# Digital Imaging and Communications in Medicine (DICOM)

*Supplement 189: Parametrical Blending Presentation State Storage*

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# DOCUMENT HISTORY

| Document Version | Date | Content |
|---|---|---|
| 01 | 17-Feb-2015 | Initial Draft |
| 04 | 05-May-2015 | Updated with more definitions and first set of parameters with specific values. |
| 06 | 21-July-2015 | Cleanup accepted items. |
| 07 | 15-Sept-2015 | Version after F2F, updated name and got supplement number (189) from WG06 |
| 08 | 13-Oct-2015 | Update for tcon, start to incorporate WG06 feedback |
| 09 | 14-Oct-2015 | Start of Blending object definition |
| 10 | 19-Nov-2015 | |
| 13 | 13-July-2016 | Update to remove Color and restrict introduction to content and no longer full overview of fMRI |
| 14 | 08-Sept-2016 | Update for PC discussion |
| 15 | 09-Sept-2016 | Update for PC discussion |
| 16 | 11-Sept-2016 | Clean up before WG06 |
| 17 | 09-Nov-2016 | Finalized example. |
| 18 | 11-Nov-2016 | Incorporate viewing pipeline and blending images. |
| 19 (PC) | 10-Dec-2016 | Public Comment version after review by WG06 |

## Scope and Field

This IOD describes how to blend multiple Parametric maps together with optional other images with a consistent color presentation.

Parametric Maps can be used to store the quantification of a specific measurement. The Parametric Blending Presentation State is defining the blending of the content of the different Parametric Maps with an optional anatomical image as underlay, showing the measurements (like BOLD fMRI, Diffusion parameter maps, CT/MRI Perfusion parameter maps, FDG PET map) in relation to the anatomical structure. Blending can be performed on any combination of Images.

The Supplement defines information that is needed to combine the different maps and show the combination. This way the user will be able to relate different items together, giving the opportunity to get a full overview instead of seeing every single item in isolation.

Displayed Area and Graphic modules are included to allow the user to add graphical information, for example, marking the Motor Cortex on the combined image.

The usage is described by using an example of an fMRI study in a new chapter in PS 17 as Informative Annex.

The usage of Color in the Parametric Map was added through CP 1584.

## OPEN ISSUES

| | |
|---|---|
| 1 | Is it enough that Spatial registration is present to align images even if they have the same Frame of Reference? The Spatial Registration is used to correct movement that is only captured after analysis? |
| 2 | We have specified the RGB values for a padding pixel as (0,0,0), do we need to remove this explicit choice? |
| 3 | What would be the expected behavior when a series contains multiple “time” points each specifying the same spatial volume? |
| 4 | Shall we restrict the inputs to single volumetric data? |
| 5 | Do we need to specify the result geometry as the difference in spatial resolution might result in different output if we don’t specify the result slices? |
| 6 | Do we need to specify relationship between input images and to what degree we get the same results after blending?<br>The current description the receiving application to examine number of slices, orientation, slice thickness etc. to determine what pixels should be blended and the output slices. |
| 7 | We proposed to match the blending to the specified input series do we need to specify it further? |

## CLOSED ISSUES

| | |
|---|---|
| 2 | The blending operation might also be used for other areas than the Functional MRI. Should we make it generic or focus on Functional MRI. The real world value mapping already makes it already generic in nature.<br>Closed as name is now Parametric Blending Presentation State Blending. |
| | |

## DICOM PS 3.2 Conformance

**Item: Add SOP Class to Table A.1-2**

**Table A.1-2**
**UID VALUES**

| UID Value | UID NAME | Category |
|---|---|---|
| … | | |
| **XXX** | **Parametric Blending Presentation State Storage** | **Transfer** |

| | | |
|---|---|---|
| … | | |

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# DICOM PS 3.3: Information Object Definitions

**Item: Add in Section A.1.4, rows and column to Table A.1-6**

## A.1.4 Overview of the Composite IOD Module Content

| IODs<br>Modules | **Parametric Blending Presentation State** |
|---|---|
| Patient | **M** |
| Specimen | **U** |
| Clinical Trial Subject | **U** |
| General Study | **M** |
| Patient Study | **U** |
| Clinical Trial Study | **U** |
| General Series | M |
| Clinical Trial Series | **U** |
| Presentation Series | **M** |
| Clinical Trial Series | |
| Frame of Reference | **M** |
| General Equipment | **M** |
| Enhanced General Equipment | **M** |
| Presentation State Identification | **M** |
| **Parametric Blending Presentation State** | **M** |
| **Parametric Blending Presentation State Display Module** | **M** |
| Displayed Area | **U** |
| Graphic Annotation | **U** |
| Spatial Transformation | **C** |
| Graphic Layer | **C** |
| Graphic Group | **U** |

| | |
|---|---|
| ICC Profile | **M** |
| Common Instance Reference | **M** |
| SOP Common | **M** |

**Item: Add in the following new section in Annex A**

## A.X PARAMETRIC BLENDING PRESENTATION STATE IOD

### A.X.1 Parametric Blending Presentation State IOD Description

The Parametric Blending Presentation State Information Object Definition (IOD) specifies information that may be used to blend two or more sets of images that are referenced from within the IOD for the purpose of presentation (display).

It includes capabilities for specifying:

a. output color space in PCS-Values
b. optional thresholds to restrict contributing areas of a Parametric Map
c. definition of blending control values for the different Parametric Maps
d. selection of the area of the blended images to display and whether to rotate or flip it
e. image and display relative annotations, including graphics, text and overlays

### A.X.2 Parametric Blending Presentation State IOD Entity-Relationship Model

The E-R Model in Section A.1.2 depicts those components of the DICOM Information Model that directly reference the Parametric Blending Presentation State IOD.

