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Digital Imaging and Communications in Medicine (DICOM)

Supplement 252: For Processing CT SOP Classes

Prepared by:

DICOM Standards Committee, Working Group 21

1812 N. Moore St, Suite 2200

Arlington, VA 22209, USA

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Scope and Field of Application

52 This Supplement adds For Processing storage SOP Classes based on the existing CT Image IOD,
53 Enhanced CT Image IOD, and Legacy Converted Enhanced CT Image IOD.

54 For Processing storage SOP Classes in DICOM facilitate the exchange and storage of images needed for
55 processing while distinguishing them from those for presentation. This supports appropriate data pipelines
56 while not disrupting reading workflow with images not intended for presentation.

57 These new SOP Classes mirror existing Mammography, Intra-Oral X-ray, and Digital X-ray For Processing
58 SOP Classes.

59 One application of the For Processing SOP Classes is to store and exchange CT basis images created by
60 the multi-energy decomposition process. These are not typically diagnostic themselves, but can be
61 processed to generate an extensive variety of diagnostic images (iodine maps, virtual non-contrast
62 images, virtual monoenergetic images at various energy levels, calcium maps, etc.). Hanging Protocols
63 would typically ignore these For Processing images.

64

65 Closed Issues:

66 Q. Include the Legacy Converted Enhanced CT Image Storage - For Processing SOP Class?

67 A: Yes.

68 Basis images created as CT Image Storage – For Processing SOP Class might get converted
69 later to an Enhanced SOP Class for efficiency or compatibility reasons. The Legacy Converted
70 Enhanced CT Image Storage - For Processing SOP Class would then be applicable.

71 Q. Can “for presentation” and “for processing” images be mixed in an Enhanced instance?

72 A: No.

73 Presentation Intent is a series level attribute so the value applies to all images in the series. (Note
74 it only represents intent.)

75 Q. Can we remove the Presentation Intent attribute (here and in other SOP Classes) since it is somewhat
76 redundant with the SOP Class semantics?

77 A: No.

78 Need to maintain symmetry. Can't remove in DX etc. because it's Type 1 so that's breaking.

79 Q. Are there attributes in the CT Image IOD which it would be useful to make Type 1C / 2C (conditional on
80 the Presentation Intent Type being FOR PROCESSING) in the new For Processing SOP Classes?

81 A: No.

82 None were suggested. Since FOR PROCESSING could also be used for purposes other than
83 multi-energy, we shouldn't make those 1C/2C

84 Q. Should one of the existing general codes in CID 7202 be used instead of the proposed Basis code.

85 A: No.

86 Public Comments supported keeping the more specific Basis Image code. Useful for distinction.

87

88 **Changes to NEMA Standards Publication PS 3.3**

89 ***Modify the CT Image IOD to add the new Single-Frame CT Series Module***

90 **A.3.3 CT Image IOD Module Table**

91 ...

92 **Table A.3-1. CT Image IOD Modules**

IE	Module	Reference	Usage
...			
Series	General Series	C.7.3.1	M
	Clinical Trial Series	C.7.3.2	U
	<u>Single-Frame CT Series</u>	<u>C.8.2.X</u>	<u>U</u>
...			

93

94 ***Modify C.8.2.1.1.1. to add codes for Basis and Noisemap images to Image Type for single-frame CT***

95 **C.8.2.1.1 CT Image Module Attribute Descriptions**

96 **C.8.2.1.1.1 Image Type**

97 ...

98 Defined Terms for Value 4 for Multi-energy CT Images:

99 VMI

100 a Virtual Monoenergetic Image. Each real-world value mapped pixel represents CT Hounsfield units and is
 101 analogous to a CT image created by a monoenergetic (of a specific keV value) X-Ray beam.

102 MAT_SPECIFIC

103 a Material-Specific Image. Each real-world value mapped pixel value represents a property of a material
 104 such as attenuation, concentration or density.

105 MAT_REMOVED

106 An image with the attenuation contribution of one or more materials removed. For pixels that did not
 107 contain any of the removed material(s), the pixel values are unchanged.

108 MAT_FRACTIONAL

109 a Material-Fractional Image. Each real-world value mapped pixel represents the fraction of a voxel
 110 occupied by a material.

111 EFF_ATOMIC_NUM

112 an Effective Atomic Number Image. Each real-world value mapped pixel represents Effective Atomic
 113 Number of the materials in the voxel.

114 ELECTRON_DENSITY

115 an Electron Density Image. Each real-world value mapped pixel represents the number of electrons per
 116 unit volume or the electron density relative to water.

