NumaStatus™

DICOM 3.0 Conformance Statement

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1 Revision History

Revision	Date	By	Comment
1.	January. 26, 2016	Charles Smith	Numa, Inc.

Contents

2 Conformance Statement Overview

NumaStatus implements the necessary DICOM services to download worklists from an information system, save Radiopharmaceutical Radiation Dose Structure Report (RRD SR) and a secondary capture image to Picture Archive and Communication Systems (PACS), patient dose management system and NM/PET workstations.

Table 1-1 Provides an overview of the network services supported by NumaStatus.

Table 1-1. Network Services

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Transfer		
Radiopharmaceutical Radiation Dose SR Storage	Yes	No
Secondary Capture Image Storage	Yes	No
Workflow Management		
Modality Worklist Information Model – FIND	Yes	No

Table 1-2 provides an overview of the DICOM UID values for the supported network services of NumaStatus.

Table 1-2. UID Values

UID Value	UID Name	Category
1.2.840.10008.1.1	Verification SOP Class	Transfer
1.2.840.10008.5.1.4.1.1.7	Secondary Capture Image Storage	Transfer
1.2.840.10008.5.1.4.1.1.88.68	Radiopharmaceutical Radiation Dose SR	Transfer
1.2.840.10008.5.1.4.31	Modality Worklist Information Model - FIND	Workflow Management

3 Introduction

This document states the conformance of NumaStatus to the DICOM 3.0 standard. It is written according to part PS 3.2-2015c of Digital Imaging and Communications in Medicine (DICOM) 3.01. NumaStatus reports the details of the radiopharmaceutical administered to patients for Nuclear Medicine and PET studies. It encodes the information in DICOM format so it can be shared with a Hospital/Radiology Information Systems. NumaStatus can interface directly with a Dose Calibrator. NumaStatus incorporates scheduled workflow for nuclear medicine and PET departments. NumaStatus ™ creates DICOM RRD SR and secondary capture images to communicate the radiopharmaceutical information.

3.1 Audience

This document is written for the people that need to understand how NumaStatus will integrate into their healthcare facility. This includes both those responsible for overall imaging network policy and architecture, as well as integrators who need to have a detailed understanding of the DICOM features of the product. This document contains some basic

DICOM definitions so that any reader may understand how this product implements DICOM features. However, integrators are expected to fully understand all the DICOM terminology, how the tables in this document relate to the product's functionality, and how that functionality integrates with other devices that support compatible DICOM features.

3.2 Remarks

The scope of this DICOM Conformance Statement is to facilitate integration between NumaStatus and other DICOM products. The Conformance Statement should be read and understood in conjunction with the DICOM Standard. DICOM by itself does not guarantee interoperability. The Conformance Statement does, however, facilitate a first-level comparison for interoperability between different applications supporting compatible DICOM functionality.

This Conformance Statement is not supposed to replace validation with other DICOM equipment to ensure proper exchange of intended information. In fact, the user should be aware of the following important issues:

- The comparison of different Conformance Statements is just the first step towards assessing interconnectivity and interoperability between the product and other DICOM conformant equipment.
- Test procedures should be defined and executed to validate the required level of interoperability with specific compatible DICOM equipment, as established by the healthcare facility.

3.3 Terms and Definitions

Informal definitions are provided for the following terms used in this Conformance Statement. The DICOM Standard is the authoritative source for formal definitions of these terms.

Abstract Syntax: The information agreed to be exchanged between applications, generally equivalent to a Service/Object Pair (SOP) Class. Examples: Verification SOP Class, Modality Worklist Information Model Find SOP Class, Computed Radiography Image Storage SOP Class.

Application Entity (AE): An end point of a DICOM information exchange, including the DICOM network or media interface software; i.e., the software that sends or receives DICOM information objects or messages. A single device may have multiple Application Entities.

Application Entity Title (AET): The externally known name of an *Application Entity*, used to identify a DICOM application to other DICOM applications on the network.

Application Context: The specification of the type of communication used between *Application Entities*. Example: DICOM network protocol.

Association: A network communication channel set up between *Application Entities*.

Attribute: A unit of information in an object definition; a data element identified by a *tag*. The information may be a complex data structure (Sequence), itself composed of lower level data elements. Examples: Patient ID (0010,0020), Accession Number (0008,0050), Photometric Interpretation (0028,0004), Procedure Code Sequence (0008,1032).

Information Object Definition (IOD): The specified set of *Attributes* that comprise a type of data object; does not represent a specific instance of the data object, but rather a class of similar data objects that have the same properties. The *Attributes* may be specified as Mandatory (Type 1), Required but possibly unknown (Type 2), or Optional (Type 3), and there may be conditions associated with the use of an Attribute (Types 1C and 2C). Examples: MR Image IOD, CT Image IOD, Print Job IOD.

Joint Photographic Experts Group (JPEG): A set of standardized image compression techniques, available for use by DICOM applications.

Media Application Profile: The specification of DICOM information objects and encoding exchanged on removable media (e.g., CDs)

Module: A set of *Attributes* within an *Information Object Definition* that are logically related to each other. Example: Patient Module includes Patient Name, Patient ID, Patient Birth Date, and Patient Sex.

Negotiation: First phase of *Association* establishment that allows *Application Entities* to agree on the types of data to be exchanged and how that data will be encoded.

Presentation Context: The set of DICOM network services used over an *Association*, as negotiated between *Application Entities*; includes *Abstract Syntaxes* and *Transfer Syntaxes*.

Protocol Data Unit (PDU): A packet (piece) of a DICOM message sent across the network. Devices must specify the maximum size packet they can receive for DICOM messages.

Security Profile: A set of mechanisms, such as encryption, user authentication, or digital signatures, used by an *Application Entity* to ensure confidentiality, integrity, and/or availability of exchanged DICOM data

Service Class Provider (SCP): Role of an *Application Entity* that provides a DICOM network service; typically, a server that performs operations requested by another *Application Entity* (*Service Class User*). Examples: Picture Archiving and Communication System (image storage SCP, and image query/retrieve SCP), Radiology Information System (modality worklist SCP).

Service Class User (SCU): Role of an *Application Entity* that uses a DICOM network service; typically, a client. Examples: imaging modality (image storage SCU, and modality worklist SCU), imaging workstation (image query/retrieve SCU)

Service/Object Pair Class (SOP Class): The specification of the network or media transfer (service) of a particular type of data (object); the fundamental unit of DICOM interoperability specification. Examples: Ultrasound Image Storage Service, Basic Grayscale Print Management.

Service/Object Pair Instance (SOP Instance): An information object; a specific occurrence of information exchanged in a *SOP Class*. Examples: a specific x-ray image.

Tag: A 32-bit identifier for a data element, represented as a pair of four digit hexadecimal numbers, the "group" and the "element". If the "group" number is odd, the tag is for a private (manufacturer-specific) data element. Examples: (0010,0020) [Patient ID], (07FE,0010) [Pixel Data], (0019,0210) [private data element]

Transfer Syntax: The encoding used for exchange of DICOM information objects and messages. Examples: *JPEG* compressed (images), little endian explicit value representation.

Unique Identifier (UID): A globally unique "dotted decimal" string that identifies a specific object or a class of objects; an ISO-8824 Object Identifier. Examples: Study Instance UID, SOP Class UID, SOP Instance UID.

Value Representation (VR): The format type of an individual DICOM data element, such as text, an integer, a person's name, or a code. DICOM information objects can be transmitted with either explicit identification of the type of each data element (Explicit VR), or without explicit identification (Implicit VR); with Implicit VR, the receiving application must use a DICOM data dictionary to look up the format of each data element.

3.5 Basics of DICOM Communication

This section describes terminology used in this Conformance Statement for the non-specialist. The key terms used in the Conformance Statement are highlighted in *italics* below. This section is not a substitute for training about DICOM, and it makes many simplifications about the meanings of DICOM terms.

Two *Application Entities* (devices) that want to communicate with each other over a network using DICOM protocol must first agree on several things during an initial network "handshake". One of the two devices must initiate an *Association* (a connection to the other device), and ask if specific services, information, and encoding can be supported by the other device (*Negotiation*).

DICOM specifies a number of network services and types of information objects, each of which is called an *Abstract Syntax* for the Negotiation. DICOM also specifies a variety of methods for encoding data, denoted *Transfer Syntaxes*. The Negotiation allows the initiating Application Entity to propose combinations of Abstract Syntax and Transfer Syntax to be used on the Association; these combinations are called *Presentation Contexts*. The receiving Application Entity accepts the Presentation Contexts it supports.

For each Presentation Context, the Association Negotiation also allows the devices to agree on *Roles* - which one is the *Service Class User* (SCU - client) and which is the *Service Class Provider* (SCP - server). Normally the device initiating the connection is the SCU, i.e., the client system calls the server, but not always.

The Association Negotiation finally enables exchange of maximum network packet (*PDU*) size, security information, and network service options (called *Extended Negotiation* information).

The Application Entities, having negotiated the Association parameters, may now commence exchanging data. Common data exchanges include queries for worklists and lists of stored images, transfer of image objects and analyses (structured reports), and sending images to film printers. Each exchangeable unit of data is formatted by the sender in accordance with the appropriate *Information Object Definition*, and sent using the negotiated Transfer Syntax. There is a Default Transfer Syntax that all systems must accept, but it may not be the most efficient for some use cases. Each transfer is explicitly acknowledged by the receiver with a *Response Status* indicating success, failure, or that query or retrieve operations are still in process.

Two Application Entities may also communicate with each other by exchanging media (such as a CD-R). Since there is no Association Negotiation possible, they both use a *Media Application Profile* that specifies "pre-negotiated" exchange media format, Abstract Syntax, and Transfer Syntax.

3.6 Abbreviations

AE Application Entity

AET Application Entity Title

CAD Computer Aided Detection

CDA Clinical Document Architecture

CD-R Compact Disk Recordable

CSE Customer Service Engineer

CR Computed Radiography

CT Computed Tomography

DHCP Dynamic Host Configuration Protocol

DICOM Digital Imaging and Communications in Medicine

DIT Directory Information Tree (LDAP)

DN Distinguished Name (LDAP)

DNS Domain Name System

DX Digital X-ray

FSC File-Set Creator

FSU File-Set Updater

FSR File-Set Reader

GSDF Grayscale Standard Display Function

GSPS Grayscale Softcopy Presentation State

HIS Hospital Information System

HL7 Health Level 7 Standard

IHE Integrating the Healthcare Enterprise

IOD Information Object Definition

IPv4 Internet Protocol version 4

IPv6 Internet Protocol version 6

ISO International Organization for Standards

IO Intra-oral X-ray

JPEG Joint Photographic Experts Group

LDAP Lightweight Directory Access Protocol

LDIF LDAP Data Interchange Format

LUT Look-up Table

MAR Medication Administration Record

MPEG Moving Picture Experts Group

MG Mammography (X-ray)

MPPS Modality Performed Procedure Step

MR Magnetic Resonance Imaging

MSPS Modality Scheduled Procedure Step

MTU Maximum Transmission Unit (IP)

MWL Modality Worklist

NM Nuclear Medicine

NTP Network Time Protocol

O Optional (Key Attribute)

OP Ophthalmic Photography

OSI Open Systems Interconnection

PACS Picture Archiving and Communication System

PET Positron Emission Tomography

PDU Protocol Data Unit

R Required (Key Attribute)

RDN Relative Distinguished Name (LDAP)

RF Radio Fluoroscopy

RIS Radiology Information System.