### A.X.3 Parametric Blending Presentation State IOD Module Table

**Table A.X-1. Parametric Blending Presentation State IOD Modules**

| IE | Module | Reference | Usage |
|---|---|---|---|
| Patient | Patient | C.7.1.1 | M |
| | Specimen | C.7.1.2 | U |
| | Clinical Trial Subject | C.7.1.3 | U |
| Study | General Study | C.7.2.1 | M |
| | Patient Study | C.7.2.2 | U |
| | Clinical Trial Study | C.7.2.3 | U |
| Series | General Series | C.7.3.1 | M |
| | Presentation Series | C.11.9 | M |
| | Clinical Trial Series | C.7.3.2 | U |
| Frame of Reference | Frame of Reference | C.7.4.1 | M |
| Equipment | General Equipment | C.7.5.1 | M |
| | Enhanced General Equipment | C.7.5.2 | M |
| Presentation State | Presentation State Identification | C.11.10 | M |

| | | | |
|---|---|---|---|
| | Parametric Blending Presentation State | C.11.x1 | M |
| | Parametric Blending Presentation State Display Module | C.11.x2 | M |
| | Displayed Area | C.10.4 | U |
| | Graphic Annotation | C.10.5 | U |
| | Spatial Transformation | C.10.6 | C - Required if rotation or flipping are to be applied |
| | Graphic Layer | C.10.7 | C - Required if Graphic Annotation Module is present |
| | Graphic Group | C.10.11 | U |
| | ICC Profile | C.11.15 | M |
| | Common Instance Reference | C.12.2 | M |
| | SOP Common | C.12.1 | M |

**Item: Add the following new sections in PS 3.3 C.11**

## C.11.X1 Parametric Blending Presentation State Module

### C.11.X1.1 Parametric Blending Presentation State Module Attributes

Table C.11.X1-1 contains Attributes that describe the identification of an optional set of images, one or more sets of parametric maps, optionally one or more sets of registration objects and the color and thresholds to be applied to them, for the purpose of blending.

**Table C.11.X1-1. Parametric Blending Presentation State Module Attributes**

| Attribute Name | Tag | Type | Attribute Description |
|---|---|---|---|
| Parametric Blending Sequence | (0070,xxx1) | 1 | A Sequence of Items identifying the images and describing transformations of them.<br><br>At least one Item shall be included in this Sequence.<br><br>See Section C.11.X1.1.1. |
| >Parametric Blending Input Number | (0070,xxx2) | 1 | Identification number of the input. Values shall be ordinal numbers starting from 1 and monotonically increasing by 1 within the Parametric Blending Presentation State instance. |
| >Study Instance UID | (0020,000D) | 1 | Unique identifier for the Study. |
| >Series Instance UID | (0020,000E) | 1 | Unique identifier of a Series that is part of the Study defined by the Study |

| Attribute Name | Tag | Type | Attribute Description |
|---|---|---|---|
| | | | Instance UID (0020,000D) |
| >Referenced Image Sequence | (0008,1140) | 1C | The set of images comprising this input series. One or more items shall be included in this sequence.<br>Required if a subset of the series is used. |
| *>>Include 'Image SOP Instance Reference Macro' Table 10-3* | | | |
| >Referenced Spatial Registration Sequence | (0070,0404) | 1C | A reference to a Spatial Registration Instance that is used to register the referenced inputs.<br>Only one item shall be included in this sequence.<br><br>Required if the Frame of Reference UID (0020,0052) value of the Images referenced by the Referenced Image Sequence (0008,1140) of this item does not match the Frame of Reference UID (0020,0052) value of this Presentation State instance. May be present otherwise. |
| *>> Include Table C.17-3 "Hierarchical SOP Instance Reference Macro Attributes"* | | | |
| *>Include Table C.11.X1.1-1 "Threshold Sequence Macro Attributes"* | | | |

| Attribute Name | Tag | Type | Attribute Description |
|---|---|---|---|
| >Time Series Blending | (0070,xxx7) | 1C | Identifying the Series as a time series where every time point shall be blended will all other series.<br><br>ENUMERATED:<br>TRUE All time points in the Time Series shall be blended<br>FALSE Otherwise<br><br>Only a single item may have the value TRUE<br><br>Required if the Series is a Time Series and all time points need to be blended with the other Series. May be present otherwise |
| >Geometry for Display | (0070,xxx8) | 1C | Identifying that the Geometry of the Series shall be used as Geometry for display.<br><br>ENUMERATED:<br>TRUE The geometry of this Series shall be used during the blending operation.<br>FALSE Otherwise<br><br>Only a single item may have the value TRUE<br><br>Required if the geometry of this Series shall be used as geometry for the blending operation. May be present otherwise. |

### C.11.X1.1.1 Parametric Blending Sequence

The sets of images and any subset of the frames therein, in the case of multi-frame images, are identified by Study, Series, SOP Instance and Frame Number.

The output frames resolution etc. shall match those of blending input number 1.

If all inputs do not have the same frames resolution etc. the application chooses the appropriate pixels to be blended. This implies that the blending result may vary between different applications. If consistent blending results are desired the inputs should be resampled in advance such that they have the same frames resolution etc.

This module specifies no explicit relationship (such as pairing or ordering) between the sets of images and frames defined in the sequence elements. This module does not define how the images are spatially related, and what re-sampling, if any, needs to be performed before the images are blended for rendering.

It is expected that blending takes place between pixels at the same position in space.

Note

1. The images in the image sets may share the same Frame of Reference, in which case the rendering application can spatially relate the image sets based on their Image Position (Patient) (0020,0032) and Image Orientation (Patient) (0020,0037) Attributes.

