DICOM Correction Proposal

STATUS	Final Text
Date of Last Update	2013/04/02
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Submission Date	2012/02/17

Correction Number	CP- 1218
Log Summary: Correct further errors in UCUM codes and related meanings	
Name of Standard PS 16 2011 plus CP 1114 and CP 1160	
Rationale for Correction: This CP pursuant to CP 1114 (Correct UCUM multiplications) and CP 1160 (Correct use of Degree sign in UCUM terms). There are further inconsistencies in UCUM terms that need to be corrected: 1) Further multiplications in addition to CP 1114 2) There are several formats for exponents used in the meanings of UCUM terms including exponents. This needs to be straightened according to the rules defined in section 7.2.2. Units of Measurement of Part 16. "… the Code Meaning for other than UCUM unity may be one of three classes of synonyms: • the <u>same string as sent in the Code Value</u> when an abbreviation is required (e.g. "ml/s") …" 3) There are several incorrect notations of the UCUM "BPM" definition "{H.B.}/min" 4) other inconsistencies found during this analysis <u>While most changes affect the Code Meaning, some do change the Code Value and that needs to be reviewed with the Working Groups that authored the affected templates.</u>	
Correction Wording: Correct Part 16 according the following marked correction proposals. For better visibility, the changes are highlighted in ==yellow==	

Changes in Part 16 TID 3114

4	>	HAS PROPERTIES	INCLUDE	TID (300) Measurement	1	MC	IF Row 1 value = (PA-00500, SRT, "Observation of Vital Signs")	$Measurement = EV (8867-4, LN, "Heart rate") $Units = EV ("{H.B.}/min", UCUM, "BPM")
…								
8	>	HAS PROPERTIES	INCLUDE	TID (300) Measurement	1-n	MC	IF Row 1 value = (PA-00500, SRT, "Observation of Vital Signs")	$Measurement = EV (122195, DCM, "Pulse Strength") $Method = BCID (3442) Peripheral Pulse Methods $TargetSite = BCID (3440) Peripheral Pulse Locations $Units = DT ("{0:4}", UCUM, "range 0:4")

9	>	HAS PROPERTIES	INCLUDE	TID (300) Measurement	1	MC	IF Row 1 value = (PA-00500, SRT, "Observation of Vital Signs")	$Measurement = EV (F-009EA, SRT, "Pain Score") $Units = DT ("{1:10}", UCUM, "range 1:10")

Changes in Part 16 TID 3206

…							
5	>	CONTAINS	NUM	EV (122431, DCM, "Regression Slope ED")	1	U		Unit = DT (1{ratio}, UCUM, "ratio")
…							
7	>	CONTAINS	NUM	EV (122433, DCM, "Regression Slope ES")	1	U		Unit = DT (1{ratio}, UCUM, "ratio")
…							
13	>	CONTAINS	NUM	EV (8867-4, LN, "Heart Rate")	1	U		Unit = DT ({hbH.B.}/min, UCUM, "beats/minBPM")
14	>	CONTAINS	INCLUDE	DTID (300) Measurement	1	U		$Measurement = DCID (3468) ED Volume $ModType = EV (121425, DCM, "Index") $ModValue = DCID (3455) Index Methods $Unit = DT (ml/m2, UCUM, "ml/m^2")
…							
16	>	CONTAINS	INCLUDE	DTID (300) Measurement	1	U		$Measurement = DCID (3469) ES Volume $ModType = EV (121425, DCM, "Index") $ModValue = DCID (3455) Index Methods $Unit = DT (ml/m2, UCUM, "ml/m^2")
…							
18	>	CONTAINS	INCLUDE	DTID (300) Measurement	1	U		$Measurement = EV (F-32120, SRT, "Stroke Volume") $ModType = EV (121425, DCM, "Index") $ModValue = DCID (3455) Index Methods $Unit = DT (ml/m2, UCUM, "ml/m^2")
…							
21	>	CONTAINS	INCLUDE	DTID (300) Measurement	1	U		$Measurement = EV (F-32110, SRT, "Cardiac Index") $ModType = EV (121425, DCM, "Index") $ModValue = DCID (3455) Index Methods $Unit = DT (l/min/m2, UCUM, "l/min/m^2")
…							
25	>	CONTAINS	INCLUDE	DTID (300) Measurement	1	U		$Measurement = EV (122447, DCM, "Wall Mass") $ModType = EV (121425, DCM, "Index") $ModValue = DCID (3455) Index Methods $Unit = DT (g/m2, UCUM, "gram/m^2")
…							
27	>	CONTAINS	INCLUDE	DTID (300) Measurement	1	U		$Measurement = EV (122448, DCM, "Wall Stress")