RRD SR Radiopharmaceutical Radiation Dose Structured Report

RT Radiotherapy

SC Secondary Capture

SCP Service Class Provider

SCU Service Class User

SOP Service-Object Pair

SPS Scheduled Procedure Step

SR Structured Reporting

TCP/IP Transmission Control Protocol/Internet Protocol

U Unique (Key Attribute)

UL Upper Layer

US Ultrasound

VL Visible Light

VR Value Representation

XA X-ray Angiography

3.7 References

Referenced documents should be listed here, including appropriate product manuals (such as service manuals that specify how to set DICOM communication parameters). References to the DICOM Standard should provide the URL for the free published version of the Standard, but should not specify a date of publication:

NEMA PS3 Digital Imaging and Communications in Medicine (DICOM) Standard, available free at http://medical.nema.org/

4 Networking

4.1 Implementation Model

The Implementation model consists of three sections: the Application Data Flow Diagram, specifying the relationship between the Application Entities and the "external world" or Real-World activities, a functional description of each Application Entity, and the sequencing constraints among them.

4.1.1 Application Data Flow

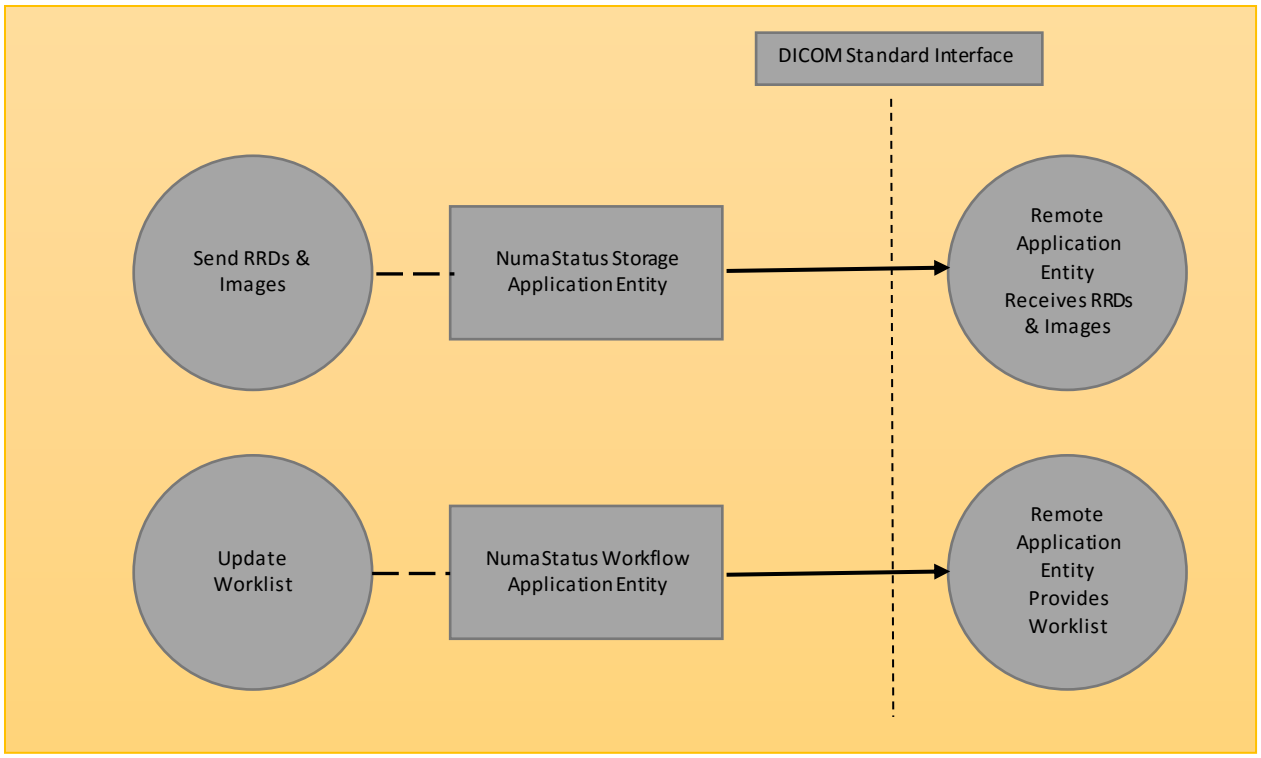

Figure 4.1-1. Application Data Flow Diagram

- The NumaStatus sends images and RRDs to a remote AE. It is associated with the local real-world activity "Send RRDs & Images". "Send RRDs & Images" is performed upon user request for each study completed or for specific images selected.
- The Workflow Application Entity receives Worklist information from a remote AE. It is associated with the local real-world activities "Update Worklist". When the "Update Worklist" local real-world activity is performed the Workflow Application Entity queries a remote AE for worklist items and provides the set of worklist items matching the query request. "Update Worklist" is performed as a result of an operator request or can be performed automatically on certain user interaction with the NumaStatus application.

4.1.2 Functional Definition of AEs

4.1.2.1 Functional Definition of "NumaStatus Storage Application Entity"

The creation of send command with image, RRD and selected destination will activate the Storage AE. An association request is sent to the destination AE and the image and report transfer is started. If the association cannot be opened, the related send-job is set to an error state and can be restarted by the user via job control interface. By default, the Storage AE will not try to initiate another association for this send-job automatically.

4.1.2.2 Functional Definition of "NumaStatus Workflow Application Entity"

Worklist Update attempts to download a Worklist from a remote node. If the Workflow AE establishes an Association to a remote AE, it will transfer all worklist items via the open Association. During receiving the worklist response items are counted and the query processing is canceled if the configurable limit of items is reached. The results will be displayed is the application Schedule Step List.

4.1.3 Sequencing of Real World Activities

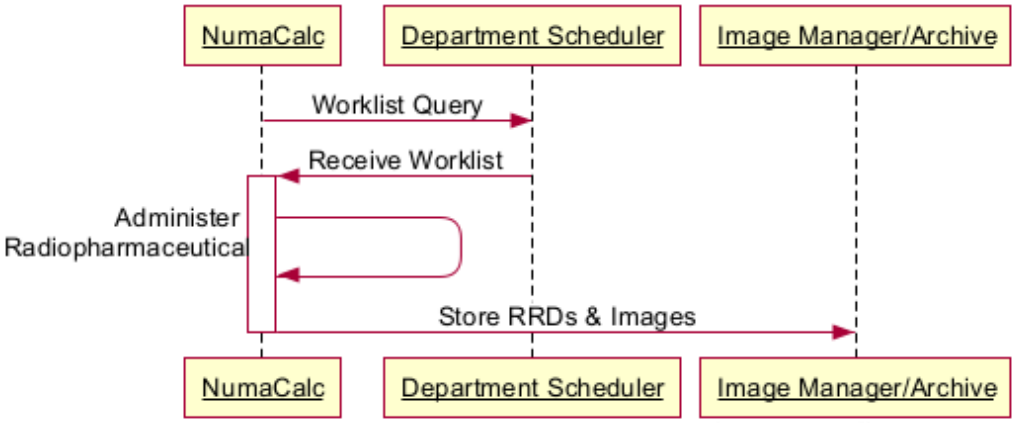

Figure 4.1-2. Application Data Flow Diagram

Under normal scheduled workflow conditions the sequencing constraints illustrated in Figure 4.1-2 apply:

1. Query Worklist
2. Receive Worklist of Modality Scheduled Procedure Steps (MSPS)
3. Select Work item (MSPS) from Worklist
4. Administer Radiopharmaceutical
5. Store RRD and Images to Image Manager.

4.2 AE Specifications:

4.2.1 "NumaStatus Storage Application Entity" Specification

4.2.1.1 SOP Classes

The specification for an Application Entity shall contain a statement of the form:

NumaStatus provides Standard Conformance to the following SOP Classes:"

Table 4.2-1. SOP Classes for "NumaStatus Storage Application Entity"

SOP Class Name	SOP Class UID	SCU	SCP
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	No

SOP Class Name	SOP Class UID	SCU	SCP
Radiopharmaceutical Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.68	Yes	No

4.2.1.2 Association Policies

4.2.1.2.1 General

The DICOM standard Application context shall be specified.

Table 4.2-2. DICOM Application Context

Application Context Name	1.2.840.10008.3.1.1.1

4.2.1.2.2 Number of Associations.

NumaStatus initiates one Association at a time for each destination to which a transfer request is being processed in the active job queue list. Only one job will be active at a time, the other remains pending until the active job is completed or failed.

Table 4.2-3. Number of Associations as an Association Initiator for "NumaStatus Storage Application Entity"

Maximum number of simultaneous associations	1 (configurable)

Table 4.2-4. Number of Associations as an Association Acceptor for "NumaStatus Storage Application Entity"

Maximum number of simultaneous associations	0

4.2.1.2.3 Asynchronous Nature

NumaStatus does not support asynchronous communication (multiple outstanding transactions over a single Association).

Table 4.2-5. Asynchronous Nature as an Association Initiator for "NumaStatus Storage Application Entity"

Maximum number of outstanding asynchronous transactions	1

4.2.1.2.4 Implementation Identifying Information

The value supplied for Implementation Class UID shall be documented here. If a version name is supplied, this fact shall be documented here. Policies defining the values supplied for version name maybe stated here.

Table 4.2-6. DICOM Implementation Class and Version for "NumaStatus Storage Application Entity"

Implementation Class UID	1.2.826.0.1.3680043.2.59.25
Implementation Version Name	NumaStatus_01

4.2.1.3 Association Initiation Policy

4.2.1.3.1 Send RRDs and Images

4.2.1.3.1.1 Description and Sequencing of Activities

A user can select images and reports and request them to be sent to multiple destinations. Each request is forwarded to the job queue and processed individually.

The Storage AE is invoked by the job control interface that is responsible for processing network archival tasks. The job consists of data describing the instances marked for storage and the destination. A job for a specific network destination initiates a C-STORE request to store images. If the process successfully establishes an Association to a remote Application Entity, it will transfer each marked instance one after another via the open Association. Status of the transfer is reported through the job control interface. Only one job will be active at a time. If the C-STORE Response from the remote Application contains a status other than Success or Warning, the Association is aborted and the related Job is switched to a failed state.

The Storage AE attempts to initiate a new Association in order to issue a C-STORE request. If the job contains multiple images then multiple C-STORE requests will be issued over the same Association.

A possible sequence of interactions between the Storage AE and an Image Manager (e.g., a storage or archive device supporting the Storage and Storage Commitment SOP Classes as an SCP) is outlined below:

1. The Storage AE opens an association with the Image Manager
2. A secondary capture image is transmitted to the Image Manager using a C-STORE request and the Image Manager replies with a C-STORE response (status success).
3. A RRD SR instance is transmitted to the Image Manager using a C-STORE request and the Image Manager replies with a C-STORE response (status success).
4. The Storage AE closes the association with the Image Manager.

4.2.1.3.1.2 Proposed Presentation Contexts

NumaStatus is capable of proposing the Presentation Contexts shown in the following table:

Table 4.2-7. Proposed Presentation Contexts for Activity Send Images & Reports

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None
Radiopharmaceutical Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.68	. Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None

Presentation Contexts for Secondary Capture Image Storage or Radiopharmaceutical Radiation Dose SR Storage will only be proposed if the Send Job contains instances for these SOP Classes.

4.2.1.3.1.3 SOP Specific Conformance for Image and RRD SR Storage SOP Classes

All Image & Presentation State Storage SOP Classes supported by the Storage AE exhibit the same behavior, except where stated, and are described together in this section.

