



# **IPTC Standards**

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## **Photo Metadata**

### **White Paper 2007**

**Document Revision 11**



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# Table of contents

- 1 Executive Summary ..... 6
- 2 Overview ..... 7
  - 2.1 About this document..... 7
  - 2.2 About the International Press Telecommunications Council..... 7
  - 2.3 Why metadata are so important ..... 8
  - 2.4 Mission statement: "Preserve metadata" ..... 9
- 3 Semantics of metadata ..... 10
  - 3.1 Overview ..... 10
  - 3.2 Descriptive Metadata..... 10
  - 3.3 Administrative Metadata..... 11
  - 3.4 Rights Metadata ..... 12
  - 3.5 Technical Properties Metadata ..... 12
  - 3.6 Metadata Schemas ..... 13
  - 3.7 Controlled Vocabularies ..... 13
- 4 Technical implementation of metadata ..... 15
  - 4.1 Overview ..... 15
  - 4.2 IPTC IIM / Adobe Image Resource Blocks..... 15
  - 4.3 Adobe XMP ..... 16
  - 4.4 Exif (JEITA) ..... 16
  - 4.5 PLUS ..... 18
- 5 Photo Workflows ..... 20
  - 5.1 Photographer..... 20
  - 5.2 News Photo Agency ..... 21
  - 5.3 Stock Photo Agency ..... 22
  - 5.4 Newspaper ..... 23
  - 5.5 Magazine ..... 24
- 6 Conclusions and open issues ..... 25
- 7 References..... 27
  - 7.1 Standards ..... 27



## 1 Executive Summary

The IPTC has had a stake in the use of photo metadata since the early 1990s, and tries to keep its standards up to date regarding the current requirements derived from its core business of news-related photos. However, since the edges between the sectors of the photo business become increasingly blurred, the IPTC has opened up the scope of its standardisation work to include stock photography and image archives.

Photo metadata is structured information about image resources, such as persons, objects and locations shown in the picture; when it was created and by whom; as well as a means to log the technical characteristics of a digital image. Photo metadata can also be used to identify photos, to express relationships between photos and to provide administrative information required in a workflow.

The goal of this White Paper is to devise a way for improving photo workflows with the help of consistent use of metadata, which is summarised by these statements:

- Metadata is essential to identify and track digital images
- Metadata is essential to properly describe the content by natural or formal language, and in this way make it possible to easily search for photographs
- Metadata is essential to express technical characteristics of photographs in an interoperable way across technical systems
- Metadata is essential to express rights and licensing terms that pertain to a digital image, hence ownership metadata must never be removed.
- Metadata is essential for a seamless photo workflow, and must be written in formats that can be easily understood by all

This White Paper aims at more than just generic statements; in chapter 3 it provides a collection of metadata properties that we believe are highly required and helpful in the different stages of photo workflow. This set of properties was collected and discussed by the members of the IPTC Photo Metadata Working Group, which represents a wide spectrum of photo business sectors. In chapter 4, the White Paper provides an overview of the most widely used technical implementations of photo metadata standards as used in professional-grade still cameras and in the major imaging software applications.

Chapter 5 contains the background for this White Paper, outlining and discussing the photo workflows that should be improved. It covers typical use cases: photo workflows for photographers, news photo agencies, stock photo agencies, newspapers and magazines.

The White Paper concludes in chapter 6 by reviewing all open issues regarding photo metadata that the Working Group has targeted as urgent matters. This conclusion covers measures for a more consistent use of metadata, improved software and user interfaces to let users better interact with the underlying technology, improved sets of metadata properties and – as speed matters not only in the news business – features for more rapidly assigning metadata values to photos.

All parties involved in professional photography (as defined here) are invited to discuss and comment on the White Paper. Contributions may be sent to [office@iptc.org](mailto:office@iptc.org).



## 2 Overview

### 2.1 About this document

The IPTC has had a stake in photo metadata since the development of its Information Interchange Model (IIM) standard in 1990. It was later adopted by Adobe for Photoshop, which became the first widely used software that added metadata to images.

Since then, the IPTC has listened to the needs from different perspectives in the professional photo workflow – from the camera to the final photo that is seen by the end user. As a first step, the IPTC Core Schema for XMP was developed and approved to resolve ambiguities that arose from the transition of the metadata storage in image files from IIM to Adobe's XMP.

After that step it was felt by the IPTC members that a more general discussion of the requirements for photo metadata was needed to cover the convergence of different sectors of the professional photo business. This discussion is reflected by the White Paper and provides:

- a list of metadata properties which are believed to be highly required and helpful in the different steps of photo workflow. The properties of this list and their description do not directly relate to any technical implementation (neither by IPTC standards nor by outside standards), but the IPTC will consider them as a set of business requirements for the development of the next version of the IPTC Core.
- a set of typical photo workflows with an overview identifying the metadata that are required for each step.
- Discussion of how photo workflows can be improved by a consistent use of metadata.

After an internal agreement by IPTC members, this White Paper is publicly available for discussion and we welcome comments from anyone in the professional photo business.

With this White Paper the IPTC aims for a better understanding of the potentially high value of metadata, and the need for a common understanding of its semantics and use to make them an added value for the media business.

### 2.2 About the International Press Telecommunications Council

The International Press Telecommunications Council is the undisputed world leader in establishing and maintaining technical standards for the business-to-business exchange of news. Virtually every news agency, newspaper and news system vendor uses IPTC standards, as do many broadcasters, content providers and web sites. Through the efforts of its members the IPTC influences news systems development worldwide and hastens the move towards open standards and greater flexibility in the exchange and storage of digital information. All IPTC standards are offered to the public at no cost and without royalties.

Using XML and other cutting-edge technologies, IPTC has published multimedia and specialized standards for exchange of such diverse news items as text, photo, graphics, sports results or television programme listings. A large taxonomy for classifying the subject matter of news, branded as NewsCodes, is also maintained by the IPTC.





All recent news exchange standards are agnostic to the media type, but for the photo business two IPTC standards have gained wide recognition:

- the “IPTC metadata” introduced by Adobe’s Photoshop about ten years ago, and
- the “IPTC Core Schema” to be used with Adobe’s XMP metadata storage technology.