								$Unit = DT (dyn/cm2, UCUM, "dynes/cm^2")
…								

Changes in Part 16 TID 3207

…								
5	>	CONTAINS	NUM	EV (122431, DCM, "Regression Slope ED")	1	U		Unit = DT (~~1~~{ratio}, UCUM, "ratio")
…								
7	>	CONTAINS	NUM	EV (122433, DCM, "Regression Slope ES")	1	U		Unit = DT (~~1~~{ratio}, UCUM, "ratio")
…								

Changes in Part 16 TID 3215

…								
6	>	CONTAINS	INCLUDE	DTID (300) Measurement	1-n	U		$Measurement = EV (G-0366, SRT, "Vessel Lumen Cross-Sectional Area") $Method = DCID (3470) Vessel Lumen Cross-Sectional Area Calculation Methods $Derivation =(R-404FB, SRT, "Minimum") $Unit = DT (mm2, UCUM, "mm^2")
…								
12	>	CONTAINS	INCLUDE	DTID (300) Measurement	1	U		$Measurement = EV (G-0366, SRT, "Vessel Lumen Cross-Sectional Area") $Derivation = EV (122404, DCM, "Reconstructed") $TargetSite = (122382, DCM, "Site of Luminal Minimum") $Unit = DT (mm2, UCUM, "mm^2")
…								
18	>>	CONTAINS	INCLUDE	DTID (300) Measurement	1-n	M		$Measurement = EV (G-0366, SRT, "Vessel Lumen Cross-Sectional Area") $Unit = (mm2, UCUM, "mm^2")
19	>	CONTAINS	INCLUDE	DTID (300) Measurement	1	U		$Measurement = EV (G-0366, SRT, "Vessel Lumen Cross-Sectional Area") $Derivation = EV (R-41D2D, SRT, "Calculated") $Method = EV(122474, DCM, "Densitometric method") $TargetSite =EV (122481, DCM, "Contour Start") $Unit = (mm2, UCUM, "mm^2")
20	>	CONTAINS	INCLUDE	DTID (300) Measurement	1	U		$Measurement = EV (G-0366, SRT, "Vessel Lumen Cross-Sectional Area") $Derivation = EV (R-41D2D, SRT, "Calculated") $Method = EV(122474, DCM, "Densitometric method") $TargetSite = EV (122482, DCM, "Contour End") $Unit = (mm2, UCUM, "mm^2")
…								
24	>	CONTAINS	INCLUDE	DTID (300) Measurement	1-n	U		$Measurement = EV (122372,

									DCM, "Lumen Volume") $Method = DCID (3470) Vessel Lumen Cross-Sectional Area Calculation Methods $Unit = DT (mm3, UCUM, "mm**^**3")
25	>	CONTAINS	INCLUDE	DTID (300) Measurement	1	U			$Measurement = EV (122542, DCM, "Plaque Area") $Unit = DT (mm2, UCUM, "mm**^**2")
26	>	CONTAINS	INCLUDE	DTID (300) Measurement	1	U			$Measurement = EV (122376, DCM, "Total Plaque Volume") $Unit = DT (mm3, UCUM, "mm**^**3")
…									

Changes in Part 16 TID 3216

…									
3		CONTAINS	INCLUDE	DTID (300) Measurement	1	M			$Measurement = EV (122550, DCM, "Turbulence Resistance") $Unit = DT (mm[Hg].s2/cm2, UCUM, "mmHG.s**^**2/cm**^**2")

Changes in Part 16 TID 3253

…									
7			INCLUDE	TID (300) Measurement	1-n	U			$Measurement = DCID (3484) IVUS Indices and Ratios $Units = EV (~~1~~**{ratio}**, UCUM, "ratio") $TargetSite = BCID (3486) Vascular Measurement Sites
…									

Changes in Part 16 TID 3303

…									
6	>	HAS ACQ CONTEXT	NUM	EV (109055, DCM, "Protocol Stage")	1	U			UNITS = DT(**"**{stage}**"**, UCUM, "stage")
…									

Changes in Part 16 TID 3304

…									
6	>	CONTAINS	NUM	DT (122704, DCM, "Ergometer power")	1	U			UNITS = EV (W, UCUM, "**wW**atts")
…									
11	>	CONTAINS	NUM	EV (8867-4, LN, "Heart Rate")	1	U			UNITS = EV (**"**{H.B.}/min**"**, UCUM, "BPM")
…									
24	>	CONTAINS	NUM	DT (122708, DCM, "Double Product")	1	U			UNITS = DT (mm[Hg]**.**{H**.**B**.**}/min, UCUM, "mmHg***.**BPM")
…									

Changes in Part 16 TID 3312

...								
16			NUM	DT (122718, DCM, "Peak Double Product")	1	U		UNITS = DT (mm[Hg].{H.B.}/min, UCUM, "mmHg*.BPM")
...								

