DICOM Correction Proposal

STATUS	Final Text
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Correction Number	CP-2005
Log Summary:	Deformable Registration Codes
Name of Standard:	PS3.16 2020c
Rationale for Correction:	Missing codes for Deformable Registrations and Deformed Images

Correction Wording:

During development of the IHE-RO Deformable Registration in Radiation Oncology (DRRO) profile it has been discovered that some necessary code definitions are missing.

There are two use case of the DRRO profile that requires additional code definitions:

(1) Deformable Registrator Creator requires a specific Registration Type Code Sequence (0070,030D) value defined in BCID 7100 “RCS Registration Method Type”. Known algorithms for Deformable Registration requires a combination of Image Content-based Alignment and Fiducial Alignment. Add definition “Image Content-based Alignment and Fiducial Alignment”.

(2) Image Deformer does not fully express the necessary relations between the image instances and Deformable Registration instance. The result of applying a Deformed Registration to a given source image sets results in a Deformed Image set. This Deformed Image set reference to the source Deformable Registration using the attribute Derivation Code Sequence (0008,9215) of the General Reference Module. This Sequence includes a Code Sequence Macro that shall contain a definition from DCID 7203 “Image Derivation” which is lacking a suitable definition for the Deformed Image use case. Resolve this by adding the definition “Deformed Image” to DCID 7203 “Image Derivation”.

Deformed Images will contain a reference to the Deformable Registration IOD instance in the Source Instance Sequence (0042,0013). This Sequence includes the Purpose of Reference Code Sequence (0040,A170) with DCID 7013 Non-Image Source Instance Purposes of Reference. This CID does not contain a proper value. Add Source Deformable Spatial Registration.

The RT Dose Module contains references Spatial Transform of Dose (3004,0005) and Referenced Spatial Registration Sequence (0070,0404). These could be re-used for Deformed Images if the General Reference is not a good fit.

DICOM PS3.16 - Content Mapping Resource

CID 7013 Non-Image Source Instance Purposes of Reference

Resources: **HTML** | **FHIR JSON** | **FHIR XML** | **IHE SVS XML**
Type: **Extensible**

Version: ~~20170914~~20200920
UID: 1.2.840.10008.6.1.1134

Table CID 7013. Non-Image Source Instance Purposes of Reference

Coding Scheme Designator	Code Value	Code Meaning
DCM	128224	Source measurement
DCM	128225	Source report
DCM	128226	Source raw data
DCM	125028	Source Deformable Spatial Registration
Include CID 7019 "Segmentation Non-Image Source Purposes of Reference"		

CID 7100 RCS Registration Method Type

Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML
Type: Extensible
Version: ~~20040115~~20200920
UID: 1.2.840.10008.6.1.494

Table CID 7100. RCS Registration Method Type

Coding Scheme Designator	Code Value	Code Meaning
DCM	125021	Frame of Reference Identity
DCM	125023	Acquisition Equipment Alignment
DCM	125025	Visual Alignment
DCM	125022	Fiducial Alignment
DCM	125024	Image Content-based Alignment
DCM	125026	Image Content and Fiducial Based Alignment

CID 7203 Image Derivation

Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML
Type: Extensible
Version: ~~20180904~~20200920
UID: 1.2.840.10008.6.1.510

Table CID 7203. Image Derivation

Coding Scheme Designator	Code Value	Code Meaning
DCM	113040	Lossy Compression
DCM	113042	Pixel by pixel addition
DCM	113046	Pixel by pixel division
DCM	113047	Pixel by pixel mask
DCM	113048	Pixel by pixel Maximum
DCM	113049	Pixel by pixel mean
DCM	113050	Metabolite Maps from spectroscopy data
DCM	113051	Pixel by pixel Minimum
DCM	113053	Pixel by pixel multiplication
DCM	113062	Pixel by pixel subtraction

DCM	113072	Multiplanar reformatting
DCM	113073	Curved multiplanar reformatting
DCM	113074	Volume rendering
DCM	113075	Surface rendering
DCM	113076	Segmentation
DCM	113077	Volume editing
DCM	113078	Maximum intensity projection
DCM	113079	Minimum intensity projection
DCM	113085	Spatial resampling
DCM	113086	Edge enhancement
DCM	113087	Smoothing
DCM	113088	Gaussian blur
DCM	113089	Unsharp mask
DCM	113090	Image stitching
DCM	113091	Spatially-related frames extracted from the volume
DCM	113092	Temporally-related frames extracted from the set of volumes
DCM	113097	Multi-energy proportional weighting
DCM	113093	Polar to Rectangular Scan Conversion
DCM	113131	Extraction of individual subject from group
DCM	**125027**	**Deformed for Registration**

DICOM PS 3.16 – Content Mapping Resource, Annex D

ANNEX D DICOM CONTROLLED TERMINOLOGY DEFINITIONS (NORMATIVE)

Code Value	Code Meaning	Definition	Notes
…			
125022	Fiducial Alignment	The registration is based on fiducials that represent patient or specimen features identified in each set of data.	
125023	Acquisition Equipment Alignment	Registration based on a-priori knowledge of the acquisition geometry. This is not an object registration as in fiducial registration. Rather, it specifies a known spatial relationship.	
125024	Image Content-based Alignment	Computed registration based on global image information.	
125026	**Image Content and Fiducial Based Alignment**	**The registration is based on fiducials that represent patient or specimen features identified in each data set in combination with global image information.**	

Code Value	Code Meaning	Definition	Notes
125027	Deformed for Registration	Values are derived by sampling data from a Source Image into a Registered Reference Coordinate System based on a Deformable Spatial Registration Instance.	
125028	Source Deformable Spatial Registration	Deformable Spatial Registration Instance used for image deformation.	