INTERNATIONAL STANDARD

ISO/IEC 15444-2

First edition
2004-05-15

Information technology — JPEG 2000 image coding system: Extensions

Technologies de l'information — Système de codage d'image JPEG 2000: Extensions

Reference number
ISO/IEC 15444-2:2004(E)

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Published in Switzerland

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 15444-2:2004 was prepared jointly by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*, in collaboration with ITU-T. The identical text is published as ITU-T Rec. T.801.

ISO/IEC 15444 consists of the following parts, under the general title *Information technology — JPEG 2000 image coding system*:

— *Part 1: Core coding system*

— *Part 2: Extensions*

— *Part 3: Motion JPEG 2000*

— *Part 4: Conformance testing*

— *Part 5: Reference software*

— *Part 6: Compound image file format*

— *Part 9: Interactivity tools, APIs and protocols*

— *Part 12: ISO base media file format*

The following parts are under preparation:

— *Part 8: Secure JPEG 2000*

— *Part 10: Extensions for theree-dimensional data and floating point data*

— *Part 11: Wireless JPEG 2000*

Annex N

JPX file format extended metadata definition and syntax

(This annex forms an integral part of this Recommendation | International Standard.
This annex is optional to a JPX reader.)

This annex defines a comprehensive set of metadata elements that may be embedded in a JPX file within XML boxes. Use of this form of metadata is optional. Metadata encoded according to this annex shall be either correctly interpreted or ignored by a JPX reader.

N.1 Introduction to extended metadata

Metadata is additional information that is associated with the primary data (the image). In the context of this Recommendation | International Standard, it is additional data linked with the image data beyond the pixels which define the image. Metadata, to be most valuable for the owner(s) and user(s) of an image, needs to be consistently maintained throughout the image lifecycle. In today's environment of image editing applications, rapid transmission via the Internet, and high quality photographic printers, the lifecycle of a digital image may be very long as well as complex.

Image metadata is a building block for digital imaging that may be used within the wide spectrum of the imaging workflow. This annex defines a standard set of image metadata based on a generic concept that may be further divided into conceptual metadata groups. Each of these groups describes a unique aspect of the image. By partitioning metadata into discrete groups, users may extend a particular block without affecting the entire architecture thereby ensuring semantic interoperability while allowing others to add value to the metadata and image data itself.

N.2 Additional references for extended metadata

- ASTM E1708-95: *Standard Practice for Electronic Interchange of Color and Appearance Data*, 1995.
- DIG. DIG35 Specification: *Metadata for Digital Images. Version 1.0*, August 2000.
- DIG: *Flashpix digital image file format. Version 1.0.1*, 10 July 1997.
- IETF RFC 1766: *Tags for the Identification of Languages*, March 1995.
- IETF RFC 2396: *Uniform Resource Identifiers (URI): Generic syntax*, August 1998.
- IETF RFC 2426: *vCard MIME Directory Profile*, September 1998.
- ISO 12232:1998, *Photography – Electronic still-picture cameras – Determination of ISO speed.*
- ISO 12233:2000, *Photography – Electronic still-picture cameras – Resolution measurements.*
- ISO 12234-2:2001, *Electronic still-picture imaging – Removable memory – Part 2: TIFF/EP image data format.*
- ISO 14524:1999, *Photography – Electronic still-picture cameras – Methods for measuring opto-electronic conversion functions (OECFs).*
- JEIDA: *Digital Still Camera File Format Standard (Exif). Version 2.1*, June 1998.
- DENKER (JOHN S.): *See How It Files*, 1996.
- NMEA 0183: *Standard For Interfacing Marine Electronic Devices. Version 2.30*, March 1998.
- WIPO. Berne Convention for the Protection of Literary and Artistic Works. Paris Act of 24 July 1971, amended 28 September 1979.
- WIPO. World Intellectual Property Organization Copyright Treaty, 1996.
- W3C, XML Schema Part 1: Structures, Rec-xmlschema-1-20010502, <http://www.w3.org/TR/xmlschema-1>.
- W3C, XML Schema Part 2: Datatypes, Rec-xmlschema-2-20010502, <http://www.w3.org/TR/xmlschema-2>.

N.3 Scope of metadata definitions

This annex consists of four logical groups of metadata as well as common definitions of dataypes that are referred to by other metadata definitions. While each group is logically partitioned, they may be linked to each other to form additional semantics.

N.3.1 Image Creation metadata

The Image Creation metadata defines the "how" metadata that specifies the source of which the image was created. For example, the camera and lens information and capture condition are useful technical information for professional and serious amateur photographers as well as advanced imaging applications.

N.3.2 Content Description metadata

The Content Description metadata defines the descriptive information of "who," "what," "when," and "where" aspect of the image. Often this metadata takes the form of extensive words, phrases, or sentences to describe a particular event or location that the image illustrates. Typically, this metadata consists of text that the user enters, either when the images are taken or scanned or later in the process during manipulation or use of the images.

N.3.3 History metadata

The History is used to provide partial information about how the image got to the present state. For example, history may include certain processing steps that have been applied to an image. Another example of a history would be the image creation events including digital capture, exposure of negative or reversal films, creation of prints, transmissive scans of negatives or positive film, or reflective scans of prints. All of this metadata is important for some applications. To permit flexibility in construction of the image history metadata, two alternate representations of the history are permitted. In the first, the history metadata is embedded in the image metadata. In the second, the previous versions of the image, represented as a URL/URI, are included in the history metadata as pointers to the location of the actual history. The history metadata for a composite image (i.e., created from two or more previous images) may also be represented through a hierarchical metadata structure. While this Specification does not define the "how" or "how much" part of the processing aspect, it does enable logging of certain processing steps applied to an image as hints for future use.

