

## DICOM Correction Proposal

Status	Final Text
Date of Last Update	2011/08/22
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Submission Date	2010/03/23

Correction Number	CP-1064
Log Summary: Float VR in numeric SR content items	
Name of Standard PS 3.3, 3.6 2011	
Rationale for Correction The VR of the value encoded in SR numeric content items is a Decimal String, which whilst OK for rendering to humans is problematic from the perspective of maintaining precision for machine calculations, and in particular may lead to a significant accumulation of round off errors if the values are used for subsequent calculations.  Include an additional, optional, encoding of the same value as an IEEE 64 bit float to be available for calculations if necessary.  Also include an optional rational numerator and denominator pair of integers if the value represents a rational number without an exact floating point representation.  Do the same for the content item macro and acquisition context module.  Also explicitly constrain the VM of Numeric Value in the Content item macro to 1, since the current text uses the singular "value".	
Sections of documents affected PS 3.3  PS 3.6	
Correction Wording:	

*Amend PS 3.3:*

### 10.2 CONTENT ITEM MACRO

A Content Item is a flexible means of encoding attribute identifiers and attribute values using the Code Sequence Macro (see Section 8) for coded terminology defined by a coding scheme. The Content Item provides a name-value pair, i.e., a Concept Name, encoded as a Code Sequence, and a Concept Value. The Concept Value may be encoded by any of a set of generic Attributes,

as specified by a Value Type, including text, personal name, numeric, and coded concept (Code Sequence) values.

- Notes:
1. Comparing a Content Item to a native DICOM Data Element, the Concept Name Code Sequence corresponds to the Data Element Tag and Attribute Name, the Value Type to the Value Representation, and the Concept Value to the Data Element Value Field. See PS3.5.
  2. The IMAGE Value Type of this Macro does not include the Type 3 attributes of the IMAGE Value Type defined in Section C.17.3, as they are not required for Acquisition Context or Protocol Context Content Items.

Specific uses of the Content Item may invoke the Content Item Macro defined in this Section, the Document Content Macro of Section C.17.3, or another similar construct. An invocation of the Content Item Macro may constrain the allowed values of Value Type (0040,A040).

Note: The NUMERIC Value Type of this Macro differs from the NUM Value Type defined in Section C.17.3, since the encoding of the Concept Value is different.

See Section 5.4 for the meaning of the Type column in this Macro when applied to Normalized IODs.

**Table 10-2**  
**Content Item Macro Attributes Description**

Attribute Name	Tag	Type	Attribute Description
Value Type	(0040,A040)	1	The type of the value encoded in this name-value Item. Defined Terms: DATETIME DATE TIME PNAME UIDREF TEXT CODE NUMERIC COMPOSITE IMAGE
...	...	...	...
>Include 'Code Sequence Macro' Table 8.8-1			No Baseline Context ID is defined.
Numeric Value	(0040,A30A)	1C	Numeric value for this name-value Item. <b><u>Only a single value shall be present.</u></b> Required if Value Type (0040,A040) is NUMERIC.
<b><u>Floating Point Value</u></b>	<b><u>(0040,A161)</u></b>	<b><u>1C</u></b>	<b><u>The floating point representation of the Numeric Value (0040,A30A). The same number of values as Numeric Value (0040,A30A) shall be present.</u></b> <b><u>Required if Numeric Value (0040,A30A) has insufficient precision to represent the value as a string. May be present otherwise.</u></b>
<b><u>Rational Numerator Value</u></b>	<b><u>(0040,A162)</u></b>	<b><u>1C</u></b>	<b><u>The integer numerator of a rational representation of the Numeric Value (0040,A30A). Encoded as a signed integer value. The same number of values as Numeric Value (0040,A30A) shall be present.</u></b>

			<b><u>Required if Numeric Value (0040,A30A) has insufficient precision to represent a rational value as a string. May be present otherwise.</u></b>
<b><u>Rational Denominator Value</u></b>	<b>(0040,A163)</b>	<b>1C</b>	<b><u>The integer denominator of a rational representation of the Numeric Value (0040,A30A). Encoded as a non-zero unsigned integer value. The same number of values as Numeric Value (0040,A30A) shall be present.</u></b> <b><u>Required if Rational Numerator Value (0040,A162) is present.</u></b>
Measurement Units Code Sequence	(0040,08EA)	1C	Units of measurement for a numeric value in this name-value Item. Only a single Item shall be permitted in this Sequence. Required if Value Type (0040,A040) is NUMERIC.
>Include 'Code Sequence Macro' Table 8.8-1			Baseline Context ID 82
...	...	...	...

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#### C.7.6.14 Acquisition Context Module

Table C.7.6.14-1 specifies Attributes for description of the conditions present during data acquisition.

This Module shall not contain descriptions of conditions that replace those that are already described in specific Modules or Attributes that are also contained within the IOD that contains this Module.

- Notes:
1. Each item of the Acquisition Context Sequence (0040,0555) contains one item of the Concept Name Code Sequence (0040,A043) and one of the mutually-exclusive Observation-value Attributes: Concept Code Sequence (0040,A168), the pair of Numeric Value (0040,A30A) and Measurement Units Code Sequence (0040,08EA), Date (0040,A121), Time (0040,A122), Person Name (0040,A123) or Text Value (0040,A160).
  2. Acquisition Context includes concepts such as: "pre-contrast", "inspiration", "valgus stress", "post-void", and date and time of contrast administration.
  3. If this SOP Instance is a Multi-frame SOP Instance, each item of the Acquisition Context Sequence (0040,0555) may be configured to describe one frame, all frames, or any specifically enumerated subset set of frames of the Multi-frame SOP Instance.

