Supplement 246 – DICOMweb Modality Workflow Services

WG27

Public Comment

March 2025

WORK ITEM 2023-10-C – DICOMWEB MODALITY SERVICES

Introduction

The DICOM Standard defines several services. Two of these are targeted towards modalities, namely the Modality Worklist service (see PS3.4, Annex K, more specifically K.6.1) and the Modality Performed Procedure Step service (see PS3.4, Annex F, more specifically F.7-F.9). Currently, these services are defined using DIMSE.

Limitations of Current Standard

Both the Modality Worklist service and the Modality Performed Procedure Step service are not yet available in DICOMweb. This limits a) the uptake of DICOMweb for modalities and b) the support of workflow services for modalities that are (intended to be) part of a web-based ecosystem.

Description of Proposal

Add the Modality Worklist and the Modality Performed Procedure Step services to DICOMweb, in principle based on the existing DICOMweb Worklist service (UPS-RS; see PS3.18, section 11). This would boil down to creating an informative annex and any normative changes needed if gaps are discovered.

PROGRESS

What happened since last meeting in January

- Discussion in WG27
- Created this presentation
- Updated supplement 246
  - Added diagrams for bi-directional proxies
  - Added examples
  - Reworked comments from WG06

Since Tuesday

- Presentation
  - Added slide with open issues
  - Reworked slides to reflect proposed approaches
  - Added slide with dual-headed server
- Supplement
  - Added/rephrased open issues
  - Reworked text to reflect proposed approaches
  - Reworked comments

Agenda

- Discuss and conclude on what HTTP method to be used for MPPS updates
- Review this presentation
- Continue line-by-line review of supplement

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DISCUSSION IN WG27

- Change of approach (based on MWL and MPPS) was very much appreciated
- `PATCH` vs `PUT` and `POST` discussion: choose your battles

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WHAT HTTP METHOD IS TO BE USED FOR MPPS UPDATES?

This is not about JSON PATCH!

HTTP `PATCH` versus `PUT` and `POST`

- The `PUT` method provides a replacement of the *entire* resource (and thus requires bandwidth).
- The `POST` method doesn't have any generic semantics; the target resource processes the representation enclosed in the request according to the resource's own specific semantics
  - Drawback: "Server and client-side developers must write application-specific code to support it, then do QA on it, debug the corner cases, and eventually rewrite the API to fix the problems they inevitably find (partial updates can get subtle). Once you get a lot of these hanging around, it's a pain."
- The `PATCH` method is a request method for making partial changes to an existing resource.
  - It is atomic, so either all or no changes
- `PATCH` is well supported by origin servers and user agents (browsers).

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WHAT HTTP METHOD IS TO BE USED FOR MPPS UPDATES?

Advantages of using HTTP PATCH method

- Semantics of Update transaction will be in line with HTTP semantics; otherwise, DICOMweb will stay 'special'
- When adapting UPS-RS transactions to follow suit
  - These will then also be in line with HTTP semantics
    - The current `PUT` method for the Change Workitem State Transaction in UPS-RS is 'weird', as it requires a separate resource for state changes, which is not HTTP's intent
  - This does not break any implementation (AFAWK)

Disadvantages of using HTTP PATCH

- More or less implies to adopt the use of `PATCH` instead of `POST` and `PUT` in UPS-RS' Update Workitem and Change Workitem State transactions
- Is a breaking change of the spec

Proposal

- Make this an Open Issue for PC, preferring `PATCH`

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OVERVIEW OF SERVICES

The principle of basing the Modality Workflow Services on the existing DICOMweb Worklist Service (UPS-RS) has been relaxed due to the amount foreseen and identified standardization and implementation issues. The Modality Workflow Services are now based on their DIMSE counterparts.

Supplement 246 – DICOMweb Modality Workflow Services contains two new services:

- **Modality Scheduled Procedure Step Service**, mimicking DIMSE's Basic Worklist Management Service (PS3.4, Annex K).
- **Modality Performed Procedure Step Service**, mimicking DIMSE's Procedure Step SOP Classes (PS3.4, Annex F), where the DIMSE notifications are not covered.

OPEN ISSUES – PROPOSED APPROACHES

3. Do we want MPPS notifications like we have in DIMSE?
   - Exclude these from DICOMweb and make clear that an IHE SWF approach can be followed when needed.
4. What HTTP method do we want for doing updates on an MPPS resource?
   - The PATCH method seems most appropriate, as this is targeted towards partial changes.
5. Do we want to allow for partial changes of sequences in MPPSs (as this is currently not allowed in DIMSE)?
   - Although there is merit in this, it is proposed to write a CP for this when needed including DIMSE.
6. What should be the name of the service returning modality scheduled procedure steps?
   - It should be the Modality Scheduled Procedure Step Service (in contrast to something like Modality Worklist Service).

