



Varian DICOM Worklist

DICOM Conformance Statement

Abstract This document provides information about the DICOM Conformance of the Varian DICOM Worklist version 8.6.

Manufacturer and European Representative

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Document History

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1. Introduction

1.1 Audience

The intended audience is:

- Customers, who want to use ARIA Worklist Service
- Marketing and Sales persons
- System Integrators of medical equipment
- Other vendors offering interfacing via DICOM

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

The document is structured firmly along the template definition as specified in Part 2 of the DICOM standard.

1.2 Overview

This document specifies the compliance to DICOM conformance requirements for connecting to the Varian Medical Systems Treatment Management System (TMS) over the ARIA Worklist Service.

The ARIA Worklist Service features described in this document support information exchange between the ARIA Worklist Service and third-party systems for the following uses:

Workflow: The ARIA Worklist Service allows the client to query for Unified Procedure Steps (UPS) and to update the Unified Procedure Steps.

Table 1-1 provides an overview of the network services supported by ARIA Worklist Provider Application Entity.

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Verification		
Verification	Not supported	Yes
Workflow Management		
Unified Procedure Step – Pull	Not supported	Yes

Table 1-1: Network Services

Note: The ARIA Worklist Service supports in the input sequence of a Scheduled Procedure Step only the reference to an instance of RT Plan SOP class. Reference to an instance of a RT Plan SOP class will only be provided, if the RT Plan SOP instance is stored in the TMS.

The following product is in the scope of this Conformance Statement:

- ARIA Worklist Service

The ARIA Worklist Service runs on Microsoft Windows XP SP2, Windows Vista Ultimate and Windows 2003 Server platforms.

1.3 Remarks

The scope of this Conformance Statement is to facilitate communication with ARIA Worklist Service and other vendor's medical equipment. The Conformance Statement should be read and understood in conjunction with the DICOM standard [1] and the Supplement 96 of the DICOM standard [3].

DICOM, by itself, does not guarantee interoperability. However, the Conformance Statement facilitates a first-level validation for interoperability between different applications supporting the same DICOM functionality.

This Conformance Statement is not intended to replace validation with other DICOM equipment to ensure proper exchange of information intended.

Because the DICOM standard is subject to ongoing changes, enhancements and improvements, Varian Medical Systems reserves the right to advance their products by making use of upcoming DICOM features without prior announcement..

1.4 References

- [1] Digital Imaging and Communications in Medicine (DICOM), Parts 1-18 (2008)
National Electrical Manufacturers Association (NEMA)
Rosslyn, VA
United States of America
- [2] DICOM Supplement 74 (Frozen Draft): Utilization of Worklist in Radiotherapy Treatment
Delivery
DICOM Standards Committee, Working Group 7 Radiation Therapy
Rosslyn, VA
United States of America
- [3] DICOM Supplement 96 (Frozen Draft): Unified Worklist and Procedure Step
DICOM Standard Committee, Working Group 6
Rosslyn, VA
United States of America

1.5 Abbreviations

This section provides the definitions of terms, acronyms, and abbreviations which are used throughout the document. An arrow sign (→) left of a word indicates that it can be looked up in this table.

AE	Application Entity (→DICOM term)
DB	Varian System Database
DICOM	Digital Imaging and Communications in Medicine, a standard on image communications in medical applications
DIMSE	DICOM Message Service element
DNS	Domain Name System
EMPTY	Attribute is sent without a value
IE	Information Entity
IOD	Information Object Definition (→DICOM term)
NEMA	National Electrical Manufacturers Association

PDU	Protocol Data Unit (→DICOM term)
SCU	Service Class User (→DICOM term)
SCP	Service Class Provider (→DICOM term)
SOP	Service-Object-Pair, a definition of an information object (like an image) and of a service (like storage) that can be performed for the object (→DICOM term)
TCP/IP	Transmission Control Protocol / Internet Protocol, a widely used computer networking protocol
UID	Unique Identifier used to identify an object by a worldwide unique identifier (→DICOM term)
VNAP	Value Not Always Present (attribute sent zero length if no value is present)
VR	Value Representation, a data encoding method in →DICOM

2. Networking

2.1 Implementation Model

2.1.1 Application Data Flow

The following sections illustrate the application’s data flow models.

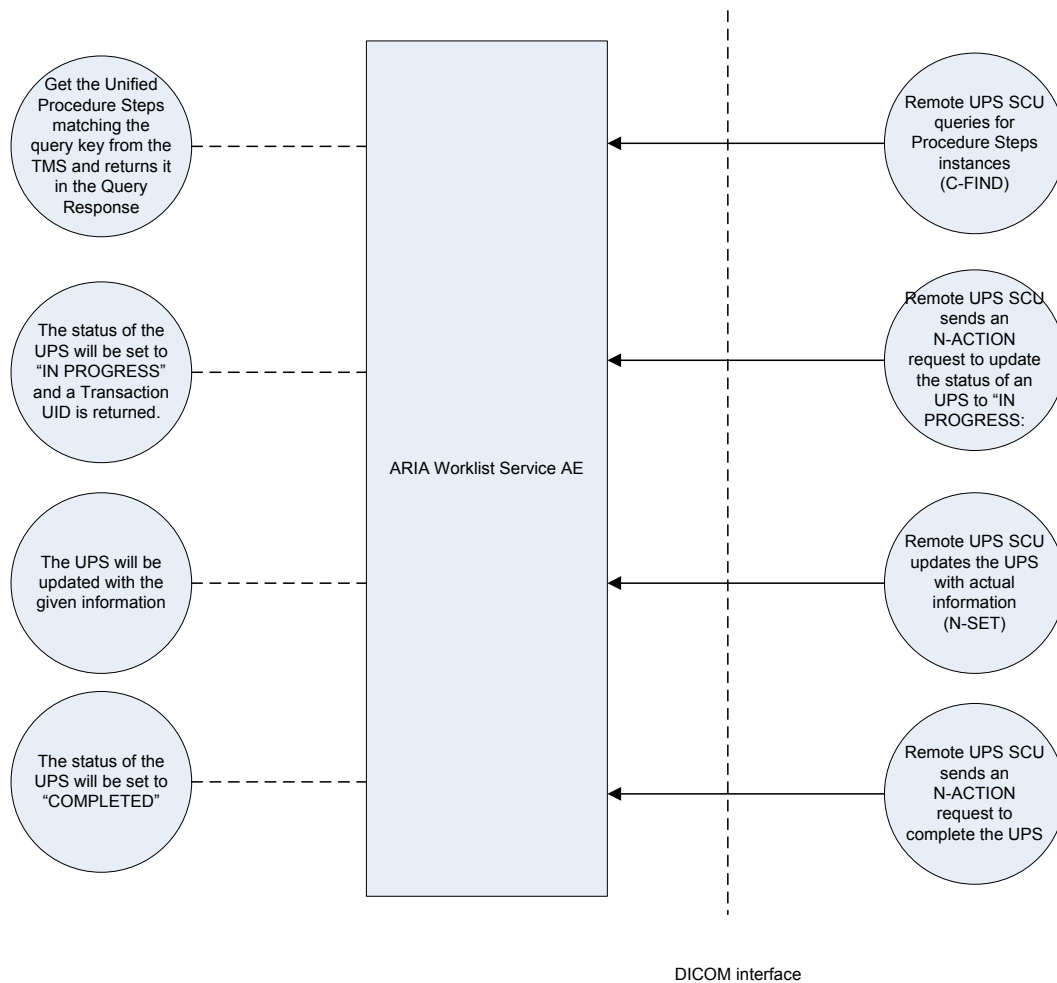


Figure 2-1: Application Data Flow

A Remote UPS Client can send a C-FIND request to the ARIA Worklist Service to get the list of Unified Procedure Steps. The client can take ownership over a selected UPS by setting it to "In Progress". ARIA Worklist Service will return a Transaction UID, which will be required by the client for all updates it will make of this UPS.

The client can update the selected UPS with the actual information using N-SET request. No more updates can be made after the status of the UPS is set to "Completed" or "Canceled".

2.1.2 Functional Definition of AE's

2.1.2.1 Functional Definition of the ARIA Worklist Service Application Entity

The ARIA Worklist Service Application Entity resides on a workstation with connection to the TMS or on the TMS server itself. It is a Windows Service which starts up when the station on which it resides is brought up, and runs continuously until the station is brought down or the service is stopped via services management console. It will then wait for a remote Application Entity to request an association. The ARIA Worklist Service Application Entity accepts the association if the proposed context is valid and supported. It waits for C-ECHO, C-FIND, N-ACTION and N-SET commands from the remote Application Entity. The associations are maintained by the ARIA Worklist Service until the remote Application Entity initiates the release process or an abort. The following operations are supported:

- Verification
 - The connection is verified by responding to an external C-ECHO command.
- Unified Procedure Step – Pull
 - C-FIND
 - N-ACTION
 - N-SET

Note: The service N-GET of the Unified Procedure Step – Pull SOP Class is not supported.

2.1.3 Sequencing of Real World Activities

The ARIA Worklist Service Application Entity does not control the sequence; however it expects the requests to be sent in a certain sequence. The following diagram shows a standard sequence.