**Table C.7.6.14-1 - ACQUISITION CONTEXT MODULE ATTRIBUTES**

<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>
Acquisition Context Sequence	(0040,0555)	2	A sequence of Items that describes the conditions present during the acquisition of the data of the SOP Instance. Zero or more items may be included in this sequence.
>Value Type	(0040,A040)	3	The type of the value encoded in this Item. Defined Terms: TEXT NUMERIC CODE

			DATE TIME PNAME See Section 10.2.
...	...	...	...
>Numeric Value	(0040,A30A)	1C	This is the Value component of a Name/Value pair when the Concept implied by Concept Name Code Sequence (0040,A043) is a set of one or more numeric values.  Required if the value that Concept Name Code Sequence (0040,A043) requires (implies) is a set of one or more integers or real numbers. Shall not be present otherwise.
<u>&gt;Floating Point Value</u>	<u>(0040,A161)</u>	<u>1C</u>	<b><u>The floating point representation of the Numeric Value (0040,A30A). The same number of values as Numeric Value (0040,A30A) shall be present.</u></b>  <b><u>Required if Numeric Value (0040,A30A) has insufficient precision to represent the value as a string. May be present otherwise.</u></b>
<u>&gt;Rational Numerator Value</u>	<u>(0040,A162)</u>	<u>1C</u>	<b><u>The integer numerator of a rational representation of the Numeric Value (0040,A30A). Encoded as a signed integer value. The same number of values as Numeric Value (0040,A30A) shall be present.</u></b>  <b><u>Required if Numeric Value (0040,A30A) has insufficient precision to represent a rational value as a string. May be present otherwise.</u></b>
<u>&gt;Rational Denominator Value</u>	<u>(0040,A163)</u>	<u>1C</u>	<b><u>The integer denominator of a rational representation of the Numeric Value (0040,A30A). Encoded as a non-zero unsigned integer value. The same number of values as Numeric Value (0040,A30A) shall be present.</u></b>  <b><u>Required if Rational Numerator Value (0040,A162) is present.</u></b>
>Measurement Units Code Sequence	(0040,08EA)	1C	Units of measurement. Only a single Item shall be permitted in this Sequence.  Required if Numeric Value (0040,A30A) is sent. Shall not be present otherwise.
>>Include 'Code Sequence Macro' Table 8.8-1			Baseline CID 82.

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### C.18.1 Numeric Measurement Macro

Table C.18.1-1 specifies the Attributes that convey a NUM (numeric measurement) value.

Note: The Measured Value Sequence (0040,A300) may be empty to convey the concept of a measurement whose value is unknown or missing, or a measurement or calculation failure.

**Table C.18.1-1  
NUMERIC MEASUREMENT MACRO ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Measured Value Sequence	(0040,A300)	2	This is the value of the Content Item. Shall consist of a Sequence of Items conveying the measured value(s), which represent integers or real numbers and units of measurement. Zero or one Items shall be permitted in this sequence.
>Numeric Value	(0040,A30A)	1	Numeric measurement value. Only a single value shall be present.
<u>&gt;Floating Point Value</u>	<b>(0040,A161)</b>	<b>1C</b>	<b><u>The floating point representation of the Numeric Value (0040,A30A). Only a single value shall be present.</u></b> <b><u>Required if Numeric Value (0040,A30A) has insufficient precision to represent the value as a string. May be present otherwise.</u></b>
<u>&gt;Rational Numerator Value</u>	<b>(0040,A162)</b>	<b>1C</b>	<b><u>The integer numerator of a rational representation of the Numeric Value (0040,A30A). Encoded as a signed integer value. Only a single value shall be present.</u></b> <b><u>Required if Numeric Value (0040,A30A) has insufficient precision to represent a rational value as a string. May be present otherwise.</u></b>
<u>&gt;Rational Denominator Value</u>	<b>(0040,A163)</b>	<b>1C</b>	<b><u>The integer denominator of a rational representation of the Numeric Value (0040,A30A). Encoded as a non-zero unsigned integer value. Only a single value shall be present.</u></b> <b><u>Required if Rational Numerator Value (0040,A162) is present.</u></b>
>Measurement Units Code Sequence	(0040,08EA)	1	Units of measurement. Only a single Item shall be permitted in this sequence.
>>Include 'Code Sequence Macro' Table 8.8-1			Defined CID 82.
Numeric Value Qualifier Code Sequence	(0040,A301)	3	Qualification of Numeric Value in Measured Value Sequence, or reason for absence of Measured Value Sequence Item. Only a single Item shall be permitted in this sequence.
>Include 'Code Sequence Macro' Table 8.8-1			Defined CID 42.

Amend PS 3.6:

(0040,A30A)	Numeric Value	NumericValue	DS	1-n
<b><u>(0040,A161)</u></b>	<b><u>Floating Point Value</u></b>	<b><u>FloatingPointValue</u></b>	<b><u>FD</u></b>	<b><u>1-n</u></b>
<b><u>(0040,A162)</u></b>	<b><u>Rational Numerator Value</u></b>	<b><u>RationalNumeratorValue</u></b>	<b><u>SL</u></b>	<b><u>1-n</u></b>
<b><u>(0040,A163)</u></b>	<b><u>Rational Denominator Value</u></b>	<b><u>RationalDenominatorValue</u></b>	<b><u>UL</u></b>	<b><u>1-n</u></b>