Digital Imaging and Communications in Medicine (DICOM)

Supplement 246: DICOMweb Modality Workflow Service

*Prepared by:*

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# Document History

|  |  |  |  |
| --- | --- | --- | --- |
| 2024.08 | Version 00 | JM, DK | Initial version with proposed document structure and content. |
| 2024.11 | Version 01 | JM, DK | Extended with observations; alternative approach included. |
| 2025.01 | Version 02 | JM, DK | Alternative approach promoted, extended with conformance. |

# Open Issues

|  |  |
| --- | --- |
| 2 | **Context**: The notified parties of the MPPS notification service as specified in [PS3.4, F.9](https://dicom.nema.org/medical/dicom/current/output/chtml/part04/sect_F.9.html).  **Issue**: This service does not specify how the MPPS Notification SCP knows what SCUs to notify on MPPS changes.  **Proposal**: Do not change the current way this behavior is specified; just add one or more notes to make clear that this aspect is something beyond the standard, and that a conceivable way to achieve this would be configuring the SCP with the SCUs to be notified.  **Decision**: [WGxx: YYYY-MM-DD] None yet. |
|  |  |

# Closed Issues

|  |  |
| --- | --- |
| 1 | **Context**: The description of the work item proposal talked about adding the Modality Worklist and the Modality Performed Procedure Step services to DICOMweb, in principle based on the existing DICOMweb Worklist service. This was expected to boil down to creating an informative annex and any normative changes needed if gaps are discovered.  **Issue**: It proved very hard, if not impossible, to map MWL/MPPS to UPS, as, among other things, the two serve different purposes.  **Proposal**: Create new Modality Workflow Services resources instead of basing DICOMweb MWL/MPPS on UPS-RS.  **Decision**: [WG06: 2025-01-14] Agreed with proposal. |
|  |  |

# Scope and Field of Application

This supplement defines the means to perform modality workflow management in DICOMweb. The Modality Workflow Service enables a user agent to use and create workflow-related resources on the origin server.

The DICOMweb Modality Workflow Service is an extension to the existing DICOMweb services, mimicking the Modality Worklist (MWL) and Modality Performed Procedure Step (MPPS) services that are already available in DIMSE. It has been designed with the intention of facilitating proxies from/to DIMSE to/from the DICOMweb Modality Workflow Service.

**Changes to NEMA Standards Publications PS 3.18**

Add new section X Modality Workflow Service and Resources

# X Modality Workflow Service and Resources

## X.1 Overview

The Modality Workflow Service provides modality-oriented workflow management for user agents. This service corresponds to both the DIMSE Modality Worklist (MWL) and DIMSE Modality Performed Procedure Step (MPPS) services as defined in Annexes K and F of PS3.4 respectively and has their semantics.

### X.1.1 Resource Descriptions

The Modality Workflow Service manages a collection of Modality Scheduled Procedure Steps and a collection of Modality Performed Procedure Steps.

The Modality Workflow Service defines the two resources as given in Table X.1.1-1.

Table X.1.1-1. Modality Workflow Service Resource Descriptions

| Resource | Support |
| --- | --- |
| /modality-scheduled-procedure-steps | The collection of Modality Scheduled Procedure Steps managed by the origin server. |
| /modality-performed-procedure-steps | The collection of Modality Performed Procedure Steps managed by the origin server. |

Table X.1.1-2 lists the DIMSE Operations used in MWL and MPPS and their corresponding Modality Workflow Service Transactions.

Table X.1.1-2. Mapping of DIMSE Operations and Modality Workflow Service Transactions

| Operation | Reference | DIMSE Service | Modality Workflow Service Transaction |
| --- | --- | --- | --- |
| Query Worklist | PS3.4, K.4 | MWL C-FIND | Search |
| Create MPPS Instance | PS3.4, F.7.2.1 | MPPS N-CREATE | Create |
| Set MPPS Information | PS3.4, F.7.2.2 | MPPS N-SET | Update |
| Get MPPS Information | PS3.4, F.8.2.1 | MPPS N-GET | Retrieve |

Note As in DIMSE, the Transactions do *not* provide a complete CRUDL interface for the respective resources. For instance, it is not possible to create Modality Scheduled Procedure Steps using DICOM, neither with DIMSE, nor with DICOMweb. What DICOM *does* provide is access to scheduled and performed procedure steps at the level required for modalities.

Next to Operations, MPPS also knows about Notifications, which, together with their related Modality Services Transactions, are listed in Table X.1.1-3.

Table X.1.1-3. Relation between DIMSE Notifications and Modality Workflow Service Transactions

| Notification | Reference | DIMSE Service | Modality Workflow Service Transaction |
| --- | --- | --- | --- |
| Receive Event Notification | PS3.4, F.9.2.1 | N-EVENT-REPORT | Subscribe |
| Provide Event Notification | PS3.4, F.9.2.2 | Unsubscribe |

Note The pair of Notifications relate to the pair of Transactions; there is *no* one-to-one mapping between DIMSE Notifications and Modality Workflow Service Transactions. See also Section 8.10 for more information about how DICOMweb deals with Notifications.

### X.1.2 Common Query Parameters

The origin server shall support Query Parameters as required in Table X.1.2-1.

The user agent shall supply in the request Query Parameters as required in Table X.1.2-1.

Table X.1.2-1. Common Query parameters

| Name | Value | Usage | | Section |
| --- | --- | --- | --- | --- |
| User Agent | Origin Server |
| Accept | media-type | O | M | Section 8.3.3.1 |
| Accept-Charset | charset | O | M | Section 8.3.3.2 |

### X.1.3 Common Media Types

The origin server shall support the media types specified as Default or Required in Table X.1.3-1.

Table X.1.3-1. Default, Required, and Optional Media Types

| Media Type | Usage | Section |
| --- | --- | --- |
| application/dicom+json | Default |  |
| application/dicom+xml | Required | Section 8.7.3.2 |
| multipart/related; type="application/dicom+json" | Required | Section 8.7.3.2 |
| multipart/related; type="application/dicom+xml" | Required | Section 8.7.3.2 |

## X.2 Conformance

An origin server conforming to the Modality Workflow Service shall, next to the Retrieve Capabilities Transaction (see Section 8.9 and Annex H), support at least one of the optional Transactions listed in Table X.2-1 and adhere to the condition mentioned next to that Transaction.

Table X.2-1. Required and Optional Transactions

| Transaction | Support | Condition | Section |
| --- | --- | --- | --- |
| Retrieve Capabilities | Required |  | Section 8.9 |
| Search | Optional |  | Section X.4 |
| Create | Optional | Requires support of the Update Transaction | Section X.5 |
| Update | Optional | Requires support of the Create Transaction | Section X.6 |
| Retrieve | Optional | Requires support of the Create Transaction | Section X.7 |
| Subscribe | Optional | Requires support of the Create and the Unsubscribe Transactions | Section X.8 |
| Unsubscribe | Optional | Requires support of the Create and the Subscribe Transactions | Section X.9 |

Implementations shall specify in their Conformance Statement (see PS3.2) and the Retrieve Capabilities Transaction the supported Transactions and the implementations’ role: origin server, user agent, or both.

In addition, for each supported Transaction they shall specify:

* The supported Query Parameters, including optional Attributes, if any.
* The supported DICOM Media Types.
* The supported character sets (if other than UTF-8).

## X.3 Transactions Overview

The Modality Workflow Service consists of the Transactions listed in Table X.3-1.

