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Correction Number CP-1389
Log Summary: Factor Common Descriptions Out of Image Library Entries
Name of Standard PS3.16, PS3.17 2013
Rationale for Correction: <p>The Image Library concept introduced with Mammography CAD is a useful means of describing relevant features of images that are used to create SR content, but does not scale well when large numbers of images with common attributes are needed.</p> <p>Some types of SR require description of other modality images than are currently provided for in TID 4020 CAD Image Library Entry.</p> <p>A case of both is PET SUV measurements for which PET-specific image attributes are required and for which a group of images may share common attributes, such as information about the radiopharmaceutical administration.</p> <p>Accordingly, it is proposed to add new templates to extend the function of the image library concept and to permit commonality of descriptive attributes. The descriptive attributes are grouped by acquisition modality and type of modality (cross-sectional or projection).</p> <p>The existing TID 4020 is left unchanged so as not to impact the installed base of equipment that already uses that template.</p> <p>EV (121058, DCM,"Procedure reported") has not been included in the common descriptors, since this is likely included in whatever enclosing root template uses the Image Library.</p>
Editor's Notes:
Correction Wording:

Amend DICOM PS3.16 - Content Mapping Resource - Structured Reporting Templates to add the following new templates:

TID t4tt1 Image Library

The Image Library contains references to images and and selected attributes describing them that facilitate analysis without having to retrieve the entire set of referenced images.

Type: Extensible
Order: Non-Significant

Table TID t4tt1. Image Library

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (111028, DCM, "Image Library")	1	M		
2	>	CONTAINS	CONTAINER	EV (dd4d01, DCM, "Image Library Group")	1-n	U		
3	>>	HAS ACQ CONTEXT	INCLUDE	DTID t4tt3 "Image Library Entry Descriptors"	1	U		
3	>>	CONTAINS	INCLUDE	DTID t4tt2 "Image Library Entry"	1-n	U		

TID t4tt2 Image Library Entry

Each instance of the Image Library Entry template contains the Image SOP Class and Instance UIDs, and selected attributes for an image that facilitate analysis without having to retrieve the entire set of referenced images.

Type: Extensible
Order: Non-Significant

Table TID t4tt2. Image Library Entry

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			IMAGE		1	M		
2	>	HAS ACQ CONTEXT	INCLUDE	DTID t4tt3 "Image Library Entry Descriptors"	1	U		

TID t4tt3 Image Library Entry Descriptors

This template contains selected attributes for an image or group of images. The descriptive information may be copied from images or derived.

Type: Extensible
Order: Non-Significant

Table TID t4tt3. Image Library Entry Descriptors

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1		HAS ACQ CONTEXT	CODE	EV (121139, DCM, "Modality")	1	U		
2		HAS ACQ CONTEXT	CODE	EV (123014, DCM, ("Target Region"))	1	U		DCID 4031 "Common Anatomic Regions"

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
3		HAS ACQ CONTEXT	CODE	EV (111027, DCM, "Image Laterality")	1	U		
4		HAS ACQ CONTEXT	DATE	EV (111060, DCM, "Study Date")	1	U		
5		HAS ACQ CONTEXT	TIME	EV (111061, DCM, "Study Time")	1	U		
6		HAS ACQ CONTEXT	DATE	EV (111018, DCM, "Content Date")	1	U		
7		HAS ACQ CONTEXT	TIME	EV (111019, DCM, "Content Time")	1	U		
8		HAS ACQ CONTEXT	DATE	EV (dd4d10, DCM, "Acquisition Date")	1	U		
9		HAS ACQ CONTEXT	TIME	EV (dd4d11, DCM, "Acquisition Time")	1	U		
10		HAS ACQ CONTEXT	UIDREF	EV (112227, DCM, "Frame of Reference UID")	1	U		
11		HAS ACQ CONTEXT	NUM	EV (110910, DCM, "Pixel Data Rows")	1	U		UNITS = EV ({pixels}, UCUM, "pixels")
12		HAS ACQ CONTEXT	NUM	EV (110911, DCM, "Pixel Data Columns")	1	U		UNITS = EV ({pixels}, UCUM, "pixels")
13		HAS ACQ CONTEXT	INCLUDE	DTID t4tt5 "Image Library Entry Descriptors for Projection Radiography"	1	U		
14		HAS ACQ CONTEXT	INCLUDE	DTID t4tt6 "Image Library Entry Descriptors for Cross-Sectional Modalities"	1	U		
15		HAS ACQ CONTEXT	INCLUDE	DTID t4tt7 "Image Library Entry Descriptors for CT"	1	U		
16		HAS ACQ CONTEXT	INCLUDE	DTID t4tt8 "Image Library Entry Descriptors for MR"	1	U		
17		HAS ACQ CONTEXT	INCLUDE	DTID t4tt9 "Image Library Entry Descriptors for PET"	1	U		