If Radiopharmaceutical Radiation Dose SR Storage SOP Instances are included in the Send Job and a corresponding Presentation Context cannot be negotiated, then Radiopharmaceutical Radiation Dose SR SOP Instances will not be sent and a warning is logged. Any remaining Secondary Capture Image Storage SOP Instances included in the Send Job will be transmitted. Failure to negotiate a Radiopharmaceutical Radiation Dose SR does not in itself cause the Send Job to be marked as failed. The behavior of Storage AE when encountering status codes in a C-STORE response is summarized in the Table below:

:

Table 4.2-9. DICOM Command Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The SCP has successfully stored the SOP Instance. If all SOP Instances in a send job have status success then the job is marked as complete
Refused	Out of Resources	A700-A7FF	The Association is aborted using A-ABORT and the send job is marked as failed. The status meaning is logged and the job failure is reported to the user via the job control application. This is a transient failure.

The behavior of the AE during communication failure is summarized in a table as follows:

Table 4.2-10. DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	The Association is aborted using A-ABORT and the send job is marked as failed. The reason is logged and the job failure is reported to the user via the job control application
Association aborted by the SCP or network layers	The send job is marked as failed. The reason is logged and the job failure is reported to the user via the job control application.

4.2.2 Workflow Application Entity Specification

4.2.2.1 SOP Classes

NumaStatus provides Standard Conformance to the following SOP Classes:

Table 4.2-16. SOP Classes for AE Workflow

SOP Class Name	SOP Class UID	SCU	SCP
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Yes	No

4.2.2.2 Association Policies

4.2.2.2.1 General

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

Table 4.2-17. DICOM Application Context for AE Workflow

Application Context Name	1.2.840.10008.3.1.1.1

4.2.2.2.2 Number of Associations

NumaStatus initiates one Association at a time for a Worklist request.

Table 4.2-18. Number of Associations Initiated for AE Workflow

Maximum number of simultaneous Associations	1

4.2.2.2.3 Asynchronous Nature

NumaStatus does not support asynchronous communication (multiple outstanding transactions over a single Association).

Table 4.2-19. Asynchronous Nature as a SCU for AE Workflow

Maximum number of outstanding asynchronous transactions	1

4.2.2.2.4 Implementation Identifying Information

The implementation information for this Application Entity is:

Table 4.2-20. DICOM Implementation Class and Version for AE Workflow

Implementation Class UID	1.2.826.0.1.3680043.2.59.25
Implementation Version Name	NumaStatus_01

4.2.2.3 Association Initiation Policy

4.2.2.3.1 Activity - Worklist Update

4.2.2.3.1.1 Description and Sequencing of Activities

The request for a Worklist Update is initiated by user interaction, i.e., pressing the buttons "Worklist Update"/"Patient Worklist Query". With "Worklist Update" the automated query mechanism is performed immediately on request, while with "Patient Worklist Query" a dialog to enter search criteria is opened and an interactive query can be performed.

The interactive Patient Worklist Query will display a dialog for entering data as search criteria. When the Query is started on user request, only the data from the dialog will be inserted as matching keys into the query.

Upon initiation of the request, the NumaStatus will build an Identifier for the C-FIND request, will initiate an Association to send the request and will wait for Worklist responses. After retrieval of all responses, NumaStatus will access the local database to add or update patient demographic data. To protect the system from overflow, the NumaStatus will limit the number of processed worklist responses to a configurable maximum. During receiving the worklist response items are counted and the query processing is canceled by issuing a C-FIND-CANCEL if the configurable limit of items is reached. The results will be displayed in a separate list, which will be cleared with the next worklist update.

NumaStatus will initiate an Association in order to issue a C-FIND request according to the Modality Worklist Information Model.

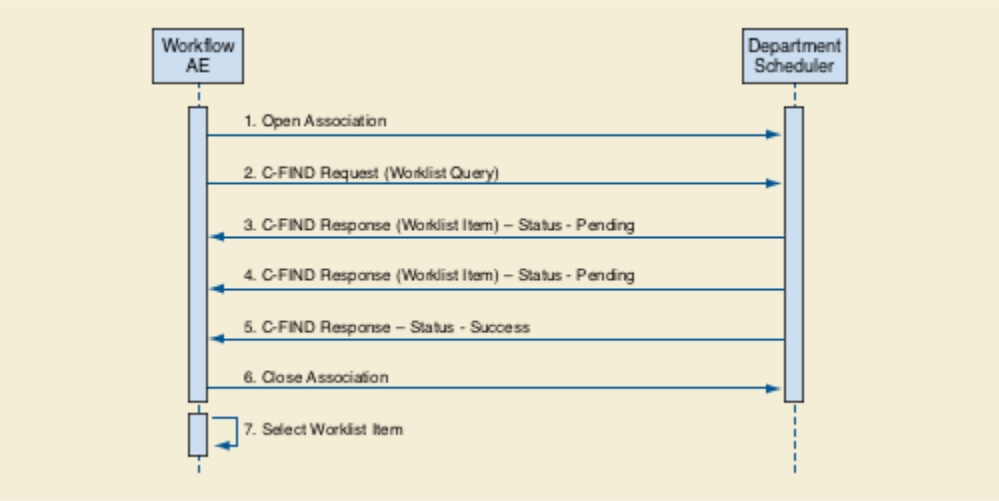

Figure 4.2-3. Sequencing of Activity - Worklist Update

A possible sequence of interactions between the Workflow AE and a Departmental Scheduler (e.g., a device such as a RIS or HIS that supports the Modality Worklist SOP Class as an SCP) is illustrated in the Figure above:

1. The Worklist AE opens an association with the Departmental Scheduler
2. The Worklist AE sends a C-FIND request to the Departmental Scheduler containing the Worklist Query attributes.
3. The Departmental Scheduler returns a C-FIND response containing the requested attributes of the first matching Worklist Item.
4. The Departmental Scheduler returns another C-FIND response containing the requested attributes of the second matching Worklist Item.
5. The Departmental Scheduler returns another C-FIND response with status Success indicating that no further matching Worklist Items exist. This example assumes that only 2 Worklist items match the Worklist Query.
6. The Worklist AE closes the association with the Departmental Scheduler.
7. The user selects a Worklist Item from the Worklist and prepares to acquire new images.

4.2.2.3.1.2 Proposed Presentation Contexts

NumaStatus will propose Presentation Contexts as shown in the following table:

Table 4.2-21. Proposed Presentation Contexts for Activity Worklist Update

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

4.2.2.3.1.3 SOP Specific Conformance for Modality Worklist

The behavior of NumaStatus when encountering status codes in a Modality Worklist C-FIND response is summarized in the Table below. If any other SCP response status than "Success" or "Pending" is received by NumaStatus, a message "query failed" will appear on the user interface.

Table 4.2-22. Modality Worklist C-FIND Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Matching is complete	0000	The SCP has completed the matches. Worklist items are available for display or further processing.
Refused	Out of Resources	A700	The Association is aborted using A-ABORT and the worklist query is marked as failed. The status meaning is logged and reported to the user if an interactive query. Any additional error information in the Response will be logged.
Failed	Identifier does not match SOP Class	A900	The Association is aborted using A-ABORT and the worklist query is marked as failed. The status meaning is logged and reported to the user if an interactive query. Any additional error information in the Response will be logged.
Failed	Unable to Process	C000 - CFFF	The Association is aborted using A-ABORT and the worklist query is marked as failed. The status meaning is logged and reported to the user if an interactive query. Any additional error information in the Response will be logged.
Cancel	Matching terminated due to Cancel request	FE00	If the query was canceled due to too may worklist items then the SCP has completed the matches. Worklist items are available for display or further processing. Otherwise, the Association is aborted using A-ABORT and the worklist query is marked as failed. The status meaning is logged and reported to the user if an interactive query.
Pending	Matches are continuing	FF00	The worklist item contained in the Identifier is collected for later display or further processing.
Pending	Matches are continuing - Warning that one or more Optional Keys were not supported	FF01	The worklist item contained in the Identifier is collected for later display or further processing. The status meaning is logged only once for each C-FIND operation.
*	*	Any other status code.	The Association is aborted using A-ABORT and the worklist is marked as failed. The status meaning is logged and reported to the user if an interactive

Service Status	Further Meaning	Error Code	Behavior
			query. Any additional error information in the Response will be logged.

The behavior of NumaStatus during communication failure is summarized in the Table below.

Table 4.2-23. Modality Worklist Communication Failure Behavior

Exception	Behavior
Timeout	The Association is aborted using A-ABORT and the worklist query marked as failed. The reason is logged and reported to the user if an interactive query.
Association aborted by the SCP or network layers	The worklist query is marked as failed. The reason is logged and reported to the user if an interactive query.

Acquired images will always use the Study Instance UID specified for the Scheduled Procedure Step (if available). If an acquisition is unscheduled, a Study Instance UID will be generated locally.

The Table below provides a description of the NumaStatus Worklist Request Identifier and specifies the attributes that are copied into the images. Unexpected attributes returned in a C-FIND response are ignored.

Requested return attributes not supported by the SCP are set to have no value. Non-matching responses returned by the SCP due to unsupported optional matching keys are ignored. No attempt is made it filter out possible duplicate entries.

Table 4.2-24. Worklist Request Identifier

Module Name Attribute Name	Tag	VR	M	R	Q	D	IOD
SOP Common							
Specific Character Set	(0008,0005)	CS		x			
Scheduled Procedure Step							
Scheduled Procedure Step Sequence	(0040,0100)						
>Scheduled Station AET	(0040,0001)	AE	(S)				
>Scheduled Procedure Step Start Date	(0040,0002)	DA	S			x	
>Scheduled Procedure Step Start Time	(0040,0003)	TM		x		x	
>Modality	(0008,0060)	CS	S	x		x	
>Scheduled Performing Physician's Name	(0040,0006)	PN		x	x	x	x
>Scheduled Procedure Step Description	(0040,0007)	LO		x		x	x

Module Name Attribute Name	Tag	VR	M	R	Q	D	IOD
>Scheduled Station Name	(0040,0010)	SH		x			
>Scheduled Procedure Step Location	(0040,0011)	SH		x			
>Scheduled Protocol Code Sequence	(0040,0008)	SQ		x			x
>Pre-Medication	(0040,0012)	LO		x		x	
>Scheduled Procedure Step ID	(0040,0009)	SH		x		x	x
>Requested Contrast Agent	(0032,1070)	LO		x		x	
Requested Procedure							
Requested Procedure ID	(0040,1001)	SH		x	x	x	x
Requested Procedure Description	(0032,1060)	LO		x		x	x
Study Instance UID	(0020,000D)	UI		x			x
Requested Procedure Priority	(0040,1003)	SH		x			
Patient Transport Arrangements	(0040,1004)	LO		x			
Referenced Study Sequence	(0008,1110)	SQ		x			x
Requested Procedure Code Sequence	(0032,1064)	SQ		x			x
Imaging Service Request							
Accession Number	(0008,0050)	SH		x	x	x	x
Requesting Physician	(0032,1032)	PN		x		x	x
Referring Physician's Name	(0008,0090)	PN		x	x	x	x
Visit Identification							
Admission ID	(0038,0010)	LO		x			
Visit Status							
Current Patient Location	(0038,0300)	LO		x	x		
Visit Admission							
Admitting Diagnosis Description	(0008,1080)	LO		x		x	
Patient Identification							

Module Name Attribute Name	Tag	VR	M	R	Q	D	IOD
Patient Name	(0010,0010)	PN		x	x	x	x
Patient ID	(0010,0020)	LO		x	x	x	x
Patient Demographic							
Patient's Birth Date	(0010,0030)	DA		x	x	x	x
Patient's Sex	(0010,0040)	CS		x	x	x	x
Patient's Weight	(0010,1030)	DS		x		x	x
Confidentiality constraint on patient data	(0040,3001)	LO		x			
Patient Medical							
Patient State	(0038,0500)	LO		x		x	
Pregnancy Status	(0010,21C0)	US		x		x	
Medical Alerts	(0010,2000)	LO		x		x	
Allergies	(0010,2110)	LO		x		x	
Special Needs	(0038,0050)	LO		x		x	

The above table should be read as follows:

Module Name The name of the associated module for supported worklist attributes.

