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8	Correction Number CP-2474	
9	Log Summary: Add more standard color spaces	
10	Name of Standard	
11	PS3.3, PS3.18	
12	Rationale for Correction:	
13	There is value in using standard color spaces with a wider gamut than others currently defined, such as Display-P3.	
14	See also http://en.wikipedia.org/wiki/DCI-P3 for a discussion between the relationship of Display-P3 and DCI-P3 .	
15	Correction Wording:	

Amend DICOM PS3.3 and PS3.18 to add new reference as follows (changes to existing text are bold and underlined for additions and ~~struckthrough~~ for removals):

2 Normative References

[IEC 61966-2.1] IEC. 1999. Ed 1.0. *Multimedia systems and equipment - colour measurement and management - Part 2.1: colour management - Default RGB colour space - sRGB*.

[ISO 22028-2] ISO. 2013. *Photography and graphic technology - Extended colour encodings for digital image storage, manipulation and interchange - Part 2: Reference output medium metric RGB colour image encoding (ROMM RGB)*. http://www.iso.org/iso/catalogue_detail.htm?csnumber=56591 .

[Adobe RGB] Adobe Systems Incorporated. 1998. 2005-05. *Adobe RGB (1998) Color Image Encoding*. <http://www.adobe.com/digitalimag/pdfs/AdobeRGB1998.pdf> .

[Display-P3] Apple, Inc. Display P3 Color Encoding. <http://www.color.org/chardata/rgb/DisplayP3.xalter> .

[SMPTE RP 431-2:2011] Society of Motion Picture and Television Engineers (SMPTE). 2011. D-Cinema Quality — Reference Projector and Environment. <http://pub.smpte.org/latest/rp431-2/rp0431-2-2011.pdf> .

[DCI DCSS] Digital Cinema Initiatives, LLC. (DCI). May 29, 2024. Digital Cinema System Specification. <http://www.dcimovies.com/dci-specification> .

Amend DICOM PS3.3 as follows (changes to existing text are bold and underlined for additions and ~~struckthrough~~ for removals):

C.11.15 ICC Profile Module

Table C.11.15-1. ICC Profile Module Attributes

Attribute Name	Tag	Type	Attribute Description
ICC Profile	(0028,2000)	1	An ICC Profile encoding the transformation of device-dependent color stored pixel values into PCS-Values.
Color Space	(0028,2002)	3	A label that identifies the well-known color space of the image. Shall be consistent with any ICC Profile (0028,2000) that is also present. See Section C.11.15.1.2.

C.11.15.1 ICC Profile Module Attribute Descriptions

C.11.15.1.1 ICC Profile

...

C.11.15.1.2 Color Space

The Color Space Attribute provides a label that identifies the color space by name, when the ICC Profile (0028, 2000) (if present) describes a well-known color space.

Defined Terms:

SRGB ICC Profile (0028,2000) defines sRGB color space [IEC 61966-2.1]

ADOBERGB ICC Profile (0028,2000) defines Adobe RGB color space [Adobe RGB]

ROMMRGB ICC Profile (0028,2000) defines ROMM RGB color space [ISO 22028-2]

DISPLAYP3 ICC Profile (0028,2000) defines Display-P3 color space [Display-P3]

Note

The Display-P3 color space is similar to but not the same as DCI-P3 color space (defined in [SMPTE RP 431-2:2011]). Display-P3 uses the sRGB transfer function whereas DCI-P3 uses a gamma of 2.6 for the transfer function, and a different white point (D65 vs D63). The reason for using Display-P3 in DICOM rather than DCI-P3 is because web browser technology has native support for it, whereas DCI-P3 was designed for digital cinema applications [DCI DCSS].

