

## DICOM Correction Proposal

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Correction Number	CP-2273
Log Summary: Clarify whether zero length Type 3 Sequences are allowed or not	
Name of Standard	
PS3.3	
Rationale for Correction:	
<p>The last two rows of the second table in PS3.3 Section 5.2 (added in CP 1043) specify that empty Type 3 Sequences are not allowed in a DICOM Data Set (in contrast to empty Type 2 Sequences).</p> <p>However, according to PS3.5 Section 7.4.5, empty Type 3 Sequences are permitted, in the same way as other empty Type 3 Data Elements.</p> <p>Either:</p> <ol style="list-style-type: none"><li>1. reverse CP 1043, and change all instances of Type 3 Sequence Item cardinality to allow zero Items (in Section 5.2 and for every usage in PS3.3 and PS3.4),</li><li>2. amend PS3.5 to reflect current PS3.3 requirements for Type 3 Sequences (thus making the requirement for Sequence and non-Sequence Data Elements different in this respect),</li><li>3. amend PS3.5 to forbid zero length Type 3 regardless of whether they are Sequence or non-Sequence Data Elements</li></ol>	
Correction Wording:	

*For reference PS3.3:*

## 5.2 Sequences

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The Type of the Sequence Attribute defines whether the Sequence Attribute itself must be present, and the Attribute Description of the Sequence Attribute may define whether and how many Items shall be present in the Sequence. The Types of the Attributes of the Data Set included in the Sequence, including any conditionality, are specified within the scope of each Data Set, i.e., for each Item present in the Sequence. See PS3.5.

For describing the number of Items in the Attribute description the following sentences are preferred:

Sequence Attribute Type	Number of Items	Sentence
1 or 1C	1	Only a single Item shall be included in this Sequence.
1 or 1C	1-n	One or more Items shall be included in this Sequence.
2 or 2C	0-1	Zero or one Item shall be included in this Sequence.

Sequence Attribute Type	Number of Items	Sentence
2 or 2C	0-n	Zero or more Items shall be included in this Sequence.
3	1	Only a single Item is permitted in this Sequence.
3	1-n	One or more Items are permitted in this Sequence.

Note

The encoding of empty Sequence Attributes is described in PS3.5.

In a number of cases for Normalized IODs, the Data Element Type and Conditions are defined in the appropriate Service definition in PS3.4, in other cases in the Attribute description in PS3.3. It is not necessary to specify for any Attribute within a Sequence the condition that it is "required if a Sequence Item is present", since this is always implicit, whether or not there are additional requirements.

*Amend PS3.5:*

### 7.4.3 Type 2 Required Data Elements

IODs and SOP Classes define Type 2 Data Elements that shall be included and are mandatory Data Elements. However, it is permissible that if a Value for a Type 2 Data Element is unknown it can be encoded with zero Value Length and no Value. If the Value is known the Value Field shall contain that Value as defined by the Data Element's VR and VM as specified in PS3.6. These Data Elements shall be included in the Data Set and their absence is a protocol violation.

Note

1. The intent of Type 2 Data Elements is to allow a zero length to be conveyed when the operator or application does not know its Value or has a specific reason for not specifying its Value. It is the intent that the device should support these Data Elements.
2. A Type 2 Sequence Data Element will contain zero or more Items, as defined by the IOD (irrespective of the VM of the Sequence, which is always one (Section 7.5)). An empty Type 2 Sequence is one with no Items, as opposed to an Item that is present but empty. Whether or not Items may be empty (contain no Data Elements) depends on the IOD definition of the Data Set for each Item, rather than the Type of the enclosing Sequence Data Element.

### 7.4.4 Type 2C Conditional Data Elements

IODs and SOP Classes define Type 2C Data Elements that have the same requirements as Type 2 Data Elements under certain specified conditions. It is a protocol violation if the specified conditions are met and the Data Element is not included.

When the specified conditions are not met, Type 2C Data Elements shall not be included in the Data Set.

Note

An example of a Type 2C Data Element is Inversion Time (0018,0082). For several SOP Class Definitions, this Data Element is required only if the Scanning Sequence (0018,0020) has the Value "IR." It is not required otherwise. See PS3.3.

### 7.4.5 Type 3 Optional Data Elements

IODs and SOP Classes define Type 3 Data Elements that are optional Data Elements. Absence of a Type 3 Data Element from a Data Set does not convey any significance and is not a protocol violation. Type 3 Data Elements may also be encoded with zero length and no Value, except for SQ Data Elements, which shall not be present with zero Items. The meaning of a zero length Type 3 Data Element shall be precisely the same as that Data Element being absent from the Data Set.