Table X.3-1. Modality Services Transactions

| Transaction Name | Method | Payload | | Description |
| --- | --- | --- | --- | --- |
| Request | Success Response |
| Search | GET | none | dataset according to PS3.4, Table K.6-1 | Searches for Modality Scheduled Procedure Steps |
| Create | PUT | dataset according to PS3.4, Table F.7.2-1 (N-CREATE) | none | Creates a new Modality Performed Procedure Step |
| Update | PATCH | dataset according to PS3.4, Table F.7.2-1 (N-SET) | none | Updates the target Modality Performed Procedure Step |
| Retrieve | GET | none | dataset according to PS3.4, Table F.8.2-1 | Retrieves the target Modality Performed Procedure Step |
| Subscribe | POST | none | none | Subscribes to state changes of the target Modality Performed Procedure Step |
| Unsubscribe | DELETE | none | none | Unsubscribes to state changes of the target Modality Performed Procedure Step |

In Table X.3-2, the Target Resources permitted for each transaction are marked with M if support is mandatory for the origin server and O if it is optional. A blank cell indicates that the resource is not allowed in the transaction.

Table X.3-2. Resources by Transaction

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Resource** | **Search** | **Create** | **Update** | **Retrieve** | **Subscribe** | **Unsubscribe** |
| Modality Scheduled Procedure Step | O |  |  |  |  |  |
| Modality Performed Procedure Step |  | O | O | O | O | O |

See Table X.2-1 for the dependencies between the support of transactions.

## X.4 Search Transaction

This Transaction searches the Modality Scheduled Procedure Steps for scheduled procedure steps that match the specified Query Parameters and returns a list of matching scheduled procedure steps. Each scheduled procedure step in the returned list includes return Attributes specified in the request. The Transaction corresponds to the DIMSE MWL C-FIND Operation (see PS3.4, Section K.4.1).

### X.4.1 Request

The request shall have the following syntax:

GET SP /modality-scheduled-procedure-steps?{&match\*}{&includefield}{&fuzzymatching}{&offset}{&limit} SP version CRLF

Accept: 1#media-type CRLF

\*(header-field CRLF)

CRLF

#### X.4.1.1 Target Resources

The Target Resource for this Transaction is the Modality Scheduled Procedure Steps.

#### X.4.1.2 Query Parameters

The origin server shall support Query Parameters as required in Table 8.3.4-1.

The user agent shall supply in the request Query Parameters as required in Table 8.3.4-1.

#### X.4.1.3 Request Header Fields

The origin server shall support header fields as required in Table X.4.1-1.

The user agent shall supply in the request header fields as defined in Table X.4.1-1.

Table X.4.1-1. Request Header Fields

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Values** | **Usage** | | **Description** |
| **User Agent** | **Origin Server** |
| Accept | media-type | M | M | The Acceptable Media Types of the response payload. |

See also Section 8.4.

#### X.4.1.4 Request Payload

The request shall have no payload.

### X.4.2 Behavior

The origin server shall perform a search according to the requirements specified in Section 8.3.4.

For each matching Modality Scheduled Procedure Step, the origin server shall include in the results:

* All Attributes in Table K.6-1 “Attributes for the Modality Worklist Information Model” in PS3.4 with a Return Key Type of 1 or 2.
* All Attributes in Table K.6-1 “Attributes for the Modality Worklist Information Model” in PS3.4 with a Return Key Type of 1C for which the conditional requirements are met.
* All other Attributes passed as match parameters that are supported by the origin server as either matching or return Attributes.
* All other Attributes passed as includefield parameter values that are supported by the origin server as return Attributes.

### X.4.3 Response

The response shall have the following syntax:

version SP status-code SP reason-phrase CRLF

CRLF

[payload]

#### X.4.3.1 Status Codes

Table X.4.3-1 shows some common status codes corresponding to this transaction. See also Section 8.5 for additional status codes.

Table X.4.3-1. Status Code Meaning

|  |  |  |
| --- | --- | --- |
| **Status** | **Code** | **Meaning** |
| Success | 200 (OK) | The origin server returns the matching results. |
| 204 (No Content) | The origin server has no matching results. |
| Failure | 400 (Bad Request) | The origin server cannot handle the search request because of errors in the request headers or parameters. |
| 413 (Payload Too Large) | The origin server cannot return the results, as their combined size exceeds the maximum payload size supported. The user agent may repeat the request with paging or with a narrower query to reduce the size. |
| 503 (Service Unavailable) | The origin server cannot handle the query; this may be a temporal or permanent state. |

#### X.4.3.2 Response Header Fields

The origin server shall support header fields as required in Table X.4.3-2.

Table X.4.3-2. Response Header Fields

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Values** | **Origin Server Usage** | **Description** |
| Content-Type | media-type | C | See section 8.4.2. |
| Content-Encoding | encoding | C | See section 8.4.2. |
| Content-Length | Uint | C | See section 8.4.3. |

All success responses shall also contain the Content Representation (see Section 8.4.2) and Payload header fields (see Section 8.4.3) with appropriate values.

It is recommended that the text returned in the Warning header field (see [RFC7234] Section 5.5) contain a DICOM Status Code (see PS3.4 and Annex C “Status Type Encoding (Normative)” in PS3.7) and descriptive reason. For example:

Warning: A700 <service>: Out of memory

#### X.4.3.3 Response Payload

A success response shall contain a dataset according to PS3.4, Table K.6-1. It shall contain the search results in an Acceptable Media Type. See Section 8.7.5.

A failure response payload may contain a Status Report describing any failures, warnings, or other useful information.

## X.5 Create Transaction

This Transaction creates a Modality Performed Procedure Step with the given Attributes. It corresponds to the DIMSE MPPS N-CREATE Operation (see PS3.4, Section F.7.2.1).

### X.5.1 Request

The request shall have the following syntax:

PUT SP /modality-performed-procedure-steps/{mppsUID} SP version CRLF

Accept: 1#media-type CRLF

\*(header-field CRLF)

CRLF

payload

#### X.5.1.1 Target Resource

The Target Resource of this transaction is an individual Modality Performed Procedure Step identified by its MPPS UID.

#### X.5.1.2 Query Parameters

The request has no Query Parameters.

#### X.5.1.3 Request Header Fields

The origin server shall support Request Header Fields as required in Table X.5.1-1.

The user agent shall supply Request Header Fields as required in Table X.5.1-1.

Table X.5.1-1. Request Header Fields

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Values** | **Usage** | | **Description** |
| **User Agent** | **Origin Server** |
| Accept | media-type | M | M | The Acceptable Media Types of the response payload. |

#### X.5.1.4 Request Payload

The request payload shall be present and shall contain one representation consistent with the Content-Type header field. The representation shall conform to Media Types described in Section 8.7.3 DICOM Media Type Sets. The payload shall conform to Section 8.6 Payloads.

The request payload shall contain the Modality Performed Procedure Step attributes with which the user agent requests the origin server to create a Modality Performed Procedure Step resource.

The request payload shall contain a dataset according to PS3.4, Table F.7.2-1, requirement type N-CREATE (SCU).

### X.5.2 Behavior

The origin server shall create a Modality Performed Procedure Step identified by the provided MPPS UID and filled with the provided attributes in the payload.

### X.5.3 Response

The response shall have the following syntax:

version SP status-code SP reason-phrase CRLF

CRLF

[payload]

#### X.5.3.1 Status Codes

Table X.5.3-1 shows some common status codes corresponding to this transaction. See also Section 8.5 for additional status codes.

Table X.5.3-1. Status Code Meaning

|  |  |  |
| --- | --- | --- |
| **Status** | **Code** | **Meaning** |
| Success | 200 (OK) | The origin server has created the requested Modality Performed Procedure Step with the provided attributes. |
| Failure | 400 (Bad Request) | The origin server cannot handle the create request because of errors in the request headers or parameters. |
| 409 (Conflict) | The origin server cannot create the target Modality Performed Procedure Step because the provided Modality Performed Procedure Step UID is already in use. |
| 503 (Service Unavailable) | The origin server cannot handle the creation of the Modality Performed Procedure Step; this may be a temporal or permanent state. |

#### X.5.3.2 Response Header Fields

The origin server shall support header fields as required in Table X.5.3-2.