Changes in Part 16 TID 3510

...								
4	>	CONTAINS	INCLUDE	TID (300) Measurement	1	U		$Measurement = EV (8867-4, LN, "Heart rate") $Units = EV ("{H.B.}/min", UCUM, "BPM")
...								
8	>	CONTAINS	INCLUDE	TID (300) Measurement	1	U		$Measurement = EV (122195, DCM, "Pulse Strength") $Units = DT("{0:4}", UCUM, "range 0:4")
9	>	CONTAINS	INCLUDE	TID (300) Measurement	1	U		$Measurement = EV (F-009EA, SRT, "Pain Score") $Units = DT("{1:10}", UCUM, "range 1:10")
...								

Changes in Part 16 TID 3550

...								
7		CONTAINS	INCLUDE	TID (300) Measurement	1	U		$Measurement = EV (8867-4, LN, "Heart rate") $Units = DT ("{H.B.}/min", UCUM, "BPM")
8		CONTAINS	INCLUDE	TID (300) Measurement	1	U		$Measurement = EV (F-043E7, SRT, "Respiration rate") $Units = DT ("/min", UCUM, "breaths/min")
...								
11		CONTAINS	INCLUDE	TID (300) Measurement	1	U		$Measurement = EV (122190, DCM, "Max dp/dt/P") $Units = DT (/s-1, UCUM, "/s")
...								

Changes in Part 16 TID 3560

...								
5	>	CONTAINS	INCLUDE	TID (300) Measurement	1-n	U		$Measurement = DCID (3616) Hemodynamic Period Measurements $Units = DT ("s/min", UCUM, "s/min")
...								
13	>	CONTAINS	INCLUDE	TID (300) Measurement	1-n	U		$Measurement = BCID (3620) Hemodynamic Ratios $Units = DT (1{ratio}, UCUM, "ratio")

...								
29	>	CONTAINS	INCLUDE	TID (300) Measurement	1	U		$Measurement = EV (F-32120, SRT, "Stroke Volume") $ModType = EV (121425, DCM, "Index") $ModValue = EV (8277-6, LN, "Body Surface Area") $Units = DT (ml./m2 UCUM, "ml/m2")
...								

Changes in Part 16 TID 3602

...								
7	>	CONTAINS	NUM	EV (8277-6, LN, "Body Surface Area")	1	MC	IF BSA used for indexed measurements in SOP Instance	UNITS = EV (m2, UCUM, "m^2")
...								
9	>	CONTAINS	NUM	EV (F-01860, SRT, "Body Mass Index")	1	U		UNITS = EV (kg/m2, UCUM, "kg/m^2")
...								
11	>	CONTAINS	NUM	EV (8867-4, LN, "Heart Rate")	1	U		UNITS = EV ("{H.B.}/min", UCUM, "BPM")
...								

Changes in Part 16 TID 3713

...								
3	>	CONTAINS	NUM	DT (2:16020, MDC, "Atrial Heart Rate")	1	U		UNITS = EV ({H.B.}/min, UCUM, "~~heart beats per minute~~BPM")
4	>	CONTAINS	NUM	DT (2:16016, MDC, "Ventricular Heart Rate")	1	M		UNITS = EV ({H.B.}/min, UCUM, "~~heart beats per minute~~BPM ")
...	>	CONTAINS	NUM	DT (2:16160, MDC, "QT interval global")	1	M		UNITS = EV (ms, UCUM, "ms")

Changes in Part 16 TID 3714

...								
5	>	CONTAINS	NUM	DCID (3688) Electrophysiology Waveform Voltages	1-n	U		UNITS = EV (m~~v~~V, UCUM, "m~~v~~V")
...								