Attribute Name Attributes supported to build a NumaStatus Worklist Request Identifier.

Tag DICOM tag for this attribute.

VR DICOM VR for this attribute.

M Matching keys for Worklist Update. A "S" will indicate that NumaStatus will supply an attribute value for Single Value Matching, a "R" will indicate Range Matching and a "*" will denote wild card matching. It can be configured if "Scheduled Station AE Title" is additionally supplied "(S)" and if Modality is set to RF or SC.

R Return keys. An "x" will indicate that NumaStatus will supply this attribute as Return Key with zero length for Universal Matching. The NumaStatus will support retired date format (yyyy.mm.dd) for "Patient's Birth Date" and "Scheduled Procedure Step Start Date" in the response identifiers. For "Scheduled Procedure Step Start Time" also retired time format as well as unspecified time components are supported.

Q Interactive Query Key. An "x" " will indicate that NumaStatus will supply this attribute as matching key, if entered in the Query Patient Worklist dialog. For example, the Patient Name can be entered thereby restricting Worklist responses to Procedure Steps scheduled for the patient.

D Displayed keys. An "x" indicates that this worklist attribute is displayed to the user during a patient registration dialog. For example, Patient Name will be displayed when registering the patient prior to an examination.

IOD An "x" indicates that this Worklist attribute is included into all Object Instances created during performance of the related Procedure Step.

The default Query Configuration is set to "Modality" (RF) and "Date" (date of today). Optionally, additional matching for the own AET is configurable.

The same info shall be repeated for each additional AE.

4.3 Network Interfaces

4.3.1 Physical Network Interface

NumaStatus supports a single network interface. One of the following physical network interfaces will be available depending on installed hardware options:

Table 4.3-1. Supported Physical Network Interfaces

Ethernet 100baseT
Ethernet 10baseT

4.3.2 Additional Protocols

NumaStatus conforms to the System Management Profiles listed in the Table below. All requested transactions for the listed profiles and actors are supported. Support for optional transactions are listed in the Table below:

Table B.4.3-2. Supported System Management Profiles

Profile Name	Actor	Protocols Used	Optional Transactions	Security Support
Network Address Management	DHCP Client	DHCP	N/A	
	DNS Client	DNS	N/A	
Time Synchronization	NTP Client	NTP	Find NTP Server	
	DHCP Client	DHCP	N/A	

4.3.2.1 DHCP

DHCP can be used to obtain TCP/IP network configuration information. The network parameters obtainable via DHCP are shown in the Table below. The Default Value column of the table shows the default used if the DHCP server does not provide a value. Values for network parameters set in the Service/Installation tool take precedence over values obtained from the DHCP server. Support for DHCP can be configured via the Service/Installation Tool. The Service/Installation tool can be used to configure the machine name. If DHCP is not in use, TCP/IP network configuration information can be manually configured via the Service/Installation Tool.

Table B.4.3-3. Supported DHCP Parameters

DHCP Parameter	Default Value
IP Address	None

DHCP Parameter	Default Value
Hostname	Requested machine name
List of NTP servers	Empty list
List of DNS servers	Empty list
Routers	Empty list
Static routes	None
Domain name	None
Subnet mask	Derived from IP Address (see service manual)
Broadcast address	Derived from IP Address (see service manual)
Default router	None
Time offset	Site configurable (from Timezone)
MTU	Network Hardware Dependent
Auto-IP permission	No permission

If the DHCP server refuses to renew a lease on the assigned IP address all active DICOM Associations will be aborted.

4.3.2.2 DNS

DNS can be used for address resolution. If DHCP is not in use or the DHCP server does not return any DNS server addresses, the identity of a DNS server can be configured via the Service/Installation Tool. If a DNS server is not in use, local mapping between hostname and IP address can be manually configured via the Service/Installation Tool.

4.3.2.3 NTP

The NTP client implements the optional Find NTP Server Transaction. The NTP client will issue an NTP broadcast to identify any local NTP servers. If no local servers can found via NTP broadcast, the NTP Servers identified by DHCP will be used as time references. Additionally, one or more NTP Servers can be configured via the Service/Installation Tool. If no NTP Servers are identified then the local clock will be used as a time reference and a warning written to the system log files.

4.3.3 IPv4 and IPv6 Support

This product only supports IPv4 connections.

4.4 Configuration

4.4.1 AE Title/Presentation Address Mapping

4.4.1.1 Local AE Titles.

All local applications use the AE Titles and TCP/IP Ports configured via the Service/Installation Tool. The Field Service Engineer can configure the TCP Port via the Service/Installation Tool. No Default AE Titles are provided. The AE Titles must be configured during installation. The local AE Title used by each individual application can be

configured independently of the AE Title used by other local applications. If so configured, all local AEs are capable of using the same AE Title.

Table 4.4-1. AE Title Configuration Table

Application Entity	Default AE Title	Default TCP/IP Port
Storage	No Default	Not Applicable
Workflow	No Default	Not Applicable

4.4.1.2 Remote AE Title/Presentation Address Mapping

The AE Title, host names and port numbers of remote applications are configured using the NumaStatus Setting.

4.4.1.2.1 Storage

The NumaStatus settings is used to configure the AE Titles, port-numbers, host-names and capabilities for the remote Storage SCPs. Associations will only be accepted from known AE Titles and associations from unknown AE Titles will be rejected. Multiple remote Storage SCPs can be defined.

4.4.1.2.2 Workflow

The NumaStatus settings is used to config the AE Title, port-number, host-name and capabilities of the remote Modality Worklist SCP. Only a single remote Modality Worklist SCP can be defined.

4.4.2 Parameters

A large number of parameters related to general operation and customer protocols can be configured using the NumaStatus settings or in setting files. The Table below only shows those configuration parameters relevant to DICOM communication. See the NumaStatus User Manual for details on general configuration capabilities.

Table 4.4-2. Configuration Parameters Table

Parameter	Configurable (Yes/No)	Default Value
General Parameters		
Max PDU Receive Size	Yes	65536 Bytes (64 kB)
Max PDU Send Size (larger PDUs will never be sent, even if the receiver supports a larger Max PDU Receive Size. If the receiver supports a smaller Max PDU Receive Size then the Max PDU Send Size will be reduced accordingly for the duration of the Association. Max PDU Receive Size information is exchanged during DICOM Association Negotiation in the Maximum Length Sub-Item of the A-ASSOCIATION-RQ and A-ASSOCIATE-AC)	No	65536 Bytes (64 kB)
Time-out waiting for a acceptance or rejection response to an Association Request (Application Level Timeout)	Yes	15 s

Parameter	Configurable (Yes/No)	Default Value
Time-out waiting for a response to an Association release request (Application Level Timeout)	Yes	30 s
Time-out waiting for completion of a TCP/IP connect request (Low-level timeout)	Yes	15 s
Time-out awaiting a Response to a DIMSE Request (Low-Level Timeout)	Yes	360 s
Time-out for waiting for data between TCP/IP-packets (Low Level Timeout)	Yes	30 s
Storage Parameters		
Storage SCU time-out waiting for a response to a C-STORE-RQ	Yes	120 s
Number of times a failed send job may be retried	Yes	0 (Failed send jobs are not retried)
Delay between retrying failed send jobs	Yes	60 s
Maximum number of simultaneously initiated Associations by the Storage AE	Yes	1
Supported Transfer Syntaxes (separately configurable for each remote AE)	Yes	Implicit VR Little Endian Explicit VR Little Endian
Storage SCU time-out waiting for a response to a C-STORE-RQ	Yes	120 s
Modality Worklist Parameters		
Modality Worklist SCU time-out waiting for the final response to a C-FIND-RQ	Yes	600 s
Maximum number of Worklist Items	Yes	1000
Supported Transfer Syntaxes for Modality Worklist	Yes	Implicit VR Little Endian Explicit VR Little Endian
Delay between automatic Worklist Updates	N\A	N\A
Query Worklist for specific Scheduled Station AE Title	Yes	
Query Worklist for specific Modality Value	Yes	NM

5 Media Interchange

6 Transformation of DICOM to CDA

7 Support of Character Sets

All NumaStatus DICOM applications support the

ISO_IR 100 (ISO 8859-1:1987 Latin Alphabet No. 1 supplementary set)

8 Security

NumaStatus does not support any specific security measures.

It is assumed that NumaStatus is used within a secured environment. It is assumed that a secured environment includes at a minimum:

a. Firewall or router protections to ensure that only approved external hosts have network access to NumaStatus.

b. Firewall or router protections to ensure that NumaStatus only has network access to approved external hosts and services.

c. Any communication with external hosts and services outside the locally secured environment use appropriate secure network channels (e.g., such as a Virtual Private Network (VPN))

Other network security procedures such as automated intrusion detection may be appropriate in some environments. Additional security features may be established by the local security policy and are beyond the scope of this conformance statement.

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9 Annexes

9.1 IOD Contents

9.1.1 Created SOP Instances

Examples of RRD SR and Secondary Capture created by NumaStatus can be downloaded from:

http://www.numa-inc.com/NumaStatus/example-images

Table B.9.1-1 specifies the attributes of an RRD SR transmitted by the NumaStatus storage application.

Table B.9.1-2 specifies the attributes of a Secondary Capture Images transmitted by the NumaStatus storage application.

The following tables use a number of abbreviations. The abbreviations used in the "Presence of …" column are:

VNAP Value Not Always Present (attribute sent zero length if no value is present)

ANAP Attribute Not Always Present

ALWAYS Always Present

EMPTY Attribute is sent without a value

The abbreviations used in the "Source" column:

MWL the attribute value source Modality Worklist

USER the attribute value source is from User input

AUTO the attribute value is generated automatically

MPPS the attribute value is the same as that use for Modality Performed Procedure Step

CONFIG the attribute value source is a configurable parameter

Note

All dates and times are encoded in the local configured calendar and time. Date, Time and Time zone are configured using the Service/Installation Tool.