Table X.5.3-2. Response Header Fields

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Values** | **Origin Server Usage** | **Description** |
| Content-Type | media-type | C | See section 8.4.2. |
| Content-Encoding | encoding | C | See section 8.4.2. |
| Content-Length | uint | C | See section 8.4.3. |

All success responses shall also contain the Content Representation (see Section 8.4.2) and Payload header fields (see Section 8.4.3) with appropriate values.

It is recommended that the text returned in the Warning header field (see [RFC7234] Section 5.5) contain a DICOM Status Code (see PS3.4 and Annex C “Status Type Encoding (Normative)” in PS3.7) and descriptive reason. For example:

Warning: A700 <service>: Out of memory

#### X.5.3.3 Response Payload

A success response shall have no payload.

A failure response payload may contain a Status Report describing any failures, warnings, or other useful information.

## X.6 Update Transaction

This Transaction sets Attributes of an existing Modality Performed Procedure Step. It corresponds to the DIMSE MPPS N-SET Operation (see PS3.4, Section F.7.2.2).

### X.6.1 Request

The request shall have the following syntax:

PATCH SP /modality-performed-procedure-steps/{mppsUID} SP version CRLF

Accept: 1#media-type CRLF

\*(header-field CRLF)

CRLF

payload

#### X.6.1.1 Target Resources

The Target Resource of this transaction is an individual Modality Performed Procedure Step identified by its MPPS UID.

#### X.6.1.2 Query Parameters

The request has no Query Parameters.

#### X.6.1.3 Request Header Fields

The origin server shall support Request Header Fields as required in Table X.6.1-1.

The user agent shall supply Request Header Fields as required in Table X.6.1-1.

Table X.6.1-1. Request Header Fields

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Values** | **Usage** | | **Description** |
| **User Agent** | **Origin Server** |
| Accept | media-type | M | M | The Acceptable Media Types of the response payload. |

#### X.6.1.4 Request Payload

The request payload shall be present and shall contain one representation consistent with the Content-Type header field. The representation shall conform to Media Types described in Section 8.7.3 DICOM Media Type Sets. The payload shall conform to Section 8.6 Payloads.

The request payload shall contain the Modality Performed Procedure Step attributes with which the user agent requests the origin server to create a Modality Performed Procedure Step resource.

The request payload shall contain a dataset according to PS3.4, Table F.7.2-1, requirement type N-SET (SCU).

### X.6.2 Behavior

The origin server shall update the Modality Performed Procedure Step identified by the provided MPPS UID with the provided attributes in the payload.

### X.6.3 Response

The response shall have the following syntax:

version SP status-code SP reason-phrase CRLF

CRLF

[payload]

#### X.6.3.1 Status Codes

Table X.6.3-1 shows some common status codes corresponding to this transaction. See also Section 8.5 for additional status codes.

Table X.6.3-1. Status Code Meaning

|  |  |  |
| --- | --- | --- |
| **Status** | **Code** | **Meaning** |
| Success | 200 (OK) | The origin server has updated the Modality Performed Procedure Step with the provided attributes. |
| Failure | 400 (Bad Request) | The origin server cannot handle the update request because of errors in the request headers or parameters. |
| 404 (Not Found) | The origin server has no knowledge about the target Modality Performed Procedure Step. |
| 409 (Conflict) | The origin server cannot update the target Modality Performed Procedure Step, for instance because the changes provided are incompatible with the data of the target Modality Performed Procedure Step. |
| 410 (Gone) | The origin server knows that the target Modality Performed Procedure Step did exist but has been deleted. |
| 503 (Service Unavailable) | The origin server cannot handle the creation of the Modality Performed Procedure Step; this may be a temporal or permanent state. |

Note When it is requested that attributes are to be updated while these have not been made available at creation time, a 409 (Conflict) can be returned; this is the case when PS3.4, Table F.7.2-1 specifies that these attributes should have been made available at creation time.

#### X.6.3.2 Response Header Fields

The origin server shall support header fields as required in Table X.6.3-2.

Table X.6.3-2. Response Header Fields

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Values** | **Origin Server Usage** | **Description** |
| Content-Type | media-type | C | See section 8.4.2. |
| Content-Encoding | encoding | C | See section 8.4.2. |
| Content-Length | uint | C | See section 8.4.3. |

All success responses shall also contain the Content Representation (see Section 8.4.2) and Payload header fields (see Section 8.4.3) with appropriate values.

It is recommended that the text returned in the Warning header field (see [RFC7234] Section 5.5) contain a DICOM Status Code (see PS3.4 and Annex C “Status Type Encoding (Normative)” in PS3.7) and descriptive reason. For example:

Warning: A700 <service>: Out of memory

#### X.6.3.3 Response Payload

A success response should have no payload.

A failure response payload may contain a Status Report describing any failures, warnings, or other useful information.

## X.7 Retrieve Transaction

This Transaction retrieves an existing Modality Performed Procedure Step. It corresponds to the MPPS DIMSE N-GET Operation (see PS3.4, Section F.8.2.1).

### X.7.1 Request

The request shall have the following syntax:

GET SP /modality-performed-procedure-steps/{mppsUID} SP version CRLF

Accept: 1#media-type CRLF

\*(header-field CRLF)

CRLF

#### X.7.1.1 Target Resources

The Target Resource of this transaction is an individual Modality Performed Procedure Step identified by its MPPS UID.

#### X.7.1.2 Query Parameters

The request has no Query Parameters.

#### X.7.1.3 Request Header Fields

The origin server shall support Request Header Fields as required in Table X.7.1-1.

The user agent shall supply Request Header Fields as required in Table X.7.1-1.

Table X.7.1-1. Request Header Fields

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Values** | **Usage** | | **Description** |
| **User Agent** | **Origin Server** |
| Accept | media-type | M | M | The Acceptable Media Types of the response payload. |

#### X.7.1.4 Request Payload

The request shall have no payload.

### X.7.2 Behavior

If the Modality Performed Procedure Step exists on the origin server, this shall be returned in an Acceptable Media Type (see Section 8.7.4).

### X.7.3 Response

The response shall have the following syntax:

version SP status-code SP reason-phrase CRLF

CRLF

[payload]

#### X.7.3.1 Status Codes

Table X.7.3-1 shows some common status codes corresponding to this transaction. See also Section 8.5 for additional status codes.

Table X.7.3-1. Status Code Meaning

|  |  |  |
| --- | --- | --- |
| **Status** | **Code** | **Meaning** |
| Success | 200 (OK) | The origin server returned the target Modality Performed Procedure Step. |
| Failure | 400 (Bad Request) | The origin server cannot handle the retrieve request because of errors in the request headers or parameters. |
| 404 (Not Found) | The origin server has no knowledge about the target Modality Performed Procedure Step. |
| 410 (Gone) | The origin server knows that the target Modality Performed Procedure Step did exist but has been deleted. |
| 503 (Service Unavailable) | The origin server cannot handle the retrieval of the target Modality Performed Procedure Step; this may be a temporal or permanent state. |

#### X.7.3.2 Response Header Fields

The origin server shall support header fields as required in Table X.7.3-2.

Table X.7.3-2. Response Header Fields

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Values** | **Origin Server Usage** | **Description** |
| Content-Type | media-type | C | See section 8.4.2. |
| Content-Encoding | encoding | C | See section 8.4.2. |
| Content-Length | uint | C | See section 8.4.3. |

All success responses shall also contain the Content Representation (see Section 8.4.2) and Payload header fields (see Section 8.4.3) with appropriate values.

It is recommended that the text returned in the Warning header field (see [RFC7234] Section 5.5) contain a DICOM Status Code (see PS3.4 and Annex C “Status Type Encoding (Normative)” in PS3.7) and descriptive reason. For example:

Warning: A700 <service>: Out of memory

#### X.7.3.3 Response Payload

A success response should have a payload containing the requested Modality Performed Procedure Step in the Selected Media Type.