Changes in Part 16 TID 3905

…									
4	>	CONTAINS	NUM	EV(122658, DCM, "Calcium Mass Threshold")	1	U			Units= DT(mg/cm3, UCUM, "mg/cm^3")
5	>	CONTAINS	NUM	EV(122659, DCM, "Calcium Scoring Calibration")	1	U			Units= DT(mg/[hnsf´U].cm3), UCUM, "mg/[hnsf´U].cm^3")
…									
7	>	CONTAINS	NUM	EV(122660, DCM, "Calcium Volume")	1	U			Units= UCUM(mm3, UCUM, "mm^3")
…									

Changes in Part 16 TID 3908

…									
8	>	CONTAINS	INCLUDE	DTID(300) Measurement	1-n	U			$Measurement= EV(G-0366, SRT, "Vessel Lumen Cross-Sectional Area") $Derivation=DCID (3838) Diameter Derivation $FindingSite=DCID(3486) IVUS Measurement Sites $Units=DT(mm2, UCUM, "mm^2")
…									

Changes in Part 16 TID 3910

…									
17	>>	CONTAINS	INCLUDE	DTID(300) Measurement	1	U			$Measurement = EV(122645, DCM, "Net Forward Volume") $ModType=EV(121425, DCM, "Index") $ModValue= DT(8277-6, LN, "BSA") $Units = (ml/m2, UCUM, "ml/m^2")
18	>>	CONTAINS	INCLUDE	DTID(300) Measurement	1-n	U			$Measurement = EV(G-0366, SRT, "Vessel Lumen Cross-Sectional Area") $Derivation = DCID (3488) Min/Max/Mean $Units = DT(mm2, UCUM, "mm^2")

Changes in Part 16 TID 3911

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1		HAS PROPERTIES	NUM	EV(122376, DCM, "Total Plaque Volume")	1	U		Units=DT(mm3,UCUM,"mm^3")
…								

Changes in Part 16 TID 3912

…									
6		HAS PROPERTIES	INCLUDE	DTID(300) Measurement	1-n	U			$Measurement= EV(G-0366, SRT, "Vessel Lumen Cross-Sectional Area") $Derivation= DCID(3488) Min/Max/Mean $Units=DT(mm2,UCUM, "mm^2")
…									

…								
2		INCLUDE	DTID(300) Measurement	1	U			$Measurement= EV(G-D705, SRT, "Volume") $Method= DCID(3807) Volume Measurement Methods $Units=DT(mm3, UCUM, "mm^3")
…								
4		INCLUDE	DTID(300) Measurement	1	U			$Measurement= EV(R-102DB, SRT, "Vessel Lumen Cross-Sectional Area Increase") $Units=DT(mm2, UCUM, "mm^2")
…								

3	>	CONTAINS	INCLUDE	DTID(300) Measurement	1	M		$Measurement=EV(8277-6, LN, "Body Surface Area") $Unit=DT(m2, UCUM, "m^2")
…								
5	>	CONTAINS	INCLUDE	DTID(300) Measurement	1-n	U		$Measurement = DCID(3835) Cardiac Volume Measurements $ModType = EV (121425, DCM, "Index") $ModValue = DT(8277-6, LN, "Body Surface Area") $Units=DT(ml/m2, UCUM, "ml/m^2")
6	>	CONTAINS	INCLUDE	DTID(300) Measurement	1	U		$Measurement = EV(F-32110, SRT, "Cardiac Index") $Units=DT(ml/min/m2, UCUM, "(ml/min)/m^2")
7	>	CONTAINS	INCLUDE	DTID(300) Measurement	1-2	U		$Measurement = EV(122447, DCM, "Wall Mass") $ModType = EV (121425, DCM, "Index") $ModValue = DT(8277-6, LN, "Body Surface Area") $Units=DT(g/m2, UCUM, "g/m^2")
…								
9	>	CONTAINS	INCLUDE	DTID(300) Measurement	1	U		$Measurement = EV(122618, DCM, "Peak Filling Rate") $ModType = EV (121425, DCM, "Index") $ModValue = DT(8277-6, LN, "Body Surface Area") $Units=DT(ml/s/m2, UCUM, "(ml/s)/m^2")
10	>	CONTAINS	INCLUDE	DTID(300) Measurement	1	U		$Measurement = EV(F-32070, SRT, "Peak Cardiac Ejection Fraction") $ModType = EV (121425, DCM, "Index") $ModValue = DT(8277-6, LN, "Body Surface Area") $Units=DT(%/m2, UCUM, "%/m^2")

NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
	HAS OBS CONTEXT	NUM	EV(8867-4, LN, "Heart Rate")	1	U		Units= DT ("{H.B.}/min", UCUM, "BPM")

...							
3	>	CONTAINS	NUM	EV (18185-9, LN, "Gestational Age")	1	MC	At least one of row 2and 3 shall be present	Units= EV (d, UCUM, "days")
...							