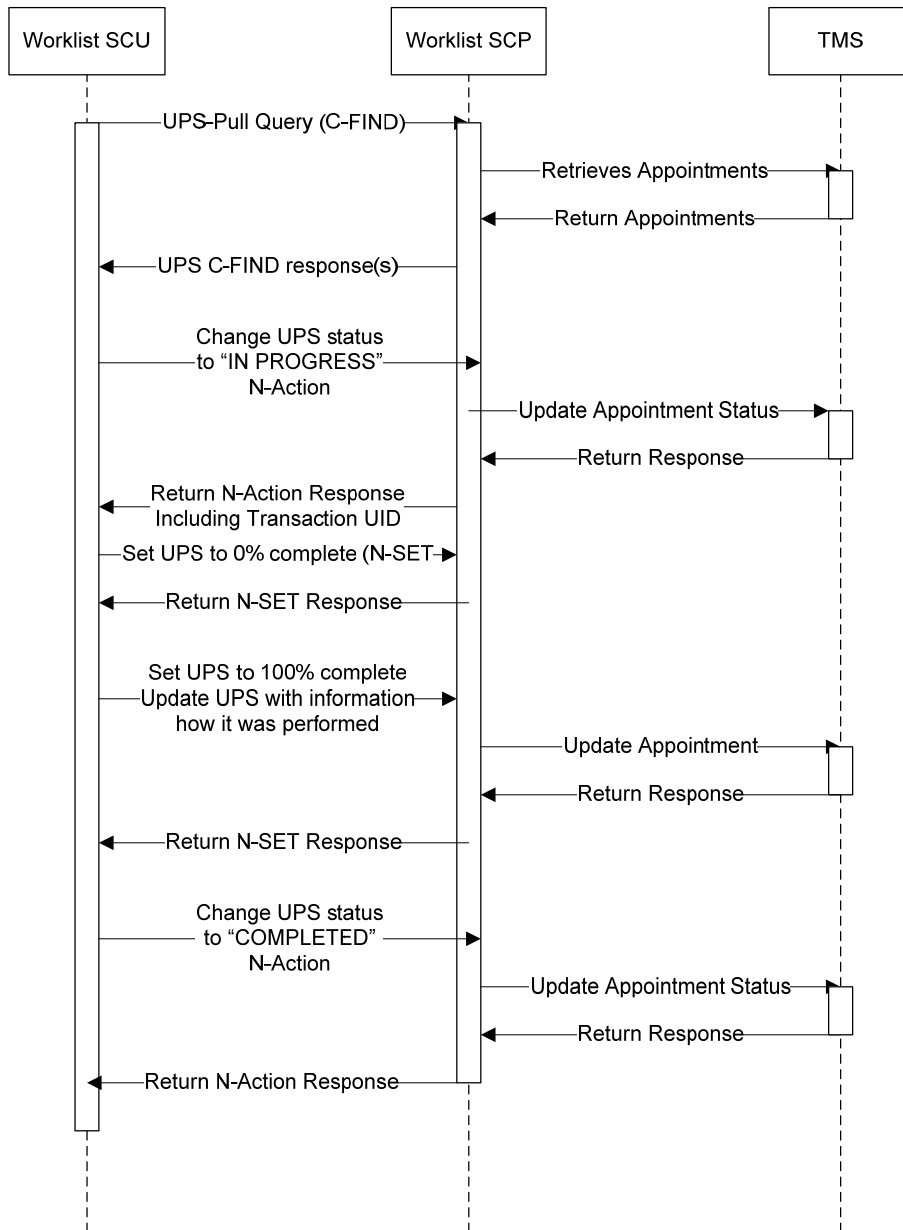


Figure 2-2: Sequence Diagram

The above sequence diagram shows a possible sequence from the selection of a Unified Procedure Step till the completion. However the Worklist Provider cannot control the sequence. All sequences are accepted as long as it follows the following rules:

- And UPS with status “SCHEDULED” must be at least once retrieved with C-FIND. A SOP Instance UID is created, which is valid until the UPS is “COMPLETED” or “CANCELED”
- An UPS with status “SCHEDULED” can either be set to “IN PROGRESS” or to “CANCELED” through an N-ACTION request. No other requests will be accepted at this point. The N-ACTION request will return a Transaction UID when setting the UPS to “IN PROGRESS”.
- An UPS with status “IN PROGRESS” can be updated using an N-SET request and the correct Transaction UID. There is no limitation how often it can be updated.
- An UPS with status “IN PROGRESS” and with a Progress of 100% can be set to “COMPLETED” with an N-ACTION request and the correct Transaction UID.
- An UPS with status “IN PROGRESS” and with a Progress of less than 100% can be set to “CANCELED” with an N-ACTION request and the correct Transaction UID.
- No N-ACTION or N-SET requests will be accepted to modify an UPS with status “COMPLETED” or “CANCELED”.
- The SOP Instance UID of the UPS will be no longer valid after the UPS is set to “CANCELED” or “COMPLETED”.

2.2 AE Specifications

2.2.1 ARIA Worklist Service Application Entity

2.2.1.1 SOP Classes

The ARIA Worklist Service Application Entity provides Standard Conformance to the following DICOM V3.0 and Supplement 96 SOP Classes as an SCP.

SOP Class Name	SOP Class UID	SCU	SCP
Unified Procedure Step - Pull	1.2.840.10008.5.1.4.34.4.3	No	Yes
Verification	1.2.840.10008.1.1	No	Yes

Table 2-1: Standard SOP Classes for ARIA Worklist Service Application Entity

2.2.1.2 Association Policies

2.2.1.2.1 General

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

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

Table 2-2: DICOM Application Context for ARIA Worklist Service Application Entity

The ARIA Worklist Service Application Entity accepts but never initiates associations.

Maximum PDU size received	28672
---------------------------	-------

Table 2-3: Maximum PDU size received as a SCP for the ARIA Worklist Service Application Entity.

2.2.1.2.2 Number of Associations

The ARIA Worklist Service Application Entity does not limit the number of concurrent associations.

Maximum number of simultaneous Associations	unlimited
---	-----------

Table 2-4: Number of Associations accepted by the ARIA Worklist Service Application Entity.

2.2.1.3 Asynchronous Nature

ARIA Worklist Service Application Entity does not support asynchronous communication.

2.2.1.4 Implementation Identifying Information

The implementation information for this Application Entity is defined in the following table.

ARIA Worklist Service Implementation Class UID	1.2.246.352.300.1
Implementation Version Name	(not used)

Table 2-5: DICOM Implementation Class and Version for ARIA Worklist Service Application Entity

2.2.1.5 Association Initiation Policy

The ARIA Worklist Service does not initiate any associations.

2.2.1.6 Association Acceptance Policy

The ARIA Worklist Service accepts Associations only if they have valid Presentation Contexts. If none of the Presentation Contexts are accepted, then the Association Request itself is rejected. It can be configured to only accept Associations from known hosts (using TCP/IP address) and/or Application Entity Titles.

2.2.1.6.1 Activity – Receive Verification Request (C-ECHO)

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
Verification	1.2.840.10008.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

Table 2-6: Proposed Presentation Contexts for ARIA Worklist Service Application Entity

2.2.1.6.1.1 SOP specific conformance for the verification SOP Class

The ARIA Worklist Service Application Entity provides standard conformance to the DICOM Verification Class as a Service Class Provider.

2.2.1.6.2 Activity – Receive Query Request (C-FIND)

2.2.1.6.2.1 Description and Sequencing of Activity

If the ARIA Worklist Service AE receives a query (C-FIND) request then the responses will be sent over the same Association used to send the C-FIND-Request.

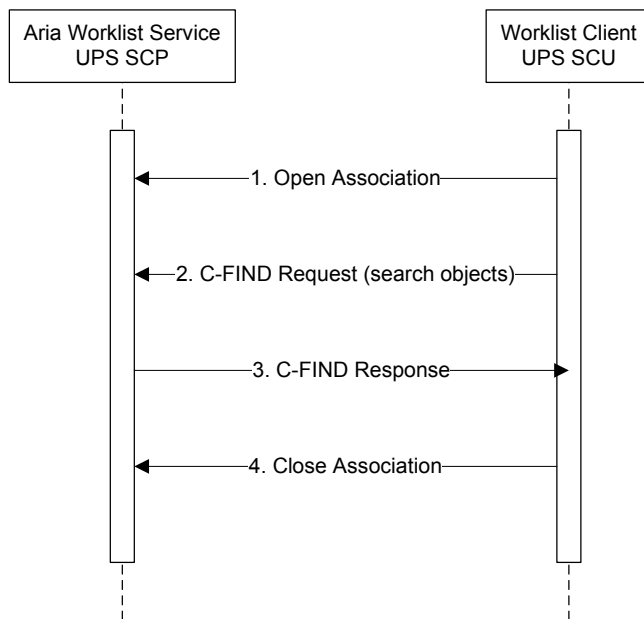


Figure 2-3: Sequencing of Activities – ARIA Worklist Service handling C-FIND Requests

A typical sequence of interactions between ARIA Worklist Service C-FIND SCP and a remote C-FIND SCU querying Instances is illustrated in Figure 2-3

1. Remote AE opens Association to ARIA Worklist Service.
2. Remote AE sends a C-FIND Request Message.
3. The ARIA Worklist Service AE returns a C-FIND Response Message for each matching UPS. A final C-FIND Response is sent indicating that the matching is complete.
4. Remote AE releases Association.

2.2.1.6.2.2 Accepted Presentation Contexts

ARIA Worklist Service Entity accepts Presentation Contexts shown in the following table.

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
Unified Worklist and Procedure Step – Pull SOP Class	1.2.840.10008.5.1.4.34.4.3	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

Table 2-7: Acceptable Presentation Contexts for ARIA Worklist Service – C-FIND

2.2.1.6.2.3 SOP Specific Conformance

The C-FIND service of the Unified Worklist and Procedure Step – Pull SOP Class always returns all supported attributes, even if they are not requested.

The following table shows the supported query keys. Not all required query keys are supported.

