

## DICOM Correction Proposal

STATUS	Final Text
Date of Last Update	2016/09/19
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Submission Date	2015/09/07

Correction Number	CP-1559
Log Summary: Reuse reference mechanisms from General Image Module in other contexts	
Name of Standard PS3.3 2016c	
<p>Rationale for Correction:</p> <p>Image-based IODs have a rich feature set for annotating derivation or source information defined in the General Image Module. As this information is also valuable for IODs that do not include the General Image Module, it is proposed to move these referencing attributes to a new Module that will be included in all existing IODs with condition "U".</p> <p>Foreseeable use cases include:</p> <ol style="list-style-type: none"> <li>1) Referencing a Segmentation Instance from within an RT Structure Set to annotate that the RTSS was derived from the Segmentation due to a transcoding step.</li> <li>2) Referencing an RT Plan from within a Registration instance to annotate the context in which the registration was created, e.g. during patient setup.</li> <li>3) Referencing any instances that were present at the time of contouring and cannot directly be referenced from an RT Structure Set: normally this only references the planning CT, but it would be beneficial to reference any other image set that may have contributed to contouring and related Registration instances.</li> <li>4) Referencing an RT Dose instance from an RT Plan to indicate that it is a dose from a prior planning step and that it was incorporated while creating the new plan.</li> </ol> <p>For IODs that already include the General Image Module there will be no change, as these attributes remain on the same level.</p> <p>In addition to the Source Image Sequence, the Source Instance Sequence will be added in order to be able to annotate source instances for non-image IODs.</p>	
Correction Wording:	

*Add to Part 3 Annex A:*

Add the General Reference Module reference below to the Module Tables of the following IODs in Table 1 below that already contain the General Image Module so that the default behavior of these IODs is not changed:

<IOD-specific IE>	...		
	<b>General Reference</b>	<b>C.12.4</b>	<b><u>U</u></b>
	...		

**Table 1: List of IODs containing General Image Module**

Computed Radiography Image IOD
Digital X-Ray Image IOD
Digital Mammography X-Ray Image IOD
Digital Intra-Oral X-Ray Image IOD
Computed Tomography Image IOD
Ultrasound Multi-frame Image IOD
Magnetic Resonance Image IOD
Ultrasound Image IOD
Secondary Capture Image IOD
Multi-frame Single Bit Secondary Capture Image IOD
Multi-frame Grayscale Byte Secondary Capture Image IOD
Multi-frame Grayscale Word Secondary Capture Image IOD
Multi-frame True Color Secondary Capture Image IOD
Nuclear Medicine Image IOD
Parametric Map IOD
Segmentation IOD
Ophthalmic Photography 8 Bit Image IOD
Ophthalmic Photography 16 Bit Image IOD
Wide Field Ophthalmic Photography Stereographic Projection Image IOD
Wide Field Ophthalmic Photography 3D Coordinates Image IOD
Ophthalmic Thickness Map IOD
Positron Emission Tomography Image IOD
RT Image IOD
RT Dose IOD
Corneal Topography Map IOD
VL Endoscopic Image IOD
Video Endoscopic Image IOD
VL Microscopic Image IOD
Video Microscopic Image IOD
VL Slide-coordinates Microscopic Image IOD
VL Photographic Image IOD
Video Photographic Image IOD
VL Whole Slide Microscopy Image IOD
Corneal Topography Map IOD

Add the General Reference Module reference below to the Module Tables of the following IODs in Table 2 below that currently do not support these referencing capabilities.

<IOD-specific IE>	...		
	<b>General Reference</b>	<b>C.12.4</b>	<b><u>U</u></b>
	...		

**Table 2: List of IODs not containing General Image Module**

RT Structure Set IOD
RT Beams Treatment Record IOD
RT Plan IOD
RT Brachy Treatment Record IOD
RT Treatment Summary Record IOD
RT Ion Plan IOD
RT Ion Beams Treatment Record IOD
RT Beams Delivery Instruction IOD
RT Brachy Application Setup Delivery Instruction IOD
Spatial Registration IOD
Spatial Fiducials IOD
Deformable Spatial Registration IOD
Surface Segmentation IOD

*Modify in Part 3 Annex C*

**C.7.6.1. General Image Module**

**Table C.7.6.1  
GENERAL IMAGE MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Description
...			
Acquisition DateTime	(0008,002A)	3	The date and time that the acquisition of data that resulted in this image started. Note The synchronization of this time with an external clock is specified in the Synchronization Module in Acquisition Time Synchronized (0018,1800).
<b>Referenced Image Sequence</b>	<b>(0008,1140)</b>	<b>3</b>	<b>Other images significantly related to this image (e.g., post-localizer CT image or Mammographic biopsy or partial view images). One or more Items are permitted in this sequence.</b>
<b>&gt;Include Table 10-3 'Image SOP Instance Reference Macro Attributes'</b>			