...							
3	>	CONTAINS	NUM	EV (11631-9, LN, "Gross Body Movement")	1	MC	At least one of row 3-7 shall be present	Units = DT ("{0:2}", UCUM, "range 0:2")
4	>	CONTAINS	NUM	EV (11632-7, LN, "Fetal Breathing")	1	MC	At least one of row 3-7 shall be present	Units = DT ("{0:2}", UCUM, "range 0:2")
5	>	CONTAINS	NUM	EV (11635-0, LN, "Fetal Tone")	1	MC	At least one of row 3-7 shall be present	Units = DT ("{0:2}", UCUM, "range 0:2")
6	>	CONTAINS	NUM	EV (11635-5, LN, "Fetal Heart Reactivity")	1	MC	At least one of row 3-7 shall be present	Units = DT ("{0:2}", UCUM, "range 0:2")
7	>	CONTAINS	NUM	EV (11630-1, LN, "Amniotic Fluid Volume")	1	MC	At least one of row 3-7 shall be present	Units = DT ("{0:2}", UCUM, "range 0:2")
...							

…

Row 13	A numeric designation for the score. Score ranges vary, typically 0-4 or 0-5. Numeric scores may depend on wall motion findings as well as morphology findings. See the table below for conventional numeric assignment schemes. The UCUM annotation code enables specifying the numeric range, ("{L:N}", UCUM, "scale L:N"), where L and N are the lower and upper ends of the range.

TID 5223
Pediatric, Fetal and Congenital Cardiac Ultrasound Measurement

…

Content Item Descriptions

Row 1	For an index type of measurement, the concept name of this row 1 will still be the original measurement concept name; it is row 2 that gives the indication that row 1 is actually an index type of measurement. When this happens, the measurement value of row 1 should be a value after being indexed and the measurement unit of row 1 should be an index type of unit.
	For example, to insert a "Stroke Volume Index" measurement to this SR object, the concept name of row 1 will be "Stroke Volume", its numerical value will be the calculation result of "Stroke Volume /BSA" and its units are "ml/cm2".
...	

...								
20	>	CONTAINS	NUM	EV (113790, DCM, "Collimated Field Area"	1	U		Units = EV (m2, UCUM, "m^2")
...								
34	>	CONTAINS	NUM	EV (113736, DCM, "Exposure")	1-n	U		Units = EV (uA.s, UCUM, "uA.s")
...								

Changes in Part 16 TID 10013

...								
24	>>	CONTAINS	NUM	EV (113836, DCM, "CTDIfreeair Calculation Factor")	1	U		Units = EV (mGy/mA.s, UCUM, "mGy/mA.s")
...								

Changes in Part 16 CID 84

UCUM	cm^2	Centimeter**2

Changes in Part 16 CID 3082

...		
UCUM	{H.B.}/min	~~Heart beat per minute~~BPM
...		

Changes in Part 16 Annex C TID 3401

...						
3	NUMERIC	DT (109055,DCM,"Protocol Stage")	1	U		UNITS=EV("{stage}",UCUM, "stage")
...						

Changes in Part 16 Annex C TID 3403

3	...					
4	NUMERIC	(109060,DCM,"Procedure Step Number")	1	U		UNITS=EV("{step}",UCUM, "step")
5	...					

...						
2	NUM	(109060,DCM,"Procedure Step Number")	1	U		UNITS=EV(<mark>"</mark>{step}<mark>"</mark>,UCUM, "step")
...						

Annex D   DICOM Controlled Terminology Definitions (Normative)

This Annex specifies the meanings of codes defined in DICOM, either explicitly or by reference to another part of DICOM or an external reference document or standard.

DICOM Code Definitions (Coding Scheme Designator "DCM" Coding Scheme Version "01")

Code Value	Code Meaning	Definition	Notes
…			
122246	BSA = 0.0004688*WT^(0.8168-0.0154*log(WT))	BSA = 0.0004688*(1000*WT)^(0.8168-0.0154*log(1000*WT)) Where (WT is weight in kilogram) Units = m<mark>^</mark>2 Boyd, Edith. *The Growth of the Surface Area of the Human Body* (originally published in 1935 by the University of Minnesota Press), Greenwood Press, Westport, Connecticut, 1975, p. 102. Equation (35)	122246
...			

Annex G   English Code Meanings of Selected Codes (Normative)

Coding Scheme Designator (0008,0102)	Coding Scheme Version	Code Value (0008,0100)	Code Meaning (0008,0104)
UCUM		1	unary
			no units
			~~ratio~~
UCUM		**{ratio}**	**ratio**
SRT		C-10520	Carbon dioxide, NOS

			Carbon dioxide gas
…..			