

DRS Documentation

Administrative Metadata for Digital Still Images

This data dictionary provides element descriptions for the <imageMetadata> block specified in the Harvard University Library Digital Repository Services (DRS) XML DTD. With other required Batch XML metadata, imageMetadata facilitates management and preservation of images deposited to DRS. In this context, “management” refers to the tasks and operations to support image quality assessment and image data processing throughout the image life cycle.

Quality assessment is defined broadly, as it refers both to machine operations and managerial (human) evaluations. Many data elements in this dictionary serve to anchor meaningful attributes of quality—such as detail, tone, color, and size—that can be measured objectively. Others have been proposed to support subjective assessments of “current value” by digital repository managers, curators, or imaging specialists seeking to determine whether intrinsic image quality (aesthetic or functional) sufficiently justifies associated maintenance or processing costs.

Data elements and values are drawn from industry specifications for file formats, as well as published guidelines from repositories committed to storing and managing large collections of images. (See *Sources Consulted*, p. 13.) Elements and values in this document apply inclusively to all digital image formats, regardless of whether they are used for masters or delivery images.

Usage

Organizations depositing images to DRS (“Depositing Agents”) should review this document in conjunction with the DRS *User Manual for Data Loading*, which provides element descriptions for the entire batch XML DTD and gives an overview of the deposit process.

<http://hul.harvard.edu/ois/systems/drs/drs_load_manual.pdf>

Note that a number of elements outside the <imageMetadata> block are relevant to batch deposits of images, particularly the <relationshipMap>, which must be used to associate images with corresponding files (e.g., external targets, target data files, and color profiles).

The DRS batch DTD and supplemental type-specific metadata dictionaries are available from the Office for Information Systems, <<http://hul.harvard.edu/ois/systems/drs/metadata.html>>.

Document Administration

This document is authored and administered by the LDI Technical Team. All questions and comments should be directed to the LDI Reformatting Advisor (stephen_chapman@harvard.edu), 617-495-8596.

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Digital Still Images: technical metadata

Section 1: Image Attributes (Elements #1-13)

Values for these data elements are constructed to facilitate parsing and reporting. Data in the mandatory fields (#1-3, 6) and mandatory-if-applicable fields (#4-8) will be used to process image files in order to produce new deliverables or to migrate master files.

Optional data (fields #9-13) are to be collected to support image processing, in some cases, and to generate summary “collection assessment reports” for data managers and object owners.

Number	1
Name	bitspersample
Definition	<i>The number of bits per component for each pixel. This field provides N values depending upon the number of components (aka “channels”) in the image.</i>
Required	M*
Repeatable	N
Type	list of integers, one per component (or color channel); include one or more ASCII spaces between each number
Values	1 = 1-bit (bitonal) 4 = 4-bit grayscale 8 = 8-bit grayscale or palletized color [see Note for photointerp below] 16 = 16-bit grayscale 8 8 8 = 24-bit RGB and Kodak PhotoYCC 16 16 16 = 48-bit RGB, HDR 24 = <i>deprecated value (as of version 1.3 of this Data Dictionary; use 8 8 8)</i> 48 = <i>deprecated value (as of version 1.3 of this Data Dictionary; use 16 16 16)</i>
Mappings	TIFF 258 (<i>Baseline Required</i> , p22-24, 29) DIG35 A.3.4 Component Information (contains sub-fields) <xsd: COMPONENT_INFO> <NUM_COMPONENT> specifies # of components (e.g., “3” for RGB) < COMP_SIZE > specifies the bit-depth of each component (but only as single integer, <i>not</i> list of integers)
Notes	“Note that this field allows a different number of bits per component for each component corresponding to a pixel. For example, RGB color data could use a different number of bits per component for each of the three color panes. Most RGB files will have the same number of bitspersample for each component. Even in this case, <u>the writer must write all three values.</u> ” (TIFF, p29, emphasis added)

* M = mandatory, MA = mandatory if applicable, R = recommended, O = optional (throughout the document)

Number	2
Name	compression
Definition	<i>Designates the compression scheme used to store the image data</i>
Required	M
Repeatable	N
Type	string
Numeric Values (TIFF)	<p>1 = uncompressed 2 = CCITT 1D 3 = Group 3 Fax 4 = CCITT Group 4 T.6-encoding 5 = LZW (Lempel Ziv Welch) 6 = JPEG 32773 = PackBits compression 65001 = lossless JPEG2000 (jp2, jpx) 65002 = lossy JPEG2000 (jp2, jpx) Image Pac = see <i>non-numeric value</i> below unknown = see <i>non-numeric value</i> below</p>
Non-numeric Values	<p>Image Pac = use for PCD (Kodak Photo CD) image unknown = when compression type cannot be determined</p>
Mappings	TIFF 259 (<i>Baseline Required</i> , p21-24, 117) DIG35 A.3.1.4 Compression Method <xsd: COMPRESSION> type = string
Notes	Contact the Guideline Administrator to propose additions to the list.