N.3.4 Intellectual Property Rights metadata

The Intellectual Property Rights (IPR) metadata defines metadata to either protect the rights of the owner of the image or provide further information to request permission to use it. It is important for developers and users to understand the implications of intellectual property and copyright information on digital images to properly protect the rights of the owner of the image data.

N.3.5 Fundamental metadata types and elements

The Fundamental metadata types define common datatypes that may be used within each metadata groups. Those include an address type or a persona type which is a collection of other primitive datatypes. The Fundamental metadata elements define elements that are commonly referenced within other metadata groups. These include a definition for language specification and a timestamp.

N.4 Metadata syntax

As defined in ITU-T T.800 | ISO/IEC 15444-1 Annex I, the JP2 file format allows XML format metadata to be contained within the box structure. Metadata defined by this annex shall be well-formed XML as defined by XML 1.0. The XML shall conform to all the normative requirements of N.6, not just those expressed in the DTD and the XML Schema. The default character encoding shall be UTF-8 unless otherwise specified in the XML document.

N.4.1 Metadata schema definition language

This Recommendation | International Standard uses the XML Schema syntax as defined by XML Schema Part 1 and XML Schema Part 2 to describe the elements of the metadata.

N.4.2 Namespace

XML namespace is a collection of names, identified by a Universal Resource Identifier (URI), that allows XML documents of different sources to use elements with the same names, to be merged within a single document with no confusion. Considering JPX metadata, either incorporating other metadata for extensibility or being used in other applications, it is important to define a XML namespace for JPX elements and attributes. To specify the JPX XML namespace the following URI is defined.

```
xmlns:xsd="http://www.jpeg.org/jpx"
```

The following namespace are used for XML and XML Schema defined elements, attributes and values:

```
xmlns:xml="http://www.w3.org/XML/1998/namespace/"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
```

N.4.3 Document type definition information

An XML Document type definition (DTD) for this Recommendation | International Standard is defined by the DTD specified in N.8.

The Formal Public Identifier (FPI) for this DTD shall be:

```
PUBLIC "-//SC29WG1/DTD JPXXML/XML//EN"
```

This FPI shall be used on the DOCTYPE declaration within a XML document referencing the DTD defined by this Recommendation | International Standard.

The following URL references the DTD for this Recommendation | International Standard:

```
"http://www.jpeg.org/metadata/15444-2.dtd"
```

In metadata defined by this annex, a DOCTYPE declaration shall be present prior to the root element of the XML document. The name in the DOCTYPE declaration shall be set to the root element name for the defined boxes in N.5. The system identifier may be modified appropriately to reference the DTD expressed in N.8.

N.4.4 XML Schema information

An XML Schema for this Recommendation | International Standard is defined by the XML Schema specified in N.9.

The following URL references the XML Schema for this Recommendation | International Standard:

```
"http://www.jpeg.org/metadata/15444-2.xsd"
```

Where an XML Schema location is used in metadata defined by this annex, the root element shall contain an xsi:schemaLocation attribute listing the jp namespace as specified in N.4.2 and the appropriate URL reference of the XML Schema file expressed in N.9.

N.5 Defined boxes

The following boxes are defined as part of JPX file format extended metadata. All boxes defined in this annex are optional unless otherwise stated. A JPX reader which supports the metadata defined in this annex shall understand all the elements within each box.

N.5.1 Image Creation metadata box

The Image Creation metadata box defines metadata that are related to the creation of a digital image. The scope of this box is applicable to metadata elements that are relevant to the creation of the digital image data, i.e., camera and scanner device information and its capture condition as well as the software or firmware to create such image. It defines the "how" metadata that specifies the origin of the image.

The type of the Image Creation box shall be 'xml\040' (0x786D 6C20) as defined in ITU-T T.800 | ISO/IEC 15444-1, I.7.1. The contents of this box shall be as follows:

Figure N.1 – Organization of the contents of Image Creation box

ICre: Image Creation metadata field. This field shall be well-formed XML as defined by XML 1.0.

Table N.1 – Format of the contents of the Image Creation box

Field name	Size (bits)	Value
ICre	Variable	This field contains an XML document as defined in N.4, with the root element IMAGE_CREATION, containing metadata defined in N.6.1.

N.5.2 Content Description metadata box

This box comprises the content description of an image. The content description has two main purposes:

- Firstly: It can be used to classify the image. Images placed in a database need to be extracted from that database. For any image to be useful (happy snaps saved in the file system of a personal computer through to an extensive professional photo library), this is required. This classification may be used to search for images.
- Secondly: Once an image is retrieved, some data which describes the image but is not useful when searching may be included. For example – "Bob is the guy asleep on the lounge" is not all that useful when searching, but is useful when describing the content.

The metadata listed in this box contains data for both of the above cases.

The type of the Content Description box shall be 'xml\040' (0x786D 6C20) as defined in ITU-T T.800 | ISO/IEC 15444-1, I.7.1. The contents of this box shall be as follows:

Figure N.2 – Organization of the contents of Content Description box

CDes: Content Description field. This field shall be well-formed XML as defined by XML 1.0.

Table N.2 – Format of the contents of the Content Description box

Field name	Size (bits)	Value
CDes	Variable	This field contains an XML document as defined in N.4, with the root element CONTENT_DESCRIPTION, containing metadata defined in N.6.2.

