DICOM Change Proposal

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Change Number CP-2577
Log Summary: Fix empty N-CREATE conflict with PPS Discontinuation Reason workflow
Name of Standard PS3.4 2026c
Rationale for Change: CP-1738 introduced the prohibition of sending empty Type 3 attributes. However, this creates a conflict with existing DICOM requirements for Performed Procedure Step (PPS) workflow. DICOM PS3.4 Section F.7.2, Note 5 states: "Only Attributes that are specified in a SOP Instance at N-CREATE may later be updated through the N-SET. If an SCU wishes to use the PPS Discontinuation Reason Code Sequence (0040,0281), it must create that Attribute (zero-length) during N-CREATE." This creates an impossible scenario: • To later send a discontinuation reason, the modality must create the Performed Procedure Step Discontinuation Reason Code Sequence (0040,0281) as zero-length (empty) during N-CREATE • PS3.4 Section 5.4.2.1 prohibits sending empty Type 3 attributes in N-SET operations • The SCU cannot comply with both requirements - it must send an empty Type 3 attribute in N-CREATE to enable later N-SET updates, but cannot subsequently use N-SET to provide the actual value due to Section 5.4.2.1 restrictions. This CP resolves the conflict by changing the usage specification to require creation during N-CREATE and N-SET operations. This CP also states that modifications to Sequence contents require submission of the complete updated value, reflecting that operation arguments are conveyed as whole values. This behavior is consistent with ISO OSI/ROSE principles, which do not define partial updates to structured parameters and instead require fully specified replacements.
Change Wording:

Update PS3.4 Section 5.4.2.1 DIMSE Service N-CREATE, N-SET, N-ACTION, as follows:

5.4.2.1 DIMSE Service N-CREATE, N-SET, N-ACTION

The following Requirements apply when specifying the use of DIMSE Services N-CREATE, N-SET, N-ACTION.

The convention used in the table below are as follows:

SCU Attribute Requirements

Mandatory The SCU shall provide the Attribute.

Optional The SCU may or may not provide the Attribute.

Not Allowed The SCU shall not provide the Attribute with the command.

SCU Attribute Contents

Permitted An Attribute with zero length is permitted.

Not Permitted An Attribute with zero length is not permitted.

SCP Behavior

Mandatory The SCP shall support receiving the Attribute with the command.

Mandatory with Default The SCP shall support receiving the Attribute. Upon receiving zero-length values, the SCP shall assign values as defined by the specification of the Service Class.

Optional The SCP may or may not support receiving the Attribute.

Not Allowed The SCP shall not support receiving this Attribute with the command.

Table 5.4.2-1. SCU and SCP Attribute Usage and Zero-Length Encoding Requirements for DIMSE N-CREATE, N-SET, and N-ACTION

	SCU		SCP
Usage	**Requirement**	**Zero Length**	**Requirement**
1/1	Mandatory	Not Permitted	Mandatory
2/1	Mandatory	Permitted	Mandatory with Default
2/2	Mandatory	Permitted	Mandatory
3/1	Optional	Not Permitted	Mandatory
3/2	Optional	~~Not~~ Permitted	Optional
3/3	Optional	~~Not~~ Permitted	Optional
-/-	Not Allowed	Not Permitted	Not Allowed

If the SCU does not provide an Attribute that is Mandatory for the SCU, the SCP shall respond with a Failure Status Code of 0120H "Missing Attribute".

If the SCU provides a zero-length value for a Mandatory Attribute when zero length is not permitted, the SCP shall respond with a Failure Status Code of 0121H "Missing Attribute Value".

Only Attributes that are specified as top level Attributes in a SOP Instance during an N-CREATE operation can later be updated through an N-SET operation.

Note

For example, the Performed Procedure Step Discontinuation Reason Code Sequence (0040,0281) needs to be present in the N-CREATE operation (with a zero-length value) to allow a discontinuation code to be provided later. This is an exception to the general Type 3 Optional Data Element encoding requirements specified in PS3.5 Section 7.4.5.