Content Item Descriptions

Target Region	The value of Anatomic Region Sequence (0008,2218) in the Image IOD, or a code derived from Body Part Examined (0018,0015) using the mapping described in Annex L.
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TID t4tt5 Image Library Entry Descriptors for Projection Radiography

This template contains selected attributes for a projection radiography image or group of such images. The descriptive information may be copied from images or derived.

Type: Extensible
Order: Non-Significant

Table TID t4tt5. Image Library Entry Descriptors for Projection Radiography

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1		HAS ACQ CONTEXT	CODE	EV (111031, DCM, "Image View")	1	U		
2	>	HAS CONCEPT MOD	CODE	EV (111032, DCM, "Image View Modifier")	1-n	U		
3		HAS ACQ CONTEXT	TEXT	EV (111044, DCM, "Patient Orientation Row")	1	U		
4		HAS ACQ CONTEXT	TEXT	EV (111043, DCM, "Patient Orientation Column")	1	U		
5		HAS ACQ CONTEXT	NUM	EV (111026, DCM, "Horizontal Pixel Spacing")	1	U		UNITS = EV (mm, UCUM, "millimeter")
6		HAS ACQ CONTEXT	NUM	EV (111066, DCM, "Vertical Pixel Spacing")	1	U		UNITS = EV (mm, UCUM, "millimeter")
7		HAS ACQ CONTEXT	NUM	EV (112011, DCM, "Positioner Primary Angle")	1	U		
8		HAS ACQ CONTEXT	NUM	EV (112012, DCM, "Positioner Secondary Angle")	1	U		

Content Item Descriptions

Patient Orientation Row	First (row) and second (column) components of Patient Orientation (0020,0020) in the Image IOD. See PS 3.3 Section C.7.6.1.1.1.
Patient Orientation Column	
Horizontal Imager Pixel Spacing	The row (first) component of Imager Pixel Spacing (0018,1164) in the Image IOD. See PS 3.3 Section C.8.11.4.
Vertical Imager Pixel Spacing	The column (second) component of Imager Pixel Spacing (0018,1164) in the Image IOD. See PS 3.3 Section C.8.11.4.

TID t4tt6 Image Library Entry Descriptors for Cross-Sectional Modalities

This template contains selected attributes for a cross-sectional image or group of such images. The descriptive information may be copied from images or derived.

Type: Extensible
Order: Non-Significant

Table TID t4tt6. Image Library Entry Descriptors for Cross-Sectional Modalities

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1		HAS ACQ CONTEXT	NUM	EV (111026, DCM, "Horizontal Pixel Spacing")	1	U		UNITS = EV (mm, UCUM, "millimeter")
2		HAS ACQ CONTEXT	NUM	EV (111066, DCM, "Vertical Pixel Spacing")	1	U		UNITS = EV (mm, UCUM, "millimeter")
3		HAS ACQ CONTEXT	NUM	EV (112226, DCM, "Spacing between slices")	1	U		UNITS = EV (mm, UCUM, "millimeter")
4		HAS ACQ CONTEXT	NUM	EV (112225, DCM, "Slice Thickness")	1	U		UNITS = EV (mm, UCUM, "millimeter")

