Status	Final Text
Date of Last Update	2025/04/01
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Correction Number CP-2436
Log Summary: Inconsistency in reference to RT Structure Sets for Planar ROI in TID 1410
Name of Standard PS3.16 2025a
Rationale for Correction: CP 2035 added RT Structure Set (RTSS) objects to TID 1410 and TID 1411 but the mutually exclusive conditions with respect to other means of specifying the ROI are internally inconsistent.
Correction Wording:

*Amend DICOM PS3.16 as follows (changes to existing text are bold and **underlined** for additions and **struckthrough** for removals):*

TID 1410 Planar ROI Measurements and Qualitative Evaluations

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Table TID 1410. Planar ROI Measurements and Qualitative Evaluations

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (125007, DCM, "Measurement Group")	1	M		
...								
5	>	CONTAINS	SCOORD	EV (111030, DCM, "Image Region")	1	MC	XOR Rows 7, 7b, 8b	GRAPHIC TYPE = not {MULTIPOINT}
6	>>	SELECTED FROM	IMAGE		1	M		
7	>	CONTAINS	IMAGE	EV (121214, DCM, "Referenced Segmentation Frame")	1	MC	XOR Rows 5, 7b**, 8b**	Reference shall be to a Segmentation Image, with a single value specified in Referenced Segment Number (0062,000B). For references to tiled Segmentation Images, one or more values shall be specified in Referenced Frame Number (0008,1160), unless all frames in the referenced Segmentation Image are selected and there is only a single Segment, in which case Referenced Frame Number (0008,1160) will be absent. The referenced tiles shall all be in the same plane. For references to non-tiled Segmentation Images, a single value shall be specified in Referenced Frame Number (0008,1160), unless there is only one frame in the referenced Segmentation Image, in which case Referenced Frame Number (0008,1160) will be absent.
7b	>	CONTAINS	SCOORD3D	EV (111030, DCM, "Image Region")	1	MC	XOR Rows 5, 7, 8b	GRAPHIC TYPE = not {MULTIPOINT, POLYLINE or ELLIPSOID}
8	>	CONTAINS	IMAGE	EV (121233, DCM, "Source image for segmentation")	1	MC	IFF Row 7	
8b	>	CONTAINS	COMPOSITE	EV (130488, DCM, "Region in Space")	1	MC	XOR Rows 5, 7, 7b	Reference shall be to an Instance of the RT Structure Set Storage SOP Class.

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
8c	>>	HAS PROPERTIES	TEXT	EV (130489, DCM, "Referenced Region of Interest Identifier")	1	M		Shall be the value of ROI Number (3006,0022) within the single referenced Item of Structure Set ROI Sequence (3006,0020) of the referenced Instance of the RT Structure Set Storage SOP Class.
9	>	CONTAINS	IMAGE	EV (121200, DCM, "Illustration of ROI")	1	U		
9b	>	CONTAINS	IMAGE	EV (130401, DCM, "Visual explanation")	1-n	U		
...								

Content Item Descriptions

...	
Row 5	To describe an infinitely small area, such as the center of a lesion, a Graphic Type of POINT may be used.
Row 6	(260753009, SCT, "Source") may be used as a generic Concept Name when there is a desire to avoid having an anonymous (unnamed) Content Item.
Row 7	Referenced Frame Number (0008,1160) and Referenced Segment Number (0062,000B) are Attributes of the IMAGE Content Item. If the Referenced Segmentation SOP Instance has Segmentation Type (0062,0001) value BINARY, it identifies the area of defined (measured) region of interest by pixel values in the referenced frame with value 1. For Segmentation Type value FRACTIONAL, the area is computed by an implementation dependent method. Referenced Frame Number (0008,1160) may reference multiple frames in the same plane for tiled Segmentation Images (such as segmentations of Whole Slide Microscopy images).
Row 7b	The area may be defined independently of an image by reference to 3D coordinates in any type of DICOM Reference Coordinate System, whether it be patient-relative (Patient Based Coordinate System), volume-relative (including acquired and presentation state volumes), or whole slide relative (Slide Coordinate System).
Row 8	Identifies the source image that was segmented to identify the ROI, and whose properties are described in this container.
Rows 8b, 8c	A reference to a single ROI that defines a planar ROI, within an RT Structure Set.
Row 9	This referenced image may contain a "screen shot" illustrating a rendered version of the ROI.
Row 9b	This referenced image may contain a visual explanation of how an algorithm produces its results, and may be a "screen shot" of the explanation already superimposed on the source image (e.g., a "heat map"), or a parametric map intended to be superimposed on the source image by the receiving application. The type of image and the type of visual explanation is described in the referenced image's own metadata. More than one referenced image may be present, if there is more than one type of visual explanation, or it needs to span more than one single-frame image.
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DICOM PS3.16 for referenced unchanged:

TID 1411 Volumetric ROI Measurements and Qualitative Evaluations

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Table TID 1411. Volumetric ROI Measurements and Qualitative Evaluations