MODALITY WORKLIST SERVICE – RESOURCES AND TRANSACTIONS

Resource	URI Template	Description
Worklist	/modality-scheduled-procedure-steps	The collection of Modality Scheduled Procedure Steps managed by the origin server.

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

MODALITY WORKLIST SERVICE – DIMSE RELATION AND SYNTAX

Transaction	Operation	Reference	DIMSE Service
Search	Query Worklist	PS3.4, K.4	C-FIND

Transaction	Request Syntax
Search	GET SP /modality-scheduled-procedure-steps?{&match*}{&includefield}{&fuzzymatching}{&offset}{&limit} SP version CRLF Accept: 1#media-type CRLF *(header-field CRLF) CRLF

MODALITY PERFORMED PROCEDURE STEP SERVICE – RES. & TRANS.

Resource	URI Template	Description
Modality Performed Procedure Step	/modality-performed-procedure-steps/{mppsUID}	A Modality Performed Procedure Step.

Transaction Name	Method	Payload		Description
		Request	Success Response	
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

MODALITY PERFORMED PROCEDURE STEP SERVICE – DIMSE REL.

Transaction	Operation	Reference	DIMSE Service
Create	Create MPPS Instance	PS3.4, F.7.2.1	N-CREATE
Update	Set MPPS Information	PS3.4, F.7.2.2	N-SET
Retrieve	Get MPPS Information	PS3.4, F.8.2.1	N-GET

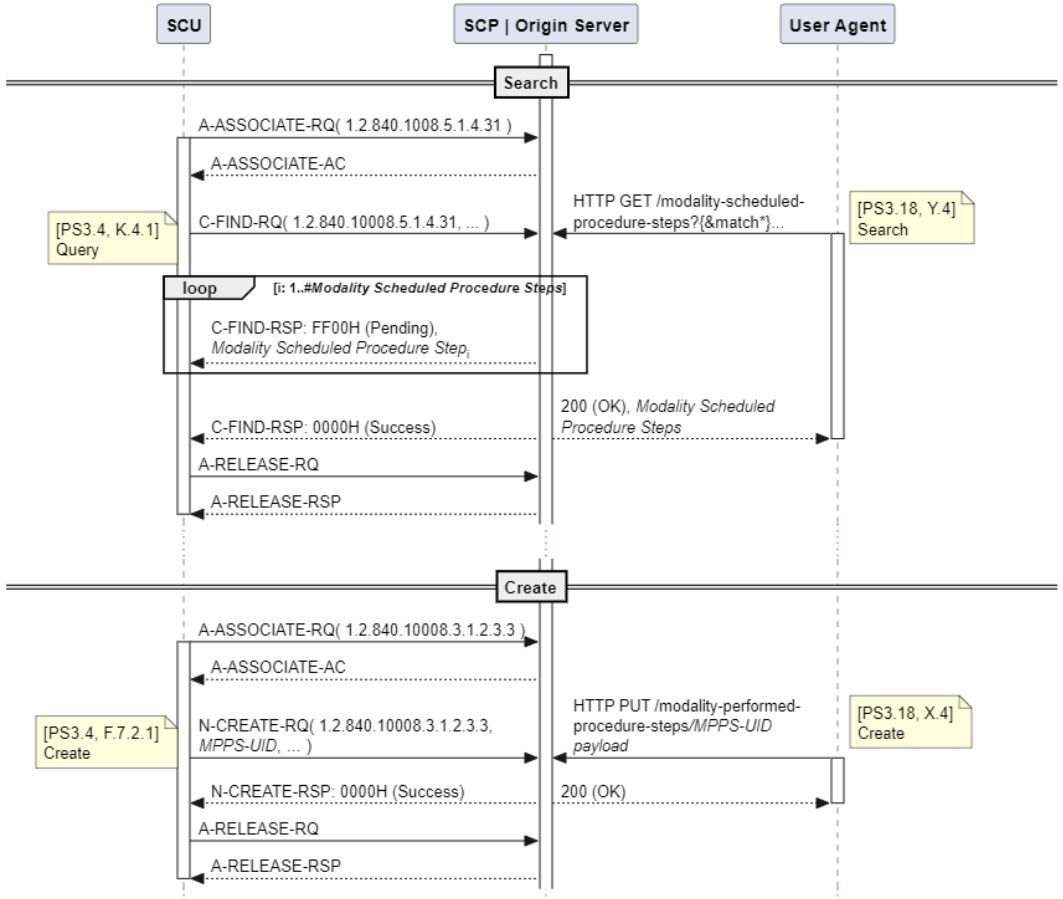
MODALITY PERFORMED PROCEDURE STEP SERVICE – SYNTAX