N.5.3 History box

This box contains the history of metadata of an image. The History metadata is used to provide partial information about how the picture got to the present state. This data is only approximate because:

- some of the data is collapsed, thus providing only a summary;
- some of the data may not have been properly entered because applications used were not able to update the history metadata.

The History box contains a summary of basic image editing operations that have already been applied to the image and previous version(s) of the image metadata. The History metadata is not designed to be used to reverse (undo) image editing operations.

The type of the History box shall be 'xml\040' (0x786D 6C20) as defined in ITU-T T.800 | ISO/IEC 15444-1, I.7.1. The contents of this box shall be as follows:

Figure N.3 – Organization of the contents of History box

Hist: History field. This field shall be well-formed XML as defined by XML 1.0.

Table N.3 – Format of the contents of the History box

Field name	Size (bits)	Value
MHist	Variable	This field contains an XML document as defined in N.4, with the root element HISTORY, containing metadata defined in N.6.3.

N.5.4 Intellectual Property Rights box

This box contains Intellectual property rights (IPR) related information associated with the image such as moral rights, copyrights as well as exploitation information.

The type of the Intellectual property rights box shall be 'jp2i' (0x6A70 3269) as defined in ITU-T T.800 | ISO/IEC 15444-1, I.6. The contents of this box shall be as follows:

Figure N.4 – Organization of the contents of Intellectual Property Rights box

IPR: Intellectual Property Rights field. This field shall be well-formed XML as defined by XML 1.0.

Table N.4 – Format of the contents of the Intellectual Property Rights box

Field name	Size (bits)	Value
IPR	Variable	This field contains an XML document as defined in N.4, with the root element IPR, containing metadata defined in N.6.4.

N.5.5 Image Identifier box

This box contains the image identifier metadata of an image. The Image Identifier metadata is used to uniquely identify the image.

The type of the Image Identifier box shall be 'xml\040' (0x786D 6C20) as defined in ITU-T T.800 | ISO/IEC 15444-1, I.7.1. The contents of this box shall be as follows:

Figure N.5 – Organization of the contents of Image Identifier box

ImgId: Image Identifier field. This field shall be well-formed XML as defined by XML 1.0.

Table N.5 – Format of the contents of the Image Identifier box

Field name	Size (bits)	Value
ImgId	Variable	This field contains an XML document as defined in N.4, with the root element IMAGE_ID, containing metadata defined in N.6.5.

N.6 Metadata definitions

This clause specifies the metadata element syntax and semantics defined as part of JPX file format extended metadata. Each of the following metadata elements is based on the XML format as defined in XML 1.0. The metadata shall be either correctly interpreted or ignored by a JPX reader.

N.6.1 Image Creation metadata

This element specifies information that are relevant to the creation of the image file. This element may contain the sub-elements listed below.

```
<xsd:element name="IMAGE_CREATION">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element ref="jp:GENERAL_CREATION_INFO" minOccurs="0"/>
      <xsd:element ref="jp:CAMERA_CAPTURE" minOccurs="0"/>
      <xsd:element ref="jp:SCANNER_CAPTURE" minOccurs="0"/>
      <xsd:element ref="jp:SOFTWARE_CREATION" minOccurs="0"/>
      <xsd:element ref="jp:CAPTURED_ITEM" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
```

Figure N.6 – Schema of the Image Creation metadata

GENERAL_CREATION_INFO: General creation information. This element specifies generic information on how the image was created. The syntax of this element is specified in N.6.1.1.

CAMERA_CAPTURE: This element specifies a camera capture metadata of a scene. The syntax of this element is specified in N.6.1.2.

SCANNER_CAPTURE: This element specifies scanner capture metadata that may be used for various scanners such as flatbed and film scanners. The syntax of this element is specified in N.6.1.8.

SOFTWARE_CREATION: This element specifies software information that created the original digital image. The syntax of this element is specified in N.6.1.10.

CAPTURED_ITEM: This element contains description of the item that was digitally captured. The syntax of this element is specified in N.6.1.11.

N.6.1.1 General Creation Information metadata

This element specifies general information on how the image was created. Applications may choose to skip further parsing based on the values stored here. For example, if the application is only interested in digital camera metadata, it can skip additional parsing based on the Image source value. This element may contain the sub-elements listed below.

```
<xsd:element name="GENERAL_CREATION_INFO">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="CREATION_TIME" type="xsd:dateTime" minOccurs="0"/>
      <xsd:element name="IMAGE_SOURCE" type="jp:tLangString" minOccurs="0"/>
      <xsd:element name="SCENE_TYPE" type="jp:tLangString" minOccurs="0"/>
      <xsd:element name="IMAGE_CREATOR" type="jp:tPerson" minOccurs="0"/>
      <xsd:element name="OPERATOR_ORG" type="jp:tOrganization" minOccurs="0"/>
      <xsd:element name="OPERATOR_ID" type="jp:tLangString" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>
```

Figure N.7 – Schema of the General Creation Information metadata

CREATION_TIME: This element specifies the date and time the image was created. This element should be stored when the creation process started. (E.g., it may be a 8 minute exposure.) This element should never be changed after it is written in the image creation device.

IMAGE_SOURCE: This element specifies the device source of the digital file, such as a film scanner, reflection print scanner, or digital camera. Table N.6 lists suggested values for this element.