   Alternatively, Spatial Registration SOP Instance(s) may exist that relates either two or more different Frames of Reference, or two or more sets of images that share the same Frame of Reference.

   While the image sets may already be spatially co-registered and oriented in the same plane, or even be sampled at the same in-plane and between-plane resolution, this will frequently not be the case.

   See PS3.4 for behavioral requirements that apply to Storage SOP Classes using this Module.

2. The underlying image for a superimposed Segmentation image need not be the source image for the segmentation.

3. If a spatial registration object is defined it shall be used for presentation and alignment of the data even if the Frame of Reference is the same, as small corrections might have taken place during post-processing.

### C.11.X1.1.2 Threshold Sequence Macro

The Threshold Sequence is defining the values of the image that are used versus ignored.

**Table C.11.X1.1-1**
**THRESHOLD SEQUENCE MACRO ATTRIBUTES**

| Attribute Name | Tag | Type | Attribute Description |
|---|---|---|---|
| Threshold Sequence | (xxy1,yyy1) | 1C | Threshold specification for the image<br>Zero or more Items are permitted in this Sequence.<br>Required if Threshold needs to be applied |
| >Threshold Value Sequence | (xxy1,yyy2) | 1 | Value(s) used as boundary for the threshold |
| >>Threshold Value | (xxy1,yyy4) | 1 | If the Threshold Type (xxy1,yyy3) is GREATER_OR_EQUAL,LESS_OR_EQUAL, GREATER_THAN or LESS_THAN only a single Item shall be included in this Sequence.<br>If the Threshold Type (xxy1,yyy3) is RANGE_INCL or RANGE_EXCL, exactly two Items shall be included in this Sequence, the first of which is less than or equal to the second.<br>Note: VR of Threshold Value is FD and if this is different than the VR of the pixels then it needs format conversion. |

| | | | |
|---|---|---|---|
| >Threshold Type | (xxy1,yyy3) | 1 | Describes how the value(s) specified by the Threshold (xxy1,yyy2) shall be used to determine the presence of the pixel value<br>See C.11.X2.1.<br>Enumerated Values:<br>RANGE_INCL<br>RANGE_EXCL<br>GREATER_OR_EQUAL<br>LESS_OR_EQUAL<br>GREATER_THAN<br>LESS_THAN |

#### C.11.X1.1.2.1 Threshold

The Threshold Type defines the pixel values that will be shown versus the ones that are ignored. Values that are not inside any of the specified Threshold items shall be treated as padding pixels.

To describe a Threshold that consists of more than one range, multiple items are specified in the Threshold sequence.

When more than one item is specified in the Threshold Sequence (xxy1,yyy1) the union of the different ranges shall be used to determine whether the pixel shall be treated as a padding pixel.

The number of values in the Threshold Value Sequence (xxy1,yyy2) and the use of those values depends on the value of the Threshold Type (xxy1,yyy3) as follows:

| | |
|---|---|
| RANGE_INCL | a pixel value shall be used when the value lies between the specified values or is equal to one of the specified values. Two items shall be present in the Threshold Value Sequence (xxy1,yyy2) |
| RANGE_EXCL | a pixel value shall be used when the value lies outside (i.e. not between) the specified values. Two items shall be present in the Threshold Value Sequence (xxy1,yyy2) |
| GREATER_OR_EQUAL | a pixel value shall be used when the value is greater than or equal to the specified value. One item shall be present in the Threshold Value Sequence (xxy1,yyy2). |
| LESS_OR_EQUAL | a pixel value shall be used when the value is less than or equal to the specified value. One item shall be present in the Threshold Value Sequence (xxy1,yyy2). |
| GREATER_THAN | a pixel value shall be used when the value is greater than the specified value. One item shall be present in the Threshold Value Sequence (xxy1,yyy2). |
| LESS_THAN | a pixel value shall be used when the value is less than the specified value. One item shall be present in the Threshold Value Sequence (xxy1,yyy2). |

### C.11.x2. Parametric Blending Presentation State Display Module

The Parametric Blending Presentation State Display Module is describing the input series and the method used for each blending step.

**Table C.11.X2.1-1**
**PARAMETRIC BLENDING PRESENTATION STATE DISPLAY MODULE ATTRIBUTES**

| Attribute Name | Tag | Type | Attribute Description |
|---|---|---|---|
| Pixel Presentation | (0008,9205) | 1 | Grayscale or color space of the Presentation State output.<br>Enumerated Values:<br>TRUE_COLOR<br>Output consists of PCS-Values |
| Parametric Blending Display Sequence | (0070,xxx4) | 1 | Item defining method of blending and the used input series. The order of items is significant. Each item results in a single RGB output that may be reused in a following step.<br>One or more items shall be included in this sequence. |
| >Parametric Blending Display Input Sequence | (0070,xxx3) | 1 | Each item is an input series that will be used in the blending operation.<br>The order of items is significant<br>Two items shall be included if the blending mode is FOREGROUND.<br>One or more items shall be included if the blending mode is EQUALLY. |
| >>Parametric Blending Input Number | (0070,xxx2) | 1 | Identification number of the input series to which the Blending information must be applied. |
| >Alpha Value | (0070,xxx5) | 1C | Specifies alpha value for the visible pixels of the set referenced by the first Parametric Blending Input Number (0070,xxx2)<br>Required if Blending mode is equal to FOREGROUND |
| >Blending Mode | (0070,xxx6) | 1 | Specifies the way the result sets are blended:<br>Enumerated values:<br>EQUALLY<br>FOREGROUND<br><br>See section C.11.x2.1 |
| >Parametric Blending Input Number | (0070,xxx2) | 1C | Identification of the result as input for a subsequent blending operation.<br>Required if the result is used for further Blending |

### C.11.x2.1 Blending Mode

Blending Mode (0070,xxx6) describes the method for weighting the different input images during the
185 blending operation.

