DICOM Correction Proposal

STATUS	Letter Ballot
Date of Last Update	2024/03/21
Person Assigned	Steve Nichols (steven.nichols@ge.com)
Submitter Name	Jim Philbin on behalf of WG-27
Submission Date	2019/09/08

Correction Number	CP-1978
Log Summary: Restore presentation state retrieval to PS3.18	
Name of Standard

PS3.18 | |
| Rationale for Correction:

Supplement 183 inadvertently omitted behavior specified for rendering Presentation States. This behavior applies to both the URI and Studies Service. See 2018e for omitted text (http://dicom.nema.org/medical/dicom/2018e/output/chtml/part18/sect_6.5.8.2.html)

This CP restores the omitted text to PS3.18 Section 8 (Common Aspects of DICOM Web Services). Other Presentation State rendering behaviors common the URI and Studies Service are moved from Section 9 (URI Service) to Section 8 for consistency.

This CP also includes enhancements (highlighted in blue) that limit rendering of objects controlling the display of images (i.e., Presentation State, Segmentation Object, etc.…) to one at time for more predictable response payloads. | |
| Correction Wording: | |

Update PS3.18 Section 8.7.4 as follows:

8.7.4 Rendered Media Types

DICOM Instances may be converted by a rendering process into non-DICOM Media Types. This can be useful to display or process them using non-DICOM software, such as browsers.

For example, an Instance containing:

1. an image could be rendered into the image/jpeg, or image/png, or image/gif Rendered Media Types.
2. a multi-frame image in a lossless Transfer Syntax could be rendered into a video/mpeg or video/mp4 or video/H265 Rendered Media Type.
3. a Structured Report could be rendered into a text/html, text/plain, or application/pdf Rendered Media Type.

Note
Rendered Media Types are usually consumer format media types. Some of the same non-DICOM Media Types are also used as Bulkdata Media Types, that is, for encoding Bulkdata extracted from Encapsulated Pixel Data (used with compressed Transfer Syntaxes), without applying a rendering process. See *Section 8.7.3.3*.

~~Rendered images shall contain no more than 8 bits per channel.~~

The rendering of Presentation States is specified in Section 8.3.5.1.

Origin servers shall support rendering Instances of different Resource Categories into Rendered Media Types as specified in Table 8.7.4-1.

Table 8.7.4-1. Rendered Media Types by Resource Category

Category	Media Type	URI	RESTful
Single Frame Image	image/jpeg	D	D
	image/gif	O	R
	image/png	O	R
	image/jp2	O	O
Multi-frame Image	image/gif	O	O
Video	video/mpeg	O	O
	video/mp4	O	O
	video/H265	O	O
Text	text/html	D	D
	text/plain	R	R
	text/xml	O	R
	text/rtf	O	O
	application/pdf	O	O

22

23 When an image/jpeg media type is returned, the image shall be encoded using the JPEG baseline lossy 8-bit
24 Huffman encoded non-hierarchical non-sequential process defined in [ISO/IEC 10918-1].

25 The origin server may support additional Rendered Media Types, which shall be documented in the Conformance
26 Statement and, if the service supports it, the Retrieve Capabilities response.

27 A Transfer Syntax media type parameter is not permitted for Rendered Media Types.

28 Update PS3.18 Section 8.3.5.1 as follows:

29 8.3.5.1 Query Parameters ~~F~~for Rendered Resources

30 The Query Parameters defined in this section specify various rendering transformations to be applied to the DICOM
31 images, video, and text contained in the parent DICOM Resource.

32 The following rules pertain to all parameters defined in this section:

33 1. All parameters are optional for the user agent.

34 2. Not all parameters are required to be supported by the origin server.

35 3. These parameters apply to **Single Frame Image, Multi-Frame Image, Video and Text** resources. **See Section**
36 **8.7.2** ~~that are images and video~~.