Founded in 1965 to safeguard and develop the telecommunications interests of the press, the IPTC is now a consortium of the world's major news agencies, news publishers and news industry vendors. It is based in Windsor, England, and maintains worldwide activities.

## 2.3 Why metadata are so important

Structured information about image resources such as its name, location, quality and relationship to other objects in the collection is called *metadata*, and is essential for identifying and managing digital assets such as images. Photographs that do not contain metadata adversely affect everyone working with digital images; resources are wasted, opportunities are lost, liability increases and intellectual property rights are eroded.

The avalanche of digital files arriving at publishers each day is a challenge to manage and access. Busy designers and art directors download preview images to their desktops, only to find days or weeks later that they cannot identify the source. Lack of image metadata can delay projects, requiring additional research to confirm caption details and establish rights and permissions. This contributes to the growing problem of image misuse, whether by error or intent. Without obtaining proper licensing or permission, users may infringe copyright and expose themselves to liability.

Widespread use of standardized photo metadata will solve many issues faced by image creators, distributors and users. When contact information for copyright owners and licensors is embedded into digital image files along with other metadata, the process of seeking permissions and correctly attributing images is simplified. Such metadata significantly reduces the likelihood of an image becoming “orphaned,” and will minimize the impact of orphan works laws currently under consideration in many regions. The protection of embedded metadata is supported by laws that are based on the World Intellectual Property Organization (WIPO) Copyright Treaty of 1996, which prohibits the removal or alteration of rights management information. Photo metadata facilitates and encourages respect for the rights of creators and rights holders, and provides image users with ready access to information that is essential to the management and use of images. The use and preservation of standardized photo metadata serves the shared interests of all communities.

For metadata to be effective, it must be incorporated into the workflow at all phases of image production, distribution and use and then remain with the image. Significant efforts are being made to increase awareness and proper use of metadata from a number of standards bodies and industry coalitions, along with trade organizations and product developers. Their work makes a difference and allows us to move forward.

A guiding set of principles are:

(The first three were proposed and adopted by one international trade organization the fourth was added by the IPTC working group)

- **Metadata is essential to identify and track digital images.**
- **Ownership metadata must never be removed.**
- **Metadata must be written in formats that are understood by all.**





## **- Metadata is essential to ensure maximum image quality and image handling efficiency**

If everyone involved with digital images recognizes that embedded metadata is an essential part of every digital image, it will ensure that all image users can easily find an image and identify its source after distribution.

If everyone understands that ownership metadata must never be removed, and work with applications that honour fields intended to be “read only” and preserved this metadata by default (or at least warn users about the legal implications of removal), then many copyright problems that exist today can be avoided.

If all applications write metadata using open standards that are fully consistent and interoperable, then information will be able to move seamlessly between different systems and environments.

## **2.4 Mission statement: “Preserve metadata”**

Metadata is important, but the relevance of specific data fields differs along the image supply chain. Even if the metadata is not relevant for a specific party, it may be important for the next workflow steps in the chain.

The following two examples illustrate the issue and are relevant for all metadata values that do not require an update of existing metadata fields:

It often happens that a publisher wants to publish a photograph, but there is no explicit licensor or contact data available. This might not be the case with images received from news agencies, but is nevertheless reported as a repeated occurrence. In that case, even the limited metadata from Exif could help to track down a usable contact.

To print high quality image, publishers depend on colour information about the image. If the original colour space of the digital camera is available, it can be used for image reproduction. If the original colour space is not available, the image editor can only make a “best guess” when selecting a colour space – losing an opportunity to optimise the image quality.

We do not want to miss opportunities; we want to create a seamless and highly automated image workflow from the photographer to the end user.



## 3 Semantics of metadata

### 3.1 Overview

Metadata has two facets:

- it makes a specific statement about a piece of media content
- it states how this information should be annotated in technical terms.

This chapter is about metadata statements regarding content.

A metadata field – also called a *metadata property* – makes a specific statement about a piece of media content. To make a statement specific, it must define what the statement covers in terms of semantics; this definition should not be ambiguous.

Hence a metadata standard must specify the semantics for each metadata field, it must guarantee that the semantics of different fields do not overlap and it may recommend a basic data type for each field, such as “date”, “numeric value”, or “text”.

This chapter groups metadata fields, also known as *properties*, in regards to semantic grouping. The following groups cover most of the required definitions for photo metadata:

- Descriptive metadata: Describes the content of the photo.
- Administrative metadata: Data about the content that cannot be retrieved or inferred from the content.
- Rights metadata: Asserts ownership of the content and controls its use.
- Technical properties: Data about the physical properties of the content.

The definitions of the metadata properties below are agnostic to their technical implementation. Some properties, such as the “headline,” are so generic that they are actually included in all current IPTC standards, although these standards may implement this single property differently over time. Hence no technical specification or behaviour should be inferred from any existing standard for any of the metadata properties listed in this chapter.

### 3.2 Descriptive Metadata

Property name	Property description
headline	A brief summary of the contents of the photograph. Note: The <i>headline</i> term should not be confused with <i>title</i> .
description/caption	Prose to comprehensively describe the who, what, when, why and where of the photograph. Note: People in the photo must be placed into the <i>person</i> field. Organisations or companies shown in some way on the photo must be placed into the <i>organisation</i> field.
location (in picture)	Defines the location shown in the photograph. Note: <i>Location</i> may be defined by hierarchical terms representing the world region, country, province/state, city or any location outside a city.
person (in picture)	Name of the known person(s) in the photograph. Note: Value should be split into surname and given name.
additional model information	Information about the age and ethnicity of the model(s) in the photograph.