FOREGROUND: the result image blends the image referenced by the first item with an alpha of Alpha Value (0070,xxx5) and the image referenced by the second item with an alpha of (1 - Alpha Value (0070,xxx5)).

Padding pixels in either image are given an alpha of zero and shall get the value 0 for R, G and B.

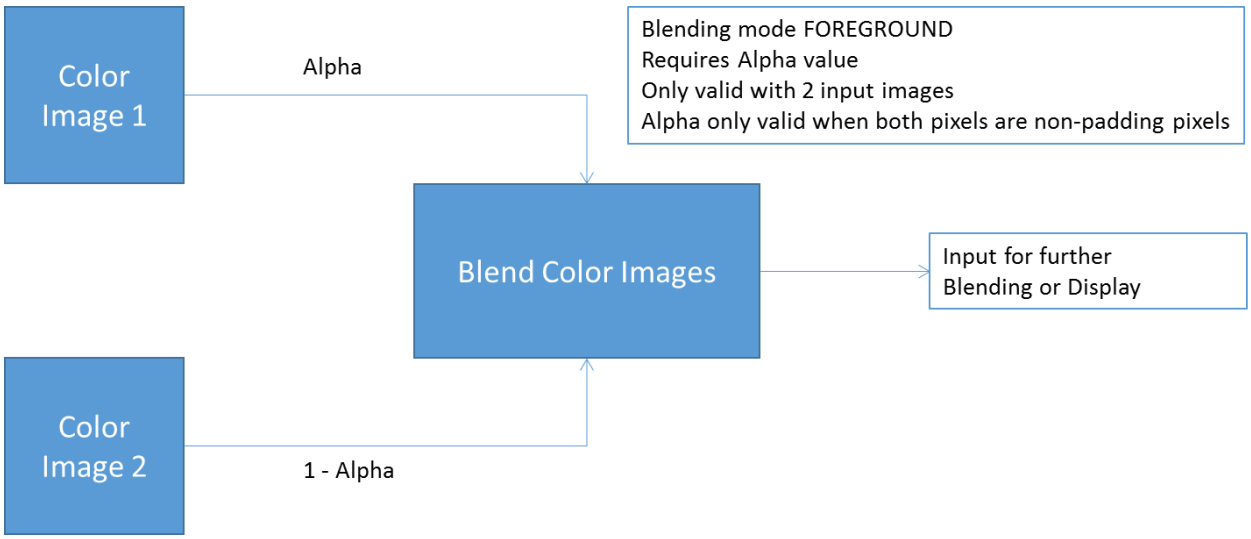


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Figure C.11.x3-1 FOREGROUND blending mode

EQUALLY: For each pixel location, alpha is 1.0 divided by the number of non-padding pixels. The result image blends all non-padding pixels using that alpha.