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
5		HAS ACQ CONTEXT	NUM	EV (110901, DCM, "Image Position (Patient) X")	1	U		UNITS = EV (mm, UCUM, "millimeter")
6		HAS ACQ CONTEXT	NUM	EV (110902, DCM, "Image Position (Patient) Y")	1	U		UNITS = EV (mm, UCUM, "millimeter")
7		HAS ACQ CONTEXT	NUM	EV (110903, DCM, "Image Position (Patient) Z")	1	U		UNITS = EV (mm, UCUM, "millimeter")
8		HAS ACQ CONTEXT	NUM	EV (110904, DCM, "Image Orientation (Patient) Row X")	1	U		UNITS = EV ({"-1:1"}, UCUM, {"-1:1"})
9		HAS ACQ CONTEXT	NUM	EV (110905, DCM, "Image Orientation (Patient) Row Y")	1	U		UNITS = EV ({"-1:1"}, UCUM, {"-1:1"})
10		HAS ACQ CONTEXT	NUM	EV (110906, DCM, "Image Orientation (Patient) Row Z")	1	U		UNITS = EV ({"-1:1"}, UCUM, {"-1:1"})
11		HAS ACQ CONTEXT	NUM	EV (110907, DCM, "Image Orientation (Patient) Column X")	1	U		UNITS = EV ({"-1:1"}, UCUM, {"-1:1"})
12		HAS ACQ CONTEXT	NUM	EV (110908, DCM, "Image Orientation (Patient) Column Y")	1	U		UNITS = EV ({"-1:1"}, UCUM, {"-1:1"})
13		HAS ACQ CONTEXT	NUM	EV (110909, DCM, "Image Orientation (Patient) Column Z")	1	U		UNITS = EV ({"-1:1"}, UCUM, {"-1:1"})

Content Item Descriptions

Horizontal Imager Pixel Spacing	The row (first) component of Pixel Spacing (0028,0030) in the Image IOD. See PS 3.3 Section 10.7.1.1 and PS 3.3 Section C.7.6.2.
Vertical Imager Pixel Spacing	The column (second) component of Pixel Spacing (0028,0030) in the Image IOD. See PS 3.3 Section 10.7.1.1 and and PS 3.3 Section C.7.6.2.

TID t4tt7 Image Library Entry Descriptors for CT

This template contains selected attributes for a CT image or group of such images. The descriptive information may be copied from images or derived.

Type: Extensible
Order: Non-Significant

Table TID t4tt7. Image Library Entry Descriptors for CT

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1		HAS ACQ CONTEXT	CODE	EV (113820, DCM, "CT Acquisition Type")	1	U		DCID 10013 "CT Acquisition Type"
2		HAS ACQ CONTEXT	CODE	EV (113961, DCM, "Reconstruction Algorithm")	1	U		DCID 10033 "CT Reconstruction Algorithm"

Content Item Descriptions

CT Acquisition Type	A code derived from the value of Acquisition Type (0018,9302) in the Image IOD. See PS 3.3 Section C.8.15.3.2.
Reconstruction Algorithm	A code derived from the value of Reconstruction Algorithm (0018,9315) in the Image IOD. See PS 3.3 Section C.8.15.3.7.

TID t4tt8 Image Library Entry Descriptors for MR

This template contains selected attributes for a MR image or group of such images. The descriptive information may be copied from images or derived.

Type: Extensible
Order: Non-Significant

Table TID t4tt8. Image Library Entry Descriptors for MR

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1		HAS ACQ CONTEXT	TEXT	EV (110909, DCM, "Pulse Sequence Name")	1	U		

Content Item Descriptions

Pulse Sequence Name	The value of Pulse Sequence Name (0018,9005) or Sequence Name (0018,0024) in the Image IOD. See PS 3.3 Section C.8.13.4.
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TID t4tt9 Image Library Entry Descriptors for PET

This template contains selected attributes for a PET image or group of such images. The descriptive information may be copied from images or derived.

Note

The content of this template is similar to that in TID 15101 NM/PET Protocol Context, but is in the form of an SR template rather than a Protocol Context Template, and the content items are not nested as modifiers. There is also some similarity to TID 3307 NM/PET Perfusion Measurement Group.

Type: Extensible
Order: Non-Significant

Table TID t4tt9. Image Library Entry Descriptors for PET

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1		HAS ACQ CONTEXT	CODE	EV (C-10072, SRT, "Radionuclide")	1	U		DCID 4020 "PET Radionuclide"
2		HAS ACQ CONTEXT	CODE	EV (F-61FDB, SRT, "Radiopharmaceutical agent")	1	U		DCID 4021 "PET Radiopharmaceutical"
3		HAS ACQ CONTEXT	NUM	EV (R-42806, SRT, "Half-life of radiopharmaceutical")	1	U		UNITS = (s, UCUM, "s")
4		HAS ACQ CONTEXT	DATETIME	EV (123003, DCM, "Radiopharmaceutical Start Date Time")	1	U		
4		HAS ACQ CONTEXT	DATETIME	EV (123004, DCM, "Radiopharmaceutical Stop Time")	1	U		
5		HAS ACQ CONTEXT	NUM	EV (123005, DCM, "Radiopharmaceutical Volume")	1	U		UNITS = DT (cm3, UCUM, "cm3")
6		HAS ACQ CONTEXT	NUM	EV (123006, DCM, "Radionuclide Total Dose")	1	U		UNITS = DT (Bq, UCUM, "Bq")