organisation (in picture)	Name of the organisation or company in the photograph. May be supplemented by values, such as stock ticker symbols, from a controlled vocabulary.
emotion	Describes the emotion shown in the photo, if people are pictured – should be a value from a controlled vocabulary.
keywords	Keywords to express the subject of the content in free text. Note: Values from controlled vocabularies should be placed in such corresponding properties as <i>Subject</i> or <i>Scene NewsCodes</i> or <i>person</i> , <i>organisation</i> , or <i>location</i> .
Subject NewsCodes	Describes the most prominent subjects of the photo by one or more codes from the IPTC "Subject NewsCodes".
Scene NewsCodes	Describes the scene of a photo content by one or more codes from the IPTC "Scene NewsCodes".
genre	Describes the nature of the photo. This may be journalistic, artistic or intellectual characteristics.
predominant colour	A value for the visually predominant colour of the photo. The value should be from a controlled vocabulary of about 20 typical colours

### 3.3 Administrative Metadata

Property name	Property description
unique id	The globally unique identifier (GUID) valid in the context of the delivering provider and at the time of the delivery.
other id(s)	An identifier, preferably a GUID, of a photo or another news object which relates to this photo. This property should be complemented by a qualifier expressing the kind of relationship; it may take values like e.g. "previous", "see also", or "similar".
title	A shorthand reference for the image or photo – primarily for an identification less formal than the <i>unique id</i> . Note: The title of an image may take several forms; for photographers, this might be the filename of their original scan or digital camera file.
date created	Records the date (and optionally the time) when the photograph was taken, not the date when scanned, imported, archived or edited. This field should support a datatype for dates that allows one to express a date range, so this may be used for historic photographs or other pictures with creation dates that are not known exactly.
location created	Defines the location where the photograph was taken. Note: This may be different from the location of the subject of the photo, such as in long distance shots.
event	A free text field naming or describing the specific event at which the photo was taken, e.g. a press conference, dedication ceremony, etc.
job id	Identifier for the purpose of improved workflow handling. This ID should be added by the creator or provider for transmission and routing purposes only and should have no significance for archiving.
instructions	Any of a number of instructions from the provider or creator to the receiver of the photo, not covered by other explicit fields. May cover e.g. embargoes, instruction for reproduction, etc.
description/caption	Name of the person(s) involved in writing, editing or correcting the



writer	caption or other metadata of the photo.
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### 3.4 Rights Metadata

Property name	Property description
creator	This should preferably be the person who created the photo. If this is not appropriate then the name of an organisation or company.
creator job title	The job title of the photographer, such as "Staff Photographer", "Freelance Photographer" or "Independent Commercial Photographer".
credit line	One or more parties to be credited for this photograph; this single line is intended to be shown adjacent to a photo. Essentially free text, this line may follow formatting and style guides as required by law or company policy.
copyright notice	A free text notice containing any necessary copyright notice for claiming the intellectual property, which should identify the current owner of the copyright for the photograph.
license contact	The person or company that should be contacted for licensing the image, if there are any open issues regarding copyright or usage.
model release	A value indicating whether "none", "unlimited" or "partial" model releases are available for this photograph, or whether they are applicable. An optional set of "release identifiers" should refer to corresponding release documents being accessible over the internet.
property release	A value indicating whether "none", "unlimited" or "partial" property releases are available for this photograph, or whether they are applicable. An optional set of "release identifiers" should refer to corresponding release documents being accessible over the internet.
other third party rights	A free-text field with statements regarding all other third party rights not covered by the <i>Model Release</i> and <i>Property Release</i> fields, such as paintings or images featured prominently in the photo.
usage rights	The <i>usage rights</i> field should include text instructions on how the photograph can be legally used. It is strongly encouraged that you use a standardized set of terms or controlled vocabulary when populating this field, or consider a reference to a PLUS code.
provider	Who provided the photograph to the receiver. This doesn't have to be the owner/creator.

### 3.5 Technical Properties Metadata

Technical metadata is written, in the first instance, by the digital camera to record physical details about the camera make and model and the lens used, the camera settings, the exact date and time the picture was taken, the GPS location, the photographer's ID, face recognition details and many other forms of metadata that help the user organise and obtain the maximum quality and use from each picture. In addition, subsequent imaging software applications add technical metadata to ensure correct handling, with the maximum speed and efficiency, throughout the various picture workflow operations. All the technical metadata just described is written into the image file in a controlled way according to an internationally recognised standard known as *Exif*. All Exif technical metadata coming from the camera should be



preserved with the original digital image, and the metadata only updated when necessary to record changes that effect the current state of the image content or to assist its further processing. The persistence of Exif technical metadata, which also includes ICC colour profiles, is essential – at least until the image is in its final form.

Below, is a very small example of the type of technical metadata that must be persistent:

Property name	Property description
colour space	The current colour space of the photo such as sRGB, Adobe RGB, etc.
orientation	The current orientation of the photo such as “landscape” or “portrait”
max available height+width	Maximum available size of the image in pixels; the high resolution rendition may be a different image.
physical type of original	One of the following terms “film”, “slide”, “digital image”, etc.

Synchronising Exif metadata with fields from sections 3.2 to 3.4 must be defined. In particular, ICC profiles defining the colour space should be preserved and must not be deleted from the metadata.

### 3.6 Metadata Schemas

A metadata schema is a collection of – at the least – the definitions of the semantics of the metadata properties. Many schemas are under control of a standardisation body. Many metadata standards also provide specifications for the technical implementation of their schema, but this is beyond the scope of this chapter.

This is a list of some selected standards that have a role in photo metadata:

(References are included in the appendix)

Name	Additional information
IPTC Information Interchange Model IIM	Created by the IPTC in 1991, adopted by Adobe for the metadata fields in Photoshop in 1995. Still widely in use.
IPTC Core Schema for XMP	Created by the IPTC in 2005, used to redefine IIM properties for Adobe’s XMP technology.
Exif	Maintained by CIPA (Camera & Imaging Products Association) and published by JEITA (Japan Electronics and Information Technology Industries Association). The main standard for metadata created by still cameras.
Dublin Core	The Dublin Core Metadata Initiative (DCMI) was founded in 1994 and is developing and maintaining the “Dublin Core” metadata properties. They are widely used as cross-media metadata.
PLUS	Picture Licensing Universal System – a standard focussed on rights and licensing information. Created by the PLUS Coalition in 2005.
DIM2	Currently under development by PRISM/IDEAlliance. An extensive set to describe the content of photos.

