | U  |                         | SRT, Value, Meaning from associated exam   |
| 10 | >> | HAS CONCEPT MOD | CODE | EV (G-C171, SRT, "Laterality")              | 1 | UC | If anatomy isbi-lateral | SRT, G-A100, Right<br>or<br>SRT, G-A101, Left<br>or<br>SRT, G-A102, Bilateral<br>or<br>SRT, G-A103, Unilateral<br><br>Note: Report may rearrange or not show all the data listed |
| 17 | >  | CONTAINS        | CODE | EV (123014, DCM, "Target Region")           | 1 | M  |                         | SRT, Value, Meaning from Associated Exam<br><br>Note: Report may rearrange or not show all the data listed   |
| 18 | >  | CONTAINS        | NUM  | EV (122130, DCM, "Dose Area Product")       | 1 | MC |                         | UNITS = EV (Gy.m2, UCUM, "Gy.m2")  |
| 21 | >  | CONTAINS        | NUM  | EV (111636, DCM, "Entrance Exposure at RP") | 1 | MC |                         | UNITS = EV (mGy, UCUM, "mGy")  |

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| TID 10003b Irradiation Event X-Ray Source Data |    |                 |      |  |       |          |  |  |
|--|----|-----------------|------|--|-------|----------|--|--|
|  | NL | Rel with Parent | VT   | Concept Name                             | VM    | Req Type | Condition  | Value We Set                                   |
| 1  |    |                 | NUM  | EV (113738, DCM, "Dose (RP)")            | 1     | MC       | IF TID (10001) Row 2 = (113704, DCM, "Projection X-Ray") AND any of the values of TID (10001) Row 18 are not (113858, DCM, "MPPS Content") | UNITS = EV (Gy, UCUM, "Gy")                    |
| 3  |    |                 | CODE | EV (113764, DCM, "Acquisition Plane")    | 1     | MC       | IF Row 1 is present and Row 2 is not present   | DCM, 113860, 15cm from Isocenter toward Source |
| 5  |    |                 | CODE | EV (113732, DCM, "Fluoro Mode")          | 1     | UC       | IFF TID (10003) Row 7 value = (P5-06000, SRT, "Fluoroscopy")   | DCM, 113631, Pulsed                            |
| 6  |    |                 | NUM  | EV (113791, DCM, "Pulse Rate")           | 1     | MC       | IFF Row 5 value = (113631, DCM, "Pulsed")  | UNITS = EV ({pulse}/s, UCUM, "pulse/s")        |
| 7  |    |                 | NUM  | EV (113768, DCM, "Number of Pulses")     | 1     | MC       | IFF Row 5 is not present or Row 5 is present and equals (113631, DCM, "Pulsed")  | UNITS = EV (1, UCUM, "no units")               |
| 10   |    |                 | NUM  | EV (113742, DCM, "Irradiation Duration") | 1     | U        |  | UNITS = EV (s, UCUM, "s")                      |
| 11   |    |                 | NUM  | EV (113733, DCM, "KVP")                  | 1 - n | M        |  | UNITS = EV (kV, UCUM, "kV")                    |
| 12   |    |                 | NUM  | EV (113734, DCM, "X-Ray Tube")           | 1 - n | MC       | IF Row 15 is not present   | UNITS = EV (mA, UCUM, "mA")                    |

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|----|---|----------|-----------|--|-----|----|----------------------------------|--|
|    |   |          |           | Current")  |     |    |                                  |  |
| 14 |   |          | NUM       | EV (113824, DCM, "Exposure Time")                  | 1   | MC | IF Row 15 is not present         | UNITS = EV (ms, UCUM, "ms")  |
| 15 |   |          | NUM       | EV (113736, DCM, "Exposure")                       | 1-n | MC | IF Row 12 and 14 are not present | UNITS = EV (uA.s, UCUM, "uA.s")  |
| 18 |   |          | CONTAINER | EV (113771, DCM, "X-Ray Filters"                   | 1-n | U  |                                  |  |
| 19 | > | CONTAINS | CODE      | EV (113772, DCM, "X-Ray Filter Type")              | 1   | U  |                                  | EV (113653, DCM, "Flat Filter")<br>Or<br>EV (113609, DCM, "No Filter")   |
| 20 | > | CONTAINS | CODE      | EV (113772, DCM, "X-Ray Filter Material")          | 1   | U  |                                  | EV (C-120F9, SRT, "Aluminum or Aluminum compound")<br>Or<br>EV (C-127F9, SRT, "Copper or Copper compound")<br><br>Not sent if Filter Type is "No Filter" |
| 21 | > | CONTAINS | NUM       | EV (113758, DCM, "X-Ray Filter Thickness Minimum") | 1   | U  |                                  | UNITS = EV (mm, UCUM, "mm")<br><br>Not sent if Filter Type is "No Filter"  |
| 22 | > | CONTAINS | NUM       | EV (113758,  | 1   | U  |                                  | UNITS = EV   |