117 MAT_MODIFIED

118 a Material-Modified Image. CT Image where real-world value mapped pixels have been modified to
 119 highlight a certain target material (either by partially suppressing the background or by enhancing the
 120 target material), or to partially suppress the target material.

121 MAT_VALUE_BASED

122 a Value-Based Image. CT Image where real-world value mapped pixels represent a certain value for a
 123 specified material

124 **BASIS**

125 **a Basis Image. CT image generated by multi-energy decomposition and used to generate spectral**
 126 **images.**

127 **NOISE MAP**

128 **a Noise Map Image. An image that represents the presence of noise in pixels of another image.**

129 Note

130 Multi-energy CT images are not necessarily DERIVED and may be ORIGINAL\PRIMARY.

131 When an image is created by a generic transformation an implementation-specific Value 4 may be
 132 provided.

133 ...

134 **Add a new Single-Frame CT Series Module in PS3.3 with Presentation Intent**

135 **C.8.2.X Single-Frame CT Series Module**

136 Table C.8-Y specifies the Attributes of the Single-Frame CT Series Module, which describe single-frame
 137 CT series.

138 **Table C.8-Y. Single-Frame CT Series Module Attributes**
 139

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	Type of device, process or method that originally acquired the data used to create the images in this Series. Enumerated Values: CT See Section C.7.3.1.1.1 for further explanation.
Presentation Intent Type	(0008,0068)	1C	Identifies the intent of the images that are contained within this Series. Enumerated Values: FOR PRESENTATION FOR PROCESSING Required if the SOP Class UID of this instance is 1.2.840.10008.5.1.4.1.1.2.XXUID (CT Image Storage - For Processing) May be present otherwise. See Section C.8.15.1.1.1 for further explanation.

140

141 **Modify CT Series Module to add Presentation Intent for Enhanced CT**

142 **C.8.15.1 CT Series Module**

143 ...

144 **Table C.8-113. CT Series Module Attributes**

145

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	Type of device, process or method that originally acquired the data used to create the images in this Series. Enumerated Values: CT See Section C.7.3.1.1.1 for further explanation.
Referenced Performed Procedure Step Sequence	(0008,1111)	1C	Uniquely identifies the Performed Procedure Step SOP Instance to which the Series is related. Only a single Item shall be included in this Sequence. Required if a Performed Procedure Step SOP Class was involved in the creation of this Series.
>Include Table 10-11 "SOP Instance Reference Macro Attributes"			
<u>Presentation Intent Type</u>	<u>(0008,0068)</u>	<u>1C</u>	<u>Identifies the intent of the images that are contained within this Series.</u> <u>Enumerated Values:</u> <u>FOR PRESENTATION</u> <u>FOR PROCESSING</u> <u>Required if the SOP Class UID of this instance is 1.2.840.10008.5.1.4.1.1.2.YYUID (Enhanced CT Image Storage - For Processing) or 1.2.840.10008.5.1.4.1.1.2.ZZUID (Legacy Converted Enhanced CT Image Storage - For Processing)</u> <u>May be present otherwise.</u> <u>See Section C.8.15.1.1.1 for further explanation.</u>

146

147 **Add Attribute description section to CT Series Module. Text mirrors DX Series Module text**

148 **C.8.15.1.1 CT Series Module Attribute Descriptions**

149 **C.8.15.1.1.1 Presentation Intent Type**

150 Presentation Intent Type (0008,0068) shall identify the intent for the purposes of display or other
151 presentation of all Images within this Series.

152 Notes

153 1. Since this is a Series level Attribute, all Images within a Series have the same Value for this
154 Attribute.

- 155 2. The intent of this restriction is to ensure that FOR PRESENTATION and FOR PROCESSING
 156 images are placed in separate Series, so that no confusion can arise as to which images are
 157 suitable for diagnostic reading as determined by local policy.

158 A Series of Images intended for viewing by an observer, after application of any grayscale transformations
 159 specified in the image object such as VOI LUT, shall, if Presentation Intent Type (0008,0068) is present,
 160 have an Enumerated Value of FOR PRESENTATION.

161 Notes

- 162 1. These images may still be of Image Type (0008,0008) ORIGINAL rather than DERIVED despite
 163 the possibility that they may have undergone some processing. In this case a DERIVED image
 164 would have undergone yet further processing to make it substantially different from the original.
 165 2. These images may still be subjected to processing or further processing, if appropriate, depending
 166 on the application.
 167 3. These images are intended for display on a device, without (further) processing, since that device
 168 may not be capable of image processing. The quality of the displayed image or its suitability for
 169 any purpose is beyond the scope of the DICOM Standard.

