DICOM Change Proposal

STATUS	Assigned
Date of Last Update	2025/12/16
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Submission Date	2025/10/21

Change Number CP-2586
Log Summary: Clarify description for rotation angle and air kerma in enhanced RDSR
Name of Standard PS3.16
Rationale for Change: The content item descriptions related to the rotation angle of a rotating x-ray source in the enhanced RDSR in TID 10050 currently requires that the initial angle during a rotation is equal to zero degrees. This is an unnecessary requirement and this CP suggests removing it. It also defines that the position defined by the center of rotation vector is the source position at zero degrees. Second, the Air Kerma at the Output Measurement Point currently requires that the period of time spanned defined by the entries in the TID is not greater than the periods of time defined by the Output Measurement Point Position, X-Ray Source Transformation Matrix, and X-Ray Source Rotation Angle (TIDs 10050 and 10051). There is a note added in this CP to indicate that for movements without irradiation, values of zero dose would be encoded.
Change Wording:

Modify PS3.16 as indicated (changes to existing text are bold and underlined for additions and bold and strikethrough for removals):

Table TID 10050. X-Ray Source Reference Coordinate System

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (130519, DCM, "X-Ray Source Reference Coordinate System")	1	M		
2	>	CONTAINS	DATETIME	DT (111526, DCM, "DateTime Started")	1	M		
3	>	CONTAINS	DATETIME	DT (111527, DCM, "DateTime Ended")	1	M		
4	>	CONTAINS	TEXT	EV (113832, DCM, "Identification of the X-Ray Source")	1	M		
5	>	CONTAINS	TABLE	EV (130520, DCM, "Transformation Matrix")	1	M		NCOLUMNS = 4 NROWS= 4 CELL VR = FD

6	>	CONTAINS	SCOORD3D	EV (130521, DCM, "Center of Rotation")	1	MC	IFF Row 8 is present	GRAPHIC TYPE = {POINT}
7	>	CONTAINS	SCOORD3D	EV (130522, DCM, "Rotation Plane Normal Point")	1	MC	IFF Row 8 is present	GRAPHIC TYPE = {POINT}
8	>	CONTAINS	TABLE	EV (130523, DCM, "Rotation Angle")	1	U		NCOLUMNS = 2 COLUMN 1 = EV (111526, DCM, "DateTime Started") COLUMN 2 = EV (130523, DCM, "Rotation Angle") COLUMN 2 UNITS = EV (deg, UCUM, "deg") COLUMN 1 VR = DT COLUMN 2 VR = FD

Content Item Descriptions

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Row 2	The DateTime of the beginning of the time period over which the Content Items are applicable.
Row 3	The DateTime of the end of the time period over which the Content Items are applicable.
Row 4	Identification **<u>of</u>** the X-Ray source. This designation shall not change for a given source throughout the entire RDSR. For systems with multiple X-Ray sources, each source shall be described with a separate instance of this template.
Row 5	A 4-by-4 matrix of dimensionless numbers of the form defined in Section C.20.2.1.1 “Frame of Reference Transformation Matrix” in PS3.3-. The matrix describes the rigid transformation matrix (including translation and rotation) that transforms the X-Ray source reference coordinate system to the RDSR reference coordinate system. The translation described by this matrix indicates the position and orientation of the X-Ray source within the RDSR reference coordinate system. Like the RDSR RCS, the X-Ray source reference coordinate system shall be a right-handed Cartesian coordinate system. In the specific case of a source rotating about a fixed point within a plane, Rows 6, 7, 8 may be specified to describe the rotation of a moving source without the need to encode multiple transformation matrices. For **<u>period of time defined by Row 2 and Row 3 where</u>** an RDSR **~~that~~** describes **~~only~~** a rotating source in a single plane, the source transformation matrix may be described **~~only~~** once, with all **~~subsequent~~** movements described by the values in Rows 6, 7, 8. If Rows 6, 7, 8 are used, the transformation matrix described in Row 5 corresponds to the position and orientation of the source at **~~the beginning of the rotation~~** **<u>a rotation angle of zero degrees</u>**.
Row 6	Position of the center of rotation of the X-Ray source in the X-Ray source reference coordinate system. Since the X-Ray source RCS uses the source as the origin, this value defines the vector from the source to the center of rotation. Its value shall be assumed to be the position at **<u>zero degrees</u>** ~~the initial angle~~ of rotation. **~~Zero degrees in Row 8 is the angle of the source about the center of rotation at its initial position.~~**
Row 7	Row 6 is combined with Row 7 to define the normal vector to the rotational plane. The Center of Rotation SCOORD3D value from Row 6 defines the origin of the vector. Row 7 defines the