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|--|--|--|--|--|--|--|--|--|
|  |  |  |  | DCM, "X-Ray Filter Thickness Maximum") |  |  |  | (mm, UCUM, "mm")<br><br>Not sent if Filter Type is "No Filter" |
|--|--|--|--|--|--|--|--|--|

Note: Filter data will be sent only if system receives the information


## ANNEX B - Worklist AE Attributes

**Table B.1: Type 1 Fields Requested From Provider**

| DICOM Tag   | Description                          | Field Use    |
|-------------|--------------------------------------|--------------|
| 0040,0100   | Scheduled Procedure Step Sequence    | Sequence     |
| 0040,0001   | Scheduled Station AE Title           | Match/Return |
| 0040,0002   | Scheduled Procedure Step Start Date  | Match        |
| 0040,0003   | Scheduled Procedure Step Start Time  | Return       |
| 0008,0060   | Modality                             | Match        |
| 0040,0007   | Scheduled Procedure Step Description | Return       |
| 0040,0009   | Scheduled Procedure Step ID          | Return       |
| 0040,1001   | Requested Procedure ID               | Return       |
| 0020,000D   | Study Instance UID                   | Return       |
| 0010,0010   | Patient Name                         | Match        |
| 0010,0020   | Patient ID                           | Match        |
| 0040, 0008  | Scheduled Protocol Code Sequence     | Sequence     |
| >0008, 0100 | Code Value                           | Return       |
| >0008,0102  | Coding Scheme Designator             | Return       |
| >0008, 0104 | Code Meaning                         | Return       |
| 0032,1064   | Requested Procedure Code Sequence    | Sequence     |
| >0008,0100  | Code Value                           | Return       |
| >0008,0102  | Coding Scheme Designator             | Return       |
| >0008,104   | Code Meaning                         | Return       |

**Table B.2: Type 2 and 3 Fields Requested From Provider**

| DICOM Tag | Description                         | Field Use    |
|-----------|-------------------------------------|--------------|
| 0010,0030 | Patient's Birth Date                | Return       |
| 0010,0040 | Patient's Sex                       | Return       |
| 0010,1030 | Patient's Weight                    | Return       |
| 0040,0006 | Scheduled Performing Physician Name | Return       |
| 0008,0050 | Accession Number                    | Match/Return |
| 0032,1032 | Requesting Physician                | Return       |
| 0008,0090 | Referring Physician                 | Return       |

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|            |                                    |          |
|------------|------------------------------------|----------|
| 0008,1110  | Referenced Study Sequence          | Sequence |
| >0008,1150 | Referenced SOP Class UID           | Return   |
| >0008,1155 | Referenced SOP Instance UID        | Return   |
| 0040,1002  | Reason for the Requested Procedure | Return   |

### ANNEX C – MWM Attributes available for DICOM storage

**Table C. 1 Common Attributes in Modality Worklist Management and DICOM storage**

| Attribute Name       | Tag       | Type | Description  |
|----------------------|-----------|------|--|
| Modality             | 0008,0060 | 1    | Type of equipment that acquired image data (XA)    |
| Study Instance UID   | 0020,000D | 1    | Unique Identifier for Study                        |
| Patient Name         | 0010,0010 | 2    | Patient’s full legal name                          |
| Patient ID           | 0010,0020 | 2    | Primary hospital ID number or code for the patient |
| Patient’s Birth Date | 0010,0030 | 2    | Birth date of the patient                          |
| Accession Number     | 0008,0050 | 2    | A RIS generated study number                       |
| Referring Physician  | 0008,0090 | 2    | Patient’s referring Physician                      |