Table N.6 – Image Source values

Value	Meaning
Digital Camera	Image create by a digital camera
Film Scanner	Image create by a film scanner
Reflection Print Scanner	Image create by a reflection print scanner (commonly referred to as flat bed)
Still From Video	Image create by from video
Computer Graphics	Image digitally created on computers

SCENE_TYPE: This element specifies the type of scene that was captured. It differentiates "original scenes" (direct capture of real-world scenes) from "second generation scenes" (images captured from pre-existing hardcopy images). It provides further differentiation for scenes that are digitally composed. Table N.7 lists suggested values for this element.

Table N.7 – Scene type values

Value	Meaning
Original Scene	Direct capture of real-world scenes
Second Generation Scene	Images captured from pre-existing hardcopy images such a photograph
Digital Scene Generation	Graphic arts or images digitally composed

IMAGE_CREATOR: This element specifies the name of the image creator. The image creator may be, for example, the photographer who captured the original picture on film, the illustrator, or graphic artist who conducted the image-creation process, etc. See Person type (N.7.1.13) for the format of this element.

OPERATOR_ORG: Operator organization. This element specifies the name of the service bureau, photofinisher, or organization where the image capture process (photographed, scanned or created by software) is conducted. See Organization type (N.7.1.14) for the format of this element.

OPERATOR_ID: This element specifies a name or ID for the person conducting the capture process.

N.6.1.2 Camera Capture metadata

This element specifies a camera capture of a scene. This element may contain camera and lens information, device characterization and camera capture settings.

```
  <xsd:element name="CAMERA_CAPTURE">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element name="CAMERA_INFO" type="jp:tProductDetails" minOccurs="0"/>
        <xsd:element name="SOFTWARE_INFO" type="jp:tProductDetails" minOccurs="0"/>
        <xsd:element name="LENS_INFO" type="jp:tProductDetails" minOccurs="0"/>
        <xsd:element ref="jp:DEVICE_CHARACTER" minOccurs="0"/>
        <xsd:element ref="jp:CAMERA_SETTINGS" minOccurs="0"/>
        <xsd:element name="ACCESSORY" type="jp:tProductDetails" minOccurs="0"

maxOccurs="unbounded"/>
      </xsd:sequence>
      <xsd:attribute ref="jp:TIMESTAMP"/>
      <xsd:attribute ref="xml:lang"/>
    </xsd:complexType>
  </xsd:element>
```

Figure N.8 – Schema of the Camera Capture metadata

CAMERA_INFO: Camera information. This element specifies information of the camera that captured the image. See Product Details type (N.7.1.21) for the format of this element.

SOFTWARE_INFO: Software information. This element specifies information about the software or firmware used to capture the image. See Product Details type (N.7.1.21) for the format of this element.

LENS_INFO: Lens information. This element specifies information about the lens that captured the image. See Product Details type (N.7.1.21) for the format of this element.

DEVICE_CHARACTER: Device characterization. This element specifies the technical characterization of the digital capture device. The syntax of this element is specified in N.6.1.3.

CAMERA_SETTINGS: Camera capture settings. This element specifies the camera settings used when the image was captured. The syntax of this element is specified in N.6.1.7.

ACCESSORY: This element specifies the information of the accessories used with the camera to capture the image. Professional and amateur photographers may want to keep track of a variety of miscellaneous technical information, such as the use of extension tubes, bellows, close-up lenses, and other specialized accessories. See Product Details type (N.7.1.21) for the format of this element.

N.6.1.3 Device Characterization metadata

This element specifies the technical characterization of the digital capture device. This element may contain the sub-elements listed below.

```
<xsd:element name="DEVICE_CHARACTER">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="SENSOR_TECHNOLOGY" minOccurs="0">
        <xsd:simpleType>
          <xsd:restriction base="xsd:string">
            <xsd:enumeration value="One-Chip Color Area"/>
            <xsd:enumeration value="Two-Chip Color Area"/>
            <xsd:enumeration value="Three-Chip Color Area"/>
            <xsd:enumeration value="Color Sequential Area"/>
            <xsd:enumeration value="Trilinear"/>
            <xsd:enumeration value="Color Sequential Linear Sensor"/>
          </xsd:restriction>
        </xsd:simpleType>
      </xsd:element>
      <xsd:element name="FOCAL_PLANE_RES" type="jp:tDoubleSize" minOccurs="0"/>
      <xsd:element name="SPECTRAL_SENSITIVITY" type="xsd:string" minOccurs="0"/>
      <xsd:element name="ISO_SATURATION" type="jp:tNonNegativeDouble" minOccurs="0"/>
      <xsd:element name="ISO_NOISE" type="jp:tNonNegativeDouble" minOccurs="0"/>
      <xsd:element ref="jp:SPATIAL_FREQ_RESPONSE" minOccurs="0"/>
      <xsd:element ref="jp:CFA_PATTERN" minOccurs="0"/>
      <xsd:element ref="jp:OECF" minOccurs="0"/>
      <xsd:element name="MIN_F_NUMBER" type="jp:tNonNegativeDouble" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>
```

Figure N.9 – Schema of the Device Characterization metadata

SENSOR_TECHNOLOGY: This element specifies either the type of image sensor or the sensing method used in the camera or image-capturing device. Table N.8 lists suggested values for this element.

Table N.8 – Sensor technology values

Value	Meaning
One-Chip Colour Area	An one-chip colour area sensor technology used.
Two-Chip Colour Area	A two-chip colour area sensor technology used.
Three-Chip Colour Area	A three-chip colour area sensor technology used.
Colour Sequential Area	A colour sequential area sensor technology used.
Trilinear	An trilinear sensor technology used.
Colour Sequential Linear Sensor	A colour sequential linear sensor technology used.

