DICOM Correction Proposal

STATUS	Letter Ballot
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Correction Number	CP-2170
Log Summary: Fix inconsistent use of name "Blending Presentation State"	
Name of Standard PS3.3, PS3.4, PS3.17	
Rationale for Correction: The name "Blending Presentation State" (sometimes "Blended Presentation State") is used for both IODs and SOP Classes throughout various parts of the DICOM standard. However, the official names are "Blending Softcopy Presentation State" and "Advanced Blending Presentation State". It is proposed to use the official names consistently, depending on which one is meant. Definitions are introduced for both Presentation State and Blending Presentation State, consistent with the terminology used (but not explicitly defined in) PS3.4.	
Correction Wording:	

3 Definitions

For the purposes of this Standard the following definitions apply.

[…]

3.8 DICOM Information Object

Blending Presentation State   **Information and behavior that may be used to blend two or more sets of images for the purpose of presentation (softcopy display).**

Presentation State   **The information and behavior that may be used to present (softcopy display) images.**

[…]

3.17 Multi-dimensional Definitions

[…]

Volumetric Presentation State (VPS)   A Presentation State that defines a transformation from 3D spatial input data (volume) to 2D spatial output data, with or without affecting other dimensions such as temporal.

A.1.2.3 Series IE

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Presentation States shall be grouped into Series without Images (i.e., in a different Series from the Series containing the Images to which they refer).

Note

The Series containing Grayscale, Color and Pseudo-Color Softcopy Presentation States and the Series containing the Images to which they refer are both contained within the same Study, except for Blend~~eding~~ Presentation States, which may refer to images from different Studies.

Waveforms shall be grouped into Series without Images. A Frame of Reference IE may apply to both Waveform Series and Image Series.

SR Documents shall be grouped into Series without Images. The Frame of Reference IE may apply to SR Document Series, for SR Documents that contain 3D spatial coordinates relative to one or more spatial Frames of Reference, or temporal coordinates that require a temporal Frame of Reference.

Change PS3.3 Section A.75.1

A.75.1 Parametric Map IOD Description

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The Parametric Map IOD encodes one or more parameters as an image. Other Image IODs may be used to encode related information, and Instances of them may be referenced from the Parametric Map, as the source from which a parameter was derived, or some other relationship.

Note

• The Blending **Softcopy** Presentation State IOD **or Advanced Blending Presentation State IOD** may be used to describe how (selected frames of) a Parametric Map Instance may be superimposed on, say, frames of acquired images for anatomical reference encoded as Instances of other Image IODs, as well as the relative opacity and pseudo-color applicable to the overlying frames.

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Change PS3.3 Section C.11.17.1.2

C.11.17.1 Structured Display Image Box Attribute Descriptions

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C.11.17.1.2 Referenced Image Sequence and Referenced Presentation State Sequence

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If images are identified indirectly through the Referenced Presentation State Sequence (0008,9237), all of the image frames identified in the top level Referenced Series Sequence (0008,1115) Attribute shall be displayed. For images identified indirectly through a **SOP Instance of the** Blending **Softcopy** Presentation State **Storage** SOP ~~Instance~~**Class**, all the image frames for which the Blending Position (0070,0405) value is UNDERLYING shall be displayed, with the relevant SUPERIMPOSED images blended as necessary.

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Note

1. Display of images using Blending ~~Softcopy~~ Presentation State must use indirect SOP Instance reference through the Referenced Presentation State Sequence (0008,9237) at the top level of Structured Display Image Box Sequence (0072,0422) Item, and cannot use the Referenced Presentation State Sequence within an Item of the Referenced Image Sequence (0008,1140).

2. A Blending Presentation State that references a blending of a single underlying frame and a single superimposed frame may be associated with a SINGLE Image Box Layout.

3. ...

3.6 DICOM Information Object Definitions

This Part of the Standard makes use of the following terms defined in PS3.3:

Blending Presentation State   **See Blending Presentation State in PS3.3.**

Presentation State   **See Presentation State in PS3.3.**

N Softcopy Presentation State Storage SOP Classes (Normative)

N.1 Overview

N.1.1 Scope

The Softcopy Presentation State Storage SOP Classes extend the functionality of the Storage Service class (defined in Annex B) to add the ability to convey an intended presentation state or record an existing presentation state. The SOP Classes specify the information and behavior that may be used to present (display) images that are referenced from within the SOP Classes.