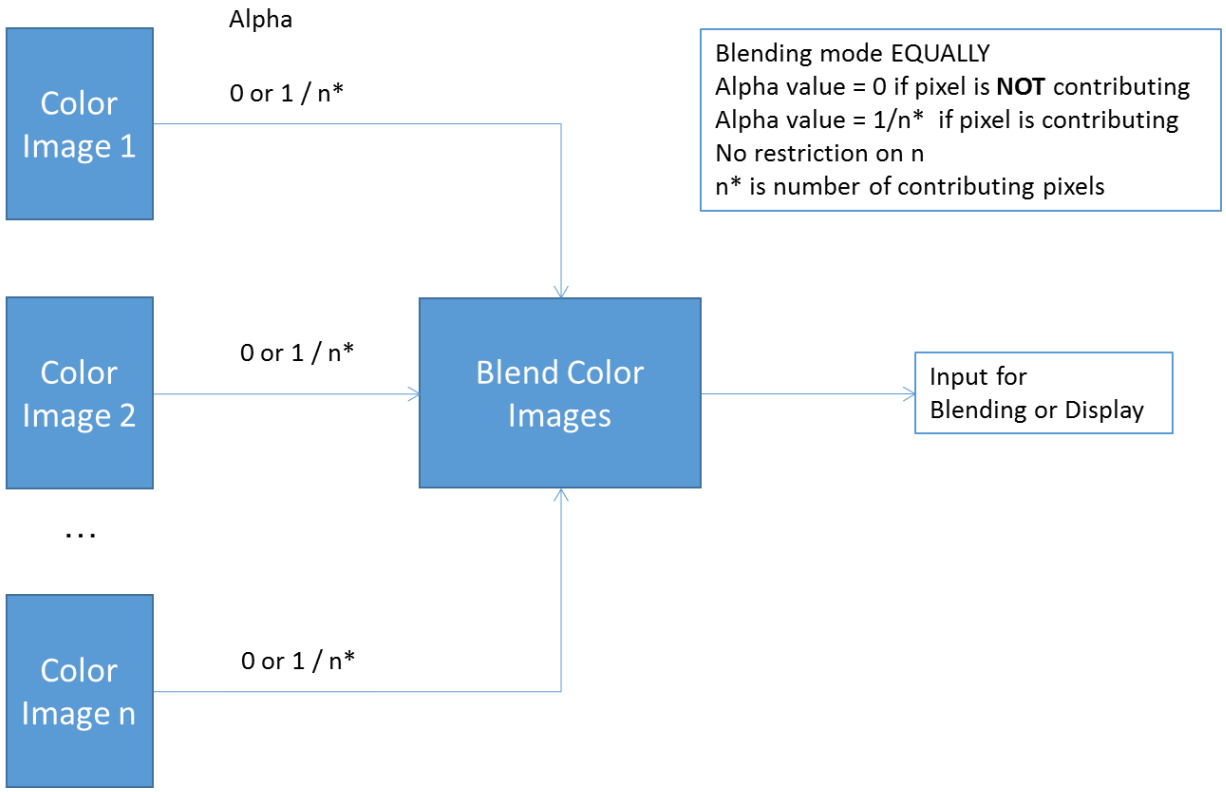

**Figure C.11.x3-2 EQUALLY blending mode**

## DICOM PS3.4: Service Class Specifications

**Amend DICOM PS 3.4 Annex B.5 Standard SOP Classes as follows:**

### Table B.5-1. Standard SOP Classes

| SOP Class Name | SOP Class UID | IOD Specification (defined in PS3.3) |
|---|---|---|
| … | … | … |
| XA/XRF Grayscale Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.5 | XA/XRF Grayscale Softcopy Presentation State IOD |
| **Parametric Blending Presentation State Storage** | **1.2.840.10008.5.1.4.1.1.11.x** | **Parametric Blending Presentation State IOD** |
| … | … | … |

**Amend DICOM PS 3.4 Annex I.4 Media Storage Standard SOP Classes as follows:**

### Table I.4-1. Media Storage Standard SOP Classes

| SOP Class Name | SOP Class UID | IOD Specification (defined in PS3.3) |
|---|---|---|
| … | … | … |
| XA/XRF Grayscale Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.5 | XA/XRF Grayscale Softcopy Presentation State IOD |
| **Parametric Blending Presentation State Storage** | **1.2.840.10008.5.1.4.1.1.11.x** | **Parametric Blending Presentation State IOD** |
| … | … | … |

# DICOM PS 3.6: Data Dictionary

210 Amend DICOM PS 3.6 – Data Dictionary – Section 6 Registry of DICOM Data Elements as follows:

## Table 6-1. Registry of DICOM Data Elements

| Tag | Name | Keyword | VR | VM | |
|---|---|---|---|---|---|
| **(0070,xxx1)** | **Parametric Blending Sequence** | **ParametricBlendingSequence** | **SQ** | **1** | |
| **(0070,xxx2)** | **Parametric Blending Input Number** | **ParametricBlendingInputNumber** | **IS** | **1** | |
| **(0070,xxx3)** | **Parametric Blending Display Input Sequence** | **ParametricBlendingDisplayInputSequence** | **SQ** | **1** | |
| **(0070,xxx4)** | **Parametric Blending Display Sequence** | **ParametricBlendingDisplaySequence** | **SQ** | **1** | |
| **(0070,xxx5)** | **Alpha Value** | **AlphaValue** | **FD** | **1** | |
| **(0070,xxx6)** | **Blending Mode** | **BlendingMode** | **CS** | **1** | |
| **(0070,xxx7)** | **Time Series Blending** | **TimeSeriesBlending** | **CS** | **1** | |
| **(0070,xxx8)** | **Geometry for Display** | **GeometryForDisplay** | **CS** | **1** | |
| **(xxy1,yyy1)** | **Threshold Sequence** | **ThresholdSequence** | **SQ** | **1** | |
| **(xxy1,yyy2)** | **Threshold Value Sequence** | **ThresholdValueSequence** | **SQ** | **1** | |
| **(xxy1,yyy3)** | **Threshold Type** | **ThresholdType** | **CS** | **1** | |
| **(xxy1,yyy4)** | **Threshold Value** | **ThresholdValue** | **FD** | **1** | |

## DICOM PS 3.17: Explanatory Information

**Item: Add the following Section**

**XX Parametric Blending Presentation State Storage Encoding Example (Informative)**

This section illustrates the usage of the Parametric Blending Presentation State for a functional MRI study.

# XX.1 Introduction

Quantitative imaging provides measurements of physical properties, in vivo and non-invasively, for research and clinical practice. DICOM support for parametric maps provides a structure for organizing these results as an extension of the already widely-used imaging standard. The addition of color LUT support for parametric maps bridges the gap between data handling and visualization.

An example of quantitative imaging in clinical practice today is the use of MRI, PET and other modalities in brain mapping for diagnostic assessment in pre-treatment planning for tumor, epilepsy, arterio-venous malformations (AVMs) and other conditions. MR Diffusion tensor imaging (DTI) results in fractional anisotropy (FA) and other parametric maps highlighting white matter structures. Task-based functional MRI (fMRI) highlights specific areas of eloquent cortex (gray matter) as expressed in statistical activation maps. Other parameters and modalities including perfusion, MR spectroscopy, and PET are often employed to locate and characterize lesions by means of their hyper- and hypo-metabolism and – perfusion in parametric maps.

The visualization of multiple parametric maps and sources of anatomical information in the same space requires the tools to highlight areas of interest (and hide irrelevant areas) in parametric maps. Two important tools provided in this supplement are thresholding of parametric maps by their real-world values, and blending of multiple image data sets in a single view.

In this example the series 2 to 5 have a lower resolution and are expected to be resampled to have the same resolution as series 1 as this is identified as series to be used for target Geometry.

# XX.2 Example (Informative)

The example describes the blending of five series:

Series 1 the anatomical series which is stored as single volume in an Enhanced MR Image object having no Color LUT attached. The Image will be displayed with an alpha value of 0.7

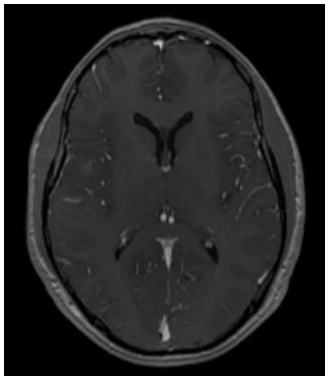

**Figure XX.2-1 Anatomical image**

Series 2 the DTI series which is stored as an Enhanced MR Color Image object means that no RGB transformation is needed. The Image will be displayed with an alpha value of 1 – 0.7.