FOCAL_PLANE_RES: Focal plane resolution. This element specifies the number of pixels per meter in the X (width) and Y (height) directions for the main image. The resolution stored is the resolution of the image generated rather than the width and height of the image sensor.

SPECTRAL_SENSITIVITY: This element specifies the spectral sensitivity of each channel of the camera used to capture the image. It is useful for certain scientific applications. The contents of this element is compatible with ASMT E1708-95 and expected to be defined by another standard. If the Spectral Sensitivity data contains a "<" or "&" characters, then all of the occurrences of "<" shall be substituted with "<" and "&" shall be substituted with "&".

ISO_SATURATION: ISO saturation speed rating. This element specifies the ISO saturation speed rating classification as defined in ISO 12232.

ISO_NOISE: ISO noise speed rating. This element specifies the ISO noise-based speed rating classification as defined in ISO 12232.

SPATIAL_FREQ_RESPONSE: Spatial frequency response. This element specifies the Spatial Frequency Response (SFR) of the image capturing device. The syntax of this element is specified in N.6.1.4.

CFA_PATTERN: Colour filter array pattern. This element specifies the colour filter array (CFA) pattern of the image sensor used to capture a single-sensor colour image. The syntax of this element is specified in N.6.1.5.

OECF: Opto-electronic conversion function. This element specifies the Opto-Electronic Conversion Function (OECF). The OECF is the relationship between the optical input and the image file code value outputs of an electronic camera. The property allows OECF values defined in ISO 14524 to be stored as a table of values. The syntax of this element is specified in N.6.1.6.

MIN_F_NUMBER: Minimum F-number. This element specifies the minimum lens f-number of the camera or image capturing device.

N.6.1.4 Spatial Frequency Response metadata

This specifies the Spatial Frequency Response (SFR) of the image capturing device. The device measured SFR data, described in ISO 12233, can be stored as a table of spatial frequencies, horizontal SFR values, vertical SFR values, and diagonal SFR values.

```
<xsd:element name="SPATIAL_FREQ_RESPONSE">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="SPATIAL_FREQ_VAL" maxOccurs="unbounded">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="SPATIAL_FREQ" type="jp:tNonNegativeDouble"/>
            <xsd:element name="HORIZ_SFR" type="jp:tNonNegativeDouble"/>
            <xsd:element name="VERT_SFR" type="jp:tNonNegativeDouble"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
```

Figure N.10 – Schema of the Spatial Frequency Response metadata

SPATIAL_FREQ_VAL: Spatial frequency value. This element specifies the list of SFR values.

SPATIAL_FREQ: Spatial frequency value in line widths per picture height units.

HORIZ_SFR: Horizontal SFR value.

VERT_SFR: Vertical SFR value.

N.6.1.5 Colour Filter Array Pattern metadata

This element encodes the actual colour filter array (CFA) geometric pattern of the image sensor used to capture a single-sensor colour image. It is not relevant for all sensing methods. The data contains the minimum number of rows and columns of filter colour values that uniquely specify the colour filter array.

```
<xsd:element name="CFA_PATTERN">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="COLOR_ROW" maxOccurs="unbounded">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="COLOR" maxOccurs="unbounded">
              <xsd:simpleType>
                <xsd:restriction base="xsd:string">
                  <xsd:enumeration value="Red"/>
                  <xsd:enumeration value="Green"/>
                  <xsd:enumeration value="Blue"/>
                  <xsd:enumeration value="Cyan"/>
                  <xsd:enumeration value="Magenta"/>
                  <xsd:enumeration value="Yellow"/>
                  <xsd:enumeration value="White"/>
                </xsd:restriction>
              </xsd:simpleType>
            </xsd:element>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
```

Figure N.11 – Schema of the Colour Filter Array Pattern metadata

COLOR_ROW:	This element specifies the list of colour values of the CFA pattern.
COLOR:	CFA pattern values. The values shall be either Red, Green, Blue, Cyan, Magenta, Yellow, or White.

N.6.1.6 Opto-electronic Conversion Function metadata

This element specifies the Opto-Electronic Conversion Function (OECF). The OECF is the relationship between the optical input and the image file code value outputs of an electronic camera. The property allows OECF values defined in ISO 14524 to be stored as a table of values.

```
<xsd:element name="OECF">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element name="LOG_VAL" maxOccurs="unbounded">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="LOG_EXPOSURE" type="xsd:double"/>
              <xsd:element name="OUTPUT_LEVEL" type="jp:tNonNegativeDouble"

maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
      </xsd:sequence>
    </xsd:complexType>
  </xsd:element>
```

Figure N.12 – Schema of the Opto-electronic Conversion Function metadata

LOG_VAL:	This element specifies the list of OECF values.
LOG_EXPOSURE:	Optical input log exposure value.
OUTPUT_LEVEL:	Image file code value output value.