	distal end of the vector. The orientation of the vector assumes the same x, y, and z axis orientations as the X-Ray source reference coordinate system. The positive rotation angle is clockwise as viewed from the center of rotation along this normal vector. This vector may or may not be a unit vector.
Row 8	Two-column table specifying DateTime values and X-Ray source rotation angles. This table shall only be populated in the specific case when the X-Ray source is rotating about a fixed center of rotation within a plane. It allows encoding of **~~a single value, i.e., angle,~~ the angle** of a source **around the center of rotation ~~in a specific motion (rotating around a fixed point)~~**, along with an accompanying **start** DateTime value. **~~The position of the source at the beginning of the rotation is defined as zero degrees.~~** The first DateTime value shall not be before the start DateTime value in Row 2 of the template, and the final DateTime value shall not be after the end DateTime value specified in Row 3.

Modify PS3.16 as indicated (changes to existing text are bold and underlined for additions and bold and strikethrough for removals):

Table TID 10048. Radiation Output

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (130514, DCM, "Radiation Output")	1	M		
2	>	CONTAINS	DATETIME	DT (111526, DCM, "DateTime Started")	1	M		
3	>	CONTAINS	DATETIME	DT (111527, DCM, "DateTime Ended")	1	M		
4	>	CONTAINS	TEXT	EV (113832, DCM, "Identification of the X-Ray Source")	1	M		
5	>	CONTAINS	NUM	EV (130515, DCM, "Air Kerma at Output Measurement Point")	1	MC	XOR Row 6	UNITS = EV (mGy, UCUM, "mGy")
6	>	CONTAINS	TABLE	EV (130515, DCM, "Air Kerma at Output Measurement Point")	1	MC	XOR Row 5	NCOLUMNS = 2 COLUMN 1 = EV (111527, DCM, "DateTime Ended") COLUMN 2 = EV (130515, DCM, "Air Kerma at Output Measurement Point") COLUMN 2 UNITS = EV (mGy, UCUM, "mGy") COLUMN 1 VR = DT COLUMN 2 VR = FL

Content Item Descriptions

Rows 2, 3	The DateTime of the start and end of the radiation output measurement or calculation. This period of time shall not overlap with the period of time of any other instance of this template within the same RDSR. ~~**This period of time shall not span a period during which the value of output measurement point position (TID 10051 Row 5), or the X-Ray source transformation matrix (TID 10050 Row 5), or the corresponding X-Ray source rotation angle (TID 10050 Row 8) change for the same X-Ray source (as identified by the value of Row 4 in each of those templates).**~~
Row 4	Identification **of** the X-Ray source. This designation shall not change for a given source throughout the entire RDSR. For systems with multiple X-Ray sources, each source shall be described with a separate instance of this template.
Row 5	The accumulated air kerma over the period of time specified by Row 2 and Row 3. If this row is present, the period of time specified by Row 2 and Row 3 shall not span a period during which the value of output measurement point position (TID 10051 Row 5), ~~**or**~~ the X-Ray source transformation matrix (TID 10050 Row 5), or the corresponding X-Ray source rotation angle (TID 10050 Row 8) change for the same X-Ray source (as identified by the value of Row 4 in each of those templates). ***Note*** ***Note: If output measurement point position (TID 10051 Row 5), the X-Ray source transformation matrix (TID 10050 Row 5), or the corresponding X-Ray source rotation angle (TID 10050 Row 8) change without concurrent irradiation during the period of time specified by Row 2 and Row 3, the value for this row will be zero.***
Row 6	The table is encoded as a two-column table, consisting of multiple rows describing corresponding values of DateTime and accumulated air kerma over the period of time specified by Row 2 and Row 3. The number of rows in the table is not constrained. In the first table row, the value in COLUMN 1 shall not be less than the value of Row 2 of this TID. In the last table row, the value of COLUMN 1 shall not exceed the value of Row 3 of this TID. For the first table row, the air kerma value in COLUMN 2 shall indicate the accumulated air kerma between the DateTime in Row 2 of this TID and the DateTime of COLUMN 1 of the first table row. Each subsequent table row describes the accumulated air kerma between the DateTime of the previous table row and the current table row. For each table row, the defined period of time shall not span a period during which the value of output measurement point position (TID 10051 Row 5), ~~**or**~~ the X-Ray source transformation matrix (TID 10050 Row 5), or the corresponding X-Ray source rotation angle (TID 10050 Row 8) change for the same X-Ray source (as identified by the value of Row 4 in each of those templates). ***Note*** ***Note: If output measurement point position (TID 10051 Row 5), the X-Ray source transformation matrix (TID 10050 Row 5), or the corresponding X-Ray source rotation angle (TID 10050 Row 8) change without concurrent irradiation during a period of time, the value for the table row corresponding to that change will be zero.***