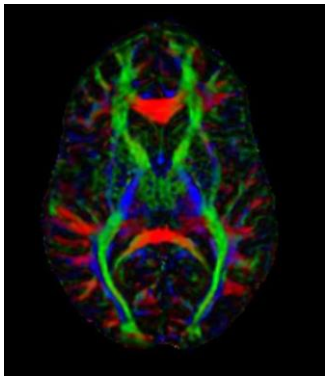

**Figure XX.2-2 DTI image**

Series 3 is Reading task captured in a Parametric Map with Color LUT Winter attached to it. The Image will be displayed with threshold range 6% to 50%. Opacity will be equal divided with the other two task maps.

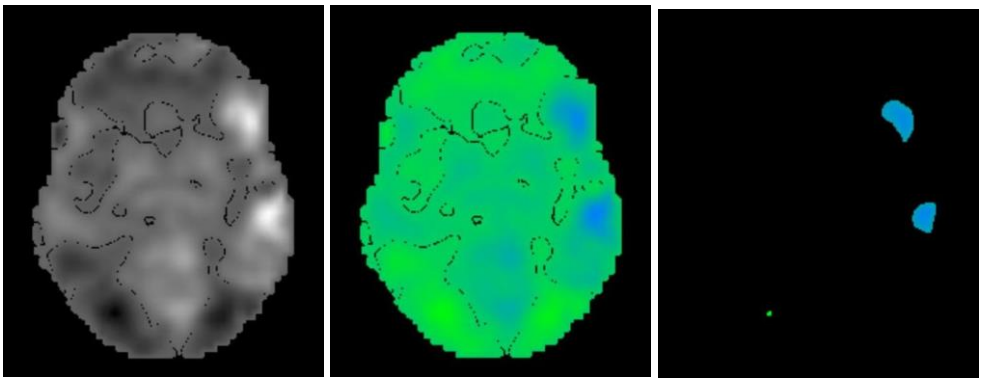

**Figure XX.2-3 Reading task image with coloring and threshold applied**

Series 4 is Listening task captured in a Parametric Map with Color LUT Fall attached to it. The Image will be displayed with threshold range 9% to 60%. Opacity will be equal divided with the other two task maps.

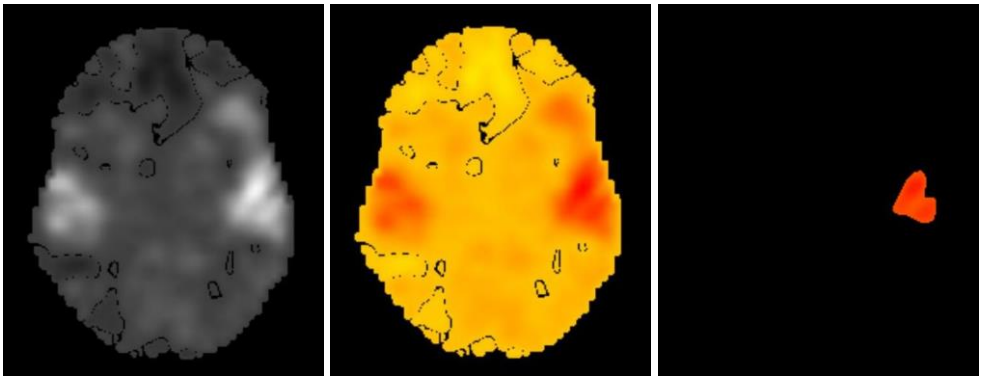

**Figure XX.2-4 Listening task image with coloring and threshold applied**

Series 5 is Silent word generation task captured in a Parametric Map with Color LUT Spring attached to it. The Image will be displayed with threshold range 7% to 75%. Opacity will be equal divided with the other two task maps.

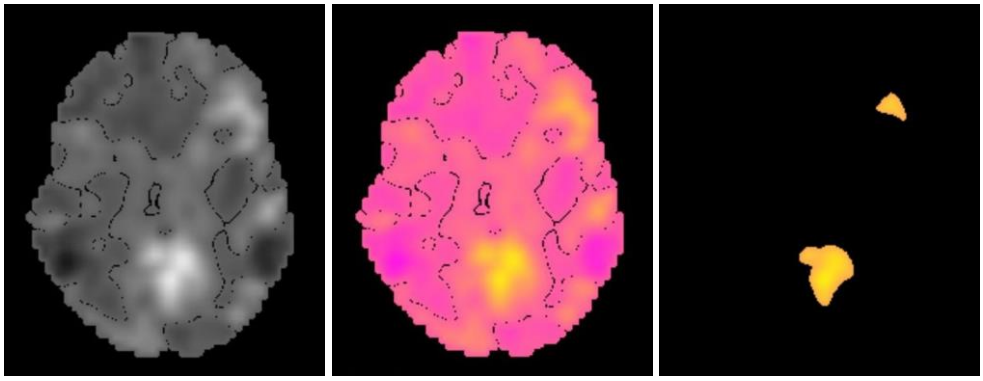

**Figure XX.2-5 Silent word generation task image with coloring and threshold applied**

The result of the first blending operation (FOREGROUND) will be blended with the result of the second blending operation (EQUALLY) through a FOREGROUND blending operation with an alpha value of 0.6.