170 Images that are intended to be further processed before being displayed shall have an Enumerated Value
 171 of FOR PROCESSING.

172 Notes

- 173 1. This type is provided to allow the functions of image acquisition and image processing for
 174 presentation to be separated and yet have images conveyed between the two processes using a
 175 DICOM object. Individual sites or users may choose to substitute their own specialized processing
 176 in place of that supplied by the implementer.
 177 2. Images available at this stage of processing may be useful for quality control and problem solving
 178 purposes, as well as academic research.
 179 3. Images of this type may also be archived, retrieved and processed with different algorithms or
 180 parameters in order to alter the appearance of specific features for clinical purposes.
 181 4. The nature of the processing that may have been applied before sending an image of type FOR
 182 PRESENTATION is also not specified.

183 Whether or not the spatial locations of all pixels are preserved during the processing of the source image
 184 that resulted in the current image can be indicated by Spatial Locations Preserved (0028,135A) in a
 185 Source Image Sequence (0008,2112) reference from the FOR PRESENTATION image to a FOR
 186 PROCESSING predecessor.

187 If images from the same exposure exist with different Values of Presentation Intent Type (0008,0068), then
 188 they shall have different SOP Instance UIDs.

189 Notes

- 190 1. The Source Image Sequence (0008,2112) in a FOR PRESENTATION image may reference the
 191 FOR PROCESSING image(s) from which it was generated to relate these images. Similarly, the
 192 Related Series Sequence (0008,1250) in a FOR_PRESENTATION image may more generally
 193 reference series that contain the FOR_PROCESSING images.
 194 2. The SOP Class UIDs of the two images will also be different.
 195

196 ***Modify Value 5 table for multi-frame CT to add codes for Basis and Noisemap images***

197 **C.8.15.2.1.1.5 Multi-energy CT Images**

198 Table C.8-116b specifies the Defined Terms for CT for Value 5 for Image Type (0008,0008) and Frame
 199 Type (0008,9007). Image Type (0008,0008) Value 5 shall be present if Multi-energy CT Acquisition
 200 (0018,9361) has a value of YES.

201 **Table C.8-116b. Image Type and Frame Type Value 5 for CT**

Defined Term Name	Code Meaning
VMI	Virtual Monoenergetic Image. Each real-world value mapped pixel represents CT Hounsfield units and is analogous to a CT image created by a monoenergetic (of a specific keV value) X-Ray beam.
MAT_SPECIFIC	Material-Specific Image. Each real-world value mapped pixel value represents a property of a material such as attenuation, concentration or density.
MAT_REMOVED	An image with the attenuation contribution of one or more materials removed. For pixels that did not contain any of the removed material(s), the pixel values are unchanged.
MAT_FRACTIONAL	Material-Fractional Image. Each real-world value mapped pixel represents the fraction of a voxel occupied by a material.
EFF_ATOMIC_NUM	Effective Atomic Number Image. Each real-world value mapped pixel represents Effective Atomic Number of the materials in the voxel.
ELECTRON_DENSITY	Electron Density Image. Each real-world value mapped pixel represents the number of electrons per unit volume or the electron density relative to water.
MAT_MODIFIED	Material-Modified Image. CT Image where real-world value mapped pixels have been modified to highlight a certain target material (either by partially suppressing the background or by enhancing the target material), or to partially suppress the target material.
MAT_VALUE_BASED	Value-Based Image. CT Image where real-world value mapped pixels represent a certain value for a specified material
MIXED	Used only as a value in Image Type (0008,0008) if frames within the image SOP Instance contain different values for Value 5 in their Frame Type (0008,9007).
<u>BASIS</u>	<u>Basis image. CT image generated by multi-energy decomposition and used to generate for spectral processing.</u>
<u>NOISE MAP</u>	<u>Noise map image. An image that represents the presence of noise in pixels of another image.</u>

202

203 ***Modify Table C.8.15.3.13-1 to allow single item series for basis images***204 **C.8.15.3.13 Multi-energy CT Processing Macro**

205 This Macro defines the Attributes for Multi-energy CT processing.

206

Table C.8.15.3.13-1. Multi-energy CT Processing Macro Attributes

Attribute Name	Tag	Type	Attribute Description
...			
>Decomposition Material Sequence	(0018,9381)	3	Basis materials used in the decomposition process. <u>Only a single Item is permitted in this Sequence when this frame or image represents a specific basis material.</u> Two or more Items are permitted in this Sequence <u>when this frame is a derivation from multiple basis materials.</u>
>>Material Code Sequence	(0018,937D)	1	Nominal material for Multi-energy CT processing. Only a single Item shall be included in this Sequence.