Number	3
Name	photointerp
Definition	<i>Designates photometric interpretation, the color space of the decompressed image data.</i>
Required	M
Repeatable	N
Type	enumerated type
Values	<p>0 = standard value for 1-bit images (WhiteIsZero: 0 is imaged as white) 1 = reversed polarity 1-bit, or grayscale (BlackIsZero: 0 is imaged as black) 2 = RGB 3 = Palette color [see <i>Notes</i> below] 5 = CMYK 6 = YcbCr (aka YCC) (also use for Kodak PhotoYCC, PhotoCD's color space) 8 = CIEL*a*b* [see <i>Notes</i> below] 9 = ICCL*a*b* [see <i>Notes</i> below] 65016 = sRGB [use for JPEG 2000 sRGB images] 65017 = grayscale colorspace [use for JPEG 2000 grayscale images] 65102 = embedded ICC profile [use for JPEG 2000 images]</p>
Mappings	TIFF 262 (<i>Baseline Required</i> , p22-24, 37, and 90) DIG35: no mapping. A.3.3 "Color Information" refers to the colorspace of the decompressed image data, <i>not</i> the internal colorspace at the file format level.

Notes	<p>When photointerp = 3 (Palette color). In this model, a color is described with a single component. The value of the component is used as an index into the red, green and blue curves in the ColorMap field to retrieve an RGB triplet that defines the color. When photointerp = 3, a ColorMap must be present in the image and, in the case of TIFF, SamplesPerPixel must be 1.</p> <p>When photointerp = 6, TIFF/EP requires use of the following four tags: 530 YCbCrSubSampling, 531 YCbCr Positioning, 529, YcbCrCoefficients, 532 ReferenceBlackWhite</p> <p>See also, TIFF Section 21 YCbCr Images for additional information regarding TIFF YcbCr (<i>Class Y</i>) images.</p> <p>When photointerp = 8 (CIELAB), value for bitspersample = 8 8 8 or 16 16 16.</p> <p>When photointerp = 9 (ICCL*a*b*), see, Adobe PageMaker ® 6.0 TIFF Technical Notes, September 14, 1995, p. 13, http://partners.adobe.com/asn/developer/pdfs/tn/TIFFPM6.pdf.</p>
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Number	4
Name	xres
Definition	<i>Designates the number of pixels per resunit in the image width.</i>
Required	MA (when resunit = 2 or 3)
Repeatable	N
Type	positive integer
Values	(null) = when resunit is 1 any positive integer = when resunit is 2 or 3
Mappings	TIFF 282 (<i>Baseline Required</i> , p21-24, 41) DIG35: no mapping. B.3.3.3 Scanner Capture Settings specifies the physical scanning resolution of the device in the X (width) and Y (height) directions, specifying the values in meters.
Examples	300 400 600
Notes	<p>This number refers to <i>final</i> number of pixels per resunit in the image width, regardless of whether the resolution is “true” or interpolated. (See also optres.)</p> <p>For multiple-resolution image file formats (e.g., PCD), this value shall refer to the highest resolution image.</p> <p>With resunit and yres, xres specifies the preferred dimensions for an output print.</p>

Number	5
Name	yres
Definition	<i>Designates the number of pixels per resunit in the image length.</i>
Required	MA (when resunit = 2 or 3)
Repeatable	N
Type	positive integer
Values	(null) = when resunit is 1 any positive integer = when resunit is 2 or 3
Mappings	TIFF 283 (<i>Baseline Required</i> , p21-24, 41) DIG35: no mapping. B.3.3.3 Scanner Capture Settings specifies the physical scanning resolution of the device in the X (width) and Y (height) directions, specifying the values in meters.
Examples	300 400 600
Notes	This number refers to <i>final</i> number of pixels per resunit in the image height, regardless of whether the resolution is “true” or interpolated. (See also optres .) For multiple-resolution image file formats (e.g., PCD), this value shall refer to the highest resolution image. With resunit and xres , yres specifies the preferred dimensions for an output print.