N.6.1.7 Camera Capture Settings metadata

This element specifies the camera settings used when the image was captured. New generations of digital and film cameras make it possible to capture more information about the conditions under which a picture was taken. This may include information about the lens aperture and exposure time, whether a flash was used, which lens was used, etc. This technical information is useful to professional and serious amateur photographers. In addition, some of these properties are useful to image database applications for populating values useful to advanced imaging applications and algorithms as well as image analysis and retrieval. This element may contain the sub-elements listed below.

```
<xsd:element name="CAMERA_SETTINGS">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:choice minOccurs="0">
        <xsd:element name="EXP_TIME" type="jp:tNonNegativeDouble"/>
        <xsd:element name="R_EXP_TIME" type="jp:tRational"/>
      </xsd:choice>
      <xsd:element name="F_NUMBER" type="jp:tNonNegativeDouble" minOccurs="0"/>
      <xsd:element name="EXP_PROGRAM" type="jp:tLangString" minOccurs="0"/>
      <xsd:element name="BRIGHTNESS" type="xsd:double" minOccurs="0"/>
      <xsd:element name="EXPOSURE_BIAS" type="xsd:double" minOccurs="0"/>
      <xsd:element name="SUBJECT_DISTANCE" type="jp:tNonNegativeDouble" minOccurs="0"/>
      <xsd:element name="METERING_MODE" type="jp:tLangString" minOccurs="0"/>
      <xsd:element name="SCENE_ILLUMINANT" type="jp:tLangString" minOccurs="0"/>
      <xsd:element name="COLOR_TEMP" type="jp:tNonNegativeDouble" minOccurs="0"/>
      <xsd:element name="FOCAL_LENGTH" type="jp:tNonNegativeDouble" minOccurs="0"/>
      <xsd:element name="FLASH" type="xsd:boolean" minOccurs="0"/>
      <xsd:element name="FLASH_ENERGY" type="jp:tNonNegativeDouble" minOccurs="0"/>
      <xsd:element name="FLASH_RETURN" type="xsd:boolean" minOccurs="0"/>
      <xsd:element name="BACK_LIGHT" minOccurs="0">
        <xsd:simpleType>
          <xsd:restriction base="xsd:string">
            <xsd:enumeration value="Front Light"/>
            <xsd:enumeration value="Back Light 1"/>
            <xsd:enumeration value="Back Light 2"/>
          </xsd:restriction>
        </xsd:simpleType>
      </xsd:element>
      <xsd:element name="SUBJECT_POSITION" type="jp:tPosition" minOccurs="0"/>
      <xsd:element name="EXPOSURE_INDEX" type="xsd:double" minOccurs="0"/>
      <xsd:element name="AUTO_FOCUS" minOccurs="0">
        <xsd:simpleType>
          <xsd:restriction base="xsd:string">
            <xsd:enumeration value="Auto Focus Used"/>
            <xsd:enumeration value="Auto Focus Interrupted"/>
            <xsd:enumeration value="Near Focused"/>
            <xsd:enumeration value="Soft Focused"/>
            <xsd:enumeration value="Manual"/>
          </xsd:restriction>
        </xsd:simpleType>
      </xsd:element>
      <xsd:element name="SPECIAL_EFFECT" minOccurs="0" maxOccurs="unbounded">
        <xsd:simpleType>
          <xsd:restriction base="xsd:string">
            <xsd:enumeration value="Colored"/>
            <xsd:enumeration value="Diffusion"/>
            <xsd:enumeration value="Multi-Image"/>
            <xsd:enumeration value="Polarizing"/>
            <xsd:enumeration value="Split-Field"/>
            <xsd:enumeration value="Star"/>
          </xsd:restriction>
        </xsd:simpleType>
      </xsd:element>
      <xsd:element name="CAMERA_LOCATION" type="jp:tLocation" minOccurs="0"/>
      <xsd:element name="ORIENTATION" type="jp:tDirection" minOccurs="0"/>
      <xsd:element name="PAR" type="jp:tRational" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>
```

Figure N.13 – Schema of the Camera Capture Settings metadata

EXP_TIME: Exposure time. This element specifies the exposure time used when the image was captured. The value of this element is stored in seconds.

R_EXP_TIME: Rational exposure time. This element specifies the exposure time used when the image was captured. The value of this element is stored in rational values in seconds.

F_NUMBER: F-Number. This element specifies the lens f-number (ratio of lens aperture to focal length) used when the image was captured.

EXP_PROGRAM: Exposure program. This element specifies the class of exposure program that the camera used at the time the image was captured. Table N.9 lists suggested values for this element.

Table N.9 – Exposure program values

Value	Meaning
Manual	The exposure setting set manually by the photographer.
Program Normal	A general purpose auto-exposure program.
Aperture Priority	The user selected the aperture and the camera selected the shutter speed for proper exposure.
Shutter Priority	The user selected the shutter speed and the camera selected the aperture for proper exposure.
Program Creative	The exposure setting is biased toward greater depth of element.
Program Action	The exposure setting is biased toward faster shutter speed.
Portrait Mode	The exposure setting is intended for close-up photos with the background out of focus.
Landscape Mode	The exposure setting is intended for landscapes with the background in good focus.

BRIGHTNESS: Brightness value. This element specifies the Brightness Value (Bv) measured when the image was captured, using APEX units. The expected maximum value is approximately 13.00 corresponding to a picture taken of a snow scene on a sunny day, and the expected minimum value is approximately –3.00 corresponding to a night scene. If the value supplied by the capture device represents a range of values rather than a single value, the minimum and maximum value may be specified.

EXPOSURE_BIAS: Exposure bias value. This element specifies the actual exposure bias (the amount of over-or underexposure relative to a normal exposure, as determined by the camera's exposure system) used when capturing the image, using APEX units. The value is the number of exposure values (stops). For example, –1.00 indicates 1 eV (1 stop) underexposure, or half the normal exposure.

SUBJECT_DISTANCE: This element specifies the distance between the front nodal plane of the lens and the subject on which the camera was focusing. The camera may have focused on a subject within the scene that may not have been the primary subject. The subject distance may be specified by a single number if the exact value is known. Alternatively, a range of values indicating the minimum and maximum distance of the subject may be set. The value of this element is in meters.