9.1.1.1 Radiopharmaceutical Radiation Dose Structure Report IOD

Table 9.1-1. Radiopharmaceutical Radiation Dose SR IOD Modules

IE	Module	Reference	Presence of Module
Patient	Patient	Table 9.1-3	ALWAYS
	Clinical Trial Subject	NS	Not Supported
Study	General Study	Table 9.1-4	ALWAYS
	Patient Study	Table 9.1-5	ALWAYS
	Clinical Trial Study	NS	Not Supported
Series	SR Document Series	Table 9.1-17	M
	Clinical Trial Series	NS	Not Supported
Frame of Reference	Synchronization	Table 9.1-7	ALWAYS
Equipment	General Equipment	Table 9.1-6	ALWAYS
	Enhanced General Equipment	Table 9.1-19	ALWAYS
Document	SR Document General	Table 9.1-18	ALWAYS
	SR Document Content		ALWAYS
	SOP Common	Table 9.1-10	ALWAYS

9.1.1.2 Secondary Capture Image IOD

Table 9.1-2. IOD of Created Secondary Capture Instance

IE	Module	Reference	Presence of Module
Patient	Patient	Table 9.1-3	ALWAYS

IE	Module	Reference	Presence of Module
	Clinical Trial Subject	NS	Not Supported
Study	General Study	Table 9.1-4	ALWAYS
	Patient Study	Table 9.1-5	ALWAYS
	Clinical Trial Study	NS	Not Supported
Series	General Series	Table 9.1-6	ALWAYS
	Clinical Trial Series	NS	Not Supported
	Private Series Characteristics	Table 9.1-9	VNAP
Equipment	General Equipment	Table 9.1-7	ALWAYS
	SC Equipment	Table 9.1-16	ALWAYS
Image	General Image	Table 9.1-12	ALWAYS
	Image Pixel	Table 9.1-13	ALWAYS
	Device	Table 9.1-14	ALWAYS
	SC Image	Table 9.1-15	ALWAYS
	SOP Common	Table 9.1-10	ALWAYS
	NM Isotope (Extended)	Table 9.1-20	ALWAYS
	Private Inventory Module	Table 9.1-8	ALWAYS

9.1.1.3 Common Modules

Table 9.1-3. Patient Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Patient's Name	(0010,0010)	PN	From Modality Worklist or user input. Values supplied via Modality Worklist will be entered as received. Values supplied via user input will contain all 5 components (some possibly empty). . Maximum 64 characters.	VNAP	MWL/USER
Patient ID	(0010,0020)	LO	From Modality Worklist or user input. Maximum 64 characters.	VNAP	MWL/USER

Attribute Name	Tag	VR	Value	Presence of Value	Source
Patient's Birth Date	(0010,0030)	DA	From Modality Worklist or user input	VNAP	MWL/USER
Patient's Sex	(0010,0040)	CS	From Modality Worklist or user input	VNAP	MWL/USER
Patient Comments	(0010,4000)	LT	From User Input. Maximum 1024 characters.	VNAP	USER

Table 9.1-4. General Study Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Study Instance UID	(0020,000D)	UI	From Modality Worklist or generated by device	ALWAYS	MWL/AUTO
Study Date	(0008,0020)	DA	<yyyymmdd>	ALWAYS	AUTO
Study Time	(0008,0030)	TM	<hhmmss>	ALWAYS	AUTO
Referring Physician's Name	(0008,0090)	PN	From Modality Worklist or User Input	VNAP	MWL/USER
Study ID	(0020,0010)	SH	Requested Procedure ID from Worklist or User Input	VNAP	MWL/USER
Accession Number	(0008,0050)	SH	From Modality Worklist or User Input	VNAP	MWL/USER
Study Description	(0008,1030)	LO	Comment text box in study list. Maximum 1024 characters.	VNAP	USER
Referenced Study Sequence	(0008,1110)	SQ	From Modality Worklist	VNAP	MWL
>Referenced SOP Class UID	(0008,1150)	UI	From Modality Worklist	VNAP	MWL
>Referenced SOP Instance UID	(0008,1155)	UI	From Modality Worklist	VNAP	MWL

Table 9.1-5. Patient Study Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Admitting Diagnosis Description	(0008,1080)	LO	From Modality Worklist	VNAP	MWL
Patient's Age	(0010,1010)	AS	Calculated from DoB input on base of actual Date	VNAP	AUTO

Attribute Name	Tag	VR	Value	Presence of Value	Source
Patient's Weight	(0010,1030)	DS	From Modality Worklist or user input	VNAP	MWL/USER

Table 9.1-6. General Equipment Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Manufacturer	(0008,0070)	LO	Numa	ALWAYS	AUTO
Institution Name	(0008,0080)	LO	From Configuration	VNAP	CONFIG
Station Name	(0008,1010)	SH	From Configuration	ALWAYS	CONFIG
Manufacturer's Model Name	(0008,1090)	LO	NUMASTATUS	ALWAYS	AUTO
Device Serial Number	(0018,1000)	LO	From Configuration	ALWAYS	CONFIG
Software Version	(0018,1020)	LO	From Configuration	ALWAYS	CONFIG

Table 9.1-7. Synchronization Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Synchronization Frame of Reference UID	(0020,0200)	UI	1.2.840.10008.15.1.1	ALWAYS	AUTO
Synchronization Trigger	(0018,106A)	CS	**NO TRIGGER**	ALWAYS	AUTO
Trigger Source or Type	(0018,1061)	LO		NEVER	
Synchronization Channel	(0018,106C)	US		NEVER	
Acquisition Time Synchronized	(0018,1800)	CS	Y	ALWAYS	CONFIG
Time Source	(0018,1801)	SH		NEVER	
Time Distribution Protocol	(0018,1801)	CS	NTP	ALWAYS	AUTO
NTP Source Address	(0018,1803)	LO	<IP Address>	ALWAYS	CONFIG

Table 9.1-8. Private Inventory Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Private creator	(0031,00xx)		NUMASTATUS-INVENTORY		
Radiopharmaceutical Name	(0031,xx03)	LO	Use given name for Radiopharmaceutical	ALWAYS	USER
Radiopharmaceutical Code Value	(0031,xx04)	SH	DICOM or Local code for radiopharmaceutical	ALWAYS	CONFIG
Radiopharmaceutical Coding Scheme Designator	(0031,xx05)	SH	Coding scheme designator	ALWAYS	CONFIG
Radiopharmaceutical Code Meaning	(0031,xx06)	LO	DICOM or Local code meaning	ALWAYS	CONFIG
Radionuclide Name	(0031,xx07)	LO	User given name for radionuclide name	ALWAYS	USER
Radionuclide Code Value	(0031,xx08)	SH		ALWAYS	CONFIG
Radionuclide Coding Scheme Designator	(0031,xx09)	SH	Coding scheme designator	ALWAYS	CONFIG
Radionuclide Code Meaning	(0031,xx0A)	LO	Radionuclide code meaning	ALWAYS	CONFIG
Radionuclide Half Life	(0031,xx0B)	SL	Half Life of Radionuclide in seconds	ALWAYS	CONFIG
Radiopharmaceutical Administration Event UID	(0031,xx0C)	UI	Generated by software	ALWAYS	AUTO
Estimated Extravasation Activity	(0031,xx0D)	SS	0% to 100%	VNAP	USER
Radiopharmaceutical Start Date Time	(0031,xx0E)	DT	Date time the Radiopharmaceutical was administered to the user.	ALWAYS	USER \AUTO
Radiopharmaceutical Stop Date Time	(0031,xx0F)	DT	Date time the user stopped administering the radiopharmaceutical to the user.	VNAP	USER
Administered Activity MBq	(0031,xx10)	FD	The activity administered to the user in MBq	ALWAYS	AUTO
Person Participant DICOM	(0031,xx11)	PN	DICOM encoded name of the person who administered the radiopharmaceutical	ALWAYS	CONFIG
Person Participant Name	(0031,xx12)	LO	Displayable name of the person who administered the radiopharmaceutical	ALWAYS	CONFIG
Radiopharmaceutical Volume	(0031,xx13)	FD	Volume in ml	VNAP	USER

Pre-Administration Measured Activity MBq	(0031,xx14)	FD	Pre-Administered Assay activity in MBq	ALWAYS	USER
Pre-Administration Measurement Date Time	(0031,xx15)	DT	Pre-Administered Assay activity in MBq	ALWAYS	USER
Pre-Administration Device Name	(0031,xx16)	LO	Pre-Administered Assay device name	VNAP	CONFIG
Pre-Administration Device Code Value	(0031,xx17)	SH	Pre-Administered Assay device type	VNAP	CONFIG
Pre-Administration Device Coding Scheme Designator	(0031,xx18)	SH	Coding Scheme Designator	VNAP	CONFIG
Pre-Administration Device Code Meaning	(0031,xx19)	LO	Code Meaning	VNAP	CONFIG
Pre-Administration Observer DICOM Name	(0031,xx1A)	PN	DICOM Name of the person who assayed the radiopharmaceutical	ALWAYS	USER
Post Administration Measured Activity MBq	(0031,xx1B)	FD	Post-Admin or residual assay	VNAP	USER
Post Administration Measurement Date Time	(0031,xx1C)	DT	Date Time of the Post-Admin assay	VNAP	USER
Post Administration Device Name	(0031,xx1D)	LO	User Friendly Name	VNAP	USER
Post Administration Device Code Value	(0031,xx1E)	SH	DICOM Code Value	VNAP	CONFIG
Post Administration Device Coding Scheme Designator	(0031,xx1F)	SH	Coding Scheme Designator	VNAP	CONFIG
Post Administration Device Code Meaning	(0031,xx20)	LO	Code Meaning	VNAP	CONFIG
Post Administration Observer DICOM Name	(0031,xx21)	PN	DICOM Name	VNAP	CONFIG
Route Of Administration Name	(0031,xx22)	LO	User friendly name of the route of administration	ALWAYS	USER
Route Of Administration Code Value	(0031,xx23)	SH	DICOM Code Value of Route of Administration	ALWAYS	CONFIG
Route Of Administration Coding Scheme Designator	(0031,xx24)	SH	Coding Scheme Designator	ALWAYS	CONFIG
Route Of Administration Code Meaning	(0031,xx25)	LO	Code Meaning	ALWAYS	CONFIG
Site Of Name	(0031,xx26)	LO	User friendly name of the site of injection	VNAP	CONFIG
Site Of Code Value	(0031,xx27)	SH	DICOM code value of site	VNAP	AUTO
Site Of Coding Scheme Designator	(0031,xx28)	SH	Coding Scheme Designator	VNAP	AUTO

Site Of Code Meaning	(0031,xx29)	LO	Code Meaning	VNAP	AUTO
Laterality Name	(0031,xx2A)	LO	User Friendly name of the laterality of the site of injection	VNAP	USER
Laterality Code Value	(0031,xx2B)	SH	Code Value of laterality	VNAP	AUTO
Laterality Coding Scheme Designator	(0031,xx2C)	SH	Coding Scheme Designator of the laterality	VNAP	AUTO
Laterality Code Meaning	(0031,xx2D)	LO	Code Meaning of laterality	VNAP	AUTO
Brand Name	(0031,xx2E)	LO	Brand name of radiopharmaceutical	VNAP	USER
Prescription Identifier	(0031,xx2F)	LO	Prescription Number of the radiopharmaceutical	VNAP	USER
Billing Code	(0031,xx30)	LO	Billing code of the radiopharmaceutical	VNAP	USER
Drug Product Identifier	(0031,xx31)	LO	Serial number of the radiopharmaceutical	VNAP	USER
Radiopharmaceutical Dispense Unit Identifier	(0031,xx32)	LO	User Input	VNAP	USER
Comment	(0031,xx33)	ST	Text	VNAP	USER
Description	(0031,xx36)	LO	User Input	ALWAYS	USER
Modality	(0031,xx38)	LO	From Worklist	ALWAYS	USER\ Worklist
Administration Point X	(0031,xx39)	SS	Selected injection spot	VNAP	
Administration Point Y	(0031,xx3A)	SS	User Input	VNAP	
Entry Date Time	(0031,xx3C)	DT	Software Generated	ALWAYS	
Associated Procedure Code Value	(0031,xx3D)	SH	From Configuration	ALWAYS	
Associated Procedure Coding Scheme Designator	(0031,xx3E)	SH	From Configuration	ALWAYS	
Associated Procedure Code Meaning	(0031,xx3F)	LO	From Configuration	ALWAYS	
Has Intent Code Value	(0031,xx40)	SH	From Configuration	ALWAYS	
Has Intent Coding Scheme Designator	(0031,xx41)	SH	From Configuration	ALWAYS	
Has Intent Code Meaning	(0031,xx42)	LO	From Configuration	ALWAYS	
Radiopharmaceutical Lot Identifier	(0031,xx43)	LO	User Input	VNAP	
Reagent Vial Identifier	(0031,xx44)	LO	User Input	VNAP	
Radionuclide Identifier	(0031,xx45)	LO	User Input	VNAP	

Note: Below is the image used to record the spot of the injection for intravenous route injections. Administration Point X and Administration Point Y map to a 128 by 256 pixel matrix overlaying the image.