Number	6
Name	resunit
Definition	<i>Designates the intended placement of pixels in the xres and yres dimensions of the printed image.</i>
Required	M
Repeatable	N
Type	enumerated type
Values	1 = no absolute unit; no meaningful absolute dimensions 2 = inch 3 = centimeter
Mappings	TIFF 296 (<i>Baseline Required</i> , p21-24, 38) DIG35: no mapping
Notes	Value = 1 for images that may have a non-square aspect ratio, but no meaningful absolute dimensions. In copy work, this value should also be used when source measurements are unknown, such as when 35mm slides or 35mm microfilm intermediates are scanned.

Number	7
Name	qualitylayers
Definition	<i>Number of quality layers to which each JPEG2000 image tile has been decomposed. Useful in determining the number of lower quality images that can be extracted from the JPEG2000 image.</i>
Required	MA
Repeatable	N
Type	integer greater than or equal to 1
Mappings	JPEG2000
Examples	12
Notes	Mandatory for JPEG2000 images (jp2, jpx)

Number	8
Name	reslevels
Definition	<i>Number of resolution levels to which each JPEG2000 image tile has been decomposed. Useful in determining the size of the smallest subresolution thumbnail image available in the JPEG2000 image.</i>
Required	MA
Repeatable	N
Type	integer greater than or equal to 1
Mappings	JPEG2000
Example	6
Notes	Mandatory for JPEG2000 images (jp2, jpx)

Number	9
Name	imagewidth
Definition	<i>Designates the number of columns per image, i.e. the total number of pixels in the horizontal or X dimension.</i>
Required	O
Repeatable	N
Type	positive integer
Mappings	TIFF 256 (<i>Baseline Required</i> , p21-24, 34) DIG35 A.3.1.3 Image Size <xsd: IMAGE_SIZE> contains sub-fields <WIDTH> in pixels
Examples	3072
Notes	For multiple-resolution image file formats (e.g., PCD), this value shall specify the pixel count at the highest resolution. Note that imagewidth is not the same as xres , which refers to the total number of pixels per resunit .

Number	10
Name	imageheight
Definition	<i>Designates the number of rows per image, i.e. the total number of pixels in the vertical or Y dimension.</i>
Required	O
Repeatable	N
Type	positive integer
Mappings	TIFF 257 (<i>Baseline Required</i> , p21-24, 34) DIG35 A.3.1.3 Image Size <xsd: IMAGE_SIZE> contains sub-fields <HEIGHT> in pixels
Examples	2048
Notes	For multiple-resolution image file formats (e.g., PCD), this value shall specify the pixel count at the highest resolution. Note that imageheight is not the same as yres , which refers to the total number of pixels per resunit .

Number	11
Name	orientation
Definition	<i>Designates the orientation of the image, with respect to the placement of its columns (imagewidth) and rows (imageheight), as it was saved to disk.</i>
Required	O
Repeatable	N
Type	enumerated type
Values	1 = normal* 3 = normal rotated 180° 6 = normal rotated cw 90° 8 = normal rotated ccw 90° 9 = unknown
Mappings	TIFF 274 (p36) DIG35 B.3.2.5 Camera Capture Settings <xsd: CAMERA_SETTINGS> <xsd: complexType> <xsd: ORIENTATION> type=dig35:tDirection (see, F.2.16)
Notes	This field is to be used to record only the orientation of the image, <u>not</u> the orientation of the device (e.g., camera) used to capture the image (see, DIG35 B.3.2.5 “Camera Capture Settings”) and TIFF/EP 5.2.12, which defines orientation as “...the orientation of the camera relative to the scene, when the image was captured.” * “normal” is defined as follows: when opened, the top (0 th) row of pixels corresponds to the visual top of the image, and the first (0 th) column of pixels on left corresponds to the visual left-hand side of the image. Consult TIFF for additional values referring to mirrored images. (Note that