A failure response payload may contain a Status Report describing any failures, warnings, or other useful information.

## X.8 Subscribe Transaction

This Transaction creates a Subscription to an existing Modality Performed Procedure Step resource. It relates to the DIMSE MPPS N-EVENT-REPORT Notification (see PS3.4, Section F.9.1).

Once a Subscription has been created, the user agent will receive notifications regarding the state of the associated Modality Performed Procedure Step. To receive the notifications generated by Subscriptions, the user agent must first open a Notification Connection between itself and the origin server using the Open Notification Connection Transaction; see Section 8.10.4.

### X.8.1 Request

The request shall have the following syntax:

POST SP /modality-performed-procedure-steps/{mppsUID}/subscribers/{aetitle} SP version CRLF

Accept: 1#media-type CRLF

\*(header-field CRLF)

CRLF

#### X.8.1.1 Target Resources

The Target Resource of this transaction is an individual Modality Performed Procedure Step identified by its MPPS UID.

#### X.8.1.2 Query Parameters

The origin server shall support Query Parameters as required in Table 8.3.4-1.

The user agent shall supply in the request Query Parameters as required in Table 8.3.4-1.

#### X.8.1.3 Request Header Fields

The origin server shall support header fields as required in Table X.8.1-1.

The user agent shall supply in the request header fields as defined in Table X.8.1-1.

Table X.8.1-1. Request Header Fields

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Values** | **Usage** | | **Description** |
| **User Agent** | **Origin Server** |
| Accept | media-type | M | M | The Acceptable Media Types of the response payload. |

#### X.8.1.4 Request Payload

The request shall have no payload.

### X.8.2 Behavior

The origin server shall create and manage a Subscription to the Target Modality Performed Procedure Step for the user agent. It will notify the user agent when changes occur, see Section 8.10.

### X.8.3 Response

The response shall have the following syntax:

version SP status-code SP reason-phrase CRLF

CRLF

[payload]

#### X.8.3.1 Status Codes

Table X.8.3-1 shows some common status codes corresponding to this transaction. See also Section 8.5 for additional status codes.

Table X.8.3-1. Status Code Meaning

|  |  |  |
| --- | --- | --- |
| **Status** | **Code** | **Meaning** |
| Success | 200 (OK) | The origin server subscribed the user agent to the target Modality Performed Procedure Step. In case the user agent was already subscribed to this Modality Performed Procedure Step, there is no change. |
| Failure | 400 (Bad Request) | The origin server cannot handle the subscription request because of errors in the request headers or parameters. |
| 404 (Not Found) | The origin server has no knowledge about the target Modality Performed Procedure Step. |
| 410 (Gone) | The origin server knows that the target Modality Performed Procedure Step did exist but has been deleted. |
| 503 (Service Unavailable) | The origin server cannot handle the subscription to the target Modality Performed Procedure Step; this may be a temporal or permanent state. |

#### X.8.3.2 Response Header Fields

The origin server shall support header fields as required in Table X.8.3-2.

Table X.8.3-2. Response Header Fields

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Values** | **Origin Server Usage** | **Description** |
| Content-Type | media-type | C | See section 8.4.2. |
| Content-Encoding | encoding | C | See section 8.4.2. |
| Content-Length | uint | C | See section 8.4.3. |

All success responses shall also contain the Content Representation (see Section 8.4.2) and Payload header fields (see Section 8.4.3) with appropriate values.

It is recommended that the text returned in the Warning header field (see [RFC7234] Section 5.5) contain a DICOM Status Code (see PS3.4 and Annex C “Status Type Encoding (Normative)” in PS3.7) and descriptive reason. For example:

Warning: A700 <service>: Out of memory

#### X.8.3.3 Response Payload

A success response shall have no payload.

A failure response payload may contain a Status Report describing any failures, warnings, or other useful information.

## X.9 Unsubscribe Transaction

This Transaction removes a Subscription to a Modality Performed Procedure Step resource. It relates to the DIMSE MPPS N-EVENT-REPORT Notification (see PS3.4, Section F.9.1).

### X.9.1 Request

The request shall have the following syntax:

DELETE SP /modality-performed-procedure-steps/{mppsUID}/subscribers/{aetitle} SP version CRLF

Accept: 1#media-type CRLF

\*(header-field CRLF)

CRLF

#### X.9.1.1 Target Resources

The Target Resource of this transaction is an individual Modality Performed Procedure Step identified by its MPPS UID.

#### X.9.1.2 Query Parameters

The origin server shall support Query Parameters as required in Table 8.3.4-1.

The user agent shall supply in the request Query Parameters as required in Table 8.3.4-1.

#### X.9.1.3 Request Header Fields

The origin server shall support header fields as required in Table X.9.1-1.

The user agent shall supply in the request header fields as defined in Table X.9.1-1.

Table X.9.1-1. Request Header Fields

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Values** | **Usage** | | **Description** |
| **User Agent** | **Origin Server** |
| Accept | media-type | M | M | The Acceptable Media Types of the response payload. |

#### X.9.1.4 Request Payload

The request shall have no payload.

### X.9.2 Behavior

Upon receipt of an Unsubscribe request, the origin server shall remove the Modality Performed Procedure Step Subscription.

### X.9.3 Response

The response shall have the following syntax:

version SP status-code SP reason-phrase CRLF

CRLF

[payload]

#### X.9.3.1 Status Codes

Table X.9.3-1 shows some common status codes corresponding to this transaction. See also Section 8.5 for additional status codes.

Table X.9.3-1. Status Code Meaning

|  |  |  |
| --- | --- | --- |
| **Status** | **Code** | **Meaning** |
| Success | 200 (OK) | The origin server unsubscribed the user agent from the target Modality Performed Procedure Step. In case the user agent was already not subscribed to this Modality Performed Procedure Step, there is no change. |
| Failure | 400 (Bad Request) | The origin server cannot handle the unsubscribe request because of errors in the request headers or parameters. |
| 404 (Not Found) | The origin server has no knowledge about the target Modality Performed Procedure Step. |
| 410 (Gone) | The origin server knows that the target Modality Performed Procedure Step did exist but has been deleted. |
| 503 (Service Unavailable) | The origin server cannot handle the unsubscribe request for the target Modality Performed Procedure Step; this may be a temporal or permanent state. |

#### X.9.3.2 Response Header Fields

The origin server shall support header fields as required in Table X.9.3-2.

Table X.9.3-2. Response Header Fields

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Values** | **Origin Server Usage** | **Description** |
| Content-Type | media-type | C | See section 8.4.2. |
| Content-Encoding | encoding | C | See section 8.4.2. |
| Content-Length | uint | C | See section 8.4.3. |

All success responses shall also contain the Content Representation (see Section 8.4.2) and Payload header fields (see Section 8.4.3) with appropriate values.

It is recommended that the text returned in the Warning header field (see [RFC7234] Section 5.5) contain a DICOM Status Code (see PS3.4 and Annex C “Status Type Encoding (Normative)” in PS3.7) and descriptive reason. For example:

Warning: A700 <service>: Out of memory

#### X.9.3.3 Response Payload

A success response shall have no payload.

A failure response payload may contain a Status Report describing any failures, warnings, or other useful information.

## X.10 Modality Performed Procedure Step Event Reports

The origin server uses the Send Event Report Transaction (see Section 8.10.5) to send a Modality Performed Procedure Step Event Report, containing the details of any state change in the Modality Performed Procedure Step to the user agent.

The origin server shall send Modality Performed Procedure Step Event Reports as described in Section F.9.2 in PS3.4.

The Event Report shall contain all mandatory Attributes described in Table F.9.2-1 “Performed Procedure Step Notification Event Information” in PS3.4 and Table 10.3-2 “N-EVENT-REPORT-RSP Message Fields” in PS3.7.