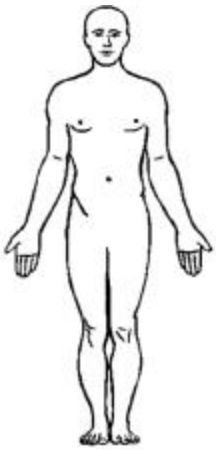

Figure 1

Table 9.1-9. Private Series Characteristics Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Private creator	(0029,00xx)		NUMASTATUS-PatSerChar		
Fasting Duration	(0029,xx04)	FD	User Input	VNAP	
Glucose	(0029,xx05)	FD	User Input	VNAP	
Hydration Volume	(0029,xx06)	FD	User Input	VNAP	
Physical Activity	(0029,xx07)	LO	User Input	VNAP	
Serum Creatine	(0029,xx08)	FD	User Input	VNAP	
Glomerular Filtration Rate	(0029,xx09)	FD	User Input	VNAP	
Effective Dose	(0029,xx0A)	FD	From Configuration	VNAP	
Dose Reference Authority Code Value	(0029,xx0B)	SH	From Configuration	VNAP	
Dose Reference Authority Coding Scheme Designator	(0029,xx0C)	SH	From Configuration	VNAP	
Dose Reference Authority Code Meaning	(0029,xx0D)	LO	From Configuration	VNAP	

Table 9.1-10. SOP Common Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Specific Character Set	(0008,0005)	CS	"ISO_IR 100" or "ISO_IR 144"	ALWAYS	CONFIG
SOP Class UID	(0008,0016)	UI	1.2.840.10008.5.1.4.1.1.12.2	ALWAYS	AUTO
SOP Instance UID	(0008,0018)	UI	Generated by device	ALWAYS	AUTO

9.1.1.4 Secondary Capture Modules

Table 9.1-11. General Series Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Modality	(0008,0060)	CS	NM or PT	ALWAYS	MWL/USER
Series Instance UID	(0020,000E)	UI	Generated by device	ALWAYS	AUTO
Series Number	(0020,0011)	IS	Generated by device	ALWAYS	AUTO
Series Date	(0008,0021)	DA	<yyyymmdd>	ALWAYS	AUTO
Series Time	(0008,0031)	TM	<hhmmss>	ALWAYS	AUTO
Performing Physician's Name	(0008,1050)	PN	Physician field in Study list. Maximum 64 characters.	VNAP	USER
Protocol Name	(0018,1030)	LO	Operator field in Study list. Maximum 64 characters.	ALWAYS	USER
Series Description	(0008,103E)	LO	Organ from Study list. Maximum 512 characters.	VNAP	USER
Operator's Name	(0008,1070)	PN	Operator field in Study list. Maximum 64 characters.	VNAP	USER
Request Attributes Sequence	(0040,0275)	SQ	Zero or 1 item will be present	ALWAYS	AUTO
>Requested Procedure ID	(0040,1001)	SH	From Modality Worklist	VNAP	MWL
>Scheduled Procedure Step ID	(0040,0009)	SH	From Modality Worklist	VNAP	MWL
>Scheduled Procedure Step Description	(0040,0007)	LO	From Modality Worklist	VNAP	MWL
Comments on the Performed Procedure Step	(0040,0280)	LO	Same as MPPS. From user input. Maximum 64 characters.	VNAP	MPPS

Table 9.1-12. General Image Module of Created SC SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Instance Number	(0020,0013)	IS	Generated by device	ALWAYS	AUTO
Patient Orientation	(0020,0020)	CS	Zero length	EMPTY	AUTO
Content Date	(0008,0023)	DA	<yyyymmdd>	ALWAYS	AUTO
Content Time	(0008,0033)	TM	<hhmmss>	ALWAYS	AUTO
Acquisition Number	(0020,0012)	IS	Generated by device	ALWAYS	AUTO
Image Comments	(0020,4000)	LT	From user input. Maximum 1024 characters.	VNAP	USER
Anatomic Region Sequence	(0008,2218)	SQ	From user input.	ALWAYS	USER
> Include 'Code Sequence Macro'	Baseline Context ID is 4009 (see also Section B.8.6)				

Table 9.1-13. Image Pixel Module of Created SC SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Pixel Data	(7FE0,0010)	O W	The Pixel Data itself does contain any burned-in annotation.	ALWAYS	AUTO

Table 9.1-14. Device Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Device Sequence	(0050,0010)	SQ		ALWAYS	CONFIG
>Manufacturer	(0008,0070)	LO	Numa Inc.	ALWAYS	CONFIG
>Manufacturer's Model Name	(0008,1090)	LO	NUMASTATUS	ALWAYS	CONFIG
>Device Serial Number	(0018,1000)	LO	From Configuration	ALWAYS	CONFIG
>Software Version	(0018,1020)	LO	From Configuration	ALWAYS	CONFIG
>Device Description	(0050,0020)	LO	From Configuration	VNAP	USER

Table 9.1-15. SC Image Module of Created SC SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Date of Secondary Capture	(0018,1012)	DA	<yyyymmdd>	ALWAYS	AUTO
Time of Secondary Capture	(0018,1014)	TM	<hhmmss>	ALWAYS	AUTO

Table 9.1-16. SC Equipment Module of Created SC SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Conversion Type	(0008,0064)	CS	SYN	ALWAYS	AUTO
Modality	(0008,0060)	CS	SR	ALWAYS	AUTO
Secondary Capture Device ID	(0018,1010)	LO		ALWAYS	CONFIG
Secondary Capture Device Manufacturer	(0018,1016)	LO	NUMA	ALWAYS	AUTO
Secondary Capture Device Manufacturer's Model Name	(0018,1018)	LO	NUMASTATUS	ALWAYS	AUTO
Secondary Capture Device Software Versions	(0018,1019)	LO		ALWAYS	AUTO
Video Image Format Acquired	(0018,1022)	SH		NEVER	
Digital Image Format Acquired	(0018,1023)	LO		NEVER	

9.1.1.5 Radiopharmaceutical Radiation Dose SR Modules

Table 9.1-17. SR Document Series Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Modality	(0008,0060)	CS	SR	ALWAYS	AUTO
Series Instance UID	(0020,000E)	UI	Generated by device	ALWAYS	AUTO
Series Number	(0020,0011)	IS	Generated by device	ALWAYS	AUTO

Attribute Name	Tag	VR	Value	Presence of Value	Source
Series Date	(0008,0021)	DA	<yyyymmdd>	ALWAYS	AUTO
Series Time	(0008,0031)	TM	<hhmmss>	ALWAYS	AUTO
Protocol Name	(0018,1030)	LO	Operator field in Study list. Maximum 64 characters.	ALWAYS	USER
Series Description	(0008,103E)	LO	Organ from Study list. Maximum 512 characters.	VNAP	USER

Table 9.1-18. SR Document General Module of Created RRD SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Instance Number	(0020,0013)	IS	Generated by device	ALWAYS	AUTO
Preliminary Flag	(0040,A496)	CS	PRELIMINARY/FINAL	VNAP	USER
Completion Flag	(0040,A491)	CS	PARTIAL/COMPLETE	ALWAYS	USER
Completion Flag Description	(0040,A492)	LO	Operator field in Study list. Maximum 64 characters.	VNAP	USER
Verification Flag	(0040,A493)	CS	UNVERIFIED	ALWAYS	AUTO
Content Date	(0008,0023)	DA	<yyyymmdd>	ALWAYS	AUTO
Content Time	(0008,0033)	TM	<hhmmss>	ALWAYS	AUTO
Verifying Observer Sequence	(0040,A073)	SQ	Generated by device	ALWAYS	AUTO
>Verifying Observer Name	(0040,A075)	PN	Maximum 64 characters.	VNAP	USER
> Verifying Observer Identification Code Sequence	(0040,A088)	SQ	Generated by device	VNAP	USER
>Verifying Organization	(0040,A027)	LO	Maximum 64 characters.	ALWAYS	USER
>Verifying DateTime	(0040,A030)	DT		ALWAYS	Auto

Table 9.1-19. Enhanced General Equipment Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Manufacturer	(0008,0070)	LO	Numa	ALWAYS	AUTO
Manufacturer's Model Name	(0008,1090)	LO	NUMASTATUS	ALWAYS	AUTO
Device Serial Number	(0018,1000)	LO	From Configuration	ALWAYS	CONFIG
Software Version	(0018,1020)	LO	From Configuration	ALWAYS	CONFIG

Table 9.1-20. Radiopharmaceutical Information Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Radiopharmaceutical Information Sequence	(0054,0016)	SQ		ALWAYS	USER
>Radionuclide Code Sequence	(0054,0300)	SQ		ALWAYS	USER
> Radiopharmaceutical Route	(0018,1070)	LO	Maximum 64 characters.	ALWAYS	USER
>Administration Route Code Sequence	(0054,0302)	SQ		ALWAYS	USER
>Radiopharmaceutical Volume	(0018,1071)	DS		VNAP	USER
>Radiopharmaceutical Start Time	(0018,1072)	TM	<hhmmss>	ALWAYS	USER
>Radiopharmaceutical Stop Time	(0018,1073)	TM	<hhmmss>	VNAP	
>Radionuclide Total Dose	(0018,1074)	DS		ALWAYS	
>Radiopharmaceutical	(0018,0031)	LO	Maximum 64 characters.	ALWAYS	
>Radiopharmaceutical Code Sequence	(0054,0304)	SQ		ALWAYS	

9.1.2 Usage of Attributes From Received IODs

The NumaStatus storage application does not receive SOP Instances. The usage of attributes received via Modality Worklist is described in Section 4.2.2.3.1.3.

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9.1.3 Attribute Mapping

The relationships between attributes received via Modality Worklist, stored in structured report and images and communicated are summarized in Table B.8.1-31. The format and conventions used in DICOM Table below are the same as the corresponding table in Section J.6 in PS3.17.

9.1.4 Coerced/Modified Fields

The Modality Worklist AE will truncate attribute values received in the response to a Modality Worklist Query if the value length is longer than the maximum length permitted by the attribute's VR

9.2 Data Dictionary of Private Attributes

The Private Attributes added to created SOP Instances are listed in the Table below. EXAMPLE-INTEGRATED-MODALITY reserves blocks of private attributes in groups 0029, and 0031. Further details on usage of these private attributes are contained in Section 9.1.