Attribute Name	Tag	VR	Matching Criteria	Types of Matching
Scheduled Procedure Step Priority	(0074,1200)	CS		*** not implemented ***
Procedure Step Label	(0074,1204)	LO		*** not implemented ***
Worklist Label	(0074,1202)	LO		*** not implemented ***
Scheduled Station Name Code Sequence	(0040,4025)	SQ	Code Value: Machine Id Code Meaning: Machine Id	Single Value Matching
Scheduled Station Class Code Sequence	(0040,4026)	SQ		*** not implemented ***
Scheduled Station Geographic Location Code Sequence	(0040,4027)	SQ		*** not implemented ***
Human Performer Code Sequence	(0040,4034)	SQ	Code Value: Doctor Id or Staff Id Code Meaning: Doctor Alias Name of Staff Alias Name	Single Value Matching
Human Performs Name	(0040,4037)	PN	Doctor or Staff: First Name, Last Name, Middle Name, Honorific, Name Suffix	Single Value Matching
Scheduled Procedure Step Start Date and Time	(0040,4005)	DT	Appointment Start Date and Time	Range Matching
Expected Completion	(0040,4011)	DT	Appointment End	Range Matching

Attribute Name	Tag	VR	Matching Criteria	Types of Matching
Date and Time			Date and Time	
Scheduled Workitem Code Sequence	(0040,4018)	SQ		*** not implemented ***
Patient ID	(0010,0020)	LO	Patient Id1	Single Value Matching
Issuer of Patient ID	(0010,0021)	LO		*** not implemented ***
Patient's Name	(0010,0010)	PN	Patient Last Name, Patient First Name	Single Value Matching
Patient's Birth Date	(0010,0030)	DA	Patient Birth Date	*** not implemented ***
Patient's Sex	(0010,0040)	CS	Patient Sex	*** not implemented ***
Admission ID	(0038,0010)	LO		*** not implemented ***
Issuer of Admission ID	(0038,0011)	LO		*** not implemented ***
Accession Number	(0008,0050)	SH		*** not implemented ***
Requested Procedure ID	(0040,1001)	SH		*** not implemented ***
Confidentiality Code	(0040,1008)	LO		*** not implemented ***
Requested Service	(0032,1033)	LO		*** not implemented ***
Related Procedure Step Sequence	(0074,1220)	SQ		*** not implemented ***

Table 2-8: Required Query Keys and their support in ARIA Worklist Service

The ARIA Worklist Service Application Entity will return one of the following Response Status to the C-FIND Request.

Service Status	Further Meaning	Error Code	Reason
Refused	Out of Resources	A700	Never sent.
Failure	Data Set does not match SOP Class	A900	Sent when Data Set is empty
	Refused: Not Authorized	C305	Never sent.
	Unable to process	C000 - CFFF	Error Id is set to give more information about Error: 0xC100, Received command is not a C-FIND Request 0xC101, DataSet is empty 0xC102, Failed to retrieve UPS from database 0xC103, Unexpected Error
	SOP Class not supported	0122H	Never sent.
Cancel	Matching terminated due to Cancel Request	FE00	Never sent. Cancel is not implemented.
Pending	Matches are continuing – Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys	FF00	
	Matches are continuing – Warning that one or more Optional Keys were not supported for the existence of this Identifier.	FF01	Never sent.
Success	Matching is completed – No final Identifier is supplied	0000	

Table 2-9: ARIA Worklist Service Response Status Values for C-FIND

2.2.1.6.3 Activity Change Status - N-ACTION

2.2.1.6.3.1 Description and Sequencing of Activity

If the ARIA Worklist Service AE receives a status change request (N-ACTION), it will change the status of the UPS if it is according the rules. It will then send the response over the same association used to send the N-ACTION request.

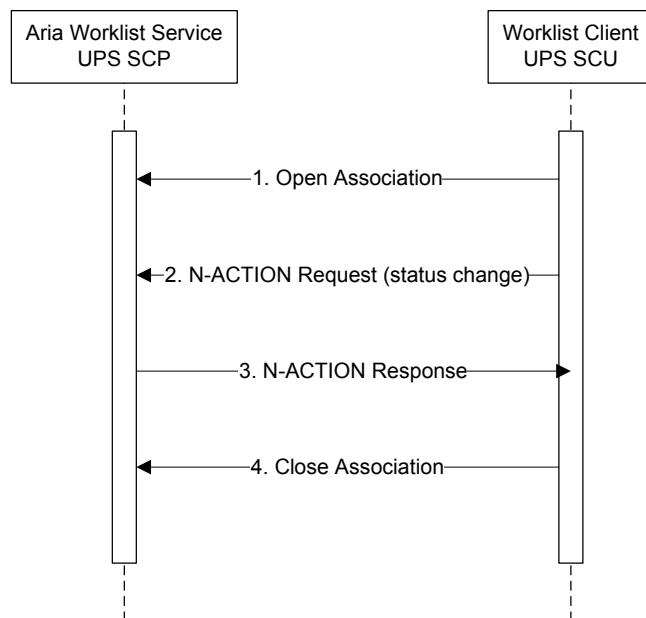


Figure 2-4: Sequencing of Activities – ARIA Worklist Service handling N-ACTION requests

A typical sequence of interactions between ARIA Worklist Service N-ACTION SCP and a remote N-ACTION SCU requesting status changes is illustrated in Figure 2-4.

1. Remote AE opens Association to ARIA Worklist Service.
2. Remote AE sends one N-ACTION Requests.
3. The ARIA Worklist Service updates the UPS with the new status if it is a valid status change request (see Table 2-10).
4. Remote AE releases Association.

The following table shows all possible status changes. Status changes not mentioned in Table 2-10 are not valid, and therefore ARIA Worklist Service responses with an error message.

Requested UPS Status	Transaction UID	Current UPS Status	Current Progress	New Appointment Status
IN PROGRESS	Empty	SCHEDULED	N/A	In Progress
COMPLETED	Valid Transaction UID	IN PROGRESS	100	Completed

Requested UPS Status	Transaction UID	Current UPS Status	Current Progress	New Appointment Status
CANCELED	Valid Transaction UID	IN PROGRESS	0	Canceled
CANCELED	Valid Transaction UID	IN PROGRESS	> 0, < 100	Part. Compl. Active
CANCELED	Valid Transaction UID	IN PROGRESS	100	Part. Compl. Finished

Table 2-10: Valid Status changes

2.2.1.6.3.2 Accepted Presentation Contexts

The ARIA Worklist Service accepts Presentation Contexts shown in Table 2-7.

2.2.1.6.3.3 SOP Specific Conformance

The ARIA Worklist Service Application Entity provides standard conformance to Unified Procedure Step – Pull SOP Class N-ACTION.

Service Status	Further Meaning	Error Code	Reason
Refused	Out of Resources	A700	Never sent.
Failure	Data Set does not match SOP Class	A900	Sent when Data Set is empty
	Refused: Not Authorized	C305	Never sent.
	Unable to process	C000 - CFFF	Error Id is set to give more information about Error: 0xC100, Command is not an N-ACTION request 0xC101, DataSet is empty 0xC104, Cancel Request not implemented 0xC108, UPS cannot be COMPLETED if Progress is smaller than 100 0xC106: Invalid Status Change Request Unexpected Error
	SOP Class not supported	0122H	Never sent.
	Unmatched Transaction UID	A505	The Transaction UID sent in the Status change request does not match the Transaction UID associated with the SOP Instance UID.

Service Status	Further Meaning	Error Code	Reason
	May no longer be updated	A501	The UPS is already in a final state (CANCELED or COMPLETED) and cannot be updated anymore.
Success	Status is successfully updated	0000	

Table 2-11: ARIA Worklist Service Response Status Values for Status Change Request (N-ACTION)

2.2.1.6.4 Activity Update Unified Procedure Step - N-SET

2.2.1.6.4.1 Description and Sequencing of Activity

If the ARIA Worklist Service receives an N-SET request, it will update the UPS if the status of the UPS is SCHEDULED or if the status is IN PROGRESS and the Transaction UID is valid. It will then send the response message over the same association used to send the N-SET request.

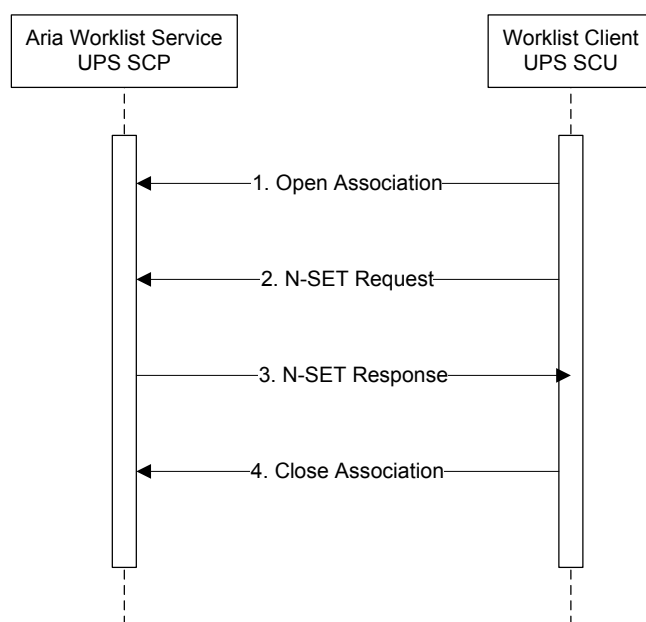


Figure 2-5: Sequencing of Activities – ARIA Worklist Service handling N-SET Requests

A typical sequence of interactions between ARIA Worklist Service N-SET SCP and a remote N-SET SCU requesting UPS updates is illustrated in Figure 2-5.

1. Remote AE opens Association to ARIA Worklist Service.
2. Remote AE sends one N-SET Requests.
3. The ARIA Worklist Service updates the UPS with the new information if an update is allowed.
4. Remote AE releases Association.

2.2.1.6.4.2 Accepted Presentation Contexts

The ARIA Worklist Service accepts Presentation Contexts shown in Table 2-7.

2.2.1.6.4.3 SOP Specific Conformance

The ARIA Worklist Service Application Entity does not support the full set of Type 1 attribute. ARIA Worklist Service does not look at the not supported attributes, and therefore may return a success, even if not all requested information is updated.