### 3.7 Controlled Vocabularies

Another way to make the use of metadata more consistent beyond defining the semantics of properties is to define a set of values and to require that one of its values must be selected for



a specific property. These sets are called Controlled Vocabulary as a body controls and standardises its values and their defining descriptions.

As the Controlled Vocabularies cover a wide range of issues, the IPTC decided not to address or discuss them in this White Paper but instead track and to follow up in future work.



## 4 Technical implementation of metadata

### 4.1 Overview

Metadata always has two facets:

- it makes a specific statement about a piece of media content
- it states how this information should be annotated in technical terms.

This chapter regards the technical annotation of metadata statements.

Keep in mind that the definition of the semantics of a metadata field is agnostic to technology. In this sense a schema of metadata fields could be implemented by different technical annotations while maintaining its semantics across the borders of technology.

This chapter provides short explanations of widely used or otherwise important technical implementation standards for photo metadata. Be aware that most of the current technical implementation standards store the metadata values in the same file as the image data, but this need not always be a requirement. This was done primarily to keep metadata and content together. Some media businesses may require that metadata must be stored in files or database systems apart from the image data. Some standards may even require storage of metadata outside the image data file to allow for an easy update of metadata that may change frequently, such as rights metadata.

### 4.2 IPTC IIM / Adobe Image Resource Blocks

The technical implementation of the “IPTC metadata” by Adobe’s Photoshop from about 1995 was actually combining three data structures:

- 1) The outermost wrapper is a header that is specified by the corresponding image file format, hence they are different for JPEG (JFIF), TIFF, EPS, PSD and other files.
- 2) Inside the headers the *image resource blocks* (IRB) are the basic building unit of several file formats, including Photoshop’s native file format, JPEG and TIFF. Each IRB provides a structure that wraps different kinds of data relating to the picture – not only metadata – with each kind having a specific identifier. The identifier 1028 (decimal) was assigned to a block of metadata provided in the IPTC IIM 4 format; see item 3 below.
- 3) The IPTC Information Interchange Format (IIM) was created in 1991 and was updated until 1999; its most current version remains at version 4.1 and it is freely available from [www.iptc.org/IIM](http://www.iptc.org/IIM).

The IPTC IIM provides two types of specifications for each of the metadata fields:

- an administrative specification with an identifier, a name and a definition of its semantics
- a precise technical specification of the data held by the field, like data format or text length.

The IIM standard was made for content of various media types, It was never focused on photos – not even visual media – but also covered text and audio.

A few more details: the IIM field identifiers are made of two portions. First, the record is identified, which only groups the metadata fields but has no additional meaning. The second portion is a *field number* within this record; the field identifier consists of two numbers separated by a colon (e.g. “2:25”, which identifies the *keywords* field). The technical specification for fields with string values limits their length to a certain value. The character





set applied to a text string could be indicated by the field “1:90” (*Coded Character Set*) but actually was never used by Adobe software. This is the main cause of problems in exchanging photos with textual metadata e.g. from Apple Macintosh systems to Windows PCs and vice versa, and across the boundaries of character sets, e.g. between Latin and Japanese scripts.

### 4.3 Adobe XMP

Adobe released its Extensible Metadata Platform XMP in 2001 to standardise the definition, creation, and processing of metadata in documents of different types; additional information is available at [www.adobe.com/products/xmp](http://www.adobe.com/products/xmp). XMP provides a data model for the metadata fields, a storage model for storing the metadata in files and finally a basic set of metadata schemas. As such, XMP can be seen as the successor to the Image Resource Blocks, since it includes most of the technical specification part of the IIM standards (see item 4.2).

A quick walkthrough:

The **data model** explains that each metadata field – they are called a *metadata property* by XMP – has three components: the media content it refers to (usually this is the media content encapsulated by the same file, e.g. the photo in a JPEG file); the semantics of this field; and the value applied to the field, which must comply with its semantics. This data model aligns with W3C’s “Resource Description Framework” (RDF) (see: [www.w3.org/RDF](http://www.w3.org/RDF) for details).

The **storage model** specifies how these three components are annotated. XMP is an XML dialect, and it implements in particular large portions of the RDF/XML serialisation specifications.

An **XMP Schema** is a set of metadata field specifications that provide a field identifier, a value type, a description of its semantics and notes (if it is managed by the user or internally by the software). The off-the-shelf XMP specifications provides a Basic Schema, and basic schemas for rights, media management, basic job ticketing, dynamic media and further some with special fields for Adobe PDF, Adobe Photoshop, Camera Raw data, the Dublin Core metadata and Exif. It should be recognized that these XMP Schemas are built on top of the data and storage model of XMP and exist in parallel with a now already large set of XMP Schemas not specified by Adobe, e.g. the “IPTC Core Schema for XMP”.

### 4.4 Exif (JEITA)

Today, nearly all pictures come from digital cameras in one of three data formats – Exif JPEG, TIFF or RAW. A fourth format, Digital Negative (DNG), developed by Adobe as a universal RAW data format, is another common post-camera digital picture format. Each of these data formats is a complex package of picture information and numerous sections of additional metadata that include the camera make and model, camera settings, time of capture, technical details and type of image contents, ownership details, descriptive details added afterwards by the photographer or agency and details added by image processing software.

The Exif technical metadata has a hierarchical TIFF-like data structure with the main structure comprised of 24 or more major data segments containing the image, thumbnails, audio and metadata. These individual segments form the main branches of an extensive underlying sub-structure of tags and data fields. A specific camera will only write data to some of these



segments and fields. Similarly, the software used by the photographer or agency will only populate certain other segments and fields of the Exif data structure by way of so-called application and "trailer" metadata segments. IPTC information can exist in one or more of these segments in XMP or the older IIM metadata style, depending on the software used.

All models of digital cameras produced by the well-known manufacturers add Exif technical metadata to each picture. Whether the cameras are of the professional SLR type or studio digital cameras, mass market pocket-size cameras or cell-phone cameras, they write extensive Exif metadata to each picture. Canon, Fuji Photo Film, Hewlett Packard, Kodak, Nikon, Nokia, Minolta, Olympus, Pentax, Samsung and Sony are some of the well-known camera manufacturers that record this technical metadata.