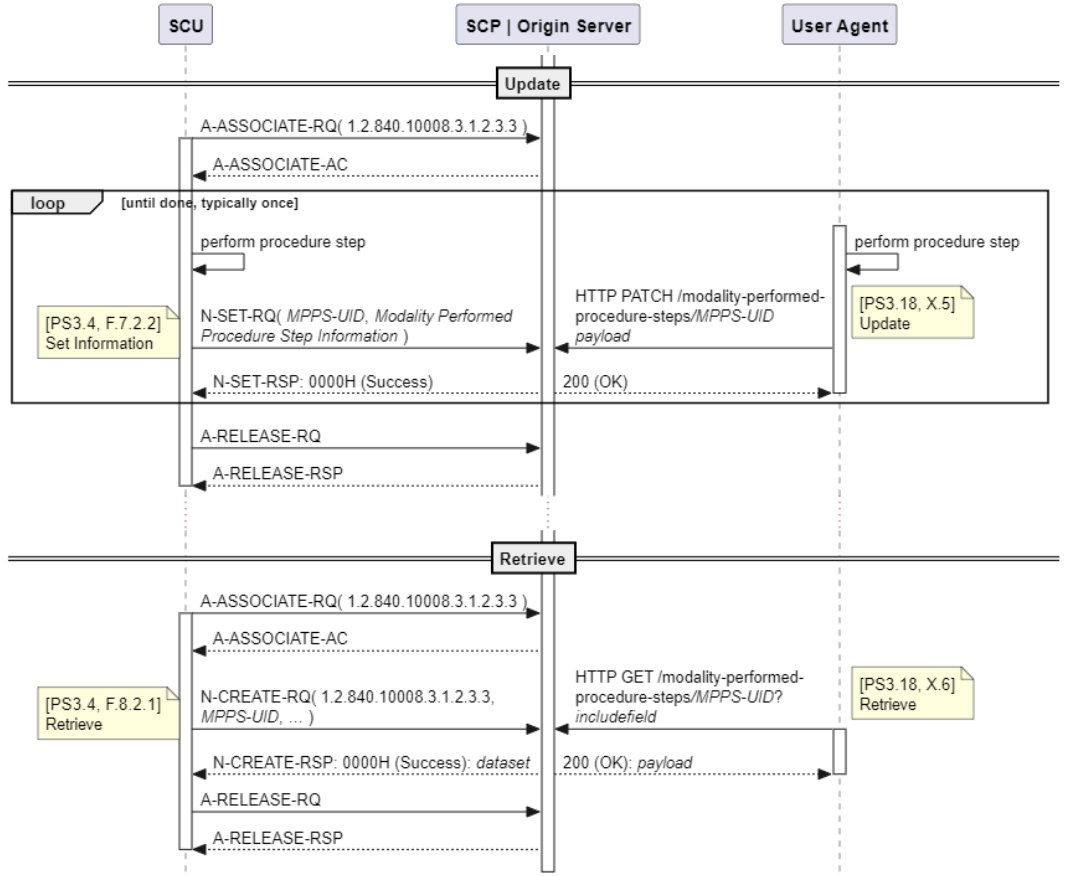
Transaction	Request Syntax
Create	PUT SP /modality-performed-procedure-steps/{mppsUID} SP version CRLF Accept: 1#media-type CRLF *(header-field CRLF) CRLF payload
Update	PATCH SP /modality-performed-procedure-steps/{mppsUID} SP version CRLF Accept: 1#media-type CRLF *(header-field CRLF) CRLF payload
Retrieve	GET SP /modality-performed-procedure-steps/{mppsUID}{?includefield*} SP version CRLF Accept: 1#media-type CRLF *(header-field CRLF) CRLF

MODALITY WORKFLOW SERVICES – SUPPORT OF TRANSACTIONS

Service	Transaction	Support
N.A.	Retrieve Capabilities	Required
Worklist Service	Search	Required
Modality Performed Procedure Step Service	Create	Required
	Update	Required
	Retrieve	Optional

EXAMPLE – DUAL-HEADED SERVER IN MIXED ECO-SYSTEM





REFERENCES

This presentation, the supplement, the examples and the analysis images (and much more) can be found at

- https://github.com/krotz-dieter/dicomweb-dmwl-mpps