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8	Correction Number CP-1446	
9	Log Summary: Prohibit circular Dimension Index references	
10	Name of Standard	
11	PS3.3 2015c	
12	Rationale for Correction:	
13	The Multi-frame Dimensions Module provides a means to define which individual attributes or entire functional groups are to be used	
14	as dimensions, and the Frame Content functional group includes a Dimension Index Values attribute that references those dimensions.	
15	Neither the Frame Content Sequence nor the Dimension Index Values data element tags can be used as values of the Dimension	
16	Index Pointer, since that would be a circular reference, hence meaningless. Make this explicit in the text.	
17	Correction Wording:	

Amend DICOM PS3.3 as follows:

C.7.6.17 Multi-frame Dimension Module

Table C.7.6.17-1 specifies the attributes of the Multi-frame Dimension Module.

Table C.7.6.17-1. Multi-frame Dimension Module Attributes

Attribute Name	Tag	Type	Attribute Description
Dimension Organization Sequence	(0020,9221)	1	Sequence that lists the Dimension Organization UIDs referenced by the containing SOP Instance. See ??? for further explanation. One or more Items shall be included in this Sequence.
>Dimension Organization UID	(0020,9164)	1	Uniquely identifies a set of dimensions referenced within the containing SOP Instance. See ??? for further explanation.
Dimension Organization Type	(0020,9311)	3	Dimension organization of the instance. Defined Terms: 3D Spatial Multi-frame image of parallel planes (3D volume set) 3D_TEMPORAL Temporal loop of parallel-plane 3D volume sets.
Dimension Index Sequence	(0020,9222)	1	Identifies the sequence containing the indices used to specify the dimension of the multi-frame object. One or more Items shall be included in this sequence.
>Dimension Index Pointer	(0020,9165)	1	Contains the Data Element Tag that is used to identify the Attribute connected with the index. See Section C.7.6.17.1 for further explanation.
>Dimension Index Private Creator	(0020,9213)	1C	Identification of the creator of a group of private data elements. Required if the Dimension Index Pointer (0020,9165) value is the Data Element Tag of a Private Attribute.
>Functional Group Pointer	(0020,9167)	1C	Contains the Data Element Tag of the Functional Group Sequence that contains the Attribute that is referenced by the Dimension Index Pointer (0020,9165). See Section C.7.6.17.1 for further explanation. Required if the value of Dimension Index Pointer (0020,9165) is the Data Element Tag of an Attribute that is contained within a Functional Group Sequence.
>Functional Group Private Creator	(0020,9238)	1C	Identification of the creator of a group of private data elements. Required if the Functional Group Pointer 0020,9167) value is the Data Element Tag of a Private Attribute.
>Dimension Organization UID	(0020,9164)	1C	Uniquely identifies a set of dimensions referenced within the containing SOP Instance. In particular the dimension described by this sequence item is associated with this Dimension Organization UID. See ??? for further explanation. Required if the value of Dimension Organization Sequence (0020,9221) contains Items
>Dimension Description Label	(0020,9421)	3	Free text description that explains the meaning of the dimension.

1 C.7.6.17.1 Dimension Indices

2 With the Dimension Index Sequence (0020,9222), Data Element Tags are specified that identify the indices used for a particular SOP
3 Instance.

4 The actual index values for each frame in a multi-frame header are stored in a single Dimension Index Values Attribute (0020,9157)
5 defined in the Frame Content Functional Group. For each SOP Instance this Attribute has a Value Multiplicity equal to the number of
6 Items in the Sequence. The ordering of the Items in the Sequence defines the ordering in the Dimension Index Values Attribute: Item
7 1 of the Sequence relates to Value 1, Item 2 to Value 2, etc.

8 The Dimension Index Pointer (0020,9165) references a single Attribute that describes the actual values that define the dimension.
9 Each Attribute referenced in the Dimension Index Sequence (0020,9222) will have an index stored in the Dimension Index Values
10 (0020,9157) for each frame. Each index value is an ordinal number starting from 1 and monotonically increasing by 1 within the scope
11 of a Dimension Organization UID (0020,9164). These values are independent of the actual values of the attribute referenced by the
12 Dimension Index Pointer (0020,9165), i.e., the index values are logical indices, rather than actual indices. Frames assigned the same
13 index shall contain nominally the same value for the referenced Attribute. If the referenced Attribute is not present for some frames,
14 or is present but has no value, then a single index shall be assigned to indicate the lack of the value (i.e., all such frames shall have
15 the same index value, which is different from other index values). It is at the discretion of the SOP Instance creator whether the Attribute
16 values are equivalent, and therefore appropriate for assignment to the same index value.

17 The Dimension Index Pointer (0020,9165) shall contain the Data Element Tag (gggg,eeee) of the Attribute being indexed.

18 **The Dimension Index Pointer (0020,9165) shall not contain the Data Element Tag for Frame Content Sequence (0020,9111)**
19 **or Dimension Index Values (0020,9157).**

20 Note

- 21 1. Dimension Index Pointer (0020,9165) may point to a Sequence containing a Functional Group. In that case all the At-
22 tributes of the Sequence are associated with the index value.
- 23 2. The Dimension Index Pointer (0020,9165) may point to a Data Element Tag (gggg,eeee) that is not present for all frames
24 of an object, or does not have a value for all frames of an object. For such frames, index values are still assigned, as
25 described above.
- 26 3. The indices used in the Dimension Index Values (0020,9157) may or may not be identical to the value of indexed attribute
27 referenced by Dimension Index Pointer (0020,9165). For example, if the referenced Attribute is itself encoded in an index-
28 like fashion (being an ordinal number starting from 1), such as In-Stack Position Number (0020,9057), then index value
29 1 would typically correspond to In-Stack Position Number (0020,9057) value 1. On the other hand, if the referenced at-
30 tribute encodes some physical measure, such as a time or distance, or a categorical value, such as a string describing
31 the phase of contrast, or a more complex description such as an entire functional group, then the index value is inde-
32 pendent of the encoded value.
- 33 4. The scope of the values of Dimension Index Pointer (0020,9165) is defined to be within a single Dimension Organization
34 UID (0020,9164). If the same Dimension Organization UID (0020,9164) is present in multiple Instances (whether part
35 of a Concatenation or not), at least one of those Instances (though not necessarily every Instance) will contain a value
36 of 1 for the Dimension Index Values (0020,9157).

37 The Functional Group Pointer (0020,9167) value is the Data Element Tag (gggg,eeee) of the Functional Group Sequence that contains
38 the Attribute being indexed. If the Dimension Index Pointer (0020,9165) contains a Data Element Tag that identifies a Functional Group
39 Sequence then the Functional Group Pointer (0020,9167) shall not be present.

40 If the Dimension Index Pointer (0020,9165) attribute contains a Private Data Element, then the Dimension Index Private Creator
41 (0020,9213) shall contain the Private Creator of the block of Private Data Elements.

42 If the Functional Group Pointer (0020,9167) attribute contains a Private Data Element, then the Functional Group Private Creator
43 (0020,9238) shall contain the Private Creator of the block of Private Data Elements.