There are also many examples of post-camera, picture processing software such as Adobe Photoshop that, in addition to preserving some of the Exif metadata, write a large amount of additional picture metadata that relates to the image processing changes that have been made in Photoshop. Photoshop "Save for Web" information becomes Exif metadata. An added ICC profile, for example, also becomes part of the Exif metadata and part of the image file. Picture management systems like Fotoware's FotoStation record image details regarding picture cropping, in addition to preserving the original Exif metadata.

The majority of picture browsers also make a point of preserving Exif metadata as well as allowing IPTC information to be added – including AcdSee, Adobe Lightbox, Apple Aperture, Breeze Systems' Breeze Browser, Camera Bits' PhotoMechanic, iView MediaPro, and many others.

All four file types – Exif JPEG, TIFF, camera RAW and DNG – include Exif metadata as an integral part of each picture file. In simpler terms, each file type has:

- File format metadata detailing the key parameters of any JPEG file compression used and where various data sets can be found inside this picture package.
- Image data
- "Thumbnail" image data
- Exif metadata automatically added by the camera to record the settings at the moment the picture was captured
- Additional audio data spoken by the photographer to annotate each image
- Other important metadata, including IPTC metadata, written by image processing programs that help the workflow in subsequent software applications.

While the image data is the most important part, IPTC metadata provide essential information for creating an image management system and workflow. Its use for ownership, copyright, billing and archiving, search and retrieval purposes is undisputed. IPTC metadata brings order to a chaotic flood of pictures.

Camera Exif technical metadata is emerging in a similar way as the means to raise the quality of pictures and the speed of processing to new levels – two functions that newspapers and magazines cannot afford to ignore. Exif metadata is the key to the correct handling of any JPEG compression and decompression process, picture orientation and colour management. While automatic post-camera image enhancements are mostly the result of powerful image analysis and enhancement software, Exif metadata can be used to supplement or control absolute or enhanced colour changes, preserve skin tones, regulate sharpness, contrast, white



balance and tone reproduction or a reduction in image "noise." Some software companies are using Exif metadata to fine tune images and to add Exif metadata that can be useful later for other software applications.

Although pictures from digital cameras are constantly improving in quality, the trend is toward cameras with an increasing numbers of mega-pixels and higher number of pictures per second. This means that the algorithms used in cameras to process the pictures are very often a compromise of speed over quality. Post-camera image processing, particularly in automated systems, allows the use of higher-quality algorithms in a more relaxed timeframe, even though the difference might be measured in milliseconds.

It is still possible to improve digital camera images post-camera, and Exif metadata is needed to identify the range of colours and the type of processing that was used in the camera for optimising the picture. If the final output destination of the picture changes from being an Internet web site to a printed application, a re-optimisation process may be appropriate and under these circumstances Exif metadata can be very useful.

Indeed, ISO and ANSI have taken steps to preserve Exif metadata in such modern image file formats as TIFF/EP and JPEG 2000; Apple, Microsoft, Adobe and Fotoware have done the same in their systems.

Due to the proliferation of digital cameras and images, the next big challenge is to effectively search, organise and route pictures. That's where metadata will have an increasingly important role. Conventional manual annotation of pictures is becoming prohibitively expensive and is both slow and error-prone. The process of automatically adding GPS and compass information, face recognition co-ordinates, scene and even signpost recognition metadata to Exif images will mean the metadata's value may sometimes surpass that of the content.

Newspapers, magazines, picture agencies, picture sources and every link in the chain from photographers to news photo agencies to newspaper editorial and production systems should preserve and maintain all of this metadata until the point where the image is ready for final output. And picture archives should keep the original picture metadata, together with its Exif technical and IPTC metadata.

## 4.5 PLUS

To address the challenges of image rights metadata, representatives of the photography, illustration, publishing, advertising, design and software industries formed the PLUS Coalition. This non-profit international standards body is dedicated to the development of image licensing standards and systems. The PLUS Coalition is "industry neutral," representing the shared interests of all parties involved in creating, distributing and using images, worldwide.

With participation from IPTC, the PLUS Coalition has developed the Picture Licensing Universal System ("PLUS"), a universal licensing language promoting the clear communication of image rights in all industries. After more than two years of open industry review involving thousands of participants worldwide, the PLUS Coalition recently achieved multi-industry consensus and approval of a comprehensive system of image rights metadata



standards. The PLUS standards are designed for integration in applications used for image capture, image editing, image display, digital asset management and commerce.

**PLUS Picture Licensing Glossary:**

Lists, defines and codifies industry standard terms and definitions for words and phrases used in image licensing.

**PLUS Media Matrix:**

Organizes all types of media and media options into a universal set of licensing menus, to make it easier to offer, select and understand image licenses.

**PLUS Packs:**

Standardized, conveniently numbered packages of commonly licensed rights that will be offered by licensors worldwide, making it easy for customers to seek and obtain licenses from any artist or stock agency.

**PLUS-ID System:**

Establishes standardized ID codes for each licensing term, media type, media option, and PLUS Pack. Designed for multi-lingual use, the PLUS IDs allow media usage descriptions to be easily encoded and decoded, using a universally recognized format to simplify the transmission of license details.

**PLUS License Data Format:**

A schema for an image license, combining all of the common elements of a license into a universal series of fields. This standard allows a detailed license statement to be expressed in XMP, embedded in image files and ingested by DAM systems and other applications, making it easy for image users to manage the rights associated with licensed images.

These PLUS standards will work in concert with a system of centralized online registries and persistent global identifiers, which are currently under development by the PLUS Coalition. The PLUS Registries are designed to address the dynamic nature of image license metadata. Image licenses expire and may be extended, constrained, expanded, withdrawn or cancelled. In addition, copyright ownership may be transferred or otherwise acquired, or even terminated at some point after image delivery. Licensor contact information can change during the term of a license or thereafter. Model release information, property release information and other rights-related information may also change after metadata is stored and delivered to a user.

As a result, license metadata embedded in any particular image may become outdated, no longer representing the most current rights information associated with that image.