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
7		HAS ACQ CONTEXT	NUM	EV (123007, DCM, "Radiopharmaceutical Specific Activity")	1	U		UNITS = DT (Bq/mol, UCUM, "Bq/mol")
8		HAS ACQ CONTEXT	CODE	EV (G-C340, SRT, "Route of Administration")	1	U		BCID 11 "Route of Administration"
9		HAS ACQ CONTEXT	NUM	EV (123009, DCM, "Radionuclide Syringe Counts")	1	U		UNITS = DT ({counts}/s, UCUM "counts/s")
10		HAS ACQ CONTEXT	NUM	EV (123010, DCM, "Radionuclide Residual Syringe Counts")	1	U		UNITS = DT ({counts}/s, UCUM "counts/s")
10		HAS ACQ CONTEXT	NUM	EV (dd4d12, DCM, "PET Radionuclide Incubation Time")	1	U		UNITS = EV (min, UCUM, "min")
12		HAS ACQ CONTEXT	NUM	EV (14749-6, LN, "Glucose")	1	U		UNITS = EV (mmol/l, UCUM, "mmol/l")
13		HAS ACQ CONTEXT	DATE	EV (109081, DCM, "Glucose Measurement Date")	1	M		
14		HAS ACQ CONTEXT	TIME	EV (109082, DCM, "Glucose Measurement Time")	1	M		

Content Item Descriptions

Half-life of radiopharmaceutical	The units for half life are chosen to be seconds, to match the units used for Radionuclide Half Life (0018,1075). See PS 3.3 Section C.8.9.2 "PET Isotope Module".
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Amend DICOM PS3.16 - Content Mapping Resource - Controlled Terminology Definitions to add the following new concepts:

Table D-1. DICOM Controlled Terminology Definitions

Code Value	Code Meaning	Definition	Notes
...
dd4d01	Image Library Group	A container that groups common information about a set of images used as evidence to produce a report.	
...
dd4d10	Acquisition Date	The date the acquisition of data started	
dd4d11	Acquisition Time	The time the acquisition of data started	
dd4d12	PET Radionuclide Incubation Time	The time between the start of injection of the PET radionuclide and the start of acquisition of the PET data.	
...

XXX Use of Image Libraries in SR Documents (Informative)

Amend DICOM PS3.17 - Explanatory Information to add new Annex XXX:

This Annex contains examples of the use of Image Library templates within SR Documents.

XXX.1 Image Library for PET-CT Example

This PET-CT example illustrates an Image Library in which attributes of images for two modalities are described, with common attributes factored out of the individual image references.

Note

1. Only the attributes of relevance to SUV and spatial measurements are included, not a complete description of all aspects of acquisition.
2. Only two images for each modality are described, rather than all slices acquired, since it is usually only necessary to describe images that are referenced elsewhere in the SR content tree, e.g., on which a region of interest is specified from which measurements are made.