Attribute Name	Tag	Type	Attribute Description
>>>Include Table 8.8-1 "Code Sequence Macro Attributes"			BCID 300 "Multi-energy Relevant Material".
...			

207

208

Changes to NEMA Standards Publication PS 3.4

209

Add SOPs to Table B.5-1 in PS3.4 Annex B.5.

210

Table B.5-1 Standard SOP Classes

SOP Class Name	SOP Class UID	IOD Specification (defined in PS3.3)	Specialization
...			
Digital Intra-Oral X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.3	Digital Intra-Oral X-Ray Image IOD	B.5.1.3
Digital Intra-Oral X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.3.1	Digital Intra-Oral X-Ray Image IOD	B.5.1.3
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	CT Image IOD	<u>B.5.1.XX</u>
<u>CT Image Storage - For Processing</u>	<u>1.2.840.10008.5.1.4.1.1.2.XXUID</u>	<u>CT Image IOD</u>	<u>B.5.1.XX</u>
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	Enhanced CT Image IOD	B.5.1.7 B.5.1.23 <u>B.5.1.XX</u>
<u>Enhanced CT Image Storage - For Processing</u>	<u>1.2.840.10008.5.1.4.1.1.2.YYUID</u>	<u>Enhanced CT Image IOD</u>	<u>B.5.1.XX</u>
Legacy Converted Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.2	Legacy Converted Enhanced CT Image IOD	B.5.1.7 B.5.1.23 <u>B.5.1.XX</u>
<u>Legacy Converted Enhanced CT Image Storage - For Processing</u>	<u>1.2.840.10008.5.1.4.1.1.2.ZZUID</u>	<u>Legacy Converted Enhanced CT Image IOD</u>	<u>B.5.1.XX</u>
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Ultrasound Multi-frame Image Storage	
...			

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Add Section B.5.1.XX to PS3.4 Annex B.5.
This text is patterned after the corresponding text for DX in B.5.1.1.
(Any suggestions to improve the form of this language should be a CP to fix the other corresponding sections too.)

217

B.5.1.XX CT Image Storage SOP Classes

218
219

The CT Image Storage SOP Class shall use the CT Image IOD, and if Presentation Intent Type (0008,0068) is present, shall have an Enumerated Value of FOR PRESENTATION.

220
221

The Enhanced CT Image Storage SOP Class shall use the Enhanced CT Image IOD, and if Presentation Intent Type (0008,0068) is present, shall have an Enumerated Value of FOR PRESENTATION.

222
223
224

The Legacy Converted Enhanced CT Image Storage SOP Class shall use the Legacy Converted Enhanced CT Image IOD, and if Presentation Intent Type (0008,0068) is present, shall have an Enumerated Value of FOR PRESENTATION.

225
226

The CT Image Storage - For Processing SOP Class shall use the CT Image IOD with an Enumerated Value of FOR PROCESSING for Presentation Intent Type (0008,0068).

227
228

The Enhanced CT Image Storage - For Processing SOP Class shall use the Enhanced CT Image IOD with an Enumerated Value of FOR PROCESSING for Presentation Intent Type (0008,0068).

229
230
231

The Legacy Converted Enhanced CT Image Storage - For Processing SOP Class shall use the Legacy Converted Enhanced CT Image IOD with an Enumerated Value of FOR PROCESSING for Presentation Intent Type (0008,0068).

232
233

An SCU or SCP of the CT Image Storage - For Processing SOP Class shall also support the CT Image Storage SOP Class in the same role.

234
235

An SCU or SCP of the Enhanced CT Image Storage - For Processing SOP Class shall also support the CT Image Storage SOP Class in the same role.

236
237

An SCU or SCP of the Legacy Converted Enhanced CT Image Storage - For Processing SOP Class shall also support the Legacy Converted Enhanced CT Image Storage SOP Class in the same role.

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In the following notes, the CT Image Storage SOP Class, Enhanced CT Image Storage SOP Class, and Legacy Converted Enhanced CT Image Storage SOP Class will be collectively referred to as For Presentation SOP Classes.