They include capabilities for specifying:

a.   the output grayscale space in P-Values

b.   the color output space as PCS-Values

c.   grayscale contrast transformations including modality, VOI and presentation LUT

d.   mask subtraction for multi-frame grayscale images

e.   selection of the area of the image to display and whether to rotate or flip it

f.   image and display relative annotations, including graphics, text and overlays

g.   the blending of two image sets into a single presentation

The grayscale softcopy ~~p~~Presentation ~~s~~State **Storage SOP Classes** refer~~s~~ to the grayscale image transformations that are to be applied in an explicitly defined manner to convert the stored image pixel data values in a Composite Image Instance to presentation values (P-Values) when an image is displayed on a softcopy device. The P-Values are in a device independent perceptually linear space that is formally defined in PS3.14 Grayscale Standard Display Function.

The color and pseudo-color softcopy ~~p~~Presentation ~~s~~State~~s~~ **Storage SOP Classes** refer to the color image transformations that are to be applied in an explicitly defined manner to convert the stored image pixel data values in a Composite Image Instance to Profile Connection Space values (PCS-Values) when an image is displayed on a softcopy device. The PCS-Values are in a device independent space that is formally defined in the ICC Profiles as CIEXYZ or CIELab values.

The blending **softcopy and advanced blending** presentation state~~s~~ **Storage SOP Classes** specify two **(or more)** sets of images, an underlying set, and a superimposed set, and the manner in which their pixel values are blended. The underlying set is rendered as grayscale and the superimposed set is rendered as color. The blending is not defined in a pair wise image-by-image or frame-by-frame manner, but rather the manner in which the two sets are combined is

left to the discretion of the implementation. Specifically, matters of spatial registration, and any re-sampling and the mechanism of interpolation are not specified.

The Ssoftcopy Presentation State Storage SOP Classes may be used to store a single state per image, or a common state to be shared by multiple selected images. All images to which the Grayscale, Color and Pseudo-Color Presentation States **Storage SOP Classes** apply must be a part of the same study that the stored state is a part of, and be of a single Composite Image Storage SOP Class.

The two sets of images to which the Blendeding **Softcopy and Advanced Blending** Presentation State **Storage SOP Classes** appliesy may be in separate Studies,. Each set shall be within a single study. Each set shall be of a single Composite Image Storage SOP Class.

How an SCU of this SOP Class records or generates this state is beyond the scope of the Standard.

[…]

Change PS3.4 Section N.2.2.1

N.2.2 Color Transformations

N.2.2.1 Profile Connection Space Transformation

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An ICC Profile is always present in a Color, Pseudo-Color or Blendeding Presentation State. If an ICC Profile is present in the Image then the Presentation State ICC Profile shall be used instead of the Image ICC Profile.

Change PS3.4 Section N.2.4.2

N.2.4.2 Superimposed Image Pixels

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The Palette Color LUT used is that encoded in the Blendeding Presentation State; any Palette Color LUTs or Supplemental Palette Color LUTs in the image instances are ignored.

Change PS3.4 Section N.2.6

N.2.6 Advanced Blending Transformations

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The Eequal blending mode blends two or more inputs where for each pixel location the opacity is calculated as 1.0 divided by the number of non-padding pixels. The result pixel blends all non-padding pixels using the calculated opacity.

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Change PS3.4 Section N.3

N.3 Behavior of an SCP

In addition to the behavior for the Storage Service Class specified in Section B.2.2 Behavior of an SCP, the following additional requirements are specified for the Softcopy Presentation State Storage SOP Classes:

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Note

Though it is not required, a display device acting as an SCP of the Blending Softcopy Presentation State Storage SOP Class **or the Advanced Blending Presentation State Storage SOP Class** may support the Spatial Registration Storage SOP Class in order to transform one Frame of Reference into another or to explicitly identify the relationship between members of two sets of images, and may be able to resample underlying and superimposed sets of images that differ from each other in orientation and in-plane and between-plane spatial resolution.

Change PS3.17 Section NNN.3

NNN.3 Corneal Topography Examples

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Corneal curvature calculations are accomplished with three different methods that provide corneal powers. The axial power map, shown in Figure NNN.3-2, is most useful clinically for routine diagnostic use as the method of calculation presents corneal topography maps that match the transitions known for corneal shape-the cornea is relatively steep in its central area, flattening toward the periphery. This figure shows an example where the map is superimposed over the source image based upon the corneal vertex Frame of Reference. ~~The~~ **A** Blending Presentation State **~~SOP Class~~** may be used to specify this superimposed processing.