

DICOM Correction Proposal

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Correction Number	CP-1766
Log Summary: Extend Original Attributes Sequence	
Name of Standard PS3.3, PS3.6 2019a	
<p>Rationale for Correction:</p> <p>One scenario for the Original Attributes Sequence is to document the repair of nonconforming SOP instances. It is not uncommon to find DICOM SOP Instances that have values that don't comply with their VRs, such as overlength attributes, or characters not compliant to the Specific Character Set declaration. If an application preserves the nonconforming attribute value as is, the data element in the Modified Attributes Sequence would remain noncompliant.</p> <p>To handle these scenarios, the data element in the Modified Attributes Sequence may be encoded zero length, so that all modified attributes can be present in that Sequence without violating DICOM VR rules. A new Sequence is added to the Original Attribute Sequence, with each item recording a pointer (selector) to the nonconforming Attribute and its original Value encoded in an unconstrained VR (OB) to contain the nonconforming value. If the nonconforming attribute is originally within a Sequence (in which case, the entire Sequence is placed in the Modified Attributes Sequence), the selector points to the specific attribute in the sequence tree.</p> <p>The Type for attributes within the Modified Attributes Sequence is changed from 1 to 2, both to accommodate nonconforming attributes whose value is nulled, and for original zero length attributes that were coerced to a value (such as attributes of the Patient Module). Even if the coercion is from a zero length value to an actual value, it is important to record that originally the value was not present.</p> <p>Also, the term used in PS3.5 is top level Data Set (not main data set).</p> <p><i>[Comment, Hologic. The SOP Common module has other occurrences of 'main data set' that should be updated to 'top level Data Set' or 'Data Set' depending on context. For example, the row after Modified Attributes Sequence. FIXED.]</i></p>	
Correction Wording:	

In PS 3.3: Section C.12.1 SOP Common Module, add to table C.12-1 SOP Common Module Attributes

C.12.1 SOP Common Module

**Table C.12-1
SOP Common Module Attributes**

Attribute Name	Tag	Type	Attribute Description
...			

Original Attributes Sequence	(0400,0561)	3	Sequence of Items containing all attributes that were removed or replaced by other values in the maintop level dData sSet . See Section C.12.1.1.9. One or more Items are permitted in this Sequence.
...			
>Modified Attributes Sequence	(0400,0550)	1	Sequence that contains all the Attributes, with their previous values, that were modified or removed from the maintop level dData sSet . See Section C.12.1.1.9.1. Only a single Item shall be included in this Sequence.
>>Any Attribute from the maintop level dData sSet that was modified or removed.		12	May include Sequence Attributes and their Items.
>Nonconforming Modified Attributes Sequence	(0400,0551)	3	Attributes that were modified or removed from the Data Set because the values were not conformant to the Attribute's Value Representation or Value Multiplicity. See Section C.12.1.1.9.2. One or more Items are permitted in this Sequence, one Item for each nonconforming Attribute.
>>Include Table 10-20 " Selector Attribute Macro "			Pointer to Attribute in Modified Attributes Sequence that had a nonconforming value.
>>Nonconforming Data Element Value	(0400,0552)	1	The original Value of the nonconforming Attribute.
...			

In PS 3.3: Section C.12.1.1 SOP Common Attribute Descriptions add new subsection

C.12.1.1.9 Original Attributes Sequence

Every transfer of a SOP Instance may result in data element coercion (see [Section B.4.1.3 Coercion of Attributes in PS3.4](#)) by the receiving application. The receiving application may also detect and correct or remove errors in SOP Instances to bring them into conformance with the SOP Class definition without changing the SOP Instance UID or creating a derived Instance (see status Warning in [Section 9.1.1.1.9 in PS3.7](#) and [Section B.2.3 in PS3.4](#)). When performing such actions, the application may add an Item to the Original Attributes Sequence (0400,0561) describing the change and the prior values of coerced, modified, or removed Attributes. Any existing Items in the Original Attributes Sequence shall be preserved.

