DICOM Correction Proposal

STATUS	Assigned
Date of Last Update	2026/03/13
Person Assigned	Christof Schadt
Submitter Name	Adrian Schmidt-Föhre, adrian.schmidtfoehre@mint-medical.com
Submission Date	2026/01/09

Correction Number	CP-2609
Log Summary: Add Conceptual Volume Identification Sequence to Segmentation IOD to enable grouping of related segments that represent the same conceptual anatomical volume.	
Name of Standard PS3.3	

Rationale for Correction:

The current DICOM Segmentation IOD includes Tracking ID (0062,0020) and Tracking UID (0062,0021) attributes in the Segment Description Macro (Table C.8.20-4). Per the DICOM standard definition, Tracking UID is "A unique identifier used for tracking a finding or feature, potentially across multiple reporting objects, over time."

This design supports longitudinal tracking of the same anatomical feature across different time points. However, it does not adequately address the use case where multiple distinct segmentations at the same time point represent different aspects or compartments of the same conceptual anatomical volume.

Clinical Use Case: Sub-Solid Pulmonary Nodules:

A concrete clinical example is the assessment of sub-solid pulmonary nodules, which consist of both ground-glass and solid components. For accurate characterization, two related but distinct segmentations are required:

1. Total nodule segmentation — representing the entire lesion volume (ground-glass + solid)

2. Solid compartment segmentation — representing only the solid portion

Both segmentations refer to the same anatomical finding (one nodule) but measure different properties. Current DICOM SEG semantics require each segment to have its own unique Tracking UID since they are distinct segmented regions. However, there is no standard mechanism to indicate that these two segments both belong to the same conceptual volume (i.e., the same nodule).

Relationship to Tracking UID:

The Tracking UID (0062,0021) and Conceptual Volume UID (3010,0006) serve complementary but distinct purposes:

- Tracking UID uniquely identifies a specific segmentation for longitudinal tracking across time. Each Segment shall have its own Tracking UID.

- Conceptual Volume UID identifies the abstract anatomical concept that one or more Segments represent. Multiple Segments may share the same Conceptual Volume UID.

Equivalence with RT Objects:

The Conceptual Volume Identification Sequence (3010,00A0) used in Segmentation is semantically equivalent to the same sequence used in RT Structure Set ROI Sequence (3006,0020). A Segmentation Segment and an RT Structure Set ROI that share the same Conceptual Volume UID (3010,0006) represent the same conceptual anatomical volume.

Correction Wording:

Modify Table C.8.20.4 Segment Description Macro. Add the following row after Tracking UID (0062,0021):

C.8.20.4 Segmentation Description Macro

Table C.8.20-4 specifies the Attributes of the Segment Description Macro.

Table C.8.20-4. Segment Description Macro Attributes

Attribute Name	Tag	Type	Attribute Description
Segment Number	(0062,0004)	1	Identification number of the Segment. The Value of Segment Number (0062,0004) shall be unique within the Segmentation Instance in which it is created. See Section C.8.20.2.4.

Attribute Name	Tag	Type	Attribute Description
Segment Label	(0062,0005)	1	User-defined label identifying this Segment. This may be the same as Code Meaning (0008,0104) of Segmented Property Type Code Sequence (0062,000F).
Segment Description	(0062,0006)	3	User-defined description for this Segment.
Segment Algorithm Type	(0062,0008)	1	Type of algorithm used to generate the Segment. Enumerated Values: AUTOMATIC calculated Segment SEMIAUTOMATIC calculated Segment with user assistance MANUAL user-entered Segment
Include Table 10-7b "Multiple Site General Anatomy Optional Macro Attributes"			*May not be necessary if the anatomy is implicit in the Segmented Property Type Code Sequence.* *More than one Item in Anatomic Region Sequence (0008,2218) may be used when a region of interest spans multiple anatomical locations and there is not a single pre-coordinated code describing the combination of locations. There is no requirement that the multiple locations be contiguous.*
Segmented Property Category Code Sequence	(0062,0003)	1	Sequence defining the general category of the property the Segment represents. Only a single Item shall be included in this Sequence.
>Include Table 8.8-1 "Code Sequence Macro Attributes"			*BCID 7150 "Segmentation Property Category".*
Segmented Property Type Code Sequence	(0062,000F)	1	Sequence defining the specific property the Segment represents. *Note* *"Property" is used in the sense of meaning "what the segmented voxels represent", whether it be a physical or biological object, be real or conceptual, having spatial, temporal or functional extent or not. I.e., it is what the Segment "is" (as opposed to some feature, attribute, quality, or characteristic of it, like color or shape or size).* Only a single Item shall be included in this Sequence.
>Include Table 8.8-1 "Code Sequence Macro Attributes"			*BCID 7151 "Segmentation Property Type".* Note
>Segmented Property Type Modifier Code Sequence	(0062,0011)	3	Sequence defining the modifier of the property type of this Segment. One or more Items are permitted in this Sequence.
>>Include Table 8.8-1 "Code Sequence Macro Attributes"			DCID 244 "Laterality".

Attribute Name	Tag	Type	Attribute Description
			Note For Retinal Segmentation Surfaces, laterality is not typically specified.
Tracking ID	(0062,0020)	1C	A text label used for tracking a finding or feature, potentially across multiple reporting objects, over time. This label shall be unique within the domain in which it is used. Required if Tracking UID (0062,0021) is present. ***Note*** 1. *May or may not have the same Value as Segment Label (0062,0005).* 2. *Related SR Instances may exist, for example, to record measurements related to this Segment, but need not exist for this Attribute to be used.* 3. *This Attribute will have the same Value as the value of the (112039, DCM, "Tracking Identifier") Content Item in SR Instances that reference this Segment in this Segmentation Instance.*
Tracking UID	(0062,0021)	1C	A unique identifier used for tracking a finding or feature, potentially across multiple reporting objects, over time. Required if Tracking ID (0062,0020) is present. ***Note*** 1. *Related SR Instances may exist, for example, to record measurements related to this Segment, but need not exist for this Attribute to be used.* 2. *This Attribute will have the same Value as the value of the (112040, DCM, "Tracking Unique Identifier") Content Item in SR Instances that reference this Segment in this Segmentation Instance.*
Conceptual Volume Identification Sequence	**(3010,00A0)**	**3**	**Identifies the Conceptual Volume which is represented by this ROI.** **Only a single Item is permitted in this Sequence.**
>Include Table 10.33-1 "Conceptual Volume Macro Attributes".			
Definition Source Sequence	(0008,1156)	3	Instances containing the source of the Segment information. Only a single Item is permitted in this Sequence.
>Include Table 10-11 "SOP Instance Reference Macro Attributes".			
>Referenced ROI Number	(3006,0084)	1C	The Value of ROI Number (3006,0022) in the referenced SOP Instance that identifies the ROI that is the origin of the Segment information. Required if Referenced SOP Class UID (0008,1150) is "1.2.840.10008.5.1.4.1.1.481.3" (RT Structure Set Storage).

Attribute Name	Tag	Type	Attribute Description
Include Table 10.9.3-1 "Content Creator Macro Attributes"			