The following is an example application/dicom+json Modality Performed Procedure Step Event Report payload:

{  
"00000002": {"vr": "UI", "Value": ["1.2.840.10008.5.1.4.34.6.4"] },  
"00000110": {"vr": "US", "Value": [23] },  
"00001000": {"vr": "UI", "Value": ["1.2.840.10008.5.1.4.34.6.4.2.3.44.22231"] },  
"00001002": {"vr": "US", "Value": [2] }  
} CRLF

Update Section 4 Symbols and Abbreviated Terms: add CRUDL, MPPS, MWL, and UPS

# 4 Symbols and Abbreviated Terms

…

**ABNF** Augmented Backus-Naur Form. See [RFC5234] and [RFC7405].

**CRUDL Create, Read, Update, Delete, List; basic operations/actions on objects.**

**DICOM** Digital Imaging and Communications in Medicine

…

**JSON** JavaScript Object Notation

**MPPS Modality Performed Procedure Step service. See PS3.4, Annex F.**

**MWL Modality Worklist service (also known as Basic Worklist service). See PS3.4, Annex K.**

**QIDO-RS** Query based on ID for DICOM Objects by RESTful Services

…

**UID** Unique (DICOM) Identifier

**UPS Unified Procedure Step service. See PS3.4, Annex CC.**

**UPS-RS** Unified Procedure Step by RESTful Services

…

Update Section B Examples: add new examples for the Modality Workflow Service

# B Examples (Informative)

…

## B.X1 Scheduled Modality Workflow

### B.X1.1 Get Applicable Workitems

As on git.

### B.X1.2 Create Workitem Report

### B.X1.3 Report Progress

### B.X1.4 Complete Workitem

## B.X2 Bi-directional Proxy for Modality Workflow

## B.X3 Notifications in Modality Workflow

Update Table H-1 Resources and Methods: add new resources and methods for Modality Workflow Service

# H Capabilities Description

|  |  |  |  |
| --- | --- | --- | --- |
| **Service** | **Resource** | **Transactions** | **Reference** |
| … | | | |
| Storage Commitment Requests (see Section 13.1.1) | | | |
|  | commitment-requests | Request | Section 13.4 |
| Result Check | Section 13.5 |
| **Modality Workflow Service (see Section X.1.1)** | | | |
|  | **modality-scheduled-procedure-steps** | **Search** | **Section X.4** |
| **modality-performed-procedure-steps** | **Create** | **Section X.5** |
| **Update** | **Section X.6** |
| **Retrieve** | **Section X.7** |
| **Subscribe** | **Section X.8** |
| **Unsubscribe** | **Section X.9** |

**Changes to NEMA Standards Publications PS 3.2**

Add new section to N.1.3 for Modality Workflow Service

## N.1 Overview

…

### N.1.3 DICOM Web Services

…

#### N.1.3.X Modality Workflow Service

Table N.1.3.X-1 lists details on the support of the Modality Workflow Service.

[Complete Table N.1.3.X-1 to indicate support for the Modality Workflow Web Service]

Table N.1.3.X‑1 Modality Workflow Service

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Service** | **Transaction** | **Resource** | **User Agent** | **Origin Server** |
| Modality Workflow Service | *Search* | modality-scheduled-procedure-steps |  |  |
| *Create* | modality-performed-procedure-steps |  |  |
| *Update* |  |  |
| *Retrieve* |  |  |
| *Subscribe* |  |  |
| *Unsubscribe* |  |  |

Add a new subsection on the Modality Workflow Service to section N.5.3 Supported DICOM Web Services

## N.5 Service and Interoperability Description

…

### N.5.3 Supported DICOM Web Services

…

#### N.5.3.X Modality Workflow Web Service

This section provides details regarding the Modality Workflow Web Service. For an overview of supported Transactions and resources see Table N.1.3.X‑1 Modality Workflow Service.

##### N.5.3.X.1 Search Transaction – Modality Workflow Service

*[If your system does not support the Modality Workflow Web Service Search Transaction, you can indicate that this section is not applicable and remove the subsections below.]*

###### N.5.3.X.1.1 User Agent

The Search Transaction user agent can request resources listed in Table N.5.3.X.1.1-1.

[List the supported resources for your Modality Worklist Search Transaction user agent. Remove the non-supported resources rows. Fill in information on your implementation in the Comments column when necessary.]

Table N.5.3.X.1.1-1: Resources for Search Transaction – User Agent

|  |  |
| --- | --- |
| Resource | Comments |
|  | See Resources path in table X.1.1-1 in PS3.18 |
| *modality-scheduled-procedure-steps* |  |

The Search Transaction user agent supports Header Fields listed in Table N.5.3.X.1.1-2.

[List the supported Header Fields and their supported Values. Fill in information on your implementation in the “Comments” column when necessary.]

Table N.5.3.X.1.1-2: Header Fields for Search Transaction – User Agent

|  |  |  |
| --- | --- | --- |
| Header Field | Supported Values | Comments |
| Content-Type | *application/dicom+json (Default)*  *application/dicom+xml*  *multipart/related; type="application/dicom+json"*  *multipart/related; type="application/dicom+xml"* |  |
| Content-Length |  | *[If Content-Encoding is not present]* |
| Content-Encoding |  | *[If Content-Length is not present]* |

###### N.5.3.X.1.2 Origin Server

The Search Transaction origin server receives GET requests to search for modality scheduled procedure steps.

The user agent specifies the Target Resource as part of the URI and the acceptable Content-Type in the HTTP header (i.e. XML or JSON).

The URI is composed by a Base URI: see Base URI for the origin server in Section N.6.3.X.

The Request Transaction origin server supports resources listed in Table N.5.3.X.1.2-1.

[Fill in information on your implementation in the Comments column when necessary.]

Table N.5.3.X.1.2-1: Resources for Search Transaction – Origin Server

|  |  |
| --- | --- |
| Resource | Comments |
|  | See Resources path in Table X.1.1-1 in PS3.18 |
| *modality-scheduled-procedure-steps* |  |

The Search Transaction origin server supports Header Fields listed in Table N.5.3.X.1.2-2.

[List the supported Header Fields and their supported Values. Fill in information on your implementation in the “Comments” column when necessary.]

Table N.5.3.X.1.2-2: Header Fields for Search Transaction – Origin Server

|  |  |  |
| --- | --- | --- |
| Header Field | Supported Values | Comments |
| Content-Type | *application/dicom+json*  *application/dicom+xml*  *multipart/related; type="application/dicom+json"*  *multipart/related; type="application/dicom+xml"* |  |
| Content-Length |  | *[If Content-Encoding is not present]* |
| Content-Encoding |  | *[If Content-Length is not present]* |

##### N.5.3.X.2 Create Transaction – Modality Workflow Service

*[If your system does not support the Modality Workflow Web Service Create Transaction, you can indicate that this section is not applicable and remove the subsections below.]*

###### N.5.3.X.2.1 User Agent

The Create Transaction user agent can request to create resources listed in Table N.5.3.X.2.1-1.

[List the supported resources for your Modality Worklist Create Transaction user agent. Remove the non-supported resources rows. Fill in information on your implementation in the Comments column when necessary.]

Table N.5.3.X.2.1-1: Resources for Create Transaction – User Agent

|  |  |
| --- | --- |
| Resource | Comments |
|  | See Resources path in table X.1.1-1 in PS3.18 |
| *modality-performed-procedure-steps* |  |

The Create Transaction user agent supports Header Fields listed in Table N.5.3.X.2.1-2.

[List the supported Header Fields and their supported Values. Fill in information on your implementation in the “Comments” column when necessary.]