Attribute Name	Tag	VR	Remark
Scheduled Procedure Step Priority	(0074,1200)	CS	
Procedure Step Label	(0074,1204)	LO	*** not implemented ***
Worklist Label	(0074,1202)	LO	*** not implemented ***
Scheduled Station Name Code Sequence	(0040,4025)	SQ	Code Value used to find matching machine (Machine Id) on database.
Scheduled Station Class Code Sequence	(0040,4026)	SQ	*** not implemented ***
Scheduled Station Geographic Location Code Sequence	(0040,4027)	SQ	
Human Performer Code Sequence	(0040,4034)	SQ	Code Value used to find Doctor or Staff
Human Performs Name	(0040,4037)	PN	Not used for finding the Doctor or Staff.
Scheduled Procedure Step Start Date and Time	(0040,4005)	DT	Appointment Start Date and Time
Expected Completion Date and Time	(0040,4011)	DT	Appointment End Date and Time
Scheduled Workitem Code Sequence	(0040,4018)	SQ	
Comments on the Scheduled Procedure Step	(0040,0400)		Added to the Appointment Note.
Input Information Sequence	(0040,4021)		*** not implemented ***
Related Procedure Step Sequence	(0074,1220)		*** not implemented ***
UPS Progress Information Sequence	(0074,1002)	SQ	
> Unified Procedure Step Progress	(0074,1004)		Progress is only stored temporarily until UPS is COMPLETED or CANCELED. It is not visible in any ARIA Application
> Unified Procedure Step Progress Description	(0074,1006)		*** not implemented ***

Attribute Name	Tag	VR	Remark
> Unified Procedure Step Communications URI Sequence	(0074,1008)	SQ	*** not implemented ***
> Unified Procedure Step Discontinuation Reason Code Sequence	(0074,100e)		*** not implemented ***
UPS Performed Procedure Sequence	(0074,1216)	SQ	
>Actual Human Performers Sequence	(0040,4035)	SQ	Code Value of Human Performer Code Sequence is used to find the doctor with matching DoctorId or staff with matching StaffId in the database. If found, the scheduled human performer will be replaced with the actual human performer.
> Performed Station Name Code Sequence	(0040,4028)	SQ	*** not implemented ***
> Performed Station Class Code Sequence	(0040,4029)		*** not implemented ***
> Performed Station Geographic Location Code Sequence	(0040,4030)	SQ	*** not implemented ***
> Performed Processing Application Code Sequence	(0040,4007)	SQ	*** not implemented ***
> Performed Procedure Step Start Date	(0040,0244)		
> Performed Procedure Step Start Time	(0040,0245)		
> Performed Procedure Step Description	(0040,0254)		Added to the Appointment Note
> Comments on the Performed Procedure Step	(0040,0280)		Added to the Appointment Note
> Performed Workitem Code Sequence	(0040,4019)		
> Performed Processing Parameters Sequence	(0074,1212)		*** not implemented ***
> Performed Procedure Step End Date	(0040,0250)		
> Performed Procedure Step End Time	(0040,0251)		
> Output Information Sequence	(0040,4033)		*** not implemented ***
> Non-DICOM Output Code Sequence	(0040,4032)		*** not implemented ***

Table 2-12: Supported attributes of an N-SET request

Service Status	Further Meaning	Error Code	Reason
Refused	Out of Resources	A700	Never sent
Failure	May No Longer Be Updated	A501	Appointment is in a final state and cannot be updated anymore. An error is returned
	Unmatched Transaction UID	A505	Invalid Transaction UID, no update is done, an error is returned.
	Processing Failure	C001	Error Id is set to give more information about Error: 0xC100: Unexpected Error
Success	Unified Procedure Step is successfully updated	0000	Update of all supported attributes was successful

Table 2-13: ARIA Worklist Service Response Status Values for N-SET

2.2.1.6.5 Activity Retrieve Unified Procedure Step - N-GET

2.2.1.6.5.1 Description and Sequencing of Activity

The ARIA Worklist Service does not support N-GET service of the Unified Procedure Step - PULL SOP Class.

2.2.1.6.5.2 Accepted Presentation Contexts

The ARIA Worklist Service accepts Presentation Contexts shown in Table 2-7.

2.2.1.6.5.3 SOP Specific Conformance

The ARIA Worklist Service always returns the Error Code C000.

2.3 Network Interfaces

2.3.1 Physical Network Interfaces

The application is indifferent to the physical medium over which TCP/IP executes; which is dependent on the underlying operating system and hardware.

2.3.2 Additional Protocols

When host names rather than IP addresses are used in the configuration properties to specify presentation addresses for remote AEs, the application is dependent on the name resolution mechanism of the underlying operating system (e.g. DNS).

2.3.2.1 IPv4 and IPv6 Support

This product supports both IPv4 and IPv6. It does not utilize any of the optional configuration identification of security features of IPv6.

3. Media Interchange

ARIA Worklist Service Application Entity does not support Media Interchange.

4. Support of Character Sets

No dedicated support for Character Sets beyond the Default Character Repertoire is available. However, text fields containing characters not in the Default Character Repertoire when importing an Instance will appear unchanged when re-exporting the same Instance again.

5. Security

5.1 Security Profiles

No Security Profiles are supported.

5.2 Association Level Security

The ARIA Worklist Service Application Entity checks the following values when determining whether to accept Association Open Requests:

- Called AE Title

By default those additional checks are disabled when setting up a new ARIA Worklist Service configuration.

5.3 Application Level Security

To set up a new ARIA Worklist Service configuration or to change an existing ARIA Worklist Service configuration local administrative credentials on the affected computer are required

Appendix A IOD Details

A.1 Supported IODs

For better reference with DICOM Standard [1] and Supplement 96 [3] section titles of the following sub-sections are decorated with section number of DICOM Standard or Supplement 96 where the corresponding IOD Module table can be found.

A.1.1 Unified Worklist and Procedure Step – B.X.2

IE	Module	Reference	Module Description
Unified Procedure Step	Unified Procedure Step Relationship Module	C.X.4	References the related SOPs and IEs
	Unified Procedure Step Scheduled Procedure Information	C.X.2	Describes the UPS task to be performed including information about place, time, priority and input data
	Unified Procedure Step Progress Information	C.X.1	Describes the progress of a UPS task
	Unified Procedure Step Performed Procedure Information	C.X.3	Describes the work performed including information about status, place, time and result data
	SOP Common	C.12.1	Contains SOP common information

Table A-1: Unified Procedure Step IOD Modules

A.2 Modules and Attributes

For better reference with DICOM Standard [1] section titles of the following sub-sections are decorated with section number of DICOM Standard Part 3 where the corresponding Module Attribute table can be found.

The first four columns in the following tables contain definitions from the DICOM standard. References in those columns refer to the DICOM standard and not to this document.

The “Handling” column describes for each Attribute whether it is supported and to which database attribute it maps. A value of “*** Not Implemented ***” indicates that an Attribute is unknown and therefore ignored by the application. A value of “*** Not Used ***” indicates that an Attribute is validated, but its value is not saved on the database.

A.2.1 Unified Procedure Step Progress Information Module – C.X.1

Attribute Name	Tag	T	Description	Handling
Unified Procedure Step State	(0074,1000)		<p>Contains the state of the Unified Procedure Step. See F.X.1 for more details.</p> <p>Enumerated Values:</p> <p>SCHEDULED = The UPS is scheduled to be performed.</p> <p>IN PROGRESS = An SCU has taken ownership of the UPS and has likely started performing the procedure step. This is the only state that implies an exclusive lock.</p> <p>CANCELED = The UPS has been permanently stopped before or during execution of the step due to voluntary or involuntary action by a human or machine.</p> <p>COMPLETED = The UPS has been completed.</p> <p>Note: CANCELLED with two L's is NOT a valid value.</p>	<p>Appointment Status</p> <p>The mapping between the Appointment Status and the UPS State is:</p> <p>“Open” -> “SCHEDULED”</p> <p>“Canceled” -> “CANCELED”</p> <p>“Part. Compl. Active” -> “CANCELED”</p> <p>“Part. Compl. Finish” -> “CANCELED”</p> <p>“In Progress” -> “IN PROGRESS”</p>
UPS Progress Information Sequence	(0074,1002)		Zero or one item may be present.	

Attribute Name	Tag	T	Description	Handling
>Unified Procedure Step Progress	(0074,1004)		A numerical indicator of progress expressed as percentage complete. Note: this is primarily for simplicity and ease of rendering (e.g. progress bar). The percentage is not necessarily an accurate indication of total time.	Will be stored temporary until the UPS is set to "CANCELED" or "COMPLETED". If the value is 0.0 at the time of canceling the UPS, the appointment status will be set to "CANCELED", otherwise to "Part. Compl. Active"
>Unified Procedure Step Progress Description	(0074,1006)		A textual description of progress. For example, it might contain "Annealing complete".	*** not implemented ***
>Unified Procedure Step Communications URI Sequence	(0074,1008)		Zero or more items may be present in this sequence.	*** not implemented ***
>>Contact URI	(0074,100a)		URI to communicate with performer of the procedure in progress. Any URI (telephone number, URL, etc.) is permitted.	*** not implemented ***
>>Contact Display Name	(0074,100c)		Name of the person, department or organization to contact for more information about the performance of the procedure step.	*** not implemented ***
>Unified Procedure Step Discontinuation Code Sequence	(0074,100e)		Reasons for Discontinuation	*** not implemented ***
>>Code Value	(0008,0100)	1C	See Section 8.1. Required if a sequence item is present.	*** not implemented ***
>>Coding Scheme Designator	(0008,0102)	1C	See Section 8.2. Required if a sequence item is present.	*** not implemented ***
>>Code Meaning	(0008,0104)	1C	See Section 8.2. Required if a sequence item is present and the value of Coding Scheme Designator (0008,0102) is not sufficient to identify the Code Value (0008,0100) unambiguously.	*** not implemented ***

A.2.2 Unified Procedure Step Scheduled Procedure Information Module – C.X.2

Attribute Name	Tag	T	Description	Handling
Scheduled Procedure Step Priority	(0074,1200)		Priority of the scheduled Unified Procedure Step Enumerated Values are: HIGH: used to indicate an urgent or emergent work item, equivalent to a STAT request. MEDIUM: used to indicate a work item that has a priority less than HIGH and higher than LOW. It can be used to further stratify work items. LOW: used to indicate a routine or non-urgent work item.	Appointment Priority
Scheduled Procedure Information Modification Date and Time	(0040,4010)		Date and time when the Scheduled Procedure Information was last modified or first created (whichever is most recent). Note: This attribute should be implicitly updated by the worklist management system whenever any modification is made to Scheduled Procedure Information Module attributes of a Unified Procedure Step.	Appointment History Date Time
Worklist Label	(0074,1202)		A label identifying the worklist to which the Unified Procedure Step instance belongs.	"Varian Delivery Worklist"
Procedure Step Label	(0074,1204)		A label describing the task of the Unified Procedure Step in text appropriate for displaying in the user selection interface.	Set to the Activity Code Will be created at run time, only valid, until UPS is COMPLETED or CANCELED
Comments on the Scheduled Procedure Step	(0040,0400)		User-defined comments on the scheduled Unified Procedure Step.	Appointment Note. Limited to 254 character
Scheduled Station Name Code Sequence	(0040,4025)		Identifying name within the enterprise of the equipment for which the Unified Procedure Step is scheduled. The name conveyed in the Code Value (0008,0100) may be the same as the AE Title, but does not have to be. Zero or more Items may be included in this sequence.	Machine
>Code Value	(0008,0100)			Machine Machineld