	TIFF/EP supports only the five values listed above.) Contact the Guideline Administrator to propose additions to the list of acceptable values.
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Number	12
Name	targetnotes
Definition	<i>Designates the name of the “internal” target(s) scanned in-frame with the source item.</i>
Required	O
Repeatable	N
Type	string
Values	string, string; string, string
Mappings	TIFF: no mapping DIG35: no mapping
Examples	<i>One target:</i> Kodak Q-60EI Target for Kodak Ektachrome, IT8.7/1-1993 <i>Two targets:</i> Kodak 18% gray card; Kodak Q-60EI Target for Kodak Ektachrome, IT8.7/1-1993
Notes	<p>Recommended syntax: use manufacturer’s full name of target, including its associated standard, whenever possible. Separate each sub-part by a comma and a single space. When multiple targets are used, separate target 1 from target 2 (etc.) by a semicolon and a single space.</p> <p>For information about external targets—i.e., those scanned and saved as independent images—review the element description for <relationshipMap> in the Digital Repository Services (DRS) User Manual for Data Loading (http://hul.harvard.edu/ois/systems/drs/drs_load_manual.pdf).</p> <p>“Targets are used as concise physical benchmarks for absolute energetic and spatial information about the item of interest at time of capture. They are, in essence, Rosetta stones for the source. As such, their utility is undisputed whenever corrections or faithful reconstructions of the source document are required. ...</p> <p>Depending on workflows and philosophy, targets can be considered as either external or internal to a digital image. <u>Internal targets are part of a digital image by being within the field of view at time of capture.</u> External targets are typically captured session-to-session and usually give temporally sparse information between image captures. For stable capture environments their utility can be equivalent to internal targets. Since they are not part of the digital image itself, their location must be managed in order to maintain a thread to the source.” (<i>NISO Data Dictionary</i>, p. 30, emphasis added.)</p>

Number	13
Name	history
Definition	<i>Designates the image change history.</i>
Required	O
Repeatable	N
Type	string
Mappings	DIG35 Annex D: History Metadata
Notes	<i>Recommended practices for use of this field are under review. Consult the Guideline Administrator for more information before recording metadata in this field.</i>

Section 2: Image Production Attributes (Elements #14-20)

All elements in this category are optional. Reporting, not parsing, is the intended application. Owners and preservation managers might, for example, use this metadata to build queries and reports to answer questions such as, “Are these images worth the cost of migration? Could quality be improved by rescanning? This metadata might also aid in the drafting of technical specifications for the production of new archival or delivery images.

Number	14
Name	source
Definition	<i>Designates the physical attributes of the source material relevant to interpreting digital image accuracy and/or quality.</i>
Required	O
Repeatable	N
Type	string
Mappings	DIG35 B.3.5 Captured Item <xsd: CAPTURED_ITEM> <REFLECTION_PRINT> type=complexType <FILM> type=complexType
Example	8" x 10" black and white print yellowed with age 35mm color negative Kodak Royal Gold 100 Emul. 3712011
Notes	Use this field to document the physical attributes of the source material <i>not already recorded in descriptive metadata</i> that is relevant to the interpretation of the accuracy and/or quality of the digital image.

Number	15
Name	system
Definition	<i>Designates the manufacturer and model names/numbers for the scanner or digital camera and its associated driver/imaging software.</i>
Required	O
Repeatable	N
Type	string

Values	Scanner Manufacturer Name; Model Name/Number; Software Name and Version Number
Mappings	TIFF 271, 272, 305 (p35, 35, and 39) DIG35 B.3.4 Software Creation <xsd: complexType> DIG35 B.3.3 Scanner Information, and B.4.1 Creation Information of a Digital Camera (includes metadata for Manufacturer and Model) xsd: complexType name="tProductDetails" (see, F.2.18)
Example	Scitex; Leaf Volare; Leaf Colorshop 4.0
Notes	Recommended syntax: record values in following order: manufacturer ("Make"); model name or number followed by serial number of device if desired ("Model"); software name and version number ("Software"). For TIFF, concatenate values and separate each value with a semicolon followed by a blank space. This field refers only to the image capture system. Related field: prosoftware .

Number	16
Name	producer
Definition	<i>Designates the organization-level producer(s) of the image.</i>
Required	O
Repeatable	N
Type	string
Values	free text
Mappings	TIFF 315 Artist (p28) <i>might</i> apply, but use caution – technically speaking, this field is to be used to record the name of the “person who created the image” DIG3 B.3.1 General Creation Information <xsd: complexType> <xsd: element name=OPERATOR_ORG type=dig35:tOrganization>
Examples	Luna Imaging, Inc. HCL Digital Imaging Group [multiple producers] Luna Imaging, Inc.; HCL Digital Imaging Group
Notes	Separate names of bureaus with a semicolon followed by a blank space. When multiple service bureaus are used, explain each bureau’s role in the methodology .