Attribute Name	Tag	Type	Description
>Purpose of Reference Code Sequence	{0040,A170}	3	Describes the purpose for which the reference is made. Only a single Item is permitted in this sequence.
>>Include Table 8.8-1 "Code Sequence Macro Attributes"			Defined CID 7201 "Referenced Image Purposes of Reference".
Derivation Description	{0008,2111}	3	A text description of how this image was derived. See Section C.7.6.1.1.3 for further explanation.
Derivation Code Sequence	{0008,9215}	3	A coded description of how this image was derived. See Section C.7.6.1.1.3 for further explanation. One or more Items are permitted in this Sequence. More than one Item indicates that successive derivation steps have been applied.
>Include Table 8.8-1 "Code Sequence Macro Attributes"			Defined CID 7203 "Image Derivation".
Source Image Sequence	{0008,2112}	3	The set of Image SOP Class/Instance pairs of the Images that were used to derive this Image. One or more Items are permitted in this Sequence. See Section C.7.6.1.1.4 for further explanation.
>Include Table 10-3 'Image SOP Instance Reference Macro Attributes'			
>Purpose of Reference Code Sequence	{0040,A170}	3	Describes the purpose for which the reference is made, that is what role the source image or frame(s) played in the derivation of this image. Only a single Item is permitted in this sequence.
>>Include Table 8.8-1 "Code Sequence Macro Attributes"			Defined CID 7202 "Source Image Purposes of Reference".

Attribute Name	Tag	Type	Description
<del>&gt;Spatial Locations Preserved</del>	<del>(0028,135A)</del>	<del>3</del>	<p><del>The extent to which the spatial locations of all pixels are preserved during the processing of the source image that resulted in the current image</del></p> <p><del>Enumerated Values:</del></p> <p><del>_____ YES</del></p> <p><del>_____ NO</del></p> <p><del>_____ REORIENTED_ONLY</del></p> <p><del>— A projection radiograph that has been flipped, and/or rotated by a multiple of 90 degrees</del></p> <p><del>Note</del></p> <p><del>1. This applies not only to images with a known relationship to a 3D space, but also to projection images. For example, a projection radiograph such as a mammogram that is processed by a point image processing operation such as contrast enhancement, or a smoothing or edge enhancing convolution, would have a value of YES for this attribute. A projection radiograph that had been magnified or warped geometrically would have a value of NO for this attribute. A projection radiograph that has been flipped, and/or rotated by a multiple of 90 degrees, such that transformation of pixel locations is possible by comparison of the values of Patient Orientation (0020,0020) would have a value of REORIENTED_ONLY. This attribute is typically of importance in relating images with Presentation Intent Type (0008,0068) values of FOR PROCESSING and FOR PRESENTATION.</del></p> <p><del>2. When the value of this attribute is NO, it is not possible to locate on the current image any pixel coordinates that are referenced relative to the source image, such as for example, might be required</del></p>

Attribute Name	Tag	Type	Description
<del>&gt;Patient Orientation</del>	<del>(0020,0020)</del>	<del>1C</del>	<del>The Patient Orientation values of the source image. Required if the value of Spatial Locations Preserved (0028,135A) is REORIENTED_ONLY.</del>
Referenced Instance Sequence	(0008,114A)	3	Non-image composite SOP Instances that are significantly related to this Image, including waveforms that may or may not be temporally synchronized with this image.  One or more Items are permitted in this sequence.
<i>&gt;Include Table 10-11 'SOP Instance Reference Macro Attributes'</i>			
<del>&gt;Purpose of Reference Code Sequence</del>	<del>(0040,A170)</del>	<del>1</del>	<del>Code describing the purpose of the reference to the Instance(s). Only a single Item shall be included in this sequence.</del>
<del>&gt;&gt;Include Table 8.8-1 "Code Sequence Macro Attributes"</del>			<del>Defined CID 7004 "Waveform Purposes of Reference" for referenced waveforms.</del>
Images in Acquisition	(0020,1002)	3	Number of images that resulted from this acquisition of data
...			

Add to Part 3 Annex C

#### C.12.4 General Reference Module

Table C.12.4-1 specifies the Attributes that reference source and other related instances and describe the manner of derivation.

Table C.12.4-1  
GENERAL REFERENCE MODULE ATTRIBUTES

Attribute Name	Tag	Type	Description
Referenced Image Sequence	(0008,1140)	3	Other images significantly related to this image (e.g., post-localizer CT image or Mammographic biopsy or partial view images).  One or more Items are permitted in this sequence.
<i>&gt;Include Table 10-3 'Image SOP Instance Reference Macro Attributes'</i>			
>Purpose of Reference Code Sequence	(0040,A170)	3	Describes the purpose for which the reference is made.  Only a single Item is permitted in this sequence.