Attribute Name	Tag	T	Description	Handling
>Coding Scheme Designator	(0008,0102)			"99VMS_MACHINE" Varian Coding Scheme Designator
>Code Meaning	(0008,0104)			Machine.MachineID
Scheduled Station Class Code Sequence	(0040,4026)		Class of the equipment for which the Unified Procedure Step is scheduled. Zero or more Items may be included in this sequence.	
>Code Value	(0008,0100)	1C	See Section 8.1. Required if a sequence item is present.	PDS
>Coding Scheme Designator	(0008,0102)	1C	See Section 8.2. Required if a sequence item is present.	"99VMS_IHE"
>Code Meaning	(0008,0104)	1C	See Section 8.2. Required if a sequence item is present and the value of Coding Scheme Designator (0008,0102) is not sufficient to identify the Code Value (0008,0100) unambiguously.	"Positioning and Delivery System"
Scheduled Station Geographic Location Code Sequence	(0040,4027)		Geographic location of the equipment for which the Unified Procedure Step is scheduled. Zero or more Items may be included in this sequence.	*** not implemented ***
>Code Value	(0008,0100)	1C	See Section 8.1. Required if a sequence item is present.	*** not implemented ***
>Coding Scheme Designator	(0008,0102)	1C	See Section 8.2. Required if a sequence item is present.	*** not implemented ***
>Code Meaning	(0008,0104)	1C	See Section 8.2. Required if a sequence item is present and the value of Coding Scheme Designator (0008,0102) is not sufficient to identify the Code Value (0008,0100) unambiguously.	*** not implemented ***
Scheduled Human Performers Sequence	(0040,4034)		The list of human performers that are scheduled to be involved or responsible for performing the Workitem in the Unified Procedure Step. Zero or more Items may be included in this sequence.	Staff / Doctor

Attribute Name	Tag	T	Description	Handling
>Human Performer Code Sequence	(0040,4009)		Human performer that is involved or responsible for performing the Workitem. Only a single Item shall be permitted in this sequence.	
>>Code Value	(0008,0100)	1C	See Section 8.1. Required if a sequence item is present.	StaffId / DoctorId
>>Coding Scheme Designator	(0008,0102)	1C	See Section 8.2. Required if a sequence item is present.	"99VMS_STAFF" / "99VMS_DOCTOR"
>>Code Meaning	(0008,0104)	1C	See Section 8.2. Required if a sequence item is present and the value of Coding Scheme Designator (0008,0102) is not sufficient to identify the Code Value (0008,0100) unambiguously.	Display Name
>Human Performer's Name	(0040,4037)		Name of the human performer.	Last Name, First Name, Middle Name, Honorific, Suffix
>Human Performer's Organization	(0040,4036)		Organization to which the human performer is accountable for the activities in the Workitem.	Hospital
Scheduled Procedure Step Start Date and Time	(0040,4005)		Date and time on which the Unified Procedure Step is scheduled to start.	Appointment Date and Start Time
Expected Completion Date and Time	(0040,4011)		Date on which the Unified Procedure Step is expected to be completed.	Appointment Date and End Time
Scheduled Workitem Code Sequence	(0040,4018)		A sequence that conveys the code for the Workitem. Only a single Item shall be permitted in this sequence.	Hard coded, depending on the Machine. Value for TomoTherapy:
>Code Value	(0008,0100)	1C	See Section 8.1. Required if a sequence item is present.	"201"
>Coding Scheme Designator	(0008,0102)	1C	See Section 8.2. Required if a sequence item is present.	"99TOMO"

Attribute Name	Tag	T	Description	Handling
>Code Meaning	(0008,0104)	1C	See Section 8.2. Required if a sequence item is present and the value of Coding Scheme Designator (0008,0102) is not sufficient to identify the Code Value (0008,0100) unambiguously.	"RT Treatment with Internal Verification"
Scheduled Processing Parameters Sequence	(0074,1210)		A sequence that conveys the processing parameters to be used by the performing system when carrying out the Workitem. Zero or more Items may be included in this sequence.	Sequence added for "CONTINUATION". Information if it is a CONITUNATION appointment is taken from Sessions if available, otherwise from the Appointments of the last 7 days. CONTINATUION is set if a previous appointment has status "Pt. Completed Active". A previous Appointment is the previous Appointment with a status of "Completed", "Pt. Compl Active" or "Pt. Compl Finished".
>Value Type	(0040,A0\$0)		The type of the value encoded in this name-value item. Enumerated Value: DATETIME DATE TIME PNAME UIDREF TEXT CODE NUMERIC	
>Concept Name Code Sequence	(0040,A043)		Coded concept name of this name-value item.	
>>Code Value	(0008,0100)	1C	See Section 8.1. Required if a sequence item is present.	
>>Coding Scheme Designator	(0008,0102)	1C	See Section 8.2. Required if a sequence item is present.	

Attribute Name	Tag	T	Description	Handling
>>Code Meaning	(0008,0104)	1C	See Section 8.2. Required if a sequence item is present and the value of Coding Scheme Designator (0008,0102) is not sufficient to identify the Code Value (0008,0100) unambiguously.	
>DateTime	(0040,A120)		Datetime value for this name-value item. Required if Value Type (0040,A040) is DATETIME.	
>Date	(0040,A121)		Date value for this name-value item. Required if Value Type (0040,A040) is DATE.	
>Time	(0040,A122)		Time value for this name-value item. Required if Value Type (0040,A040) is TIME.	
>Person Name	(0040,A123)		Person name value for this name-value item. Required if Value Type (0040,A040) is PNAME.	
>UID	(0040,A124)		UID value for this name-value item. Required if Value Type (0040,A040) is UIDREF.	
>Text Value	(0040,A160)		Text value for this name-value item. Required if Value Type (0040,A040) is TEXT.	
>Concept Code Sequence	(0040,A168)		Coded concept value for this name-value item. Required if Value Type (0040,A040) is CODE	
>>Code Value	(0008,0100)	1C	See Section 8.1. Required if a sequence item is present.	
>>Coding Scheme Designator	(0008,0102)	1C	See Section 8.2. Required if a sequence item is present.	
>>Code Meaning	(0008,0104)	1C	See Section 8.2. Required if a sequence item is present and the value of Coding Scheme Designator (0008,0102) is not sufficient to identify the Code Value (0008,0100) unambiguously.	
>Numeric Value	(0040,A30A)		Numeric value for this name-value item. Required if Value Type (0040,A040) is NUMERIC.	

Attribute Name	Tag	T	Description	Handling
>Measurement Units Code Sequence	(0040,08EA)		Units of measurement for a numeric value in this name-value item. Required if Value Type (0040,A040) is NUMERIC.	
>>Code Value	(0008,0100)	1C	See Section 8.1. Required if a sequence item is present.	
>>Coding Scheme Designator	(0008,0102)	1C	See Section 8.2. Required if a sequence item is present.	
>>Code Meaning	(0008,0104)	1C	See Section 8.2. Required if a sequence item is present and the value of Coding Scheme Designator (0008,0102) is not sufficient to identify the Code Value (0008,0100) unambiguously.	
Input Availability Flag	(0040,4020)		Flag that indicates the availability of Composite SOP Instances referenced in the Attribute "Input Information Sequence" (0040,4021) of the Unified Procedure Step. Enumerated values are: INCOMPLETE COMPLETE The value INCOMPLETE denotes that the list of Composite SOP Instances may not yet be complete. The value COMPLETE denotes that all Composite SOP Instances are available and listed. Note: It may happen that the list of Composite SOP Instances is empty when the value of the Input Availability Flag is COMPLETE. In such a case a Workitem has been scheduled that does not require input information.	COMPLETE
Input Information Sequence	(0040,4021)		List of Composite SOP Instances that forms the input information needed to perform the scheduled Unified Procedure Step. See also Input Availability Flag (0040,4020). Zero or more Items may be included in this sequence.	For TomoTherapy: Not supported. TomoTherapy plans are not stored in TMS. For other Delivery Treatments: Scheduled Plan
>Referenced SOP Class UID	(0008,1150)	1	Uniquely identifies the referenced SOP Class	

Attribute Name	Tag	T	Description	Handling
>Referenced SOP Instance UID	(0008,1155)	1	Uniquely identifies the referenced SOP Instance	
>Referenced Frame Number	(0008,1160)		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 and the reference does not apply to all frames, and Referenced Segment Number (0062, 000B) is not present.	*** not used ***
>Referenced Segment Number	(0062,000B)		Identifies the Segment Number to which the reference applies. Required if the Referenced SOP Instance is a Segmentation and the reference does not apply to all segments and Referenced Fame Number (0008,1160) is not present.	*** not used ***
Study Instance UID	(0020,000D)		Unique Study identification that shall be used for the created Composite SOP Instances resulting from this Unified Procedure Step. Note: In most cases this will be the same Study Instance UID as for the instances in the Input Information Sequence (0040,4021).	Study UID of Plan, if Plan is given, otherwise not supported.

A.2.3 Unified Procedure Step Performed Procedure Information Module – C.X.3

Attribute Name	Tag	T	Description	Handling
UPS Performed Procedure Sequence	(0074,1216)		Zero or one item may be present.	

Attribute Name	Tag	T	Description	Handling
>Actual Human Performers Sequence	(0040,4035)		The list of human performers that are/were actually involved or responsible for performing the Procedure Step. Zero or more Items may be included in this sequence. Note: Initially this list will be empty. A list of entries may be created at or after the status transition of the Unified Procedure Step State (0074,1000) to "IN PROGRESS"	Replace Scheduled Human Performers with Actual Human Performers in Attendee. Human Performer must already be in the TMS.
>>Human Performer Code Sequence	(0040,4009)		Human performer that is involved or responsible for performing the Workitem. Only a single Item shall be permitted in this sequence.	
>>>Code Value	(0008,0100)	1C	See Section 8.1. Required if a sequence item is present.	Doctor / Staff ID Id used to find the doctor or staff member on the database.
>>>Coding Scheme Designator	(0008,0102)	1C	See Section 8.2. Required if a sequence item is present.	
>>>Code Meaning	(0008,0104)	1C	See Section 8.2. Required if a sequence item is present and the value of Coding Scheme Designator (0008,0102) is not sufficient to identify the Code Value (0008,0100) unambiguously.	Doctor / Staff Display Name
>>Human Performer's Name	(0040,4037)		Name of the human performer.	Doctor / Staff First Name Last Name Middle Name Honorific Prefix
>>Human Performer's Organization	(0040,4036)		Organization to which the human performer is accountable for the activities in the Workitem.	