Table XXX.1-1. Image Library for PET-CT Example

Node	Code Meaning of Concept Name	Code Meaning or Example Value	TID
1.n	Image Library		TID t4tt1
1.n.1	Image Library Group		TID t4tt1
1.n.1.3	Modality	PET	TID t4tt3
1.n.1.4	Target Region	Whole Body	TID t4tt3
1.n.1.5	Study Date	20030417	TID t4tt3
1.n.1.6	Acquisition Date	20030417	TID t4tt3
1.n.1.7	Acquisition Time	094513	TID t4tt3
1.n.1.8	Frame of Reference UID	1.2.3.xyz	TID t4tt3
1.n.1.9	Pixel Data Rows	128	TID t4tt3
1.n.1.10	Pixel Data Columns	128	TID t4tt3
1.n.1.11	Horizontal Pixel Spacing	4.0 mm	TID t4tt6
1.n.1.12	Vertical Pixel Spacing	4.0 mm	TID t4tt6
1.n.1.13	Spacing Between Slices	4.0 mm	TID t4tt6
1.n.1.14	Slice Thickness	4.0 mm	TID t4tt6
1.n.1.15	Image Orientation (Patient) Row X	1	TID t4tt6
1.n.1.16	Image Orientation (Patient) Row Y	0	TID t4tt6
1.n.1.17	Image Orientation (Patient) Row Z	0	TID t4tt6
1.n.1.18	Image Orientation (Patient) Column X	0	TID t4tt6
1.n.1.19	Image Orientation (Patient) Column Y	1	TID t4tt6
1.n.1.20	Image Orientation (Patient) Column Z	0	TID t4tt6
1.n.1.21	Radionuclide	¹⁸ F	TID t4tt9
1.n.1.22	Radiopharmaceutical agent	Fluorodeoxyglucose F ¹⁸	TID t4tt9

Node	Code Meaning of Concept Name	Code Meaning or Example Value	TID
1.n.1.23	Radiopharmaceutical Start Date Time	20030417084513	TID t4tt9
1.n.1.24	Radionuclide Total Dose	277000000 Bq	TID t4tt9
1.n.1.25	PET Radionuclide Incubation Time	60 min	TID t4tt9
1.n.1.26	Glucose	5.5 mmol/l	TID t4tt9
1.n.1.26.1	Glucose Measurement Date	20030417	TID t4tt9
1.n.1.26.2	Glucose Measurement Time	083043	TID t4tt9
1.n.1.27		IMAGE - PET image #1	TID t4tt2
1.n.1.27.1	Image Position (Patient) X	-288.0	TID t4tt6
1.n.1.27.2	Image Position (Patient) Y	288.0	TID t4tt6
1.n.1.27.3	Image Position (Patient) Z	136.0	TID t4tt6
1.n.1.28		IMAGE - PET image #2	TID t4tt2
1.n.1.28.1	Image Position (Patient) X	-288.0	TID t4tt6
1.n.1.28.2	Image Position (Patient) Y	288.0	TID t4tt6
1.n.1.28.3	Image Position (Patient) Z	140.0	TID t4tt6
1.n.2	Image Library Group		TID t4tt1
1.n.2.1	Modality	CT	TID t4tt3
1.n.2.2	Target Region	Whole Body	TID t4tt3
1.n.2.3	Study Date	20030417	TID t4tt3
1.n.2.4	Frame of Reference UID	1.2.3.xyz	TID t4tt3
1.n.2.5	Pixel Data Rows	512	TID t4tt3
1.n.2.6	Pixel Data Columns	512	TID t4tt3
1.n.2.7	Horizontal Pixel Spacing	1.171875 mm	TID t4tt6
1.n.2.8	Vertical Pixel Spacing	1.171875 mm	TID t4tt6
1.n.2.9	Spacing Between Slices	4 mm	TID t4tt6
1.n.2.10	Slice Thickness	4 mm	TID t4tt6
1.n.2.11	Image Orientation (Patient) Row X	1	TID t4tt6
1.n.2.12	Image Orientation (Patient) Row Y	0	TID t4tt6
1.n.2.13	Image Orientation (Patient) Row Z	0	TID t4tt6
1.n.2.14	Image Orientation (Patient) Column X	0	TID t4tt6
1.n.2.15	Image Orientation (Patient) Column Y	1	TID t4tt6
1.n.2.16	Image Orientation (Patient) Column Z	0	TID t4tt6
1.n.2.17	CTAcquisition Type	Spiral Acquisition	TID t4tt7
1.n.2.18	Reconstruction Algorithm	Filtered Back Projection	TID t4tt7
1.n.2.19		IMAGE - CT image #1	TID t4tt2
1.n.2.19.1	Image Position (Patient) X	-288.0	TID t4tt6
1.n.2.19.2	Image Position (Patient) Y	288.0	TID t4tt6
1.n.2.19.3	Image Position (Patient) Z	136.0	TID t4tt6
1.n.2.20		IMAGE - CT image #2	TID t4tt2
1.n.2.20.1	Image Position (Patient) X	-288.0	TID t4tt6
1.n.2.20.2	Image Position (Patient) Y	288.0	TID t4tt6
1.n.2.20.3	Image Position (Patient) Z	140.0	TID t4tt6