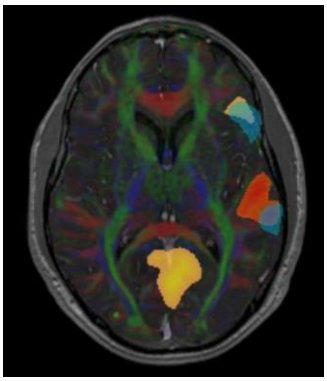

**Figure XX.2-6 Blended result**

Figure XX.2-6 shows the final result with information of patient and different blended image layers. The overlay of the patient and layer information is not described in the object but would be application specific behavior.

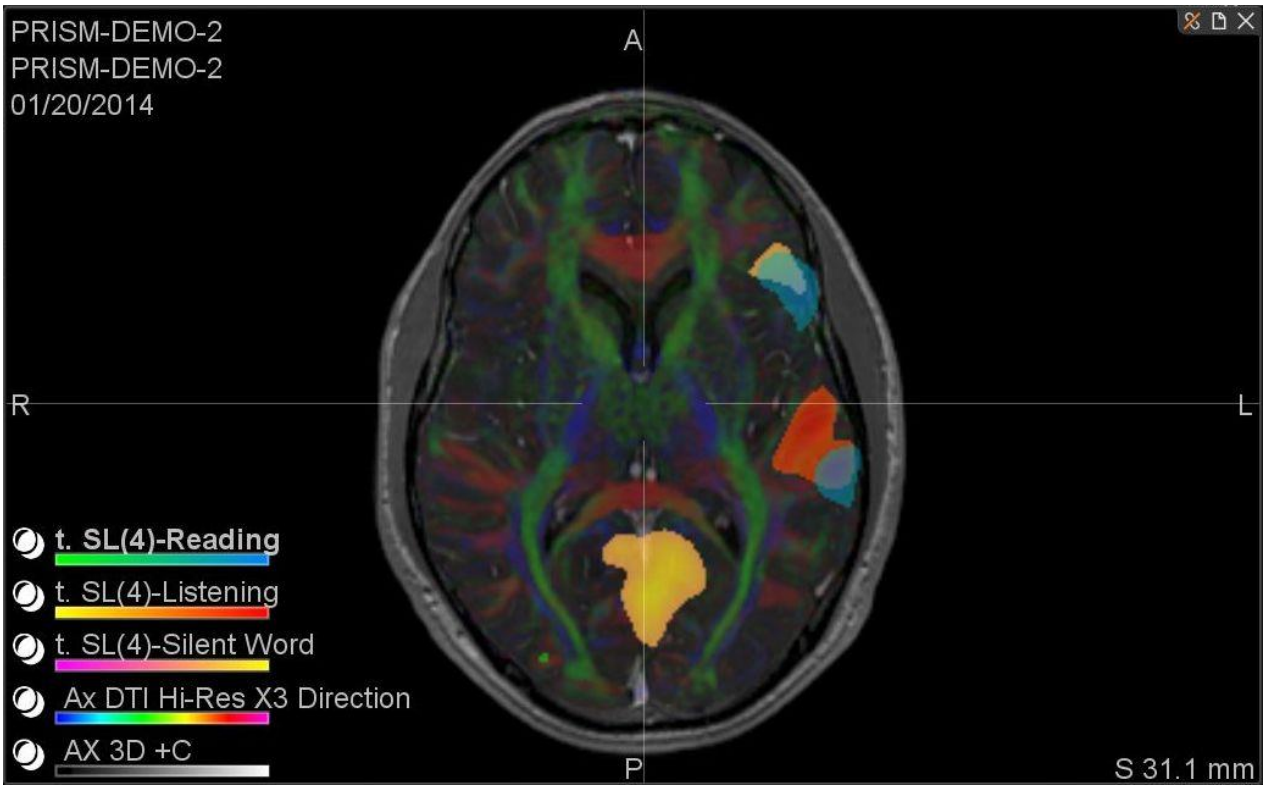


**Figure XX.2-6 Blended result with Patient and Series information**

## XX.3 Encoding example (Informative)

| Attribute Name | Tag | Value | Comment |
|---|---|---|---|
| Parametric Blending Sequence | (0070,xxx1) | | |
| **Sequence Item 1** | | | Identifies Anatomical Series, no subset of series or registration |
| >Parametric Blending Input Number | (0070,xxx2) | "1" | |
| >Study Instance UID | (0020,000D) | "1.3.46.670589.11.3" | |
| >Series Instance UID | (0020,000E) | "1.3.46.670589.11.3.45" | |
| >Geometry for Display | (0070,xxx8) | TRUE | Series geometry shall be used as target geometry for the blending operation |
| **End Sequence item 1** | | | |

| Attribute Name | Tag | Value | Comment |
|---|---|---|---|
| **Sequence Item 2** | | | Identifies DTI Series, no subset of series is used, no registration present |
| >Parametric Blending Input Number | (0070,xxx2) | “2” | |
| >Study Instance UID | (0020,000D) | “1.3.46.670589.11.3” | |
| >Series Instance UID | (0020,000E) | “1.3.46.670589.11.3.49” | |
| > Geometry for Display | (0070,xxx8) | FALSE | Series geometry shall not be used as target geometry for the blending operation |