Attribute Name	Tag	T	Description	Handling
>Performed Station Name Code Sequence	(0040,4028)		Name within the enterprise of the equipment that created the Procedure Step. This name may be the same as the AE Title, but does not have to be. Zero or one Item may be included in this sequence.	*** not used ***
>>Code Value	(0008,0100)	1C	See Section 8.1. Required if a sequence item is present.	
>>Coding Scheme Designator	(0008,0102)	1C	See Section 8.2. Required if a sequence item is present.	
>>Code Meaning	(0008,0104)	1C	See Section 8.2. Required if a sequence item is present and the value of Coding Scheme Designator (0008,0102) is not sufficient to identify the Code Value (0008,0100) unambiguously.	
>Performed Station Class Code Sequence	(0040,4029)		Class of the equipment that created the Procedure Step. Zero or one Item may be included in this sequence	*** not used ***
>>Code Value	(0008,0100)	1C	See Section 8.1. Required if a sequence item is present.	
>>Coding Scheme Designator	(0008,0102)	1C	See Section 8.2. Required if a sequence item is present.	
>>Code Meaning	(0008,0104)	1C	See Section 8.2. Required if a sequence item is present and the value of Coding Scheme Designator (0008,0102) is not sufficient to identify the Code Value (0008,0100) unambiguously.	
>Performed Station Geographic Location Code Sequence	(0040,4030)		Geographic location of the equipment that created Procedure Step. Zero or one Item may be included in this sequence.	*** not implemented ***
>>Code Value	(0008,0100)	1C	See Section 8.1. Required if a sequence item is present.	
>>Coding Scheme Designator	(0008,0102)	1C	See Section 8.2. Required if a sequence item is present.	

Attribute Name	Tag	T	Description	Handling
>>Code Meaning	(0008,0104)	1C	See Section 8.2. Required if a sequence item is present and the value of Coding Scheme Designator (0008,0102) is not sufficient to identify the Code Value (0008,0100) unambiguously.	
>Performed Processing Applications Code Sequence	(0040,4007)		The list of processing application instances and/or application types on which the Procedure Step is executed. Zero or more Items may be included in this sequence.	*** not implemented ***
>>Code Value	(0008,0100)	1C	See Section 8.1. Required if a sequence item is present.	
>>Coding Scheme Designator	(0008,0102)	1C	See Section 8.2. Required if a sequence item is present.	
>>Code Meaning	(0008,0104)	1C	See Section 8.2. Required if a sequence item is present and the value of Coding Scheme Designator (0008,0102) is not sufficient to identify the Code Value (0008,0100) unambiguously.	
>Performed Procedure Step Start Date	(0040,0244)		Date on which the Procedure Step started.	Appointment Actual Start Date
>Performed Procedure Step Start Time	(0040,0245)		Time at which the Procedure Step started.	Appointment Actual Start Time
>Performed Procedure Step Description	(0040,0254)		Institution-generated description or classification of the Procedure Step that was performed.	Activity Description
>Performed Workitem Code Sequence	(0040,4019)		A sequence that conveys the type of procedure performed. Zero or more items may be present in this sequence.	Procedure Code. Will replace Scheduled Procedure Codes with Performed Procedure Codes

Attribute Name	Tag	T	Description	Handling
>>Code Value	(0008,0100)	1C	See Section 8.1. Required if a sequence item is present.	Procedure Code - Code Procedure Code needs already to be on the database. Code value is used to find the Procedure Code
>>Coding Scheme Designator	(0008,0102)	1C	See Section 8.2. Required if a sequence item is present.	
>>Code Meaning	(0008,0104)	1C	See Section 8.2. Required if a sequence item is present and the value of Coding Scheme Designator (0008,0102) is not sufficient to identify the Code Value (0008,0100) unambiguously.	Procedure Code Description
>Performed Processing Parameters Sequence	(0074,1212)		A sequence that conveys details of the procedure performed. Zero or more items may be present in this sequence	*** not implemented ***
>>Value Type	(0040,A0\$0)		The type of the value encoded in this name-value item. Enumerated Value: DATETIME DATE TIME PNAME UIDREF TEXT CODE NUMERIC	
>>Concept Name Code Sequence	(0040,A043)		Coded concept name of this name-value item.	
>>>Code Value	(0008,0100)	1C	See Section 8.1. Required if a sequence item is present.	
>>>Coding Scheme Designator	(0008,0102)	1C	See Section 8.2. Required if a sequence item is present.	

Attribute Name	Tag	T	Description	Handling
>>>Code Meaning	(0008,0104)	1C	See Section 8.2. Required if a sequence item is present and the value of Coding Scheme Designator (0008,0102) is not sufficient to identify the Code Value (0008,0100) unambiguously.	
>>DateTime	(0040,A120)		Datetime value for this name-value item. Required if Value Type (0040,A040) is DATETIME.	
>>Date	(0040,A121)		Date value for this name-value item. Required if Value Type (0040,A040) is DATE.	
>>Time	(0040,A122)		Time value for this name-value item. Required if Value Type (0040,A040) is TIME.	
>>Person Name	(0040,A123)		Person name value for this name-value item. Required if Value Type (0040,A040) is PNAME.	
>>UID	(0040,A124)		UID value for this name-value item. Required if Value Type (0040,A040) is UIDREF.	
>>Text Value	(0040,A160)		Text value for this name-value item. Required if Value Type (0040,A040) is TEXT.	
>>Concept Code Sequence	(0040,A168)		Coded concept value for this name-value item. Required if Value Type (0040,A040) is CODE	
>>>Code Value	(0008,0100)	1C	See Section 8.1. Required if a sequence item is present.	
>>>Coding Scheme Designator	(0008,0102)	1C	See Section 8.2. Required if a sequence item is present.	
>>>Code Meaning	(0008,0104)	1C	See Section 8.2. Required if a sequence item is present and the value of Coding Scheme Designator (0008,0102) is not sufficient to identify the Code Value (0008,0100) unambiguously.	
>>Numeric Value	(0040,A30A)		Numeric value for this name-value item. Required if Value Type (0040,A040) is NUMERIC.	

Attribute Name	Tag	T	Description	Handling
>>Measurement Units Code Sequence	(0040,08EA)		Units of measurement for a numeric value in this name-value item. Required if Value Type (0040,A040) is NUMERIC.	
>>>Code Value	(0008,0100)	1C	See Section 8.1. Required if a sequence item is present.	
>>>Coding Scheme Designator	(0008,0102)	1C	See Section 8.2. Required if a sequence item is present.	
>>>Code Meaning	(0008,0104)	1C	See Section 8.2. Required if a sequence item is present and the value of Coding Scheme Designator (0008,0102) is not sufficient to identify the Code Value (0008,0100) unambiguously.	
>Performed Procedure Step End Date	(0040,0250)		Date on which the Procedure Step ended.	Appointment Actual End Date
>Performed Procedure Step End Time	(0040,0251)		Time at which the Procedure Step ended.	Appointment Actual End Time
>Output Information Sequence	(0040,4033)		A Sequence that provides reference to any resulting Composite SOP instances or HL7 Structured Documents (unencapsulated) created. Zero or more Items may be included in this sequence.	*** not implemented ***
>Referenced SOP Class UID	(0008,1150)	1	Uniquely identifies the referenced SOP Class	
>Referenced SOP Instance UID	(0008,1155)	1	Uniquely identifies the referenced SOP Instance	
>Referenced Frame Number	(0008,1160)		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 and the reference does not apply to all frames, and Referenced Segment Number (0062, 000B) is not present.	

Attribute Name	Tag	T	Description	Handling
>Referenced Segment Number	(0062,000B)		Identifies the Segment Number to which the reference applies. Required if the Referenced SOP Instance is a Segmentation and the reference does not apply to all segments and Referenced Fame Number (0008,1160) is not present.	
>Non-DICOM Output Code Sequence	(0040,4032)		A Sequence that describes the type of any other output produced as results. Zero or more Items may be included in this sequence. Note: This does not provide a direct link or identifier for the output. Such output may be indexed by Patient ID, Accession # or other similar attributes.	*** not implemented ***
>>Code Value	(0008,0100)	1C	See Section 8.1. Required if a sequence item is present.	*** not implemented ***
>>Coding Scheme Designator	(0008,0102)	1C	See Section 8.2. Required if a sequence item is present.	*** not implemented ***
>>Code Meaning	(0008,0104)	1C	See Section 8.2. Required if a sequence item is present and the value of Coding Scheme Designator (0008,0102) is not sufficient to identify the Code Value (0008,0100) unambiguously.	*** not implemented ***

A.2.4 Unified Procedure Step Relationship Module – C.X.4

Attribute Name	Tag	T	Description	Handling
Patient's Name	(0010,0010)		Patient's full legal name.	Patient First Name, Last Name, Middle Name, Honorific, Prefix
Patient ID	(0010,0020)		Primary hospital identification number or code for the patient. See C.X.4.1	ID1
Issuer of Patient ID	(0010,0021)		Identifier of the Assigning Authority that issued the Patient ID.	Patient Id Issuer