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Notes

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1. The intent of the above requirements is to ensure a useful level of interoperability by avoiding the situation where an SCU might support only a given For Processing SOP Class and an SCP only the corresponding For Presentation SOP Class, or vice versa. The burden is therefore to support the corresponding For Presentation SOP Class as a "baseline".
2. Multi-frame For Processing SOP Class instances can contain multiple sets of frames, e.g. high-energy and low-energy basis images for spectral processing, and perhaps other related sets of frames such as noise maps. In such cases, an item in the Dimension Index Sequence (0020,9222) can differentiate the sets of frames similar to the way temporal stacks are handled. The Dimension Index Pointer (0020,9165) can reference Frame Type (0008,9007), where value 5 distinguishes frames that are basis images from noise map images, and Functional Group Pointer (0020,9167) can reference CT Image Frame Type Sequence (0018,9329) where Frame Type is located. Another item in the Dimension Index Sequence might point to the Material Code Sequence in the Decomposition Material Sequence (0018,9381), which distinguishes different basis materials, in the Multi-energy CT Processing Sequence functional group. The multiple sets of frames will share the same Stack ID and the In-stack positions for each set of frames will correspond to each other. See C.7.6.17.1 for further discussion of Dimension Indices.
3. The term "support" is used in this section in the sense that an SCU or SCP must be capable of sending or receiving the For Presentation SOP Class. There is no intent to imply that an SCU must always send an instance of the For Presentation SOP Class when an instance of the For

262 Processing SOP Class is sent.

263
 264 Nor is there any intent to imply that during Association establishment, that a Presentation Context
 265 for the For Presentation SOP Class has to be proposed by the initiator. However, an association
 266 acceptor may reject a For Presentation SOP Class Presentation Context if it accepts a For
 267 Processing SOP Class Presentation Context, and prefers that SOP Class, in which case it may no
 268 longer be able to "pass on" the object later as an SCU unless it is able to generate a For
 269 Presentation object.

270
 271 It is not possible for an SCP to determine from proposed Presentation Contexts whether or not an
 272 SCU "supports" (is capable of sending) both For Processing and For Presentation SOP Class
 273 Instances. Such a determination requires a priori knowledge of the information contained in the
 274 Conformance Statement for the SCU, as well as how the SCU is configured and operated. An
 275 SCU that supports both SOP Classes may well choose to only propose one or the other during
 276 Association establishment, depending on which Instances it actually intends to send over that
 277 particular association (although the SCU must be capable of sending instances of the For
 278 Presentation SOP Class if the SCP does not accept the For Processing).

279
 280 The intent of the requirement is that if an SCU is only capable of sending the For Presentation
 281 SOP Class, any SCP will be guaranteed to be able to receive it. Conversely, if an SCP is only
 282 capable of receiving the For Presentation SOP Class, any SCU will be guaranteed to be able to
 283 send it.

284

285 **Sections PS3.4 B.5.1.7 and B.5.1.23. are included unchanged for reference**

286 **B.5.1.7 Enhanced CT Image Storage and Legacy Converted Enhanced CT Image Storage SOP**
 287 **Class**

288 An SCP of the Enhanced CT Image Storage or Legacy Converted Enhanced CT Image Storage SOP
 289 Class shall also support the Grayscale Softcopy Presentation State Storage SOP Class as an SCP.

290 **Note**

291 *This requirement is present in order to allow the exchange of graphical annotations created by an*
 292 *acquisition or conversion device.*

293 ...

294 **B.5.1.23 Enhanced Multi-Frame Image SOP Classes**

295 An SCP of any of the Enhanced Multi-Frame Image SOP Classes that makes SOP Instances available
 296 through the Enhanced Multi-Frame Image Conversion Extended Negotiation of the Query/Retrieve Service
 297 Class (see [Section C.3.5](#)) shall support Storage Level 2 (Full).

298 **Note**

299 *Effective use of the Image Conversion option requires the storage of Type 3 Attributes.*

300

301 **Changes to NEMA Standards Publication PS 3.6**

302 *Add the SOP Class UIDs for the new SOP Classes to Table A-1 PS3.6 Annex A*

303

UID Value	UID Name	UID Keyword	UID Type	Part
...				