| Attribute Name | Tag | Value | Comment |
|---|---|---|---|
| **End Sequence item 2** | | | |
| **Sequence Item 3** | | | Identifies first Parametric map, no registration |
| >Parametric Blending Input Number | (0070,xxx2) | “3” | |
| >Study Instance UID | (0020,000D) | “1.3.46.670589.11.3” | |
| >Series Instance UID | (0020,000E) | “1.3.46.670589.11.3.56” | |
| >Threshold Sequence | (xxy1,yyy1) | | |
| >Sequence Item 3-1 | | | |
| >>Threshold Value Sequence | (xxy1,yyy2) | | |
| >>Sequence Item 3-1-1 | | | |
| >>> Threshold Value | (xxx1,yyy4) | 6 | First threshold value |
| >> End Sequence Item 3-1-1 | | | |
| >>Sequence Item 3-1-2 | | | |
| >>>Threshold Value | (xxy1,yyy4) | 50 | Second threshold value |
| >>End Sequence Item 3-1-2 | | | |
| >>Threshold Type | (xxy1,yyy3) | RANGE_INCL | |
| >End Sequence Item 3-1 | | | |
| **End Sequence item 3** | | | |
| **Sequence Item 4** | | | Identifies second Parametric map, no registration |
| >Parametric Blending Input Number | (0070,xxx2) | “3” | |
| >Study Instance UID | (0020,000D) | “1.3.46.670589.11.3” | |
| >Series Instance UID | (0020,000E) | “1.3.46.670589.11.3.58” | |
| >Threshold Sequence | (xxy1,yyy1) | | |
| >Sequence Item 4-1 | | | |
| >>Threshold Value Sequence | (xxy1,yyy2) | | |
| >>>Sequence Item 4-1-1 | | | |
| >>>Threshold Value | (xxy1,yyy4) | 9 | First threshold value |
| >>End Sequence Item 4-1-1 | | | |
| >>Sequence Item 4-1-2 | | | |

| Attribute Name | Tag | Value | Comment |
|---|---|---|---|
| >>>Threshold Value | (xxy1,yyy4) | 60 | Second threshold value |
| >>End Sequence Item 4-1-2 | | | |
| >>Threshold Type | (xxy1,yyy3) | RANGE_INCL | |
| >End Sequence 4-1 | | | |
| **End Sequence item 4** | | | |
| **Sequence Item 5** | | | Identifies third Parametric map, no registration |
| >Parametric Blending Input Number | (0070,xxx2) | “3” | |
| >Study Instance UID | (0020,000D) | “1.3.46.670589.11.3” | |
| >Series Instance UID | (0020,000E) | “1.3.46.670589.11.3.59” | |
| >Threshold Sequence | (xxy1,yyy1) | | |
| >Sequence Item 5-1 | | | |
| >>Threshold Value Sequence | (xxy1,yyy2) | | |
| >>Sequence Item 5-1-1 | | | |
| >>>Threshold Value | (xxy1,yyy4) | 7 | First threshold value |
| >>End Sequence Item 5-1-1 | | | |
| >>Sequence Item 5-1-2 | | | |
| >>>Threshold Value | (xxy1,yyy4) | 75 | Second threshold value |
| >>End Sequence Item 5-1-2 | | | |
| >>Threshold Type | (xxy1,yyy3) | RANGE_INCL | |
| >End Sequence Item 5-1 | | | |
| > End Sequence Item 2-3 | | | |
| **End Sequence item 5** | | | |
| Pixel Presentation | (0008,9205) | “TRUE_COLOR” | |
| Parametric Blending Display Sequence | (0070,xxx4) | | |
| **Sequence Item 1** | | | |
| >Parametric Blending Display Input Sequence | (0070,xxx3) | | |
| **>Sequence Item 1-1** | | | Anatomical series, no threshold |
| >>Parametric Blending Input Number | (0070,xxx2) | “1” | |

| Attribute Name | Tag | Value | Comment |
|---|---|---|---|
| **>End Sequence Item 1-1** | | | |
| **>Sequence Item 1-2** | | | DTI series, no threshold |
| >>Parametric Blending Input Number | (0070,xxx2) | “2” | |
| **>End Sequence Item 1-2** | | | |
| >Alpha Value | (0070,xxx5) | 0.7 | |
| >Blending Mode | (0070,xxx6) | FOREGROUND | |
| >Parametric Blending Input Number | (0070,xxx2) | “6” | Output is used for later Blending |
| **End Sequence item 1** | | | |
| **Sequence Item 2** | | | |
| > Parametric Blending Display Input Sequence | (0070,xxx3) | | |
| **>Sequence Item 2-1** | | | Parametric series 1 |
| >>Parametric Blending Input Number | (0070,xxx2) | “3” | |
| **>End Sequence Item 2-1** | | | |
| **>Sequence Item 2-2** | | | Parametric series 2 |
| >>Parametric Blending Input Number | (0070,xxx2) | “4” | |
| **>End Sequence Item 2-2** | | | |
| **>Sequence Item 2-3** | | | Parametric series 3 |
| >>Parametric Blending Input Number | (0070,xxx2) | “5” | |
| >End Sequence Item 2-3 | | | |
| >Blending Mode | (0070,xxx6) | EQUALLY | |
| >Parametric Blending Input Number | (0070,xxx2) | “7” | Output is used for later Blending |
| **End Sequence item 2** | | | |
| **Sequence Item 3** | | | |
| > Parametric Blending Display Input Sequence | (0070,xxx3) | | |
| **> Sequence Item 3-1** | | | Output first blending operation, no threshold |
| >> Parametric Blending Input Number | (0070,xxx2) | “6” | |

| Attribute Name | Tag | Value | Comment |
|---|---|---|---|
| **> End Sequence Item 3-1** | | | |
| **> Sequence Item 3-2** | | | Output second blending operation, no threshold |
| >> Parametric Blending Input Number | (0070,xxx2) | “7” | |
| **> End Sequence Item 3-2** | | | |
| >Alpha Value | (0070,xxx5) | 0.6 | |
| Blending Mode | (0070,xxx6) | FOREGROUND | |
| **End Sequence item 3** | | | |