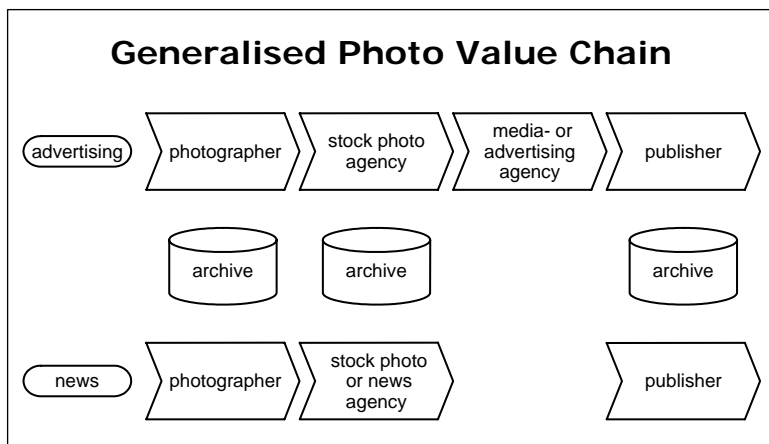
The PLUS Registries address the challenge of dynamic license metadata. As the Registries are not subject to the practical limitations associated with embedded metadata, a unique PLUS License ID embedded in an image file will always refer to a remotely stored copy of the most current license information, providing access to timely, accurate license information.

In addition to fostering a precise mutual understanding of the rights associated with an image license, the PLUS standards and registries form an integrated system designed to allow users to leverage currently available technologies to better manage those rights throughout the life of an image license. This will maximize the value derived from licensed image assets, and significantly reduce exposure to liability associated with the unintentional but nevertheless unauthorized use of images.

Additional information is available on the PLUS web site: [www.useplus.org](http://www.useplus.org)



## 5 Photo Workflows



The diagram on the left describes the photo value chain from the eagle’s view. Larger advertising campaigns are not handled by a single media agency, and more aggregators and syndicators may be involved on the way to the publisher. In this context, outdoor advertising, online, mobile and other media channels can be viewed as “publishers”. At each workflow step there may be changes and

enhancements to the photo as such and existing metadata may be changed or deleted and new metadata may be added – all for good business reasons.

### 5.1 Photographer

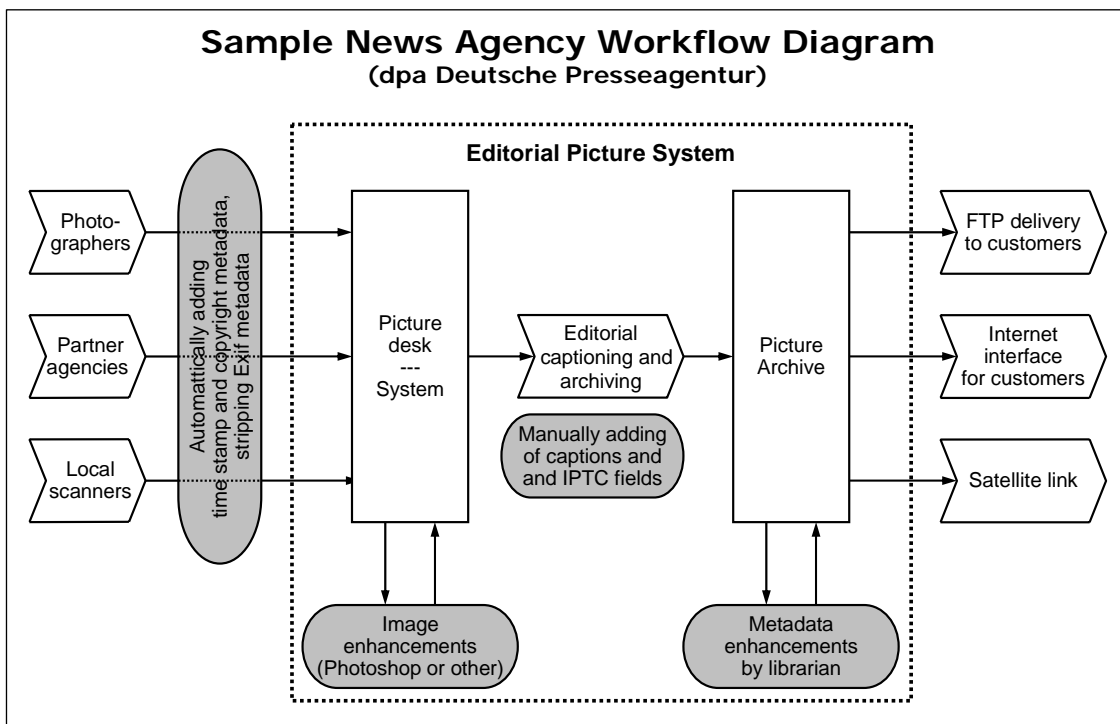
The use by photographers of embedded metadata, such as IPTC and IPTC Core, varies widely. The emerging trends do make logical sense. Those photographers who are regularly supplying various print or online media, or have clients that require metadata to be embedded before submitting work, are more often diligent about adding metadata to their images.

Those photographers who always embed their copyright and contact information are typically those who are licensing their images for assignment or as stock photography. This latter finding was confirmed in a recent survey of some 400 photographer members of the Stock Artists Alliance in an internal survey. Some of this may have to do with the education that these members received through their trade association. However, the greater driving force is the consequences of having their images considered as "orphans" in a world where unidentified images may result in lost income.

The only photographers using a majority of the IPTC metadata fields are those who are licensing some of their images directly, since they must locate images within their own system through the use of metadata, as well as making it possible for their images to be found by clients searching online portals or online image databases.

## 5.2 News Photo Agency

With the 1995 release of Adobe Photoshop, all news agencies for the first time had the chance to exchange photo metadata (IIM 2.0/Record 2) using a standard software package. It did not take long for the “IPTC Header” became the standard to exchange photo metadata between news agencies, their photographers and customers.



News agencies are under a huge pressure to release images as quickly as possible. This is the reason why news agencies require their photographers to send news photos containing an abundance of metadata.