C.12.1.1.9.1 Modified Attributes Sequence

Attributes that were modified or removed shall be placed in the Modified Attributes Sequence (0400,0550) with their prior values. If an Attribute within a Sequence was modified or removed, the entire prior value of the Sequence shall be placed in the Modified Attributes Sequence; this applies recursively up to the enclosing Sequence Attribute in the top level Data Set.

Attributes that were empty or absent and for which values have been added may be present in the Modified Attributes Sequence with a zero length value.

If an Attribute was modified or removed because its value was nonconforming to its Value Representation or Value Multiplicity, it shall be included in the Modified Attributes Sequence with a zero length value.

Any Private Data Elements present in the Item shall be accompanied by their respective Private Data Element Creator Attribute.

C.12.1.1.9.2 Nonconforming Modified Attributes Sequence

If an Attribute was modified or removed because its value was nonconforming to its Value Representation or Value Multiplicity, the original value (which was replaced by a zero length value in the Modified Attributes Sequence) may be recorded in the Nonconforming Modified Attributes Sequence (0400,0551).

The nonconforming Attribute is identified by the attributes of the Selector Attribute Macro. Because a single Attribute is being identified, Selector Attribute (0072,0026) shall be present.

The Data Set to which the Selector Attribute Macro applies is the single Item of the Modified Attributes Sequence (0400,0550) within the same Item of the Original Attributes Sequence (0400,0561). Therefore, the Modified Attributes Sequence (0400,0550) is not identified in the Selector Sequence Pointer (0072,0052).

Notes:

1. This is effectively the same as a pointer to the equivalent attribute in the original top level Data Set.
2. Characters in text attributes non-conformant to the identified Specific Character Set (0008,0005) may be considered non-conformant to the VR.
3. For example, if Body Part Examined had a nonconforming value, the Modified Attributes Sequence Item would have the Attributes:

(0072,0026)	00180015	Selector Attribute
(0072,0028)	1	Selector Value Number
(0400,0552)	ABDOMEN&PELVIS	Nonconforming Data Element Value

4. The Nonconforming Data Element Value (0400,0552) has Value Representation OB, which allows an arbitrary byte string to be encoded.

In PS 3.3: Section C.12.1.1 existing subsections correct use of main data set:

C.12.1.1.3 Digital Signatures Macro

This Macro allows Digital Signatures to be included in a DICOM Data Set for the purpose of insuring the integrity of the Data Set, and to authenticate the sources of the Data Set. Table C.12-6 defines the Attributes needed to embed a Digital Signature in a Data Set. This Macro may appear in individual Sequence Items as well as in the **main top level** Data Set of the SOP Instance.

C.12.1.1.4 Encrypted Attribute Descriptions

C.12.1.1.4.2 Encrypted Content

Table C.12-7. Encrypted Attributes Data Set Attributes

Attribute Name	Tag	Type	Attribute Description
Modified Attributes Sequence	(0400,0550)	1	Sequence of Items containing all Attributes that were removed or replaced by "dummy values" in the main top level Data Set during de-identification of the SOP instance. Upon reversal of the de-identification process, the Attributes are copied back into the main Data Set, replacing any dummy values that might have been created.

Attribute Name	Tag	Type	Attribute Description
			Only a single Item shall be included in this Sequence.
> Any Attribute from the main top level Data Set that was modified or removed during the de-identification process.		3	

In PS 3.6, Section 6: Add new elements to the Dictionary

<u>(0400,0551)</u>	<u>Nonconforming Modified Attributes Sequence</u>	<u>NonconformingModifiedAttributesSequence</u>	<u>SQ</u>	<u>1</u>
<u>(0400,0552)</u>	<u>Nonconforming Data Element Value</u>	<u>NonconformingDataElementValue</u>	<u>OB</u>	<u>1</u>