DICOM Correction Proposal

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Correction Number CP-2468
Log Summary: Clarification of UN Usage in RT Objects
Name of Standard PS3.3
Rationale for Correction: In radiotherapy the Contour Data (3006,0050), DVH Data (3004,0058), Compensator Transmission Data (300A,00EB) and Compensator Thickness Data (300A,00EC) can exceed the length of 65534 bytes limit when using Explicit Transfer Syntax. This CP updates the existing notes to use the UN Value Representation in this case.
Correction Wording:

Update PS3.3 C.8.8.4 RT DVH Module

Table C.8-40. RT DVH Module Attributes

Attribute Name	Tag	Type	Attribute Description
…			
>DVH Data	(3004,0058)	1	A data stream describing the dose bin widths Dn and associated volumes Vn in DVH Volume Units (3004,0054) in the order D1V1, D2V2, … DnVn. Note ~~**DVH Data arrays may not be properly encoded if Explicit VR Transfer Syntax is used and the VL of this Attribute exceeds 65534 bytes.**~~ **If the Value Length of this Data Element exceeds 65534 bytes and Explicit VR Transfer Syntax is used, then the Value Representation UN can be used for this Data Element. See 6.2.2 in PS3.5.**

Update PS3.3 C.8.8.6 ROI Contour Module

Table C.8-42. ROI Contour Module Attributes

Attribute Name	Tag	Type	Attribute Description
…			
>>Contour Data	(3006,0050)	1	Sequence of (x,y,z) triplets defining a contour in the Patient-Based Coordinate System described in Section C.7.6.2.1.1 (mm). See Section C.8.8.6.1 and Section C.8.8.6.3. See Section C.8.8.6.4. Note ~~**Contour Data may not be properly encoded if Explicit VR Transfer Syntax is used and the VL of this Attribute exceeds 65534 bytes.**~~ **If the Value Length of this Data Element exceeds 65534 bytes and Explicit VR Transfer Syntax is used, then the Value Representation UN can be used for this Data Element. See 6.2.2 in PS3.5.**

Update PS3.3 C.8.8.14 RT Beams Module

Table C.8-50. RT Beams Module Attributes

Attribute Name	Tag	Type	Attribute Description
>>Compensator Transmission Data	(300A,00EB)	1C	A data stream of the pixel samples that comprise the compensator, expressed as broad-beam transmission values (between 0 and 1) along a ray line passing through the pixel, at the beam energy specified by the Nominal Beam Energy (300A,0114) of the first Control Point of the Control Point Sequence (300A,0111). The order of pixels encoded is left to right, top to bottom, i.e., the upper left pixel is encoded first followed by the remainder of the first row, followed by the first pixel of the 2nd row, then the remainder of the 2nd row and so on) when viewed from the radiation source. Required if Material ID (300A,00E1) is zero-length. May be present if Material ID (300A,00E1) is non-zero length. See Section C.8.8.14.10 and Section C.8.8.14.11. Note ~~**Compensator Transmission Data may not be properly encoded if Explicit VR Transfer Syntax is used and the VL of this Attribute exceeds 65534 bytes.**~~ **If the Value Length of this Data Element exceeds 65534 bytes and Explicit VR Transfer Syntax is used, then the Value Representation UN can be used for this Data Element. See 6.2.2 in PS3.5.**
>>Compensator Thickness Data	(300A,00EC)	1C	A data stream of the pixel samples that comprise the compensator, expressed as thicknesses (in mm). The order of

Attribute Name	Tag	Type	Attribute Description
			pixels encoded is left to right, top to bottom, i.e., the upper left pixel is encoded first followed by the remainder of the first row, followed by the first pixel of the 2nd row, then the remainder of the 2nd row and so on) when viewed from the radiation source. Required if Material ID (300A,00E1) is non-zero length. May be present if Material ID (300A,00E1) is zero length. See Section C.8.8.14.9 and Section C.8.8.14.10 and Section C.8.8.14.11, “Block and Compensator Precedence for Dosimetric Calculations”. Note ~~**Compensator Thickness Data may not be properly encoded if Explicit VR Transfer Syntax is used and the VL of this Attribute exceeds 65534 bytes.**~~ **If the Value Length of this Data Element exceeds 65534 bytes and Explicit VR Transfer Syntax is used, then the Value Representation UN can be used for this Data Element. See 6.2.2 in PS3.5.**

Update PS3.3 C.8.8.25 RT Ion Beams Module

Table C.8.8.25-1. RT Ion Beams Module Attributes

Attribute Name	Tag	Type	Attribute Description
>>Compensator Thickness Data	(300A,00EC)	1	A data stream of the pixel samples that comprise the range compensator, expressed as physical thickness (in mm), either parallel to radiation beam axis if Compensator Divergence (300A,02E0) equals ABSENT, or divergent according to the beam geometrical divergence if Compensator Divergence (300A,02E0) equals PRESENT. The order of pixels encoded is left to right, top to bottom (upper left pixel, followed by the remainder of row 1, followed by the remainder of the rows). **Note** **If the Value Length of this Data Element exceeds 65534 bytes and Explicit VR Transfer Syntax is used, then the Value Representation UN can be used for this Data Element. See 6.2.2 in PS3.5.**

For reference unchanged PS3.5 Section 6.2.2:

6.2.2 Unknown (UN) Value Representation

The Unknown (UN) VR shall only be used for Private Data Elements and Standard Data Elements previously encoded as some DICOM VR other than UN using Implicit VR encoding, and whose Value Representation is currently unknown, or whose known Value Representation is one of those that have a 16-bit Value Length Field (see Section 7.1.2) when using Explicit VR encoding and whose Value Length exceeds 65534 (2^{16}-2). As long as the VR is unknown the Value Field is insensitive to byte ordering and shall not be 'byte-swapped' (see Section 7.3). In the case of Undefined Length Sequences, the Value shall remain in Implicit VR form. See Section 7.8 for a description of Private Data Attribute Elements and Section 10 and Annex A for a discussion of Transfer Syntaxes.

The UN VR shall not be used for Private Creator Data Elements (i.e., the VR is equal to LO, see Section 7.8.1).

The UN VR shall not be used for File Meta Information Data Elements (any Tag (0002,xxxx), see PS3.10).

Note

1. All other (non-default) DICOM Transfer Syntaxes employ Explicit VR in their encoding, and therefore any Private and/or Standard Data Element Value Field encoded and decoded using any Transfer Syntax other than the DICOM Default Little Endian Transfer Syntax, and not having been translated to the DICOM Default Little Endian Transfer Syntax in the interim, will have a known VR.

2. If at some point an application knows the actual VR for a Data Element of VR UN (e.g., has its own applicable data dictionary), it can assume that the Value Field of the Data Element is encoded in Little Endian byte ordering with Implicit VR encoding, irrespective of the current Transfer Syntax.

3. This VR of UN is needed when an Explicit VR must be given to a Data Element whose Value Representation is unknown (e.g., store and forward).

4. This VR of UN is also needed for the encoding of Data Elements with Explicit VR whose Value Length exceeds 65534 (2^{16}-2) (FFFEH, the largest even length unsigned 16 bit number) but which are defined to have a 16 bit Explicit VR Value Length Field.

5. The Value Length Field of VR UN may contain Undefined Length (FFFFFFFFH), in which case the contents can be assumed to be encoded with Implicit VR. See Section 7.5.1 to determine how to parse Data Elements with an Undefined Length.

6. An example of a Standard Data Element using a UN VR is a Type 3 or Type U Standard Attribute added to an SOP Class definition. An existing application that does not support that new Attribute (and encounters it) could convert the VR to UN.