Table 9.2-1. NumaStatus Private Patient Series Characteristics Attributes

Tag	Attribute Name	VR	VM	Attribute Description
(0029,00xx)	Private creator			
(0029,xx04)	Fasting Duration	FD	1	Patient Series Characteristics Fasting Duration
(0029,xx05)	Glucose	FD	1	Patient Series Characteristics Glucose
(0029,xx06)	Hydration Volume	FD	1	Patient Series Characteristics Hydration Volume
(0029,xx07)	Physical Activity	LO	1	Patient Series Characteristics Physical Activity
(0029,xx08)	Serum Creatine	FD	1	Patient Series Characteristics Serum Creatine
(0029,xx09)	Glomerular Filtration Rate	FD	1	Patient Series Characteristics Glomerular Filtration Rate
(0029,xx0A)	Effective Dose	FD	1	Patient Series Characteristics Effective Dose
(0029,xx0B)	Dose Reference Authority Code Value	SH	1	Patient Series Characteristics Dose Reference Authority Code Value
(0029,xx0C)	Dose Reference Authority Coding Scheme Designator	SH	1	Patient Series Characteristics Dose Reference Authority Coding Scheme Designator
(0029,xx0D)	Dose Reference Authority Code Meaning	LO	1	Patient Series Characteristics Dose Reference Authority Code Meaning

Table 9.2-2. NumaStatus Private Inventory Attributes

Tag	Attribute Name	VR	VM	Attribute Description
(0031,00xx)	Private creator			NUMASTATUS-INVENTORY
(0031,xx03)	Radiopharmaceutical Name	LO	1	Administered Inventory Radiopharmaceutical Name
(0031,xx04)	Radiopharmaceutical CodeValue	SH	1	Administered Inventory Radiopharmaceutical Code Value
(0031,xx05)	Radiopharmaceutical Coding Scheme Designator	SH	1	Administered Inventory Radiopharmaceutical Coding Scheme Designator
(0031,xx06)	Radiopharmaceutical Code Meaning	LO	1	Administered Inventory Radiopharmaceutical Code Meaning
(0031,xx07)	Radionuclide Name	LO	1	Administered Inventory Radionuclide Name

(0031,xx08)	Radionuclide Code Value	SH	1	Administered Inventory Radionuclide Code Value
(0031,xx09)	Radionuclide Coding Scheme Designator	SH	1	Administered Inventory Radionuclide Coding Scheme Designator
(0031,xx0A)	Radionuclide Code Meaning	LO	1	Administered Inventory Radionuclide Code Meaning
(0031,xx0B)	Radionuclide Half Life	SL	1	Administered Inventory Radionuclide Half Life
(0031,xx0C)	Radiopharmaceutical Administration Event UID	UI	1	Administered Inventory Radiopharmaceutical Administration Event UID
(0031,xx0D)	Estimated Extravasation Activity	SS	1	Administered Inventory Estimated Extravasation Activity
(0031,xx0E)	Radiopharmaceutical Start Date Time	DT	1	Administered Inventory Radiopharmaceutical Start Date Time
(0031,xx0F)	Radiopharmaceutical Stop Date Time	DT	1	Administered Inventory Radiopharmaceutical Stop Date Time
(0031,xx10)	Administered Activity MBq	FD	1	Administered Inventory Administered Activity MBq
(0031,xx11)	Person Participant DICOM	PN	1	Administered Inventory Person Participant DICOM
(0031,xx12)	Person Participant Name	LO	1	Administered Inventory Person Participant Name
(0031,xx13)	Radiopharmaceutical Volume	FD	1	Administered Inventory Radiopharmaceutical Volume
(0031,xx14)	Pre Administration Measured Activity MBq	FD	1	Administered Inventory Pre-Administration Measured Activity MBq
(0031,xx15)	Pre Administration Measurement Date Time	DT	1	Administered Inventory Pre-Administration Measurement Date Time
(0031,xx16)	Pre Administration Device Name	LO	1	Administered Inventory Pre-Administration Device Name
(0031,xx17)	Pre Administration Device Code Value	SH	1	Administered Inventory Pre-Administration Device Code Value
(0031,xx18)	Pre Administration Device Coding Scheme Designator	SH	1	Administered Inventory Pre-Administration Device Coding Scheme Designator
(0031,xx19)	Pre Administration Device Code Meaning	LO	1	Administered Inventory Pre-Administration Device Code Meaning
(0031,xx1A)	Pre Administration Observer DICOM Name	PN	1	Administered Inventory Pre-Administration Observer DICOM Name
(0031,xx1B)	Post Administration Measured Activity MBq	FD	1	Administered Inventory Post Administration Measured Activity MBq
(0031,xx1C)	Post Administration Measurement Date Time	DT	1	Administered Inventory Post Administration Measurement Date Time
(0031,xx1D)	Post Administration Device Name	LO	1	Administered Inventory Post Administration Device Name
(0031,xx1E)	Post Administration Device Code Value	SH	1	Administered Inventory Post Administration Device Code Value
(0031,xx1F)	Post Administration Device Coding Scheme Designator	SH	1	Administered Inventory Post Administration Device Coding Scheme Designator
(0031,xx20)	Post Administration Device Code Meaning	LO	1	Administered Inventory Post Administration Device Code Meaning
(0031,xx21)	Post Administration Observer DICOM Name	PN	1	Administered Inventory Post Administration Observer DICOM Name
(0031,xx22)	Route Of Administration Name	LO	1	Administered Inventory Route Of Administration Name
(0031,xx23)	Route Of Administration Code Value	SH	1	Administered Inventory Route Of Administration Code Value
(0031,xx24)	Route Of Administration Coding Scheme Designator	SH	1	Administered Inventory Route Of Administration Coding Scheme Designator
(0031,xx25)	Route Of Administration Code Meaning	LO	1	Administered Inventory Route Of Administration Code Meaning
(0031,xx26)	Site Of Name	LO	1	Administered Inventory Site Of Name
(0031,xx27)	Site Of Code Value	SH	1	Administered Inventory Site Of Code Value

(0031,xx28)	Site Of Coding Scheme Designator	SH	1	Administered Inventory Site Of Coding Scheme Designator
(0031,xx29)	Site Of Code Meaning	LO	1	Administered Inventory Site Of Code Meaning
(0031,xx2A)	Laterality Name	LO	1	Administered Inventory Laterality Name
(0031,xx2B)	Laterality Code Value	SH	1	Administered Inventory Laterality Code Value
(0031,xx2C)	Laterality Coding Scheme Designator	SH	1	Administered Inventory Laterality Coding Scheme Designator
(0031,xx2D)	Laterality Code Meaning	LO	1	Administered Inventory Laterality Code Meaning
(0031,xx2E)	Brand Name	LO	1	Administered Inventory Brand Name
(0031,xx2F)	Prescription Identifier	LO	1	Administered Inventory Prescription Identifier
(0031,xx30)	Billing Code	LO	1	Administered Inventory Billing Code
(0031,xx31)	Drug Product Identifier	LO	1	Administered Inventory Drug Product Identifier
(0031,xx32)	Radiopharmaceutical Dispense Unit Identifier	LO	1	Administered Inventory Radiopharmaceutical Dispense Unit Identifier
(0031,xx33)	Comment	ST	1	Administered Inventory Comment
(0031,xx36)	Description	LO	1	Administered Inventory Description
(0031,xx38)	Modality	LO	1	Administered Inventory Modality
(0031,xx39)	Administration Point X	SS	1	Administered Inventory Administration Point X
(0031,xx3A)	Administration Point Y	SS	1	Administered Inventory Administration Point Y
(0031,xx3C)	Entry Date Time	DT	1	Administered Inventory Entry Date Time
(0031,xx3D)	Associated Procedure Code Value	SH	1	Administered Inventory Associated Procedure Code Value
(0031,xx3E)	Associated Procedure Coding Scheme Designator	SH	1	Administered Inventory Associated Procedure Coding Scheme Designator
(0031,xx3F)	Associated Procedure Code Meaning	LO	1	Administered Inventory Associated Procedure Code Meaning
(0031,xx40)	Has Intent Code Value	SH	1	Administered Inventory Has Intent Code Value
(0031,xx41)	Has Intent Coding Scheme Designator	SH	1	Administered Inventory Has Intent Coding Scheme Designator
(0031,xx42)	Has Intent Code Meaning	LO	1	Administered Inventory Has Intent Code Meaning
(0031,xx43)	Radiopharmaceutical Lot Identifier	LO	1	Administered Inventory Radiopharmaceutical Lot Identifier
(0031,xx44)	Reagent Vial Identifier	LO	1	Administered Inventory Reagent Vial Identifier
(0031,xx45)	Radionuclide Identifier	LO	1	Administered Inventory Radionuclide Identifier

9.3 Coded Terminology and Templates

9.3.1 Templates

9.3.1.1 TID 10021. Radiopharmaceutical Radiation Dose

Table 9.3-1 TID 10021. Radiopharmaceutical Radiation Dose

	NL	Rel with Parent	VT	Concept Name	VM	Mapping	Presence of Value	Source
1			CONTAINER	EV (113500, DCM, "Radiopharmaceutical Radiation Dose Report")	1		ALWAYS	AUTO

	NL	Rel with Parent	VT	Concept Name	VM	Mapping	Presence of Value	Source
2	>	HAS CONCEPT MOD	CODE	EV (G-C2D0, SRT, "Associated Procedure")	1	NUMASTATUS-INVENTORY. Associated Procedure Code Value\Code Meaning Coding Scheme Designator	ALWAYS	USER
3	>>	HAS CONCEPT MOD	CODE	EV (G-C0E8, SRT, "Has Intent")	1	NUMASTATUS-INVENTORY. Has Intent Code Value\Code Meaning Coding Scheme Designator	ALWAYS	USER
4	>	CONTAINS	INCLUDE	DTID 10022 “Radiopharmaceutical Administration Event Data”	1		ALWAYS	AUTO
5	>	CONTAINS	INCLUDE	DTID 10024 “Radiopharmaceutical Administration Patient Characteristics”	1		VNAP	USER
6	>	CONTAINS	TEXT	EV (121106, DCM, "Comment")	1		VNAP	USER

9.3.1.2 TID 10022 Radiopharmaceutical Administration Event Data

Table 9.3-2 TID 10022. Radiopharmaceutical Administration Event Data

	NL	Rel with Parent	VT	Concept Name	VM	Mapping	Presence of Value	Source
1			CONTAINER	EV (113502, DCM, "Radiopharmaceutical Administration")	1		ALWAYS	AUTO
2	>	CONTAINS	CODE	EV (F-61FDB, SRT, "Radiopharmaceutical agent")	1	NUMASTATUS-INVENTORY. Radiopharmaceutical Code Value/ Radiopharmaceutical Coding Scheme Designator/ Radiopharmac	ALWAYS	USER

	NL	Rel with Parent	VT	Concept Name	VM	Mapping	Presence of Value	Source
						eutical Code Meaning		
3	>>	HAS PROPERTIES	CODE	EV (C-10072, SRT, "Radionuclide")	1	NUMASTATUS-INVENTORY. Radionuclide Code Value/ Radionuclide Coding Scheme Designator/ Radionuclide Code Meaning	ALWAYS	USER
4	>>	HAS PROPERTIES	NUM	EV (R-42806, SRT, "Radionuclide Half Life")	1	NUMASTATUS-INVENTORY. Radionuclide Half Life	ALWAYS	USER
5	>	CONTAINS	NUM	EV (123007, DCM, "Radiopharmaceutical Specific Activity")	1		NEVER	NOT SUPPORTED
6	>	CONTAINS	UIDREF	EV (113503, DCM, "Radiopharmaceutical Administration Event UID")	1	NUMASTATUS-INVENTORY. Radiopharmaceutical Administration Event UID	ALWAYS	AUTO
7	>	CONTAINS	CODE	EV (113505, DCM, "Intravenous Extravasation Symptoms")	1-n		NEVER	NOT SUPPORTED
8	>	CONTAINS	NUM	EV (113506, DCM, "Estimated Extravasation Activity")	1	NUMASTATUS-INVENTORY. Estimated Extravasation Activity	VNAP	USER
9	>	CONTAINS	DATETIME	EV (123003, DCM, "Radiopharmaceutical Start DateTime")	1	NUMASTATUS-INVENTORY. Radiopharmaceutical Start Date Time	ALWAYS	AUTO\USER
10	>	CONTAINS	DATETIME	EV (123004, DCM, "Radiopharmaceutical Stop DateTime")	1	NUMASTATUS-INVENTORY. Radiopharmaceutical Stop DateTime	VNAP	USER
11	>	CONTAINS	NUM	EV (113507, DCM, "Administered activity")	1	NUMASTATUS-INVENTORY. Administered Activity MBq	ALWAYS	AUTO