METERING_MODE: This element specifies the metering mode (the camera's method of spatially weighting the scene luminance values to determine the sensor exposure) used when capturing the image. Table N.10 lists suggested values for this element.

Table N.10 – Metering mode values

Value	Meaning
Average	Average mode used.
Center Weighted Average	Center weighted average mode used.
Spot	Spot mode used.
MultiSpot	MultiSpot mode used.
Pattern	Pattern mode used.
Partial	Partial mode used.

SCENE_ILLUMINANT: This element specifies the light source (scene illuminant) that was present when the image was captured. Table N.11 lists suggested values for this element.

Table N.11 – Scene illuminant values

Value	Meaning
Daylight	Daylight illuminant used.
Fluorescent Light	Fluorescent light used.
Tungsten Lamp	Tungsten lamp used.
Flash	Flash used.
Standard Illuminant A	Standard illuminant A used.
Standard Illuminant B	Standard illuminant B used.
Standard Illuminant C	Standard illuminant C used.
D55 Illuminant	D55 illuminant used.
D65 Illuminant	D65 illuminant used.
D75 Illuminant	D75 illuminant used.

COLOR_TEMP: Colour temperature. This element specifies the actual colour temperature value of the scene illuminant stored in units of Kelvin.

FOCAL_LENGTH: This element specifies the lens focal length used to capture the image. The focal length may be specified by using a single number, for a fixed focal length lens or a zoom lens, if the zoom position is known. The value of this element is stored in meters.

FLASH: This element specifies whether flash was used at image capture.

FLASH_ENERGY: This element specifies the amount of flash energy that was used. The measurement units are Beam Candle Power Seconds (BCPS).

FLASH_RETURN: This element specifies whether the camera judged that the flash was not effective at the time of exposure.

BACK_LIGHT: This element specifies the camera's evaluation of the lighting conditions at the time of exposure. Table N.12 lists BACK_LIGHT values used for lighting situations.

Table N.12 – Back light values

Value	Meaning
Front Light	The subject is illuminated from the front side.
Back Light 1	The brightness value difference between the subject centre and the surrounding area is greater than one full step (APEX). The frame is exposed for the subject centre.
Back Light 2	The brightness value difference between the subject centre and the surrounding area is greater than one full step (APEX). The frame is exposed for the surrounding area.

SUBJECT_POSITION: This element specifies the approximate position of the subject in the scene. See Position Type for the format of this element.

EXPOSURE_INDEX: This element specifies the exposure index setting the camera selected.

AUTO_FOCUS: This element specifies the status of the focus of the capture device at the time of capture. Table N.13 lists values used for auto focus status.

Table N.13 – Auto focus values

Value	Meaning
Auto Focus Used	The camera successfully focused on the subject.
Auto Focus Interrupted	The image was captured before the camera had successfully focused on the subject.
Near Focused	The camera deliberately focused at a distance closer than the subject to allow for the super-imposition of a focused foreground subject.
Soft Focused	The camera deliberately did not focus exactly at the subject distance to create a softer image (commonly used for portraits).
Manual	The camera was focused manually.

SPECIAL_EFFECT: Special Effects. This element specifies the types of special effects filters used. It contains a list of filter elements, where the order of the elements in the array indicates the stacking order of the filters. The first value in the array is the filter closest to the original scene. This element specifies the special effect filter used. Legal values are Coloured, Diffusion, Multi-Image, Polarizing, Split-Field, Star.

CAMERA_LOCATION: This element specifies the location of the camera when the picture was taken. See Location Type for the format of this element.

ORIENTATION: This element specifies the orientation of the camera when the picture was taken. See Direction Type for the format of this element.

PAR: Print aspect ratio. This element specifies the print aspect ratio specified by the user when the picture was taken.

N.6.1.8 Scanner Capture metadata

This element specifies scanner capture metadata that may be used for various scanners such as flatbed and film scanners. It optionally contains scanner information, device characterization and scanner capture settings. This element may contain the sub-elements listed below.

```
<xsd:element name="SCANNER_CAPTURE">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="SCANNER_INFO" type="jp:tProductDetails" minOccurs="0"/>
      <xsd:element name="SOFTWARE_INFO" type="jp:tProductDetails" minOccurs="0"/>
      <xsd:element ref="jp:SCANNER_SETTINGS" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>
```

Figure N.14 – Schema of the Scanner Capture metadata

SCANNER_INFO: Scanner information. This element specifies information about a particular scanner that was used to digitize an image item. It is recommended that applications are able to create a unique value of the scanner by combining all elements. See Product Details type (N.7.1.21) for the format of this element.

SOFTWARE_INFO: Software information. This element specifies information about the software or firmware used to capture the image. See Product Details type (N.7.1.21) for the format of this element.

SCANNER_SETTINGS: This element specifies the scanner settings used when the image was scanned. The syntax of this element is specified in N.6.1.9.

N.6.1.9 Scanner Settings metadata

This element specifies the scanner settings used when the image was scanned. This element may contain the sub-elements listed below.

```
<xsd:element name="SCANNER_SETTINGS">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="PIXEL_SIZE" type="jp:tNonNegativeDouble" minOccurs="0"/>
      <xsd:element name="PHYSICAL_SCAN_RES" type="jp:tDoubleSize" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute ref="jp:TIMESTAMP"/>
  </xsd:complexType>
</xsd:element>
```

Figure N.15 – Schema of the Scanner Settings metadata

PIXEL_SIZE: This element specifies the pixel size, in meters, of the scanner.