37 The set of transformations specified by the parameters in this section shall be applied to the images as if the
38 parameters were a Presentation State~~, that is, in the order specified by the applicable image rendering pipeline~~
39 ~~specified in PS3.4~~. **The origin server determines the presentation of other objects controlling the display of**
40 **images, such as Structured Reports or Segmentation Objects.**

41 *Editorial Note: This text is from current 9.5.2*

42 **Presentation State transformations are applied using the appropriate rendering pipeline specified in Section**
43 **N.2 "Pixel Transformation Sequence" in PS3.4. Any Source Image Region parameters are applied after any**
44 **Presentation State parameters. Any Viewport parameters are applied after any Source Image Region.**

45 **Even if the output of the image is defined in P-Values (grayscale values intended for display on a device**
46 **calibrated to the DICOM Grayscale Standard Display Function PS3.14), or contains an ICC profile, the**
47 **grayscale or color space for the rendered image is not defined by this Standard.**

48 Table 8.3.5-1 shows the Query Parameters that may be used when requesting a Rendered Representation.

49 **Table 8.3.5-1. Retrieve Rendered Query Parameters**

Key	Values	Target Resource Category	Section
accept	Rendered Media Type	All Categories	8.3.3.1
annotation	"patient" and/or "technique"	Image (single or multi-frame) or Video	8.3.5.1.1
charset	character set token	All Categories	8.3.3.2
quality	uint	Image (single or multi-frame) or Video	8.3.5.1.2
viewport	vw, vh, [sx, sy, sw, sh]	Non-Presentation States	8.3.5.1.3
viewport	vw, vh,	Presentation States	8.3.5.1.3
window	center, width, shape	Non-Presentation States	8.3.5.1.4
iccprofile	"no", "yes", "srgb", "adobergb" or "rommrgb"	Image (single or multi-frame) or Video	8.3.5.1.5

50

51 Insert the following as PS3.18 Section 8.3.5.1.6:

52 **8.3.5.1.6 Presentation State Behavior**

53

54 *Editorial Note: This text is taken from 2018e 6.5.8.2. Behavior*

55 If a target resource is a single Presentation State Instance, that instance may contain references to one or more
56 series, each of which may contain one or more instances, each of which may contain one or more frames. The
57 response shall return rendered versions of all supported Instances and frames referenced by the Presentation State
58 Instance.

59 For example, if the Presentation State instance:

60 • references a multi-frame image, without referencing specific frames, then the response will contain all
61 frames specified by the target resource,
62 • or references a series, then the response will contain all instances contained in that series.

63 If the Presentation State Instance contains a Blending Sequence, then the rendered images in the response shall
64 correspond to the frames of the input that have a Blending Sequence Item with a Blending Position (0070,0405) value
65 of UNDERLYING. See Section C.11.14.1.1 "Blending Sequence" in PS3.3 .

66 The origin server shall render all of the images referenced by the Presentation State in an Acceptable Media Type
67 using the rendering pipeline specified in PS3.4 Section N.2.

68 If there is more than one frame in the response they shall be ordered according to the following criteria:

69 • first by Dimension Index Values (0020,9157) attribute, if present,
70 • then by Image Position (Patient) (0020,0032) attribute, if present,
71 • then by Image Position Volume (0020,9301), if present,
72 • then by Order of the instance references in the Presentation State.

73 If the above does not fully specify the ordering of the frames, then the origin server shall resolve any remaining
74 ambiguity in the ordering.

75 *Editorial Note: This text is from current 9.5.2.3*

76 If the target resource is a Presentation State and if the Presentation Size Mode is SCALE TO FIT or TRUE SIZE,
77 then the displayed area specified in the Presentation State shall be scaled, maintaining the aspect ratio, to fit the
78 size specified by the rows and columns parameters if present, otherwise the displayed area selected in the
79 presentation state will be returned without scaling.

80 *Note*

81 *1. The intent of the TRUE SIZE mode in the presentation state cannot be satisfied, since the physical size
82 of the pixels displayed by the web browser is unlikely to be known. If the Presentation Size Mode in the
83 presentation state is MAGNIFY, then the displayed area specified in the presentation shall be magnified*

84 (scaled) as specified in the presentation state. It will then be cropped to fit the size specified by the
85 viewport parameters, if present.

86 2. Any Displayed Area relative annotations specified in the presentation state are rendered relative to the
87 Specified Displayed Area within the presentation state, not the size of the returned image.