The German news agency dpa (Deutsche Presse Agentur) receives images from three major sources: photographers, partner agencies, or scanned images from local sources. These images are viewed, evaluated and selected by editors using picture desk software. They enhance and correct – sometimes translate – photo metadata information before the images are released for distribution and stored in a picture archive. From this moment on, dpa customers are in the position to search and retrieve the image from the archive based on previously entered metadata.

In a second step (and adding a certain delay), all images entered by the editors are checked again by specially trained photo librarians. They correct and enhance the metadata even more by adding additional standardised keywords, assuring that all images can be found.

This procedure has been tested and operational since dpa started archiving images electronically. Not many changes have been made to the procedures since then, so the work is still performed based on the aging IPTC IIM standard. When dpa recognised that Exif metadata supplied by digital cameras contained duplicate data, it was decided to remove all Exif metadata from newsphotos upon reception.





The current workflow is well accepted by photographers and customers. It was realised early in the process that there is a gap between the requirements and the IIM, but dpa was able to build some “work around” by adding additional non-standard fields to the IIM structure.

### 5.3 Stock Photo Agency

Stock photo agencies and photo archives receive their images from a variety of sources: freelance and assignment photographers, news-agencies and other stock photo agencies, and archives from other countries.

Even broader than the variety of sources is the variety of customers. From newspapers and magazines to advertising agencies, book publishers and commercial prospects – every possible user of a photo is a potential customer of a stock photo agency or photo archive.

Another aspect is long-time archiving. Detailed information is required to make a 50-year-old press photo findable in the correct historical context among 10 million other photos without being forced to view tens of thousands of irrelevant hits.

After receiving a new photo, all the metadata are revised and, if necessary, corrected. In most cases additional metadata are added to make the photo searchable (and findable) for all of the different kinds of customers.

For stock photo agencies and photo archives it is of vital importance to have their large and fast growing number of photos (in many cases millions of images) easily searchable, both for in-house use as well as in web databases for clients. To achieve this, a very detailed structure of metadata is needed. A simple free text search often leads to many irrelevant results, which requires a lot of human interaction.

Though the existing IPTC standards for metadata (both IIM and IPTC Core) cover a part of the needed structure, there is a lot of descriptive and administrative data that needs to be added by in-house systems, but is not compatible with these or other existing standards. Not all of this information can be written into the image’s header, since it will get lost when an image is given to a third party such as customers or partner agencies. To avoid loss of information (and to avoid the cost and time needed for intensive re-captioning), this data is often written into IPTC fields that were not designated for that purpose. By doing so, the structure of the metadata is damaged and any further automatic processes may be unnecessarily complicated. Comparable problems come up when this information is exported to Excel spreadsheets or CSV documents.

In addition to descriptive metadata, a lot of rights information is needed in the stock photo industry, such as the availability of model or property releases. At this time there is no existing structure to store this information within the image’s metadata. This also leads to unstructured entries in IPTC fields, such as the “special instructions“ field, and forces redundant work (and human mistakes) after a photo is imported into another database.

To sum up:

- For a precise retrieval of photos in large databases a very detailed structure for the storage of metadata is needed.
- All rights relevant information should be embedded in the metadata set using a given structure.

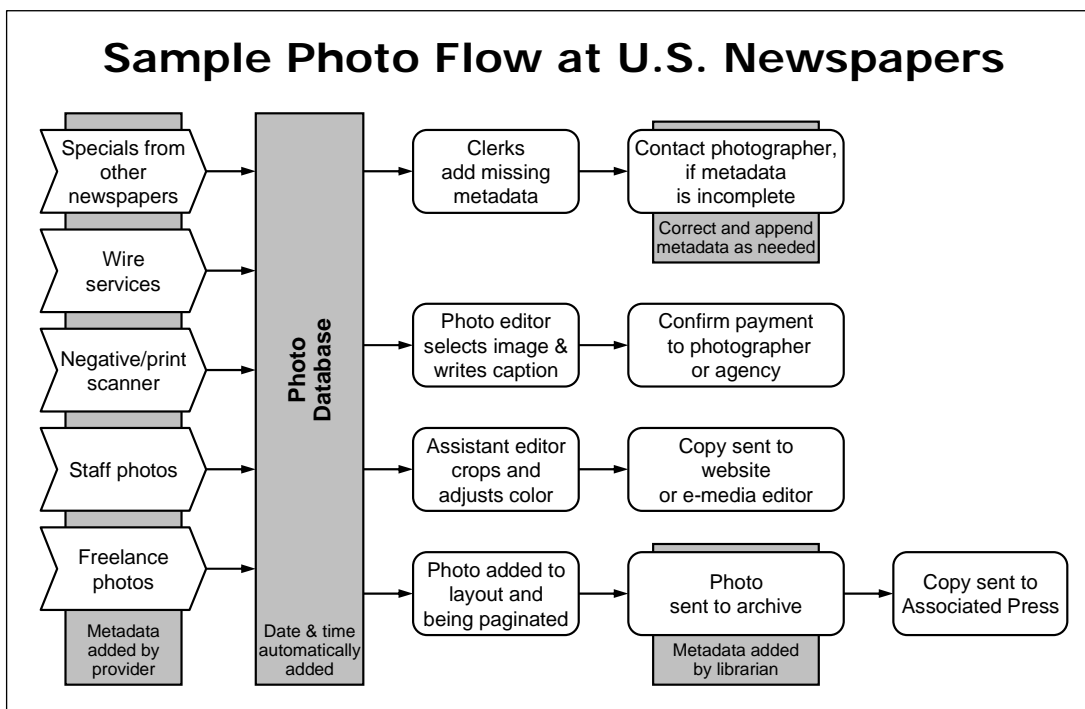




- To avoid redundant entering of data, all needed metadata should be embedded in the photo and the structure of the metadata should be based on an international standard.
- To make translations easier and to avoid misunderstandings, controlled vocabularies should be used whenever possible.

## 5.4 Newspaper

Two major considerations in newspaper photo flow are the ability to process many incoming images in a short period of time – often minutes rather than hours – and the flexibility to output the same image simultaneously in several different media. Print, web, television and mobile device output are all possible at a modern newspaper, often using automation to quickly bring certain photos to the attention of editors.