<u>1.2.840.10008.5.1.4.1.1.2.XXUID</u>	<u>CT Image Storage - For Processing</u>	<u>CTImageStorageForProcessing</u>	<u>SOP Class</u>	<u>PS3.4</u>
<u>1.2.840.10008.5.1.4.1.1.2.YYUID</u>	<u>Enhanced CT Image Storage - For Processing</u>	<u>EnhancedCTImageStorageForProcessing</u>	<u>SOP Class</u>	<u>PS3.4</u>
<u>1.2.840.10008.5.1.4.1.1.2.ZZUID</u>	<u>Legacy Converted Enhanced CT Image Storage - For Processing</u>	<u>LegacyConvertedEnhancedCTImageStorageForProcessing</u>	<u>SOP Class</u>	<u>PS3.4</u>
...				

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305

Changes to NEMA Standards Publication PS 3.16

306 *Modify CID 7202 Source Image Purpose of Reference to add a code for use in Source Image Sequence*
 307 *(0008,2112) to point to Basis instances from which spectral images were derived.*
 308 *See General Reference Module PS3.3 C.12-10.*

309 CID 7202 Source Image Purpose of Reference

310 **Resources:** HTML | FHIR JSON | FHIR XML | IHE SVS XML
 311 **Keyword:** SourceImagePurposeOfReference
 312 **FHIR Keyword:** dicom-cid-7202-SourceImagePurposeOfReference
 313 **Type:** Extensible
 314 **Version:** 20170405yyyymmdd
 315 **UID:** 1.2.840.10008.6.1.509

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318

Table CID 7202. Source Image Purpose of Reference

Coding Scheme Designator	Code Value	Code Meaning
DCM	121320	Uncompressed predecessor
DCM	121321	Mask image for image processing operation
DCM	121322	Source image for image processing operation
DCM	121329	Source image for montage
DCM	121330	Lossy compressed predecessor
DCM	121358	For Processing predecessor
DCM	113130	Predecessor containing group of imaging subjects
DCM	128250	Structural image for image processing
DCM	128251	Flow image for image processing
<u>DCM</u>	<u>Newcode1</u>	<u>Basis image for spectral processing</u>

319

320 *Modify CID 7203 to add code for use in Derivation Image Sequence (0008,9124).*

321 CID 7203 Image Derivation

322 **Resources:** HTML | FHIR JSON | FHIR XML | IHE SVS XML

323 **Keyword:** ImageDerivation
 324 **FHIR Keyword:** dicom-cid-7203-ImageDerivation
 325 **Type:** Extensible
 326 **Version:** ~~20200920~~yyyyymmdd
 327 **UID:** 1.2.840.10008.6.1.510
 328
 329
 330

Table CID 7203. Image Derivation

Coding Scheme Designator	Code Value	Code Meaning
...		
DCM	113097	Multi-energy proportional weighting
<u>DCM</u>	<u>Newcode2</u>	<u>Basis image decomposition</u>
...		

331

332 *Modify CID 300 as shown. (This represents merging CP2576 into this Supplement)*

333 **CID 300 Multi-energy Relevant Material**

334 Concepts for materials relevant to Multi-energy Imaging.

335 **Resources:** HTML | FHIR JSON | FHIR XML | IHE SVS XML
 336 **Keyword:** MultienergyRelevantMaterial
 337 **FHIR Keyword:** dicom-cid-300-MultienergyRelevantMaterial
 338 **Type:** Extensible
 339 **Version:** ~~yyyyymmdd~~20190817
 340 **UID:** 1.2.840.10008.6.1.1208
 341
 342

Table CID 300. Multi-energy Relevant Material

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-RT ID	UMLS Concept Unique ID
SCT	83881004	Aluminum Oxide	C-12013	C0002374
...				
<u>DCM</u>	<u>Newcode6</u>	<u>Compton Scattering</u>		
<u>DCM</u>	<u>Newcode7</u>	<u>Photoelectric Effect</u>		

343

344 *Add definitions to PS 3.16 Annex D*

345 **Table D-1. DICOM Controlled Terminology Definitions**

Code Value	Code Meaning	Definition	Notes
...			
<u>Newcode1</u>	<u>Basis image for spectral processing</u>	<u>Multi-energy CT basis image used as the source for derivation of a spectral image.</u>	

113097	Multi-energy proportional weighting	Image pixels created through proportional weighting of multiple acquisitions at distinct X-Ray energies.	
<u>Newcode2</u>	<u>Basis image decomposition</u>	<u>Image pixels created through decomposition of multi-energy acquisition data.</u>	
<u>Newcode6</u>	<u>Compton Scattering</u>	<u>The energy-dependent component of x-ray attenuation that is due to Compton scattering.</u>	
<u>Newcode7</u>	<u>Photoelectric Effect</u>	<u>The energy-dependent component of x-ray attenuation that is due to the photoelectric effect.</u>	