Attribute Name	Tag	T	Description	Handling
Other Patient IDs Sequence	(0010,1002)		A sequence of identification numbers or codes used to identify the patient, which may or may not be human readable, and may or may not have been obtained from an implanted or attached device such as an RFID or barcode.	
>Patient ID	(0010,0020)		An identification number or code used to identify the patient.	Patient ID2 Patient Universal ID
>Issuer of Patient ID	(0010,0021)		Identifier of the Assigning Authority that issued the Patient ID.	Patient Id Issuer
>Type of Patient ID	(0010,0022)		The type of identifier in this item. Defined Terms: TEXT RFID BARCODE Note: The identifier is coded as a string regardless of the type, not as a binary value.	TEXT
Patient's Birth Date	(0010,0030)		Date of birth of the named patient.	Patient Birth Date
Patient's Sex	(0010,0040)		Sex of the named Patient. Enumerated Values: M = male F = female O = other	Patient Sex
Admission ID	(0038,0010)		Identification number of the visit as assigned by the healthcare provider	*** not implemented ***
Issuer of Admission ID	(0038,0011)		Name of healthcare provider that issued the Admission ID	*** not implemented ***
Admitting Diagnoses Description	(0008,1080)		Description of admitting diagnosis (diagnoses).	*** not implemented ***
Admitting Diagnoses Code Sequence	(0008,1084)		A sequence that conveys the admitting diagnosis (diagnoses). One or more Items may be included in this Sequence.	*** not implemented ***

Attribute Name	Tag	T	Description	Handling
>>Code Value	(0008,0100)	1C	See Section 8.1. Required if a sequence item is present.	
>>Coding Scheme Designator	(0008,0102)	1C	See Section 8.2. Required if a sequence item is present.	
>>Code Meaning	(0008,0104)	1C	See Section 8.2. Required if a sequence item is present and the value of Coding Scheme Designator (0008,0102) is not sufficient to identify the Code Value (0008,0100) unambiguously.	
Referenced Request Sequence	(0040,A370)		The list of Requested Procedures the Procedure Step shall contribute to. Zero or more Items may be included in the sequence.	Only one item supported
>Study Instance UID	(0020,000D)		Unique identifier for the Study.	*** not implemented ***
>Referenced Study Sequence	(0008,1110)		Uniquely identifies the Study SOP Instance associated with this Unified Procedure Step. Only a single Item shall be permitted in this sequence.	*** not implemented ***
>>Referenced SOP Class UID	(0008,1150)		Uniquely identifies the SOP Class.	*** not implemented ***
>>Referenced SOP Instance UID	(0008,1155)		Uniquely identifies the SOP Instance.	*** not implemented ***
>Accession Number	(0008,0050)		A departmental IS generated number that identifies the Imaging Service Request.	*** not implemented ***
>Requested Procedure Code Sequence	(0032,1064)		A sequence that conveys the Procedure Type of the Requested Procedure. Zero or one Item may be included in this sequence.	*** not implemented ***
>>Code Value	(0008,0100)	1C	See Section 8.1. Required if a sequence item is present.	*** not implemented ***
>>Coding Scheme Designator	(0008,0102)	1C	See Section 8.2. Required if a sequence item is present.	*** not implemented ***

Attribute Name	Tag	T	Description	Handling
>>Code Meaning	(0008,0104)	1C	See Section 8.2. Required if a sequence item is present and the value of Coding Scheme Designator (0008,0102) is not sufficient to identify the Code Value (0008,0100) unambiguously.	*** not implemented ***
>Placer Order Number / Imaging Service Request	(0040,2016)		The order number assigned to the Imaging Service Request by the party placing the order.	*** not implemented ***
>Filler Order Number / Imaging Service Request	(0040,2017)		The order number assigned to the Imaging Service Request by the party filling the order.	*** not implemented ***
>Requested Procedure ID	(0040,1001)		Identifier of the related Requested Procedure.	*** not implemented ***
>Requested Procedure Description	(0032,1060)		Institution-generated description or classification of the Requested Procedure.	Activity Code
>Reason for the Requested Procedure	(0040,1002)		Reason for requesting this procedure.	*** not implemented ***
> Reason for Requested Procedure Code Sequence	(0040,100A)		Coded reason for requesting this procedure.	*** not implemented ***
>>Code Value	(0008,0100)	1C	See Section 8.1. Required if a sequence item is present.	
>>Coding Scheme Designator	(0008,0102)	1C	See Section 8.2. Required if a sequence item is present.	
>>Code Meaning	(0008,0104)	1C	See Section 8.2. Required if a sequence item is present and the value of Coding Scheme Designator (0008,0102) is not sufficient to identify the Code Value (0008,0100) unambiguously.	
>Requested Procedure Comments	(0040,1400)		User-defined comments on the Requested Procedure.	Appointment Note

Attribute Name	Tag	T	Description	Handling
>Confidentiality Code	(0040,1008)		Confidentiality Constraints on the Requested Procedure by the party filling the order.	*** not implemented ***
>Names of Intended Recipients of Results	(0040,1010)		Names of the physicians, who are intended recipients of results.	*** not implemented ***
>Imaging Service Request Comments	(0040,2400)		User-defined comments on the Imaging Service Request.	*** not implemented ***
>Requesting Physician	(0032,1032)		Physician who requested the Imaging Service Request.	*** not implemented ***
>Requesting Service	(0032,1033)		Institutional department where the request initiated.	*** not implemented ***
>Issue Date of Imaging Service Request	(0040,2004)		Date on which the Imaging Service Request was issued by the requester.	*** not implemented ***
>Issue Time of Imaging Service Request	(0040,2005)		Time at which the Imaging Service Request was issued by the requester.	*** not implemented ***
>Referring Physician's Name	(0008,0090)		Patient's primary physician for this Imaging Service Request.	*** not implemented ***
Related Procedure Step Sequence	(0074,1220)		List of Procedure Step Instances related to this Procedure Step Instance	*** not implemented ***
>Referenced SOP Class UID	(0008,1150)		Uniquely identifies the SOP Class of the referenced Instance	
>Referenced SOP Instance UID	(0008,1155)		Uniquely identifies the referenced SOP Instance	
>Procedure Step Relationship Type	(0074,1222)		Description of the referenced Procedure Step's relationship to this Procedure Step.	

A.2.5 SOP Common – C.12.1

Attribute Name	Tag	T	Description	Handling
SOP Class UID	(0008,0016)	1	Uniquely identifies the SOP Class. See C.12.1.1.1 for further explanation. See also PS 3.4.	The SOP Class UID is used to map the data to an appropriate object type.
SOP Instance UID	(0008,0018)	1	Uniquely identifies the SOP Instance. See C.12.1.1.1 for further explanation. See also PS 3.4.	A New SOP Instance UID will be created the first time an the UPS is returned in a Query response. The SOP Instance UID is only valid until the UPS is Completed or Canceled.
Specific Character Set	(0008,0005)	1C	Character Set that expands or replaces the Basic Graphic Set. Required if an expanded or replacement character set is used. See C.12.1.1.2 for Defined Terms.	*** Not Used *** Supported character set depends on client operating system version. No character translation is performed other than reading/writing contents of DICOM string attributes in corresponding database attributes. Also no support for multiple character sets within a single attribute.
Instance Creation Date	(0008,0012)	3	Date the SOP Instance was created.	*** Not Implemented **
Instance Creation Time	(0008,0013)	3	Time the SOP Instance was created.	*** Not Implemented **
Instance Creator UID	(0008,0014)	3	Uniquely identifies device which created the SOP Instance.	*** Not Implemented **
Related General SOP Class UID	(0008,001A)	3	Uniquely identifies a Related General SOP Class for the SOP Class of this Instance. See PS 3.4.	*** Not Implemented ***
Original Specialized SOP Class UID	(0008,001B)	3	The SOP Class in which the Instance was originally encoded, but which has been replaced during a fall-back conversion to the current Related General SOP Class. See PS 3.4.	*** Not Implemented ***

Attribute Name	Tag	T	Description	Handling
Coding Scheme Identification Sequence	(0008,0110)	3	Sequence of items that map values of Coding Scheme Designator (0008,0102) to an external coding system registration, or to a private or local coding scheme. One or more items may be present in the sequence.	*** Not Implemented ***
> Coding Scheme Designator	(0008,0102)	1	The value of a Coding Scheme Designator, used in this SOP Instance, which is being mapped.	*** Not Implemented ***
> Coding Scheme Registry	(0008,0112)	1C	The name of the external registry where further definition of the identified coding scheme may be obtained. Required if coding scheme is registered. Defined term: HL7	*** Not Implemented ***
> Coding Scheme UID	(0008,010C)	1C	The coding scheme UID identifier. Required if coding scheme is identified by an ISO 8824 object identifier compatible with the UI VR.	*** Not Implemented ***
> Coding Scheme External ID	(0008,0114)	2C	The coding scheme identifier as defined in an external registry. Required if coding scheme is registered and Coding Scheme UID (0008,010C) is not present.	*** Not Implemented ***
> Coding Scheme Name	(0008,0115)	3	The coding scheme full common name	*** Not Implemented ***
> Coding Scheme Version	(0008,0103)	3	The coding scheme version associated with the Coding Scheme Designator (0008,0102).	*** Not Implemented ***
> Responsible Organization	(0008,0116)	3	Name of the organization responsible for the Coding Scheme. May include organizational contact information.	*** Not Implemented ***

Attribute Name	Tag	T	Description	Handling
Timezone Offset From UTC	(0008,0201)	3	<p>Contains the offset from UTC to the timezone for all DA and TM Attributes present in this SOP Instance. Encoded as an ASCII string in the format "&ZZZZ". The components of this string, from left to right, are & = "+" or "-", and ZZZZ = Hours and Minutes of offset.</p> <p>Notes:</p> <ol style="list-style-type: none"> 1. This encoding is the same as described in PS 3.5 for the DT Value Representation. 2. This Attribute does not apply to values with a DT Value Representation, which may contain an explicitly encoded timezone. 3. The corrected time may cross a 24 hour boundary. For example, if Local Time = 1.00 a.m. and Offset = +0200, then UTC = 11.00 p.m. (23.00) the day before. 4. The "+" sign may not be omitted. Time earlier than UTC is expressed as a negative offset. <p>Note:</p> <p>For example: UTC = 5.00 a.m. Local Time = 3.00 a.m. Offset = -0200 The local timezone offset is undefined if this Attribute is absent.</p>	*** Not Implemented ***
Contributing Equipment Sequence	(0018,A001)	3	Sequence of Items containing descriptive attributes of related equipment which has contributed to the acquisition, creation or modification of the composite instance. One or more Items may be included in this Sequence. See C.12.1.1.5 for further explanation.	*** Not Implemented ***
> Purpose of Reference Code Sequence	(0040,A170)	1	Describes the purpose for which the related equipment is being reference. Only a single Item shall be permitted in this sequence. See C.12.1.1.5 for further explanation.	*** Not Implemented ***
>> Code Value	(0008,0100)	1C	See Section 8.1. Required if a sequence item is present.	*** Not Implemented ***
>> Coding Scheme Designator	(0008,0102)	1C	See Section 8.2. Required if a sequence item is present.	*** Not Implemented ***