Number	17
Name	optres
Definition	<i>Designates the actual number of photo elements in the scanning sensor (colloquially known as “the maximum optical resolution” for a system).</i>
Required	O
Repeatable	N
Type	string

Values	[any positive integer] dpi = *use for all linear-sensor scanners (MonochromeLinear, ColorTriLinear, ColorSequentialLinear) longer dimension [positive integer] x smaller dimension [positive integer] = *use for all area-sensor scanners (MonochromeArea, OneChipColorArea, TwoChipColorArea, ThreeChipColorArea, ColorSequentialArea)
Mappings	TIFF: no mapping DIG35: no mapping
Examples	400 dpi 3,072 x 2,048
Notes	This element helps to characterize the quality of the scanner that was used. This number is likely to be different from xres and yres .

Number	18
Name	prosoftware
Definition	<i>Designates the name and version of the image processing software used to edit or transform the image data captured at scanning.</i>
Required	O
Repeatable	N
Type	string
Mappings	TIFF: no mapping DIG35: no mapping
Examples	Adobe Photoshop 4.0 TMS Sequoia ScanFix 4.0 TMS Sequoia ScanFix 4.0; Adobe Photoshop 4.0
Notes	Recommended syntax for a single program: manufacturer software version. When multiple programs are used, concatenate values and the values for program 1 from program 2 with a semicolon followed by a blank space. If possible, record these names in chronological order (first to last). Do not include the name of the scanning software in this field. See system .

Number	19
Name	enhancements
Definition	<i>Designates the settings, or description of their function, used by the prosoftware.</i>
Required	O
Repeatable	N
Type	string
Mappings	TIFF: no mapping DIG35: no mapping
Examples	hue/saturation correction despeckling, deskewing, and sharpening

Notes	<p>Use this field to note the processes applied (“actions”) – ideally as an ordinal listing—to the image data created at scanning, particularly irreversible transformations (such as sharpening) that bear upon image quality. For multiple actions, separate the descriptions for each by a semicolon and single space.</p> <p>If the script itself is to be saved as a separate file (e.g., <i>photoshop.ATN</i>), this object must be accommodated in the DTD in a manner similar to that used for profiles and performance data related to targets. (See the objectData portion of the DRS DTD.)</p>
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Number	20
Name	methodology
Definition	<i>Designates the methodology and rationale to digitize an object or collection.</i>
Required	O
Repeatable	N
Type	String (4,000 characters max.)
Mappings	TIFF: no mapping DIG35: no mapping
Examples	<p>See, “Scanning the Collection” notes associated with selected American Memory collections, http://lcweb2.loc.gov/ammem/ammemhome.html</p> <p>[example from Harvard LDI project] Digital images were created by staff in the Harvard College Library Digital Imaging Group in 1999 by scanning printed original pages with an auto-document-feeder scanner. Prior to scanning, Harvard College Library Conservation Services disbound and trimmed pages from duplicate copies of annual reports.</p> <p>Each side of each page, including blank pages, was scanned to create a 600 dpi 1-bit TIFF archival image. All archival images were saved with Group 4 compression. Following scanning, all 1-bit TIFFs were enhanced using TMS Sequoia’s ScanFix™ software to optimize the files for optical character recognition (OCR). These files were delivered to University of Michigan Digital Library Production Services for OCR and low-level SGML markup compliant with Text Encoding Initiative (TEI) guidelines. The OCR-generated ASCII was not corrected. Structured evaluations confirmed that these specifications yielded page images sufficient to create 1:1 preservation-quality reprints, as well as OCR-generated ASCII adequate to support a search retrieval rate of 97%.</p> <p>For on-screen display in the page-turning application, 100 dpi 4-bit GIF images were created from the archival TIFFs. Image Alchemy was used for TIFF-to-GIF conversion. Evaluations confirmed that this specification achieved the optimum balance between legibility and size, with an 800 x 600 pixel monitor designated as the default monitor resolution.</p>
Notes	Use this free-text field to document any aspects of the conversion methodology not already accounted for in other metadata. If you choose to use a local filename

	<p>as the free-text for this field — as an alternative to including a methodology note with each image — you will <i>not</i> be able to query DRS to report which images are associated with the “Methodology” file.</p>
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	<p><i>Best Practice:</i> Describe only ONE production method in the methodology statement. If, for example, a digitization <i>project</i> entails creating two “classes” of page images—e.g., bitonal and color—then the producer would create <i>separate batches</i> of images for deposit, one for bitonal images, the other for color. The former would include the detailed methodology pertaining to the production of 1-bit images; the latter would include the detailed methodology pertaining to the production of color images.</p>
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Sources Consulted