Table N.5.3.X.2.1-2: Header Fields for Create Transaction – User Agent

|  |  |  |
| --- | --- | --- |
| Header Field | Supported Values | Comments |
| Content-Type | *application/dicom+json (Default)*  *application/dicom+xml*  *multipart/related; type="application/dicom+json"*  *multipart/related; type="application/dicom+xml"* |  |
| Content-Length |  | *[If Content-Encoding is not present]* |
| Content-Encoding |  | *[If Content-Length is not present]* |

###### N.5.3.X.2.2 Origin Server

The Create Transaction origin server receives PUT requests to create a modality performed procedure step.

The user agent specifies the Target Resource as part of the URI and the acceptable Content-Type in the HTTP header (i.e. XML or JSON).

The URI is composed by a Base URI: see Base URI for the origin server in Section N.6.3.X.

The Create Transaction origin server supports resources listed in Table N.5.3.X.2.2-1.

[Fill in information on your implementation in the Comments column when necessary.]

Table N.5.3.X.2.2-1: Resources for Create Transaction – Origin Server

|  |  |
| --- | --- |
| Resource | Comments |
|  | See Resources path in Table X.1.1-1 in PS3.18 |
| *modality-performed-procedure-steps* |  |

The Create Transaction origin server supports Header Fields listed in Table N.5.3.X.2.2-2.

[List the supported Header Fields and their supported Values. Fill in information on your implementation in the “Comments” column when necessary.]

Table N.5.3.X.2.2-2: Header Fields for Create Transaction – Origin Server

|  |  |  |
| --- | --- | --- |
| Header Field | Supported Values | Comments |
| Content-Type | *application/dicom+json*  *application/dicom+xml*  *multipart/related; type="application/dicom+json"*  *multipart/related; type="application/dicom+xml"* |  |
| Content-Length |  | *[If Content-Encoding is not present]* |
| Content-Encoding |  | *[If Content-Length is not present]* |

##### N.5.3.X.3 Update Transaction – Modality Workflow Service

*[If your system does not support the Modality Workflow Web Service Update Transaction, you can indicate that this section is not applicable and remove the subsections below.]*

###### N.5.3.X.3.1 User Agent

The Update Transaction user agent can request to update resources listed in Table N.5.3.X.3.1-1.

[List the supported resources for your Modality Worklist Update Transaction user agent. Remove the non-supported resources rows. Fill in information on your implementation in the Comments column when necessary.]

Table N.5.3.X.3.1-1: Resources for Update Transaction – User Agent

|  |  |
| --- | --- |
| Resource | Comments |
|  | See Resources path in table X.1.1-1 in PS3.18 |
| *modality-performed-procedure-steps* |  |

The Update Transaction user agent supports Header Fields listed in Table N.5.3.X.3.1-2.

[List the supported Header Fields and their supported Values. Fill in information on your implementation in the “Comments” column when necessary.]

Table N.5.3.X.3.1-2: Header Fields for Update Transaction – User Agent

|  |  |  |
| --- | --- | --- |
| Header Field | Supported Values | Comments |
| Content-Type | *application/dicom+json (Default)*  *application/dicom+xml*  *multipart/related; type="application/dicom+json"*  *multipart/related; type="application/dicom+xml"* |  |
| Content-Length |  | *[If Content-Encoding is not present]* |
| Content-Encoding |  | *[If Content-Length is not present]* |

###### N.5.3.X.3.2 Origin Server

The Update Transaction origin server receives PATCH requests to update a modality performed procedure step.

The user agent specifies the Target Resource as part of the URI and the acceptable Content-Type in the HTTP header (i.e. XML or JSON).

The URI is composed by a Base URI: see Base URI for the origin server in Section N.6.3.X.

The Update Transaction origin server supports resources listed in Table N.5.3.X.3.2-1.

[Fill in information on your implementation in the Comments column when necessary.]

Table N.5.3.X.3.2-1: Resources for Update Transaction – Origin Server

|  |  |
| --- | --- |
| Resource | Comments |
|  | See Resources path in Table X.1.1-1 in PS3.18 |
| *modality-performed-procedure-steps* |  |

The Update Transaction origin server supports Header Fields listed in Table N.5.3.X.3.2-2.

[List the supported Header Fields and their supported Values. Fill in information on your implementation in the “Comments” column when necessary.]

Table N.5.3.X.3.2-2: Header Fields for Update Transaction – Origin Server

|  |  |  |
| --- | --- | --- |
| Header Field | Supported Values | Comments |
| Content-Type | *application/dicom+json*  *application/dicom+xml*  *multipart/related; type="application/dicom+json"*  *multipart/related; type="application/dicom+xml"* |  |
| Content-Length |  | *[If Content-Encoding is not present]* |
| Content-Encoding |  | *[If Content-Length is not present]* |

##### N.5.3.X.4 Retrieve Transaction – Modality Workflow Service

*[If your system does not support the Modality Workflow Web Service Retrieve Transaction, you can indicate that this section is not applicable and remove the subsections below.]*

###### N.5.3.X.4.1 User Agent

The Retrieve Transaction user agent can request to retrieve resources listed in Table N.5.3.X.4.1-1.

[List the supported resources for your Modality Worklist Retrieve Transaction user agent. Remove the non-supported resources rows. Fill in information on your implementation in the Comments column when necessary.]

Table N.5.3.X.4.1-1: Resources for Retrieve Transaction – User Agent

|  |  |
| --- | --- |
| Resource | Comments |
|  | See Resources path in table X.1.1-1 in PS3.18 |
| *modality-performed-procedure-steps* |  |

The Retrieve Transaction user agent supports Header Fields listed in Table N.5.3.X.4.1-2.

[List the supported Header Fields and their supported Values. Fill in information on your implementation in the “Comments” column when necessary.]

Table N.5.3.X.4.1-2: Header Fields for Retrieve Transaction – User Agent

|  |  |  |
| --- | --- | --- |
| Header Field | Supported Values | Comments |
| Content-Type | *application/dicom+json (Default)*  *application/dicom+xml*  *multipart/related; type="application/dicom+json"*  *multipart/related; type="application/dicom+xml"* |  |
| Content-Length |  | *[If Content-Encoding is not present]* |
| Content-Encoding |  | *[If Content-Length is not present]* |

###### N.5.3.X.4.2 Origin Server

The Retrieve Transaction origin server receives GET requests to retrieve a modality performed procedure step.

The user agent specifies the Target Resource as part of the URI and the acceptable Content-Type in the HTTP header (i.e. XML or JSON).

The URI is composed by a Base URI: see Base URI for the origin server in Section N.6.3.X.

The Retrieve Transaction origin server supports resources listed in Table N.5.3.X.4.2-1.

[Fill in information on your implementation in the Comments column when necessary.]

Table N.5.3.X.4.2-1: Resources for Retrieve Transaction – Origin Server

|  |  |
| --- | --- |
| Resource | Comments |
|  | See Resources path in Table X.1.1-1 in PS3.18 |
| *modality-performed-procedure-steps* |  |

The Retrieve Transaction origin server supports Header Fields listed in Table N.5.3.X.4.2-2.

[List the supported Header Fields and their supported Values. Fill in information on your implementation in the “Comments” column when necessary.]

Table N.5.3.X.4.2-2: Header Fields for Retrieve Transaction – Origin Server

|  |  |  |
| --- | --- | --- |
| Header Field | Supported Values | Comments |
| Content-Type | *application/dicom+json*  *application/dicom+xml*  *multipart/related; type="application/dicom+json"*  *multipart/related; type="application/dicom+xml"* |  |
| Content-Length |  | *[If Content-Encoding is not present]* |
| Content-Encoding |  | *[If Content-Length is not present]* |

##### N.5.3.X.5 Subscribe Transaction – Modality Workflow Service

*[If your system does not support the Modality Workflow Web Service Subscribe Transaction, you can indicate that this section is not applicable and remove the subsections below.]*

###### N.5.3.X.5.1 User Agent

The Subscribe Transaction user agent can request resources listed in Table N.5.3.X.5.1-1.