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (125007, DCM, "Measurement Group")	1	M		
...								
5	>	CONTAINS	SCOORD	EV (111030, DCM, "Image Region")	1-n	MC	XOR Rows 7, 10, 12b	GRAPHIC TYPE = not {MULTIPOINT}
6	>>	SELECTED FROM	IMAGE		1	M		
7	>	CONTAINS	IMAGE	EV (121191, DCM, "Referenced Segment")	1	MC	XOR Rows 5, 10, 12b	Reference shall be to a Segmentation Image or Surface Segmentation object, with a single value specified in Referenced Segment Number
10	>	CONTAINS	SCOORD3D	EV (121231, DCM, "Volume Surface")	1-n	MC	XOR Rows 5, 7, 12b	If one item, GRAPHIC TYPE = {ELLIPSOID or POINT} If more than one item, GRAPHIC TYPE = {POLYGON or ELLIPSE}
11	>	CONTAINS	IMAGE	EV (121233, DCM, "Source image for segmentation")	1-n	MC	XOR Row 12 and IFF (Row 7 or Row 10)	
12	>	CONTAINS	UIDREF	EV (121232, DCM, "Source series for segmentation")	1	MC	XOR Row 11 and IFF (Row 7 or Row 10)	
12b	>	CONTAINS	COMPOSITE	EV (130488, DCM, "Region in Space")	1	MC	XOR Rows 5, 7, 10	Reference shall be to an Instance of the RT Structure Set Storage SOP Class.
12c	>>	HAS PROPERTIES	TEXT	EV (130489, DCM, "Referenced Region of Interest Identifier")	1	M		Shall be the value of ROI Number (3006,0022) within the single referenced Item of Structure Set ROI Sequence (3006,0020) of the referenced Instance of the RT Structure Set Storage SOP Class.
13	>	CONTAINS	IMAGE	EV (121200, DCM, "Illustration of ROI")	1-n	U		
13b	>	CONTAINS	IMAGE	EV (130401, DCM, "Visual explanation")	1-n	U		
...								

Content Item Descriptions

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Row 5	Even though the coordinates are image-relative, not every image slice within the spatial extent of the ROI is required to be encoded. That is, the ROI may be more coarsely sampled than the image slices, and may be irregularly sampled, and the omission of a contour on a slice does not mean that it is omitted from the ROI. For example, a user may not draw an outline on every slice. However, failure to include every intermediate slice does give rise to this potential ambiguity, and is discouraged.

Rows 5, 7, 10	A single invocation of TID 1411 defines the entire spatial extent defined of a single ROI. A single structure with multiple fragments disconnected in spatial extent needs to be described as separate ROIs, in separate invocations of TID 1411, with different Tracking Identifiers and Tracking Unique Identifiers, but the same Finding.
Rows 5, 10	To describe an infinitely small volume, such as the center of a lesion, a Graphic Type of POINT may be used.
Row 6	(260753009, SCT, "Source") may be used as a generic Concept Name when there is a desire to avoid having an anonymous (unnamed) Content Item.
Rows 6, 7	Referenced Segment Number (0062,000B) is an Attribute of the IMAGE Content Item, and shall be present with a single value. If the Referenced SOP Instance is a Segmentation Image, it shall have a defined Frame of Reference. If it has Segmentation Type (0062,0001) value BINARY, it identifies the volume of defined (measured) region of interest by voxel values in the referenced segment with value 1. If it has Segmentation Type value FRACTIONAL, the volume is defined by an implementation dependent method. The extent, sampling rate and orientation of the Segmentation are not required to match that of corresponding image slices (if any), identified in Row 11 or referenced from the Segmentation. If the referenced SOP Instance is a Surface Segmentation, the referenced segment shall constitute a finite volume. It identifies the volume of the defined (measured) region of interest by the interior of the finite volume. Segment number shall be specified even if the Segmentation SOP Instance has only a single segment.
Row 10	Either a single item describing a closed volumetric surface, or multiple items describing a set of parallel closed coplanar areas (contours) is specified. The sampling rate and orientation of the contours is not required to match that of any image slices (if any), nor are the in-plane or cross-plane sampling rates required to be regular.
Row 11	Identifies the source images that were segmented to identify the ROI, when, for example a subset of images in a series was used.
Row 12	Identifies the source series of images that were segmented to identify the ROI, when, for example an entire set of images in a series was used.
Rows 12b, 12c	A reference to a single ROI that defines a volumetric ROI, within an RT Structure Set.
Row 13	These referenced images may contain "screen shot" illustrating rendered versions of the ROI.
Row 13b	This referenced image may contain a visual explanation of how an algorithm produces its results, and may be a "screen shot" of the explanation already superimposed on the source image (e.g., a "heat map"), or a parametric map intended to be superimposed on the source image by the receiving application. The type of image and the type of visual explanation is described in the referenced image's own metadata. More than one referenced image may be present, if there is more than one type of visual explanation, or it needs to span more than one single-frame image.
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