

DICOM Correction Proposal

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| STATUS | Letter Ballot |
| Date of Last Update | 2016/05/30 |
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| Submission Date | 2015/09/07 |

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| Correction Number | CP-1559 |
| Log Summary: Reuse reference mechanisms from General Image Module in other contexts | |
| Name of Standard PS3.3 PS3.6 | |
| <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"> 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. 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. 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. 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. <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, a Source Instance Sequence will be added in order to be able to annotate source instances for non-image IODs.</p> | |
| Correction Wording: | |

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| <p><i>Add to Part 3 Annex A</i></p> <p>Add the General Reference Module reference below to the Module Tables of the following IODs that already contain the General Image Module so that the default behavior of these IODs is not changed:</p> <p>CR, CT, MR, NM, US, US MF, SC *, PT, XA, RF, RT Image, DX, MG, IO, VL *, OPM, CM, RTDOSE</p> <p>Add the General Reference Module reference below to the Module Tables of the following IODs that currently do not support these referencing capabilities.</p> |
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RT Structure Set, RT Plan, RT Beams Treatment Record, RT Brachy Treatment Record, RT Treatment Summary Record, RT Ion Plan, RT Ion Beams Treatment Record, RT Beams Delivery Instruction, RT Brachy Delivery Instruction (currently Supplement 184), Spatial Fiducials, Spatial Registration

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|-------------------|--------------------------|------------|----------|
| <IOD-specific IE> | ... | | |
| | General Reference | C.X | U |
| | ... | | |

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). |
| 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>>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. |
| >>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. |

| Attribute Name | Tag | Type | Description |
|---|------------------------|--------------|---|
| 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 |
|--|------------------------|--------------|--|
| >Spatial Locations Preserved | (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>Enumerated Values:</p> <p>_____ YES</p> <p>_____ NO</p> <p>_____ REORIENTED_ONLY</p> <p>— A projection radiograph that has been flipped, and/or rotated by a multiple of 90 degrees</p> <p>Note</p> <p>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.</p> <p>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</p> |

| Attribute Name | Tag | Type | Description |
|--|-------------|------|--|
| >Patient Orientation | (0020,0020) | 1C | The Patient Orientation values of the source image. Required if the value of Spatial Locations Preserved (0028,135A) is REORIENTED_ONLY. |
| 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>>Include Table 10-11 'SOP Instance Reference Macro Attributes'</i> | | | |
| >Purpose of Reference Code Sequence | (0040,A170) | 1 | Code describing the purpose of the reference to the Instance(s). Only a single Item shall be included in this sequence. |
| <i>>>Include Table 8.8-1 "Code Sequence Macro Attributes"</i> | | | <i>Defined CID 7004 "Waveform Purposes of Reference" for referenced waveforms.</i> |
| Images in Acquisition | (0020,1002) | 3 | Number of images that resulted from this acquisition of data |
| ... | | | |

Add to Part 3 Annex C

C.X General Reference Module

Table C.X
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>>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. |

| <u>Attribute Name</u> | <u>Tag</u> | <u>Type</u> | <u>Description</u> |
|---|--------------------|-------------|---|
| >>Include Table 8.8-1 "Code Sequence Macro Attributes" | | | Defined CID 7201 "Referenced Image Purposes of Reference". |
| <u>Referenced Instance Sequence</u> | <u>(0008,114A)</u> | <u>3</u> | <u>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.</u> <u>One or more Items are permitted in this sequence.</u> |
| >Include Table 10-11 'SOP Instance Reference Macro Attributes' | | | |
| <u>>Purpose of Reference Code Sequence</u> | <u>(0040,A170)</u> | <u>1</u> | <u>Code describing the purpose of the reference to the Instance(s).</u> <u>Only a single Item shall be included in this sequence.</u> |
| >>Include Table 8.8-1 "Code Sequence Macro Attributes" | | | Defined CID 7004 "Waveform Purposes of Reference" for referenced waveforms. |
| <u>Derivation Description</u> | <u>(0008,2111)</u> | <u>3</u> | <u>A text description of how this image was derived. See Section C.7.6.1.1.3 for further explanation.</u> |
| <u>Derivation Code Sequence</u> | <u>(0008,9215)</u> | <u>3</u> | <u>A coded description of how this image was derived. See Section C.7.6.1.1.3 for further explanation.</u> <u>One or more Items are permitted in this Sequence. More than one Item indicates that successive derivation steps have been applied.</u> |
| >Include Table 8.8-1 "Code Sequence Macro Attributes" | | | Defined CID 7203 "Image Derivation". |
| <u>Source Image Sequence</u> | <u>(0008,2112)</u> | <u>3</u> | <u>The set of Image SOP Class/Instance pairs of the Images that were used to derive this Image.</u> <u>One or more Items are permitted in this Sequence.</u> <u>See Section C.7.6.1.1.4 for further explanation.</u> |
| >Include Table 10-3 'Image SOP Instance Reference Macro Attributes' | | | |
| <u>>Purpose of Reference Code Sequence</u> | <u>(0040,A170)</u> | <u>3</u> | <u>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.</u> <u>Only a single Item is permitted in this sequence.</u> |
| >>Include Table 8.8-1 "Code Sequence Macro Attributes" | | | Defined CID 7202 "Source Image Purposes of Reference". |

| Attribute Name | Tag | Type | Description |
|--|--------------------|----------|--|
| >Spatial Locations Preserved | (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>Enumerated Values:</p> <p>_____ YES</p> <p>_____ NO</p> <p>_____ REORIENTED ONLY</p> <p><u>A projection radiograph that has been flipped, and/or rotated by a multiple of 90 degrees</u></p> <p>Note</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> |

| Attribute Name | Tag | Type | Description |
|---|--------------------|-------------|--|
| >Patient Orientation | (0020,0020) | 1C | The Patient Orientation values of the source image. Required if the value of Spatial Locations Preserved (0028,135A) is REORIENTED ONLY. |
| Source Instance Sequence | (xxxx,yyyy) | 3 | 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. |
| >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". |

Add to PS 6, chapter 6 Registry of Data Elements

(xxxx,yyyy) Source Instance Sequence SourceInstanceSequence SQ 1