[List the supported resources for your Modality Worklist Subscribe Transaction user agent. Remove the non-supported resources rows. Fill in information on your implementation in the Comments column when necessary.]

Table N.5.3.X.5.1-1: Resources for Subscribe Transaction – User Agent

|  |  |
| --- | --- |
| Resource | Comments |
|  | See Resources path in table X.1.1-1 in PS3.18 |
| *modality-performed-procedure-steps* |  |

The Subscribe Transaction user agent supports Header Fields listed in Table N.5.3.X.5.1-2.

[List the supported Header Fields and their supported Values. Fill in information on your implementation in the “Comments” column when necessary.]

Table N.5.3.X.5.1-2: Header Fields for Subscribe Transaction – User Agent

|  |  |  |
| --- | --- | --- |
| Header Field | Supported Values | Comments |
| Content-Type | *application/dicom+json (Default)*  *application/dicom+xml*  *multipart/related; type="application/dicom+json"*  *multipart/related; type="application/dicom+xml"* |  |
| Content-Length |  | *[If Content-Encoding is not present]* |
| Content-Encoding |  | *[If Content-Length is not present]* |

###### N.5.3.X.5.2 Origin Server

The Subscribe Transaction origin server receives POST requests to subscribe to changes of a modality performed procedure step.

The user agent specifies the Target Resource as part of the URI and the acceptable Content-Type in the HTTP header (i.e. XML or JSON).

The URI is composed by a Base URI: see Base URI for the origin server in Section N.6.3.X.

The Subscribe Transaction origin server supports resources listed in Table N.5.3.X.5.2-1.

[Fill in information on your implementation in the Comments column when necessary.]

Table N.5.3.X.5.2-1: Resources for Subscribe Transaction – Origin Server

|  |  |
| --- | --- |
| Resource | Comments |
|  | See Resources path in Table X.1.1-1 in PS3.18 |
| *modality-performed-procedure-steps* |  |

The Subscribe Transaction origin server supports Header Fields listed in Table N.5.3.X.5.2-2.

[List the supported Header Fields and their supported Values. Fill in information on your implementation in the “Comments” column when necessary.]

Table N.5.3.X.5.2-2: Header Fields for Retrieve Transaction – Origin Server

|  |  |  |
| --- | --- | --- |
| Header Field | Supported Values | Comments |
| Content-Type | *application/dicom+json*  *application/dicom+xml*  *multipart/related; type="application/dicom+json"*  *multipart/related; type="application/dicom+xml"* |  |
| Content-Length |  | *[If Content-Encoding is not present]* |
| Content-Encoding |  | *[If Content-Length is not present]* |

##### N.5.3.X.6 Unsubscribe Transaction – Modality Workflow Service

*[If your system does not support the Modality Workflow Web Service Unsubscribe Transaction, you can indicate that this section is not applicable and remove the subsections below.]*

###### N.5.3.X.6.1 User Agent

The Unsubscribe Transaction user agent can request resources listed in Table N.5.3.X.6.1-1.

[List the supported resources for your Modality Worklist Unsubscribe Transaction user agent. Remove the non-supported resources rows. Fill in information on your implementation in the Comments column when necessary.]

Table N.5.3.X.6.1-1: Resources for Unsubscribe Transaction – User Agent

|  |  |
| --- | --- |
| Resource | Comments |
|  | See Resources path in table X.1.1-1 in PS3.18 |
| *modality-performed-procedure-steps* |  |

The Unsubscribe Transaction user agent supports Header Fields listed in Table N.5.3.X.6.1-2.

[List the supported Header Fields and their supported Values. Fill in information on your implementation in the “Comments” column when necessary.]

Table N.5.3.X.6.1-2: Header Fields for Unsubscribe Transaction – User Agent

|  |  |  |
| --- | --- | --- |
| Header Field | Supported Values | Comments |
| Content-Type | *application/dicom+json (Default)*  *application/dicom+xml*  *multipart/related; type="application/dicom+json"*  *multipart/related; type="application/dicom+xml"* |  |
| Content-Length |  | *[If Content-Encoding is not present]* |
| Content-Encoding |  | *[If Content-Length is not present]* |

###### N.5.3.X.6.2 Origin Server

The Unsubscribe Transaction origin server receives DELETE requests to unsubscribe from changes of a modality performed procedure step.

The user agent specifies the Target Resource as part of the URI and the acceptable Content-Type in the HTTP header (i.e. XML or JSON).

The URI is composed by a Base URI: see Base URI for the origin server in Section N.6.3.X.

The Unsubscribe Transaction origin server supports resources listed in Table N.5.3.X.6.2-1.

[Fill in information on your implementation in the Comments column when necessary.]

Table N.5.3.X.6.2-1: Resources for Subscribe Transaction – Origin Server

|  |  |
| --- | --- |
| Resource | Comments |
|  | See Resources path in Table X.1.1-1 in PS3.18 |
| *modality-performed-procedure-steps* |  |

The Unsubscribe Transaction origin server supports Header Fields listed in Table N.5.3.X.6.2-2.

[List the supported Header Fields and their supported Values. Fill in information on your implementation in the “Comments” column when necessary.]

Table N.5.3.X.6.2-2: Header Fields for Retrieve Transaction – Origin Server

|  |  |  |
| --- | --- | --- |
| Header Field | Supported Values | Comments |
| Content-Type | *application/dicom+json*  *application/dicom+xml*  *multipart/related; type="application/dicom+json"*  *multipart/related; type="application/dicom+xml"* |  |
| Content-Length |  | *[If Content-Encoding is not present]* |
| Content-Encoding |  | *[If Content-Length is not present]* |

Add a new subsection on the Modality Workflow Service to section N.7.3.3 DICOM Web Services.

## N.7 Network and Media Communication Details

…

### N.7.3 Status Codes

…

#### N.7.3.3 DICOM Web Services

…

##### N.7.3.3.X Modality Workflow Service

###### N.7.3.3.X.1 Search Transaction as Origin Server

Table N.7.3.3.X.1-1 lists the Status Codes that an origin server supports for the Search Transaction of the Modality Workflow Service and the condition in which any of the listed Status Codes is sent.

[Describe below the condition in which the application sends the specific Status Codes in the Search Transaction response as origin server.]

Table N.7.3.3.X.1-1: Status Codes of Origin Server for Search Transaction

| **Status** | **Code** | **Condition** |
| --- | --- | --- |
| *Success* | *200 (OK)* | *TO BE FILLED IN* |
| *202 (Accepted)* |  |
| *Failure* | *400 (Bad Request)* |  |
| *409 (Conflict)* |  |
| *503 (Service Unavailable)* |  |

###### N.7.3.3.X.2 Search Transaction as User Agent

Table N.7.3.3.X.2-1 lists the Status Codes that a user agent supports for the Search Transaction of the Modality Workflow Service and defines the application behavior, when encountering any of the listed Status Codes.

[Describe below the behavior of the application when it receives various Status Codes in the Search Transaction response]

Table N.7.3.3.X.2-1: Status Codes of User Agent for Search Transaction

| **Status** | **Code** | **Behavior** |
| --- | --- | --- |
| *Success* | *200 (OK)* | *TO BE FILLED IN* |
| *202 (Accepted)* |  |
| *Failure* | *400 (Bad Request)* |  |
| *409 (Conflict)* |  |
| *\** | *Any other code* |  |

###### N.7.3.3.X.3 Create Transaction as Origin Server

Table N.7.3.3.X.3-1 lists the Status Codes that an origin server supports for the Create Transaction of the Modality Workflow Service and the condition in which any of the listed Status Codes is sent.

[Describe below the condition in which the application sends the specific Status Codes in the Create Transaction response as origin server.]