**Table C.2 MPPS Attributes**

| Attribute Name                      | Tag         | Description  |
|-------------------------------------|-------------|--|
| Performed Station AE Title          | (0040,0241) | AE title of the modality on which the Performed Procedure Step was performed.  |
| Performed Station Name              | (0040,0242) | An institution defined name for the modality on which the Performed Procedure Step was performed.  |
| Performed Location                  | (0040,0243) | Description of the location at which the Performed Procedure Step was performed.   |
| Performed Procedure Step Start Date | (0040,0244) | Date on which the Performed Procedure Step started.<br>Note: This value may be used to determine the earliest date to use as the Study Date (0008,0020) in |

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|  |             | composite instances and in updated Modality Scheduled Procedure Steps in order to allow Study level attributes to have consistent values if additional Procedure Steps are performed.  |
| Performed Procedure Step Start Time      | (0040,0245) | Time at which the Performed Procedure Step started.<br><br>Note: This value may be used to determine the earliest time to use as the Study Time (0008,0030) in composite instances and in updated Modality Scheduled Procedure Steps in order to allow Study level attributes to have consistent values if additional Procedure Steps are performed. |
| Performed Procedure Step ID              | (0040,0253) | User or equipment generated identifier of that part of a Procedure that has been carried out within this step  |
| Performed Procedure Step End Date        | (0040,0250) | Date on which the Performed Procedure Step ended.  |
| Performed Procedure Step End Time        | (0040,0251) | Time at which the Performed Procedure Step ended.  |
| Performed Procedure Step Status          | (0040,0252) | Contains the state of the Performed Procedure Step.<br>Enumerated Values:<br>IN PROGRESS = Started but not complete<br>DISCONTINUED = Canceled or unsuccessfully terminated<br>COMPLETED = Successfully completed  |
| Performed Procedure Step Description     | (0040,0254) | Institution-generated description or classification of the Procedure Step that was performed.  |
| Comments on the Performed Procedure Step | (0040,0280) | User-defined comments on the Performed Procedure Step.   |
| Performed Procedure Type Description     | (0040,0255) | A description of the type of procedure performed.  |
| Procedure Code Sequence                  | (0008,1032) | A sequence that conveys the (single) type of procedure performed.  |


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|   |             | Only a single Item shall be included in this sequence.  |
| Reason For Performed Procedure Code Sequence                  | (0040,1012) | Coded reason(s) for performing this procedure.<br><br>Note: May differ from the values in Reason for the Requested Procedure (0040,100A) in Request Attribute Sequence (0040,0275), for example if what was performed differs from what was requested.<br><br>One or more Items shall be included in this Sequence. |
| Performed Procedure Step Discontinuation Reason Code Sequence | (0040,0281) | The reason the Performed Procedure Step Status (0040,0252) was set to DISCONTINUED.   |



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**0.0 Revisions**

| Rev | Date       | Initials | EC      | Training Req'd (x) | Purpose  |
|-----|------------|----------|---------|--------------------|--|
| A   | 03/31/2014 | SPW      | 1059704 | --                 | <ul style="list-style-type: none"> <li>New Release for NEXUS</li> </ul>  |
| B   | 11/09/2017 | MCY      | 00134   | --                 | <ul style="list-style-type: none"> <li>Changed Varian to Varex</li> </ul>  |
| C   | 1/21/2020  | SPW      | 0000217 | --                 | <ul style="list-style-type: none"> <li>Updated for Nexus DRF 3.2</li> </ul>  |
| D   | 1/25/2021  | SPW      | 0002058 | --                 | <ul style="list-style-type: none"> <li>Updated for DICOM compression, removed Secondary Capture, and updated for DICOM Structure Dose Report, updated C.7.2.2</li> </ul> |
| E   | 2/10/2022  | SPW      | 0004029 | --                 | <ul style="list-style-type: none"> <li>Updated Structure Dose Report, Image Pixel Module and X-Ray Acquisition Module</li> </ul>   |