88 Though the output of the Presentation State is defined in DICOM to be in P-Values (grayscale values intended for
89 display on a device calibrated to the DICOM Grayscale Standard Display Function PS3.14), the grayscale for the
90 rendered images is not defined by this Standard.

91 If the Presentation State contains the ICC Profile Module, the image(s) in the response shall include the ICC Profile
92 as specified in Section 8.3.5.1.5.

93 The origin server shall reject the request if any of the following are true:

94 • Windowing parameters (Window Center and Window Width) are present,

95 • the Frame Number parameter is present,

96 • the Presentation Series UID does not correspond to an existing Presentation Series on the origin server, or

97 • the Presentation UID does not correspond to an existing Presentation Instance on the origin server

98 the origin server shall return a 400 (Bad Request) response and may include a payload containing an appropriate error
99 message.
100

101 *Update PS3.18 Section 9.5.2 as follows:*

102 **9.5.2 Behavior**

103 **The Target Resource shall be rendered as specified in Section 8.3.5.1.**

104 A success response shall contain the Target Resource in an Acceptable Rendered Media Type. See Section 8.7.4.

105 ~~The Target Resource shall be rendered and returned as specified in the Query Parameters. Presentation State~~
106 ~~transformations are applied using the appropriate rendering pipeline specified in Section N.2 "Pixel~~
107 ~~Transformation Sequence" in PS3.4. Any Source Image Region parameters are applied after any Presentation~~
108 ~~State parameters. Any Viewport parameters are applied after any Source Image Region.~~

109 ~~Even if the output of the image is defined in P-Values (grayscale values intended for display on a device~~
110 ~~calibrated to the DICOM Grayscale Standard Display Function PS3.14), or contains an ICC profile, the grayscale~~
111 ~~or color space for the rendered image is not defined by this Standard.~~
112

113 *Update PS3.18 Section 9.5.2.3 as follows:*

114 **9.5.2.3 Presentation State**

115 ~~If the Target Resource is a Presentation State and If the Presentation Size Mode is SCALE TO FIT or TRUE~~
116 ~~SIZE, then the displayed area specified in the Presentation State shall be scaled, maintaining the aspect ratio,~~
117 ~~to fit the size specified by the rows and columns parameters if present, otherwise the displayed area selected~~
118 ~~in the presentation state will be returned without scaling.~~

119 ~~Note~~

120 ~~1. The intent of the TRUE SIZE mode in the presentation state cannot be satisfied, since the physical~~
121 ~~size of the pixels displayed by the web browser is unlikely to be known. If the Presentation Size~~
122 ~~Mode in the presentation state is MAGNIFY, then the displayed area specified in the presentation~~
123 ~~shall be magnified (scaled) as specified in the presentation state. It will then be cropped to fit the~~
124 ~~size specified by the viewport parameters, if present.~~
125 ~~2. Any Displayed Area relative annotations specified in the presentation state are rendered relative to~~
126 ~~the Specified Displayed Area within the presentation state, not the size of the returned image.~~

127 ~~Though the output of the presentation state is defined in DICOM to be in P-Values (grayscale values intended~~
128 ~~for display on a device calibrated to the DICOM Grayscale Standard Display Function PS3.14), the grayscale~~
129 ~~or color space for the images returned by the request is not defined by this standard.~~

130 ~~However, if any of the following are true:~~

131 ~~• the Frame Number or Windowing parameters are present,~~

132 ~~• the Presentation Series UID does not correspond to an existing Presentation Series on the origin server, or~~

133 ~~• the Presentation UID does not correspond to an existing Presentation Instance on the origin server~~

134 ~~the origin server shall return a 400 (Bad Request) response and may include a payload containing an~~
135 ~~appropriate error message.~~

136 **See Section 8.3.5.1.6.**

137
138 *Update PS3.18 Section 10.4.3.3.3 as follows:*

139 **10.4.3.3.3 Rendered Resource Payload**

140 The payload for a Rendered Resource (see Section 10.4.1.1.3) shall contain a rendering of all valid Instances of the
141 Composite SOP classes for which conformance is claimed, e.g., origin server shall be able to render all Photometric
142 Interpretations that are defined in the IOD for that SOP class. The content type of the response payload shall be a
143 Rendered Media Type **as specified in Section 8.3.5.1**.