

DICOM Correction Proposal Form

Tracking Information - Administration Use Only	
Correction Proposal Number	CP 156
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Correction Number: CP 156	
Log Summary: Clarify Image Pixel Attributes for Compressed Transfer Syntaxes-Clarify Photometric Interpretation for RLE and JPEG Transfer Syntax	
Type of Modification	Name of Standard
Clarification	DICOM Standard - 1998
<p>Rationale for Correction:</p> <p>The existing DICOM Standard states that for compressed image data the image object's "Data Elements ... shall contain values which are consistent with the characteristics of the uncompressed pixel data ..." (PS3.5 8.2.1 and 8.2.2 – 1998). This makes it vague for cases where image data is converted from one photometric interpretation to another prior to the compression step in order to enhance the compression ratio. For example, in the case where RGB data is converted to YBR FULL 422 data prior to JPEG or RLE compression should the Data Elements indicate the state of the RGB data or of the YBR FULL 422 data.</p> <p>The correct approach should be that the Data Elements indicate the <u>last-actual</u> state of the <u>compressed data stream</u>image data prior to the compression step. This will allow proper decompression <u>and interpretation of the decompressed output</u> in cases where only the DICOM Data Elements indicate the state of the compressed image data.</p>	
<p>Sections of document affected:</p> <p>PS3.3 - 1998 PS3.5 - 1998</p>	

Correction Wording:

~~Add this to~~ Amend the last paragraph of PS3.5- Section 8.2.1- JPEG IMAGE COMPRESSION as follows:

The use of the DICOM Encapsulated Format to support JPEG Compressed Pixel Data ~~implies~~ **requires** that the Data Elements which are related to the ~~Native Format~~ Pixel Data encoding (e.g. **Photometric Interpretation, Number of Samples, Planar Configuration, Bits Allocated, Bits Stored, High Bit, Pixel Representation, Rows, Columns, etc.**) shall contain values which are consistent with the characteristics of the ~~uncompressed pixel data from which the compressed Data Stream was derived.~~ The Pixel Data characteristics included in the JPEG Interchange Format shall be used to decode the compressed data stream.

Notes: 1. These requirements were formerly specified in terms of the "uncompressed pixel data from which the compressed Data Stream was derived". However, since the form of the "original" uncompressed data stream could vary between different implementations, this requirement is now specified in terms of consistency with what is encapsulated.

When decompressing, should the characteristics explicitly specified in the compressed data stream (e.g. spatial subsampling or number of components or planar configuration) be inconsistent with those specified in the DICOM Data Elements, those explicitly specified in the compressed data stream should be used to control the decompression. The DICOM data elements, if inconsistent, can be regarded as suggestions as to the form in which an uncompressed data set might be encoded.

2. Those characteristics not explicitly specified in the compressed data stream (e.g. color space which is not specified in the JPEG Interchange Format), or implied by the definition of the compression scheme (e.g. always unsigned in JPEG), can therefore be determined from the DICOM Data Element in the enclosing data set. For example a Photometric Interpretation of "YBR FULL 422" would describe the color space that is commonly used to lossy compress images using JPEG. It is unusual to use an RGB color space for lossy compression, since no advantage is taken of correlation between the red, green and blue components (e.g. of luminance), and poor compression is achieved.

3. Should the compression process be incapable of encoding a particular form of pixel data representation (e.g. JPEG cannot encode signed integers, only unsigned integers), then ideally only the appropriate form should be "fed" into the compression process. However, for certain characteristics described in DICOM Data Elements but not explicitly described in the compressed Data Stream (such as Pixel Representation), then the DICOM Data Element should be considered to describe what has been compressed (e.g. the pixel data really is to be interpreted as signed if Pixel Representation so specifies).

4. DICOM Data Elements should not describe characteristics that are beyond the capability of the compression scheme used. For example, JPEG lossy processes are limited to 12 bits, hence the value of Bits Stored should be 12 or less. Bits Allocated is irrelevant, and is likely to be constrained by the Information Object Definition in PS 3.3 to values of 8 or 16.

In the final paragraph after the first sentence add the following.

~~"In the case where the image data is converted from one photometric interpretation to another prior to the actual compression step the Data Elements shall contain values which are consistent with the final state of the image data prior to the compression step. For~~

CP 156
Clarify Image Pixel Attributes for Compressed Transfer Syntaxes

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