Attribute Name	Tag	T	Description	Handling
>> Coding Scheme Version	(0008,0103)	1C	See Section 8.2. Required if a sequence item is present and the value of Coding Scheme Designator (0008,0102) is not sufficient to identify the Code Value (0008,0100) unambiguously.	*** Not Implemented ***
>> Code Meaning	(0008,0104)	1C	See Section 8.3. Required if a sequence item is present.	*** Not Implemented ***
> Manufacturer	(0008,0070)	1	Manufacturer of the equipment that contributed to the composite instance.	*** Not Implemented **
> Institution Name	(0008,0080)	3	Institution where the equipment that contributed to the composite instance is located.	*** Not Implemented **
> Institution Address	(0008,0081)	3	Address of the institution where the equipment that contributed to the composite instance is located.	*** Not Implemented ***
> Station Name	(0008,1010)	3	User defined name identifying the machine that contributed to the composite instance.	*** Not Implemented **
> Institutional Department Name	(0008,1040)	3	Department in the institution where the equipment that contributed to the composite instance is located.	*** Not Implemented **
> Manufacturer's Model Name	(0008,1090)	3	Manufacturer's model name of the equipment that contributed to the composite instance.	!*** Not Implemented ***
> Device Serial Number	(0018,1000)	3	Manufacturer's serial number of the equipment that contributed to the composite instance.	*** Not Implemented ***
> Software Version(s)	(0018,1020)	3	Manufacturer's designation of the software version of the equipment that contributed to the composite instance.	*** Not Implemented ***
> Spatial Resolution	(0018,1050)	3	The inherent limiting resolution in mm of the acquisition equipment for high contrast objects for the data gathering and reconstruction technique chosen. If variable across the images of the series, the value at the image center.	*** Not Implemented ***
> Date of Last Calibration	(0018,1200)	3	Date when the image acquisition device calibration was last changed in any way. Multiple entries may be used for additional calibrations at other times. See C.7.5.1.1.1 for further explanation.	*** Not Implemented ***

Attribute Name	Tag	T	Description	Handling
> Time of Last Calibration	(0018,1201)	3	Time when the image acquisition device calibration was last changed in any way. Multiple entries may be used. See C.7.5.1.1.1 for further explanation.	*** Not Implemented ***
> Contribution Date Time	(0018,A002)	3	The Date & Time when the equipment contributed to the composite instance.	*** Not Implemented ***
> Contribution Description	(0018,A003)	3	Description of the contribution the equipment made to the composite instance.	*** Not Implemented ***
Instance Number	(0020,0013)	3	A number that identifies this Composite object instance.	*** Not Implemented ***
SOP Instance Status	(0100,0410)	3	A flag that indicates the storage status of the SOP Instance. Not Specified (NS) implies that this SOP Instance has no special storage status, and hence no special actions need be taken. Original (OR) implies that this is the primary SOP instance for the purpose of storage, but that it has not yet been authorized for diagnostic use. Authorized Original (AO) implies that this is the primary SOP instance for the purpose of storage, which has been authorized for diagnostic use. Any copies of an Authorized Original should be given the status of Authorized Copy. Authorized Copy (AC) implies that this is a copy of an Authorized Original SOP Instance. Enumerated Values: NS, OR, AO, AC Note: Proper use of these flags is specified in Security Profiles. Implementations that do not conform to such Security Profiles may not necessarily handle these flags properly.	*** Not Implemented ***
SOP Authorization Date and Time	(0100,0420)	3	The date and time when the SOP Instance Status (0100,0410) was set to AO.	*** Not Implemented ***
SOP Authorization Comment	(0100,0424)	3	Any comments associated with the setting of the SOP Instance Status (0100,0410) to AO.	*** Not Implemented ***

Attribute Name	Tag	T	Description	Handling
Authorization Equipment Certification Number	(0100,0426)	3	The certification number issued to the Application Entity that set the SOP Instance Status (0100,0410) to AO.	*** Not Implemented ***
MAC Parameters Sequence	(4FFE,0001)	3	A sequence of one or more items that describe the parameters used to calculate a MAC for use in Digital Signatures.	*** Not Implemented ***
> MAC ID Number	(0400,0005)	1	A number used to identify this MAC Parameters Sequence item.	*** Not Implemented ***
> MAC Calculation Transfer Syntax UID	(0400,0010)	1	The Transfer Syntax UID used to encode the values of the Data Elements included in the MAC calculation. Only Transfer Syntaxes that explicitly include the VR and use Little Endian encoding shall be used. Notes: Certain Transfer Syntaxes, particularly those that are used with compressed data, allow the fragmentation of the pixel data to change. If such fragmentation changes, Digital Signatures generated with such Transfer Syntaxes could become invalid.	*** Not Implemented ***
> MAC Algorithm	(0400,0015)	1	The algorithm used in generating the MAC to be encrypted to form the Digital Signature. Defined Terms: RIPEMD160 MD5 SHA1. Note: Digital Signature Security Profiles (see PS 3.15) may require the use of a restricted subset of these terms.	*** Not Implemented ***
> Data Elements Signed	(0400,0020)	1	A list of Data Element Tags in the order they appear in the Data Set which identify the Data Elements used in creating the MAC for the Digital Signature. See Section C.12.1.1.3.1.1.	*** Not Implemented ***
Digital Signatures Sequence	(FFFA,FFFA)	3	Sequence holding one or more Digital Signatures.	*** Not Implemented ***

Attribute Name	Tag	T	Description	Handling
> MAC ID Number	(0400,0005)	1	A number used to identify which MAC Parameters Sequence item was used in the calculation of this Digital Signature.	*** Not Implemented ***
> Digital Signature UID	(0400,0100)	1	A UID that can be used to uniquely reference this signature.	*** Not Implemented ***
> Digital Signature DateTime	(0400,0105)	1	The date and time the Digital Signature was created. The time shall include an offset (i.e., time zone indication) from Coordinated Universal Time. Note: This is not a certified timestamp, and hence is not completely verifiable. An application can compare this date and time with those of other signatures and the validity date of the certificate to gain confidence in the veracity of this date and time.	*** Not Implemented ***
> Certificate Type	(0400,0110)	1	The type of certificate used in (0400,0115). Defined Term: X509_1993_SIG Note: Digital Signature Security Profiles (see PS 3.15) may require the use of a restricted subset of these terms.	*** Not Implemented ***
> Certificate of Signer	(0400,0115)	1	A certificate that holds the identity of the entity producing this Digital Signature, that entity's public key or key identifier, and the algorithm and associated parameters with which that public key is to be used. Algorithms allowed are specified in Digital Signature Security Profiles (see PS 3.15). Notes: 1. As technology advances, additional encryption algorithms may be allowed in future versions. Implementations should take this possibility into account. 2. When symmetric encryption is used, the certificate merely identifies which key was used by which entity, but not the actual key itself. Some other means (e.g., a trusted third party) must be used to obtain the key.	*** Not Implemented ***
> Signature	(0400,0120)	1	The MAC generated as described in Section 12.2.1.1 and encrypted using the algorithm, parameters, and private key associated with the Certificate of the Signer (0400,0115). See Section C.12.1.1.3.1.2.	*** Not Implemented ***

Attribute Name	Tag	T	Description	Handling
> Certified Timestamp Type	(0400,0305)	1C	The type of certified timestamp used in the Certified Timestamp (0400,0310) Attribute. Required if Certified Timestamp (0400,0310) is present. Defined Terms: CMS_TSP û Internet X.509 Public Key Infrastructure Time Stamp Protocol Note: Digital Signature Security Profiles (see PS 3.15) may require the use of a restricted subset of these terms.	*** Not Implemented ***
> Certified Timestamp	(0400,0310)	3	A certified timestamp of the Digital Signature (0400,0120) Attribute Value, which shall be obtained when the Digital Signature is created. See Section C.12.1.1.3.1.3.	*** Not Implemented ***
Encrypted Attributes Sequence	(0400,0500)	1C	Sequence of Items containing encrypted DICOM data. One or more Items shall be present. Required if application level confidentiality is needed and certain recipients are allowed to decrypt all or portions of the Encrypted Attributes Data Set. See C.12.1.1.4.1.	*** Not Implemented ***
> Encrypted Content Transfer Syntax UID	(0400,0510)	1	Transfer Syntax used to encode the encrypted content. Only Transfer Syntaxes that explicitly include the VR and use Little Endian encoding shall be used.	*** Not Implemented ***
> Encrypted Content	(0400,0520)	1	Encrypted data. See C.12.1.1.4.2.	*** Not Implemented ***
HL7 Structured Document Reference Sequence	(0040,A390)	1C	Sequence of items defining mapping and/or access mechanism for HL7 Structured Documents referenced from the current SOP Instance. One or more Items may be included in this sequence. See C.12.1.1.6. Required if HL7 Structured Documents are referenced within the Instance.	*** Not Implemented ***
> Referenced SOP Class UID	(0008,1150)	1	Unique identifier for the class of HL7 Structured Document.	*** Not Implemented ***
> Referenced SOP Instance UID	(0008,1155)	1	Unique identifier for the HL7 Structured Document as used in DICOM instance references.	*** Not Implemented ***

Attribute Name	Tag	T	Description	Handling
> HL7 Instance Identifier	(0040,E001)	1	Instance Identifier of the referenced HL7 Structured Document, encoded as a UID (OID or UUID), concatenated with a caret ("^") and Extension value (if Extension is present in Instance Identifier).	*** Not Implemented ***
> Retrieve URI	(0040,E010)	3	Retrieval access path to HL7 Structured Document. Includes fully specified scheme, authority, path, and query in accordance with RFC 2396	*** Not Implemented ***

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