Table N.7.3.3.X.3-1: Status Codes of Origin Server for Create Transaction

| **Status** | **Code** | **Condition** |
| --- | --- | --- |
| *Success* | *200 (OK)* | *TO BE FILLED IN* |
| *202 (Accepted)* |  |
| *Failure* | *400 (Bad Request)* |  |
| *409 (Conflict)* |  |
| *503 (Service Unavailable)* |  |

###### N.7.3.3.X.4 Create Transaction as User Agent

Table N.7.3.3.X.4-1 lists the Status Codes that a user agent supports for the Create Transaction of the Modality Workflow Service and defines the application behavior, when encountering any of the listed Status Codes.

[Describe below the behavior of the application when it receives various Status Codes in the Create Transaction response]

Table N.7.3.3.X.4-1: Status Codes of User Agent for Create Transaction

| **Status** | **Code** | **Behavior** |
| --- | --- | --- |
| *Success* | *200 (OK)* | *TO BE FILLED IN* |
| *202 (Accepted)* |  |
| *Failure* | *400 (Bad Request)* |  |
| *409 (Conflict)* |  |
| *\** | *Any other code* |  |

###### N.7.3.3.X.5 Update Transaction as Origin Server

Table N.7.3.3.X.5-1 lists the Status Codes that an origin server supports for the Update Transaction of the Modality Workflow Service and the condition in which any of the listed Status Codes is sent.

[Describe below the condition in which the application sends the specific Status Codes in the Update Transaction response as origin server.]

Table N.7.3.3.X.5-1: Status Codes of Origin Server for Update Transaction

| **Status** | **Code** | **Condition** |
| --- | --- | --- |
| *Success* | *200 (OK)* | *TO BE FILLED IN* |
| *202 (Accepted)* |  |
| *Failure* | *400 (Bad Request)* |  |
| *409 (Conflict)* |  |
| *503 (Service Unavailable)* |  |

###### N.7.3.3.X.6 Update Transaction as User Agent

Table N.7.3.3.X.6-1 lists the Status Codes that a user agent supports for the Update Transaction of the Modality Workflow Service and defines the application behavior, when encountering any of the listed Status Codes.

[Describe below the behavior of the application when it receives various Status Codes in the Update Transaction response]

Table N.7.3.3.X.6-1: Status Codes of User Agent for Update Transaction

| **Status** | **Code** | **Behavior** |
| --- | --- | --- |
| *Success* | *200 (OK)* | *TO BE FILLED IN* |
| *202 (Accepted)* |  |
| *Failure* | *400 (Bad Request)* |  |
| *409 (Conflict)* |  |
| *\** | *Any other code* |  |

###### N.7.3.3.X.7 Retrieve Transaction as Origin Server

Table N.7.3.3.X.7-1 lists the Status Codes that an origin server supports for the Retrieve Transaction of the Modality Workflow Service and the condition in which any of the listed Status Codes is sent.

[Describe below the condition in which the application sends the specific Status Codes in the Retrieve Transaction response as origin server.]

Table N.7.3.3.X.7-1: Status Codes of Origin Server for Retrieve Transaction

| **Status** | **Code** | **Condition** |
| --- | --- | --- |
| *Success* | *200 (OK)* | *TO BE FILLED IN* |
| *202 (Accepted)* |  |
| *Failure* | *400 (Bad Request)* |  |
| *409 (Conflict)* |  |
| *503 (Service Unavailable)* |  |

###### N.7.3.3.X.8 Retrieve Transaction as User Agent

Table N.7.3.3.X.8-1 lists the Status Codes that a user agent supports for the Retrieve Transaction of the Modality Workflow Service and defines the application behavior, when encountering any of the listed Status Codes.

[Describe below the behavior of the application when it receives various Status Codes in the Retrieve Transaction response]

Table N.7.3.3.X.8-1: Status Codes of User Agent for Retrieve Transaction

| **Status** | **Code** | **Behavior** |
| --- | --- | --- |
| *Success* | *200 (OK)* | *TO BE FILLED IN* |
| *202 (Accepted)* |  |
| *Failure* | *400 (Bad Request)* |  |
| *409 (Conflict)* |  |
| *\** | *Any other code* |  |

###### N.7.3.3.X.9 Subscribe Transaction as Origin Server

Table N.7.3.3.X.9-1 lists the Status Codes that an origin server supports for the Subscribe Transaction of the Modality Workflow Service and the condition in which any of the listed Status Codes is sent.

[Describe below the condition in which the application sends the specific Status Codes in the Subscribe Transaction response as origin server.]

Table N.7.3.3.X.9-1: Status Codes of Origin Server for Subscribe Transaction

| **Status** | **Code** | **Condition** |
| --- | --- | --- |
| *Success* | *200 (OK)* | *TO BE FILLED IN* |
| *202 (Accepted)* |  |
| *Failure* | *400 (Bad Request)* |  |
| *409 (Conflict)* |  |
| *503 (Service Unavailable)* |  |

###### N.7.3.3.X.10 Subscribe Transaction as User Agent

Table N.7.3.3.X.2-1 lists the Status Codes that a user agent supports for the Subscribe Transaction of the Modality Workflow Service and defines the application behavior, when encountering any of the listed Status Codes.

[Describe below the behavior of the application when it receives various Status Codes in the Subscribe Transaction response]

Table N.7.3.3.X.10-1: Status Codes of User Agent for Subscribe Transaction

| **Status** | **Code** | **Behavior** |
| --- | --- | --- |
| *Success* | *200 (OK)* | *TO BE FILLED IN* |
| *202 (Accepted)* |  |
| *Failure* | *400 (Bad Request)* |  |
| *409 (Conflict)* |  |
| *\** | *Any other code* |  |

###### N.7.3.3.X.11 Unsubscribe Transaction as Origin Server

Table N.7.3.3.X.11-1 lists the Status Codes that an origin server supports for the Unsubscribe Transaction of the Modality Workflow Service and the condition in which any of the listed Status Codes is sent.

[Describe below the condition in which the application sends the specific Status Codes in the Unsubscribe Transaction response as origin server.]

Table N.7.3.3.X.11-1: Status Codes of Origin Server for Unsubscribe Transaction

| **Status** | **Code** | **Condition** |
| --- | --- | --- |
| *Success* | *200 (OK)* | *TO BE FILLED IN* |
| *202 (Accepted)* |  |
| *Failure* | *400 (Bad Request)* |  |
| *409 (Conflict)* |  |
| *503 (Service Unavailable)* |  |

###### N.7.3.3.X.12 Unsubscribe Transaction as User Agent

Table N.7.3.3.X.12-1 lists the Status Codes that a user agent supports for the Unsubscribe Transaction of the Modality Workflow Service and defines the application behavior, when encountering any of the listed Status Codes.

[Describe below the behavior of the application when it receives various Status Codes in the Unsubscribe Transaction response]

Table N.7.3.3.X.12-1: Status Codes of User Agent for Unsubscribe Transaction

| **Status** | **Code** | **Behavior** |
| --- | --- | --- |
| *Success* | *200 (OK)* | *TO BE FILLED IN* |
| *202 (Accepted)* |  |
| *Failure* | *400 (Bad Request)* |  |
| *409 (Conflict)* |  |
| *\** | *Any other code* |  |

**Changes to NEMA Standards Publications PS 3.4**

Update section F.9 with a note of how an SCP knows what SCUs to notify about changes

**F.9**

…

Note

…

1. The terms IS and PACS used in the previous example are provided for clarification purposes only. This document does not define nor constrain the purpose or role of any IS, PACS or acquisition Application Entity conforming to this Service Class Specification.
2. **It is beyond the scope of the specification to define how the SCP knows about what SCUs to notify about changes. A conceivable way would be to make this a configuration item of the SCP.**

…

**Changes to NEMA Standards Publications PS 3.6**

There are no new attributes to be added to table 6-1 of section 6.

**Changes to NEMA Standards Publications PS 3.15**

There are no new attributes to be added to table E.1-1 of annex E.