	NL	Rel with Parent	VT	Concept Name	VM	Mapping	Presence of Value	Source
12	>	CONTAINS	NUM	EV (123005, DCM, "Radiopharmaceutical Volume")	1	NUMASTATUS-INVENTORY. Radiopharmaceutical Volume	VNAP	USER
13	>	CONTAINS	NUM	EV (113508, DCM, "Pre-Administration Measured Activity")	1	NUMASTATUS-INVENTORY Pre. - Administration Measured Activity MBq\Date Time	ALWAYS	USER
14	>>	HAS OBS CONTEXT	CODE	EV (113540, DCM, "Activity Measurement Device")	1	NUMASTATUS-INVENTORY. Pre-Administration. Device Code Value\Code Meaning\Coding Scheme Designator	VNAP	USER
15	>>	HAS OBS CONTEXT	INCLUDE	DTID 1002 “Observer Context”	1	NUMASTATUS-INVENTORY. Pre-Administration Observer DICOM Name	VNAP	USER
16	>	CONTAINS	NUM	EV (113509, DCM, "Post-Administration Measured Activity")	1	NUMASTATUS-INVENTORY. Post Administration Measured Activity MBq\Date Time	VNAP	USER
17	>>	HAS OBS CONTEXT	CODE	EV (113540, DCM, "Activity Measurement Device")	1	NUMASTATUS-INVENTORY. Post-Administration. Device Code Value\Code Meaning\Coding Scheme Designator	VNAP	USER
18	>>	HAS OBS CONTEXT	INCLUDE	DTID 1002 “Observer Context”	1	NUMASTATUS-INVENTORY. Post Administration	VNAP	USER

	NL	Rel with Parent	VT	Concept Name	VM	Mapping	Presence of Value	Source
						Observer DICOM Name		
19	>	CONTAINS	INCLUDE	DTID 10023 “Organ Dose”	1-n		VNAP	USER
20	>	CONTAINS	CODE	EV (G-C340, SRT, "Route of administration")	1	NUMASTATUS-INVENTORY Route Of Administration Code Value\ Code Coding Scheme Designator\ Code Meaning	ALWAYS	USER
21	>>	HAS PROPERTIES	CODE	EV (G-C581, SRT, "Site of")	1	NUMASTATUS-INVENTORY.Site Of Code Value\Code Name\Code Meaning	VNAP	USER\AUTO
22	>>>	HAS CONCEPT MOD	CODE	EV (G-C171, SRT, "Laterality")	1	NUMASTATUS-INVENTORY. Laterality Code Value\ Laterality Code Meaning\Coding Scheme Designator	VNAP	USER
23	>	HAS OBS CONTEXT	INCLUDE	DTID 1020 “Person Participant”	1	NUMASTATUS-INVENTORY. Person Participant DICOM	ALWAYS	USER
24	>	CONTAINS	CODE	EV (121147, DCM, "Billing Code(s) ")	1	NUMASTATUS-INVENTORY. Billing Code	VNAP	USER
25	>	CONTAINS	CODE	EV (113510, DCM, "Drug Product Identifier")	1	NUMASTATUS-INVENTORY. Drug Product Identifier.	VNAP	USER
26	>	CONTAINS	TEXT	EV (111529, DCM, "Brand Name")	1	NUMASTATUS-INVENTORY. Brand Name	VNAP	USER

	NL	Rel with Parent	VT	Concept Name	VM	Mapping	Presence of Value	Source
27	>	CONTAINS	TEXT	EV (113511, DCM, "Radiopharmaceutical Dispense Unit Identifier")	1	NUMASTATUS-INVENTORY. Radiopharmaceutical Dispense Unit Identifier	VNAP	USER
28	>>	CONTAINS	TEXT	EV (113512, DCM, "Radiopharmaceutical Lot Identifier")	1	NUMASTATUS-INVENTORY. Radiopharmaceutical Lot Identifier	VNAP	USER
29	>>	CONTAINS	TEXT	EV (113513, DCM, "Reagent Vial Identifier")	1	NUMASTATUS-INVENTORY. Reagent Vial Identifier	VNAP	USER
30	>>	CONTAINS	TEXT	EV (113514, DCM, "Radionuclide Identifier")	1	NUMASTATUS-INVENTORY. Radionuclide Identifier	VNAP	USER
31	>	CONTAINS	TEXT	EV (113516, DCM, "Prescription Identifier")	1	NUMASTATUS-INVENTORY. Prescription Identifier.	VNAP	USER
32	>	CONTAINS	TEXT	EV (121106, DCM, "Comment")	1	NUMASTATUS-INVENTORY. Comment	VNAP	USER

9.3.1.3 TID 10023 Organ Dose

Table 9.3-3 TID 10023. Organ Dose

	NL	Rel with Parent	VT	Concept Name	VM	Mapping	Presence of Value	Source
1			CONTAINER	EV (113517, DCM, "Organ Dose Information")			ALWAYS	AUTO
2	>	HAS CONCEPT MOD	CODE	EV (G-C0E3, SRT, "Finding Site")	1		ALWAYS	CONFIGURATION
3	>	HAS CONCEPT MOD	CODE	EV (G-C171, SRT, "Laterality")	1		ALWAYS	CONFIGURATION

	NL	Rel with Parent	VT	Concept Name	VM	Mapping	Presence of Value	Source
4	>	CONTAINS	NUM	EV (G-D701, SRT, "Mass")	1		NEVER	NOT SUPPORTED
5	>>	HAS CONCEPT MOD	TEXT	EV (G-C036, SRT, "Measurement Method")	1		NEVER	NOT SUPPORTED
6	>	CONTAINS	NUM	EV (113518, DCM, "Organ Dose")	1		ALWAYS	CONFIGURATION
7	>>	HAS PROPERTIES	CODE	EV (121406, DCM, "Reference Authority")	1		ALWAYS	CONFIGURATION
8	>>	HAS PROPERTIES	TEXT	EV (121406, DCM, "Reference Authority")	1		NEVER	NOT SUPPORTED

9.3.1.4 TID 10024 Radiopharmaceutical Administration Patient Characteristics

Table 9.3-4 TID 10024. Radiopharmaceutical Administration Patient Characteristics

	NL	Rel with Parent	VT	Concept Name	VM	Mapping	Presence	Source
1			CONTAINER	EV (121118, DCM, "Patient Characteristics")			ALWAYS	AUTO
2	>	CONTAINS	CODE	EV (109054, DCM, "Patient state")	1		VNAP	USER
3	>	CONTAINS	NUM	EV (121033, DCM, "Subject Age")	1		VNAP	USER\WORKLIST
4	>	CONTAINS	CODE	EV (121032, DCM, "Subject Sex")	1		ALWAYS	USER\WORKLIST
5	>	CONTAINS	NUM	EV (8302-2, LN, "Patient Height")	1		VNAP	USER\WORKLIST
6	>	CONTAINS	NUM	EV (29463-7, LN, "Patient Weight")	1		VNAP	USER\WORKLIST
7	>	CONTAINS	NUM	EV (8277-6, LN, "Body Surface Area")	1		NEVER	NOT SUPPORTED
8	>>	INFERRED FROM	CODE	EV (8278-4, LN, "Body Surface Area Formula")	1		NEVER	NOT SUPPORTED
9	>	CONTAINS	NUM	EV (F-01860, SRT, "Body Mass Index")	1		NEVER	NOT SUPPORTED
10	>>	INFERRED FROM	CODE	EV (121420, DCM, "Equation")	1		NEVER	NOT SUPPORTED
11	>	CONTAINS	NUM	EV (14749-6, LN, "Glucose")	1	Patient Series Characteristics Glucose	VNAP	USER
12	>	CONTAINS	NUM	EV(113550, DCM, "Fasting Duration")	1	U	VNAP	USER

	NL	Rel with Parent	VT	Concept Name	VM	Mapping	Presence	Source
13	>	CONTAINS	NUM	EV(113551, DCM, "Hydration Volume")	1	U	VNAP	USER
14	>	CONTAINS	TEXT	EV (113552, DCM, "Recent Physical Activity")	1	U	VNAP	USER
15	>	CONTAINS	NUM	EV (2160-0, LN, "Serum Creatinine")	1	U	VNAP	USER
16	>	CONTAINS	NUM	EV (F-70210, SRT, "Glomerular Filtration Rate")	1	U	VNAP	USER
17	>>	HAS CONCEPT MOD	CODE	EV (G-C036, SRT, "Measurement Method")	1	U	VNAP	USER
18	>>	HAS CONCEPT MOD	CODE	EV (121050, DCM, "Equivalent meaning of concept name")	1	M	VNAP	USER

9.3.2 Context Groups

Table 9.3-5. Context Groups

Context Group	Default Value Set	Configurable	Use
NM/PET Procedures	CID 3108	Extensible	Users can add NM/PET Procedures type
Procedure Intent	CID 3108	Extensible	Users can add Procedure Intent type
Radiopharmaceuticals	CID 25	Extensible	Users can add Radiopharmaceuticals and use local codes,
PET Radiopharmaceutical	CID 4021	Extensible	Users can add Radiopharmaceuticals and use local codes.
Isotopes in Radiopharmaceuticals	CID 18	Extensible	Users can add isotopes and use local codes.
PET Radionuclide	CID 4020	Extensible	Users can add isotopes and use local codes.
Intravenous Extravasation Symptoms	CID 10043	Extensible	Users can add Intravenous Extravasation Symptoms

Context Group	Default Value Set	Configurable	Use
Source of Radioisotope Activity Information"	CID 10041	Extensible	Users can Radioisotope Activity Information sources.
Route of Administration	CID 11	Extensible	Users can add route of administration
Percutaneous Entry Site	CID 3746	No	Mapped from user input
Laterality	CID 244	No	Mapped from user input for Percutaneous Entry Site or Organ type
Radiosensitive Organs	CID 10044	Extensible	Users can add radiosensitive and use local codes.
Radiopharmaceutical Organ Dose Reference Authority	CID 10040	Extensible	Users can add more reference authorities or local codes
Radiopharmaceutical Patient State	CID 10045	Extensible	Users can add more states.
Units of Measure for Age	CID 7456	Years only	Fixed to Years
Sex	CID 7455	M,F,O only	Mapped to DICOM 0010, 0040
Body Surface Area Equations	CID 3663	Extensible	Uses can add more Equations
GFR Measurement Methods	CID 10047	Extensible	Users can add more methods
GFR Measurements	CID 10046	Extensible	Users can add more measurements

9.5 Standard Extended/Specialized/Private SOP Classes

NumaStatus does extended the Secondary Capture SOP class to include the Radiopharmaceutical Information Sequence so items can be easily read from the secondary capture to the PET and NM IODs. NumaStatus does not create a Specialized or Private SOP Class.

9.6 Private Transfer Syntaxes

NumaStatus does not implement a Private Transfer Syntax.

9.7 IHE Harmony

9.7.1 RRD Transfer Timing

The current RRD and Secondary captures are transferred when the user selects them to be sent. The software does not auto send the reports. Therefore transfer time may vary from the time was radiopharmaceutical was administered and the report is receive at the c-store provider.