A top level Sequence Attribute can be replaced using an N-SET operation. Modification of the contents of the Sequence requires providing the complete new Sequence Value.

Update PS3.4 Section F.7.2.1.1 Modality Performed Procedure Step Subset Specification, as follows:

F.7.2.1.1 Modality Performed Procedure Step Subset Specification

…

Table F.7.2-1. Modality Performed Procedure Step SOP Class N-CREATE, N-SET and Final State Attributes

Attribute Name	Tag	Usage N-CREATE (SCU/SCP)	Usage N-SET (SCU/SCP)	Usage Final State (see Note 1)
…				
Performed Procedure Step Information				
Performed Procedure Step ID	(0040,0253)	1/1	Not allowed	
Performed Station AE Title	(0040,0241)	1/1	Not allowed	
Performed Station Name	(0040,0242)	2/2	Not allowed	
Performed Location	(0040,0243)	2/2	Not allowed	
Performed Procedure Step Start Date	(0040,0244)	1/1	Not allowed	
Performed Procedure Step Start Time	(0040,0245)	1/1	Not allowed	
Performed Procedure Step Status	(0040,0252)	1/1	3/1	
Performed Procedure Step Description	(0040,0254)	2/2	3/2	
Performed Procedure Type Description	(0040,0255)	2/2	3/2	
Procedure Code Sequence	(0008,1032)	2/2	3/2	
>Include Table F.7.2-1e "Modality Performed Procedure Step Enhanced Code Value Macro with N-SET, Optional Meaning"				
Reason For Performed Procedure Code Sequence	(0040,1012)	3/3	3/3	
>Include Table F.7.2-1c "Modality Performed Procedure Step Enhanced Code Value Macro with N-SET, Mandatory Meaning"				
Performed Procedure Step End Date	(0040,0250)	2/2	3/1	1
Performed Procedure Step End Time	(0040,0251)	2/2	3/1	1
Comments on the Performed Procedure Step	(0040,0280)	3/3	3/3	
Performed Procedure Step Discontinuation Reason Code Sequence	(0040,0281)	3/3	3/3	
>Include Table F.7.2-1c "Modality Performed Procedure Step Enhanced Code Value Macro with N-SET, Mandatory Meaning"				
Image Acquisition Results				
…				

Note

1. The requirement for the final state is that which applies at the time that the Performed Procedure Step Status (0040,0252) is N-SET to a value of COMPLETED or DISCONTINUED, as described in Section F.7.2.2.2. It is only described if it is different from the SCP requirement for the N-CREATE.

2. The Performed Series Sequence (0040,0340) may not be empty (zero length) at the time that the Performed Procedure Step Status (0040,0252) is N-SET to a value of COMPLETED or DISCONTINUED. In other words a Series must exist for every Performed Procedure Step, though it may contain no Images or Non-Image Composite objects, if none were created, as described in Section F.7.2.2.2.

3. Attributes (0040,1006) Placer Order Number/Procedure and (0040,1007) Filler Order Number/Procedure were previously defined in DICOM. They are now retired (see PS3.3-1998).

4. Attributes (0040,2006) and (0040,2007) were previously defined in DICOM. They are now retired (see PS3.3-1998).

5. ~~**Only Attributes that are specified in a SOP Instance at N-CREATE may later be updated through the N-SET.**~~ If an SCU wishes to use the PPS Discontinuation Reason Code Sequence (0040,0281), it ~~**must**~~**will need to** create that Attribute (zero-length) during **the** N-CREATE **operation. If Performed Procedure Step Status (0040,0252) is finally N-SET to a value other than DISCONTINUED, the Performed Procedure Step Discontinuation Reason Code Sequence (0040,0281) remains empty (with a zero-length value), since top-level Attributes, once set, cannot be deleted later.**

6. The Radiation Dose Module was previously defined in DICOM. This is now retired (see PS3.3-2017c).