[CDL] California Digital Library. *Digital Image Collection Standards*, September 1, 1999. Available in Word and PDF. <<http://www.ucop.edu/irc/cdl/tasw/Current/current.html>>

[DIG 35] Digital Imaging Group DIG35. *DIG35 Specification: Metadata for Digital Images, Version 1.1*, June 18, 2001, Annexes A, B, and D. <http://www.digitalimaging.org/i_dig35.html>

_____, “The Power of Metadata Is Propelling Digital Imaging Beyond the Limitations of Conventional Photography . . . An Overview of the Opportunities for Implementing Metadata Standards,” whitepaper, August 1999. <http://www.i3a.org/i_dig35.html>

[MoA II] Hurley, Bernard J. John Price-Wilkin, Merrilee Proffitt, and Howard Besser. *The Making of America II Testbed Project: A Digital Library Service Model*, December 1999. Washington, DC: Council on Library and Information Resources, 1999. Available in HTML, PDF, and print from: <<http://www.clir.org/pubs/abstract/pub87abst.html>>

[IANA] Internet Assigned Number Authority. *IANA Media Types List*, undated document, provides links to RFCs used to register standard MIME types, <ftp://ftp.isi.edu/in-notes/iana/assignments/media-types/>

[JPEG 2000] [ISO/IEC 15444-1](#) Information technology -- JPEG 2000 image coding system -- Part 1: Core coding system.

[JPEG 2000] [ISO/IEC FCD 15444-2](#) Information technology -- JPEG 2000 image coding system -- Part 2: Extensions.

[Library of Congress] Library of Congress. “ImageMD — proposed metadata for the extension schema for digital-file images.” Toward a Revised Set of Extension Schemas for the Metadata Encoding and Transmission Standard AV Prototype Project Working Documents, February 2002. <<http://lcweb.loc.gov/rr/mopic/avprot/extension2.html#imageMD>>

[MIME Types] LANTech. “MIME types – Images,” document dated May 9, 1999, <<http://www.ltsw.se/knbase/internet/image.htm>>

[NISO] National Information Standards Organization (NISO). “Technical Metadata for Digital Still Images,” Standards Committee AU. Proposed draft standard released for comment February 16, 2001. <http://www.niso.org/committees/committee_au.html>

[NLA] Webb, Colin. “Preservation Metadata for Digital Collections,” *Exposure Draft*. National Library of Australia, October 15, 1999. <<http://www.nla.gov.au/preserve/pmeta.html>>

[RLG] RLG Working Group on Preservation Issues of Metadata. *Final Report*, May, 1998, <<http://www.rlg.org/preserv/presmeta.html>>

[TIFF] Adobe Developers Association. *TIFF (Tagged Image File Format) 6.0 Specification*, updated September, 20 1995, document dated June, 3 1992, <<http://partners.adobe.com/asn/developer/PDFS/TN/TIFF6.pdf>>

[TIFF EP] ISO/FDIS 12234-2:2001. *Electronic still picture cameras — Removable memory — Part 2: TIFF/EP Image data format* (Tag Image File Format / Electronic Photography), WG18/Item 189.2. <http://www.pima.net/standards/iso/tc42/wg18/WG18_POW.htm#12234-2>

[W3C] W3C. “NOTE-datetime, *Date and Time Formats*,” <<http://www.w3.org/TR/NOTE-datetime>>

Revision History

VERSION	CONTACT	LAST UPDATE	STATUS
0.1	SMC	January 5, 2000	
1.0	SMC	June 8, 2000	released for use
1.1	SMC	October 25, 2000	<ul style="list-style-type: none"> • Removed <ICC> element • Removed <type> element • Removed <scannertargetstruct> element: accommodated by “IS_TARGET_OF” value in <relationshipMap>
1.2	SMC	February 20, 2002	<ul style="list-style-type: none"> • Removed <displayorient> element • Removed <modified> element – only used at update, not initial deposit; use “History” or “Methodology” field to record provenance • Updated “mappings” and “notes” to be consistent with DIG35 v1.1 • Updated Sources
1.3	SMC	March 26, 2004	<ul style="list-style-type: none"> • Deprecated two values in <bitspersample> • Updated document to accommodate JPEG2000 (image/jp2, image/jpx) images <ul style="list-style-type: none"> – Added JP2 values to <compression> – Added JP2 values to <photointerp> – Added JP2 element <qualitylayers> – Added JP2 element <reslevels>