Amend DICOM PS3.18 as follows (changes to existing text are bold and underlined for additions and ~~struckthrough~~ for removals):

8.3.5.1 Query Parameters for Rendered Resources

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Table 8.3.5-1. Retrieve Rendered Query Parameters

Key	Values	Target Resource Category	Section
...			
iccprofile	"no", "yes", "srgb", "adobergb" or , "rommrgb", <u>or display3</u>	Image (single or multi-frame) or Video	8.3.5.1.5

8.3.5.1.5 ICC Profile

The "iccprofile" parameter specifies the color characteristics of, and inclusion of an ICC Profile in, the rendered images. It has the following syntax:

```
%s"iccprofile=" 1#( %s"no" / %s"yes" / %s"srgb" / %s"adobergb" / %s"rommrgb" / %s"display3" )
```

Where

"no"	indicates that no ICC profile shall be present in the rendered image in the response.
"yes"	indicates that an ICC profile shall be present in the rendered image in the response, describing its color characteristics, if the Media Type supports embedded ICC Profiles.
"srgb"	indicates that an sRGB ICC profile shall be present in the image, if the Media Type supports embedded ICC Profiles, and that the pixels of the rendered image in the response shall be transformed from their original color space and be encoded in the sRGB color space [IEC 61966-2.1].
"adobergb"	indicates that an Adobe RGB ICC profile shall be present in the image, if the Media Type supports embedded ICC Profiles, and that the pixels of the rendered image in the response shall be transformed from their original color space and be encoded in the Adobe RGB color space [Adobe RGB].
"rommrgb"	indicates that a ROMM RGB ICC profile shall be present in the image, if the Media Type supports embedded ICC Profiles, and that the pixels of the rendered image in the response shall be transformed from their original color space and encoded in the ROMM RGB color space [ISO 22028-2].
<u>"display3"</u>	<u>indicates that a Display-P3 ICC profile shall be present in the image, if the Media Type supports embedded ICC Profiles, and that the pixels of the rendered image in the response shall be transformed from their original color space and encoded in the Display-P3 color space [Display-P3]</u>

When this parameter is not present:

- an ICC profile may or may not be present in the image in the response;
- the color characteristics of the image in the response may or may not be consistent with any DICOM ICC Profile (0028,2000) Attribute in the metadata.

The ICC Profile in the image in the response shall be:

- 1 • the ICC profile of the color space specified explicitly by the parameter,
- 2 • otherwise, the ICC profile encoded in the source DICOM ICC Profile (0028,2000) Attribute, if any, appropriate to the selected frame,
- 3 • otherwise, the ICC profile, if any, embedded in the stored compressed representation of the selected frame,
- 4 • otherwise, at the discretion of the origin server, the ICC profile of a well-known color space listed in Section C.11.15.1.2 "Color
- 5 Space" in PS3.3 that is appropriate to the type and source of the image.

6 If the Media Type does not support embedded ICC Profiles:

- 7 • a 400 Bad Request error shall be returned if the parameter value is other than "no"

8 **Note**

- 9 1. This parameter allows ICC profile information to be present in the image in the response so that the user agent can
10 make use of it for local color management (e.g., an ICC profile capable browser can apply the profile when displaying
11 the rendered image in the response).
- 12 2. This parameter provides a limited mechanism for requesting that the origin server perform some color management. It
13 provides the names of well-known color spaces for the rendered image in the response. It does not provide a mechanism
14 to supply an arbitrary ICC profile, such as the calibration profile of a display, so it does not absolve the user agent from
15 the need to handle its own color calibration and color management.
- 16 3. ICC profiles can theoretically be large relative to the compressed pixel data of a single frame, so the user agent may
17 specify a parameter value of "no", retrieve the DICOM ICC Profile (0028,2000) Attribute value(s) that apply to multiple
18 frames from the metadata, and combine these itself.
- 19 4. ICC profiles are embedded in rendered images of Media Type image/jpeg as one or more chunks in APP2 marker
20 segments with an identifier of "ICC_PROFILE", as defined in Annex B of ???.
- 21 5. ICC profiles are embedded in rendered images of Media Type image/jp2 either as JP2 Restricted or JPX Full profiles
22 according to ??? and ???, respectively; rendered images in the response are not subject to the prohibition against inclusion
23 of a JP2 box in JPEG 2000 compressed data streams in DICOM images.
- 24 6. ICC profiles are embedded in rendered images of Media Type image/png in an iCCP chunk, as defined in ???.