Larger newspapers often receive more than 1,000 images per day from wire service, staff and freelance sources. This means that incoming images must have as much metadata as possible to guard against loss or delay within the selection and editing processes. A simple rule can be inferred: The more metadata, the more likely a photo will be seen by decision makers.

Three or more news wire agencies may compete with freelancers and staff photographers for attention on a major story, generating 100 or more photos each day.

Newspaper photographers have long been familiar with the so-called "IPTC Header," which in fact was a variant of the IPTC IIM standard. Virtually every newspaper and wire service in the world uses IPTC Header metadata in some form, usually to search for caption and photographer information. The more savvy newspapers use IPTC metadata to spur resale of images through better database indexing, and North American newspapers are careful to provide crucial IPTC metadata -- including rights and permissions information -- when submitting photos to The Associated Press and Canadian Press.



Freelance photographers, who depend on getting the attention of busy editors, commonly add copious amounts of metadata to ensure that their photos are snared during database searches conducted by photo editors and art directors.

Staff photographers have learned that accurate photo metadata help their employers pick the best images, and help archivists retrieve images later. Story editors also find that accurate metadata helps them write better captions and ensure that proper credit is given.

Finally, XML technology helps IPTC metadata to survive the page production process, allowing important photo metadata to be embedded into page images and news graphics. Not only does this improve the searching of page and news graphic archives, but it also preserves rights and permission information that was previously lost in the production process.

## 5.5 Magazine

The extended deadlines common to most magazines, coupled with the fact that a large number of them are just now beginning the transition from film to digital submission, as well as only licensing images for one-time use, mean that there has been less of a concern with metadata. It may well be that many magazines are receiving images from photographers and stock agencies with embedded metadata, but most have not taken advantage of this information.

Most magazines, until recently, have not reused images on a regular basis, and thus have not found the need to organize the images they have received – as these weren't really assets they could legitimately reuse without re-negotiation.

The magazine staffs that are making progress at using metadata in their workflows are those that have hired employees with a background in newspaper work or those that have in-house photography studios or staff photographers.



## 6 Conclusions and open issues

- *Well defined mapping between metadata properties of different schemas:*  
Exif, IPTC IIM, IPTC Core, PLUS and other standards exist in the photo industry. In fact metadata properties for precisely the same semantics exist in parallel. A mutually agreed and well-defined mapping between the properties is the basic requirement for any synchronisation of values by software.
- *Write-Once metadata values:*  
Some metadata values can actually only be written once without abusing a stakeholder, such as the creator or the original copyright owner of a photograph. To implement this requirement, the values of specific properties should be protected by a digital signature mechanism: it would not prevent changes to these fields but a check against the signature would reveal any changes.
- *Versioning of metadata values:*  
Currently only the latest edit of a property's value is stored. At least as an option it should be possible to save the previous version of a value after editing it. Another option is that standards should define which properties should or must have versioned values.
- *Cameras should allow easy-to-preset metadata values:*  
As the camera is the first stage of most photo workflows, it is highly desirable to upload presets of administrative and descriptive metadata such as the photographer, a job identification for a series of photos, or a common basic caption for a series of photos.
- *Cameras should deliver more than Exif metadata (this point is related to the one above):*  
The current Exif specification provides only a limited set of descriptive and administrative properties. To meet the request for uploading metadata presets it is desirable that cameras manage metadata beyond the Exif schema.
- *Improved support for controlled vocabularies (CV) as the source of metadata values on the user interface level:*  
Currently, the vast majority of photo management software provides only limited support for this feature. CVs that map between a single term identifier and term names in different languages are a tremendous benefit to the international photo business – but their easy application by users must be supported by the software. Another requirement is to agree upon a common format for exchanging CV files.
- *Consistent implementation and use of photo metadata standards must be improved:*  
Standardisation bodies should not only provide technical specifications but also easy-to-understand names and descriptions for properties in different languages. Software vendors should commit themselves to adopting the names as field labels and to provide on-the-spot help with the full definition of a field to deliver the specified semantics to the end user. Furthermore, standardisation bodies should also provide user guides on how to fill in the metadata fields. The IPTC has created a user guide for the IPTC Core and provides it at no cost to all software vendors and interested parties.
- *Imaging devices are not restricted to cameras anymore:*  
To align pictures from non-camera sources to existing photo workflows, the makers of such devices should implement photo metadata at the same level as professional still camera makers.



- *A key feature of metadata for digital assets – photographs included – are globally unique identifiers:*

Standardisation bodies and system vendors should start a joint effort to define and encourage a technical and administrative system for generating such identifiers and a system that resolves these identifiers to a set of at least basic information about this digital asset.



## 7 References

### 7.1 Standards

IIM	IPTC Information Interchange Model – latest version 4.1 <a href="http://www.iptc.org/std/IIM/4.1/specification/IIMV4.1.pdf">http://www.iptc.org/std/IIM/4.1/specification/IIMV4.1.pdf</a>
IPTC Core	IPTC Core Schema for XMP – latest version 1.0 <a href="http://www.iptc.org/std/Iptc4xmpCore/1.0/specification/Iptc4xmpCore_1.0-spec-XMPSchema_8.pdf">http://www.iptc.org/std/Iptc4xmpCore/1.0/specification/Iptc4xmpCore_1.0-spec-XMPSchema_8.pdf</a>
Exif	Exchangeable image file format for digital still cameras: Exif - latest version 2.21 Available as JEITA document CP-3451-1 – see: <a href="http://www.jeita.or.jp/english/">http://www.jeita.or.jp/english/</a>
Dublin Core	Dublin Core Metadata Element Set, latest version 1.1 <a href="http://dublincore.org/documents/dces/">http://dublincore.org/documents/dces/</a>
PLUS	Picture Licensing Universal System - <a href="http://www.useplus.com">http://www.useplus.com</a>
DIM2	Digital Image Management Metadata – draft of version 1.0 <a href="http://www.prismstandard.org/DIM2_10/DIM2Guide10FinalA.pdf">http://www.prismstandard.org/DIM2_10/DIM2Guide10FinalA.pdf</a>

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