Attribute Name	Tag	Type	Description
<b>&gt;&gt;Include Table 8.8-1 "Code Sequence Macro Attributes"</b>			<b>Defined CID 7201 "Referenced Image Purposes of Reference".</b>
<b>Referenced Instance Sequence</b>	<b>(0008,114A)</b>	<b>3</b>	<b>Non-image composite SOP Instances that are significantly related to this Image, including waveforms that may or may not be temporally synchronized with this image. One or more Items are permitted in this sequence.</b>
<b>&gt;Include Table 10-11 'SOP Instance Reference Macro Attributes'</b>			
<b>&gt;Purpose of Reference Code Sequence</b>	<b>(0040,A170)</b>	<b>1</b>	<b>Code describing the purpose of the reference to the Instance(s). Only a single Item shall be included in this sequence.</b>
<b>&gt;&gt;Include Table 8.8-1 "Code Sequence Macro Attributes"</b>			<b>Defined CID 7004 "Waveform Purposes of Reference" for referenced waveforms. Defined CID 7022 "Waveform Purposes of Reference" for referenced RT Instances.</b>
<b>Derivation Description</b>	<b>(0008,2111)</b>	<b>3</b>	<b>A text description of how this image was derived. See Section C.7.6.1.1.3 for further explanation.</b>
<b>Derivation Code Sequence</b>	<b>(0008,9215)</b>	<b>3</b>	<b>A coded description of how this image was derived. See Section C.7.6.1.1.3 for further explanation. One or more Items are permitted in this Sequence. More than one Item indicates that successive derivation steps have been applied.</b>
<b>&gt;Include Table 8.8-1 "Code Sequence Macro Attributes"</b>			<b>Defined CID 7203 "Image Derivation".</b>
<b>Source Image Sequence</b>	<b>(0008,2112)</b>	<b>3</b>	<b>The set of Image SOP Class/Instance pairs of the Images that were used to derive this Image. One or more Items are permitted in this Sequence. See Section C.7.6.1.1.4 for further explanation.</b>
<b>&gt;Include Table 10-3 'Image SOP Instance Reference Macro Attributes'</b>			
<b>&gt;Purpose of Reference Code Sequence</b>	<b>(0040,A170)</b>	<b>3</b>	<b>Describes the purpose for which the reference is made, that is what role the source image or frame(s) played in the derivation of this image. Only a single Item is permitted in this sequence.</b>
<b>&gt;&gt;Include Table 8.8-1 "Code Sequence Macro Attributes"</b>			<b>Defined CID 7202 "Source Image Purposes of Reference".</b>

Attribute Name	Tag	Type	Description
<u>&gt;Spatial Locations Preserved</u>	(0028,135A)	3	<p>The extent to which the spatial locations of all pixels are preserved during the processing of the source image that resulted in the current image</p> <p><b>Enumerated Values:</b></p> <p><u>YES</u></p> <p><u>NO</u></p> <p><u>REORIENTED ONLY</u></p> <p><u>A projection radiograph that has been flipped, and/or rotated by a multiple of 90 degrees</u></p> <p><b>Note</b></p> <p>3. <u>This applies not only to images with a known relationship to a 3D space, but also to projection images. For example, a projection radiograph such as a mammogram that is processed by a point image processing operation such as contrast enhancement, or a smoothing or edge enhancing convolution, would have a value of YES for this attribute. A projection radiograph that had been magnified or warped geometrically would have a value of NO for this attribute. A projection radiograph that has been flipped, and/or rotated by a multiple of 90 degrees, such that transformation of pixel locations is possible by comparison of the values of Patient Orientation (0020,0020) would have a value of REORIENTED ONLY. This attribute is typically of importance in relating images with Presentation Intent Type (0008,0068) values of FOR PROCESSING and FOR PRESENTATION.</u></p> <p>4. <u>When the value of this attribute is NO, it is not possible to locate on the current image any pixel coordinates that are referenced relative to the source image, such as for example, might be required</u></p>



<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Description</b>
<b>&gt;Patient Orientation</b>	<b>(0020,0020)</b>	<b>1C</b>	<b>The Patient Orientation values of the source image. Required if the value of Spatial Locations Preserved (0028,135A) is REORIENTED ONLY.</b>
<b>Source Instance Sequence</b>	<b>(0042,0013)</b>	<b>3</b>	<b>The set of non-image composite SOP instances that were used to derive this instance. One or more Items are permitted in this Sequence. See Section C.7.6.1.1.4 for further explanation.</b>
<b>&gt;Include Table 10-11 'SOP Instance Reference Macro Attributes'</b>			
<b>&gt;Purpose of Reference Code Sequence</b>	<b>(0040,A170)</b>	<b>3</b>	<b>Describes the purpose for which the reference is made, that is what role the source instance(s) played in the derivation of this instance. Only a single Item is permitted in this sequence.</b>
<b>&gt;&gt;Include Table 8.8-1 "Code Sequence Macro Attributes"</b>			<b>Defined CID 7013 "Source Instance Purposes of Reference".</b>