PHYSICAL_SCAN_RES: Physical scan resolution. These element specify the physical scanning resolution of the device (not the interpolated resolution of the final output data) in the X (width) and Y (height) directions. The value of these elements are in meters.

N.6.1.10 Software Creation metadata

This element specifies software creation information (e.g., the application name) that created the original image.

```
<xsd:element name="SOFTWARE_CREATION">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="SOFTWARE_INFO"   type="jp:tProductDetails"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
```

Figure N.16 – Schema of the Software Creation metadata

SOFTWARE_INFO: Software information. This element specifies information about the software that created the original image. See Product Details type (N.7.1.21) for the format of this element.

N.6.1.11 Captured Item metadata

This element specifies capture item metadata. It optionally contains reflection print or film. This element may contain the sub-elements listed below.

```
<xsd:element name="CAPTURED_ITEM">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:choice>
        <xsd:element ref="jp:REFLECTION_PRINT" minOccurs="0"/>
        <xsd:element ref="jp:FILM" minOccurs="0"/>
      </xsd:choice>
    </xsd:sequence>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>
```

Figure N.17 – Schema of the Captured Item metadata

REFLECTION_PRINT: This element specifies information about a reflection print that was digitally captured. The syntax of this element is specified in N.6.1.12.

FILM: This element specifies information about the film. The syntax of this element is specified in N.6.1.13.

N.6.1.12 Reflection Print metadata

This element specifies information about a reflection print that was digitally captured. This element may contain the sub-elements listed below.

```
<xsd:element name="REFLECTION_PRINT">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="DOCUMENT_SIZE" type="jp:tDoubleSize" minOccurs="0"/>
      <xsd:element name="MEDIUM" minOccurs="0">
        <xsd:simpleType>
          <xsd:restriction base="xsd:string">
            <xsd:enumeration value="Continuous Tone Image"/>
            <xsd:enumeration value="Halftone Image"/>
            <xsd:enumeration value="Line Art"/>
          </xsd:restriction>
        </xsd:simpleType>
      </xsd:element>
      <xsd:element name="RP_TYPE" minOccurs="0">
        <xsd:simpleType>
          <xsd:restriction base="xsd:string">
            <xsd:enumeration value="B/W Print"/>
            <xsd:enumeration value="Color Print"/>
            <xsd:enumeration value="B/W Document"/>
            <xsd:enumeration value="Color Document"/>
          </xsd:restriction>
        </xsd:simpleType>
      </xsd:element>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
```

Figure N.18 – Schema of the Reflection Print metadata

DOCUMENT_SIZE: This element specifies the lengths of the X (width) and Y (height) dimension of the original photograph or document, respectively. The values of these elements are given in meters.

MEDIUM: This element specifies the medium of the original photograph, document, or artifact. Legal values include Continuous Tone Image, Halftone Image, and Line Art.

RP_TYPE: Reflection print type. This element specifies the type of the original document or photographic print. Legal values include B/W Print, Colour Print, B/W Document, and Colour Document.

N.6.1.13 Film metadata

This element specifies information on the film that was digitized. This element may contain the sub-elements listed below.

```
<xsd:element name="FILM">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="BRAND" type="jp:tProductDetails" minOccurs="0"/>
      <xsd:element name="CATEGORY" minOccurs="0">
        <xsd:simpleType>
          <xsd:restriction base="xsd:string">
            <xsd:enumeration value="Negative B/W"/>
            <xsd:enumeration value="Negative Color"/>
            <xsd:enumeration value="Reversal B/W"/>
            <xsd:enumeration value="Reversal Color"/>
            <xsd:enumeration value="Chromagenic"/>
            <xsd:enumeration value="Internegative B/W"/>
            <xsd:enumeration value="Internegative Color"/>
          </xsd:restriction>
        </xsd:simpleType>
      </xsd:element>
      <xsd:element name="FILM_SIZE" type="jp:tDoubleSize" minOccurs="0"/>
      <xsd:element name="ROLL_ID" type="jp:tLangString" minOccurs="0"/>
      <xsd:element name="FRAME_ID" type="xsd:positiveInteger" minOccurs="0"/>
      <xsd:element name="FILM_SPEED" type="xsd:positiveInteger" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>
```

Figure N.19 – Schema of the Film metadata

BRAND: This element specifies the name of the film manufacturer. See Product Details type (N.7.1.21) for the format of this element.

CATEGORY: This element specifies the category of film used. Legal values include Negative B/W, Negative Colour, Reversal B/W, Reversal Colour, Chromagenic, Internegative B/W, and Internegative Colour. The category Chromagenic refers to B/W negative film that is developed with a C41 process (i.e., colour negative chemistry).

FILM_SIZE: This element specifies the size of the X and Y dimension of the film used, and the unit is in meters.

ROLL_ID: This element specifies the roll number or ID of the film. For some film, this number is encoded on the film cartridge as a bar code.

FRAME_ID: This element specifies the frame number or ID of the frame digitized from the roll of film.

FILM_SPEED: This element specifies the film speed of the film. This element is measured in ASA.

N.6.2 Content Description metadata

The Content Description metadata describes the content of the information captured in the image. Those are semantic information typically requiring user input. The value of such information increases as time passes. This element may contain the sub-elements listed below.

```
<xsd:element name="CONTENT_DESCRIPTION">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="GROUP_CAPTION" type="jp:tLangString" minOccurs="0"/>
      <xsd:element name="CAPTION" type="jp:tLangString" minOccurs="0"/>
      <xsd:element name="CAPTURE_TIME" type="jp:tDateTime" minOccurs="0"/>
      <xsd:element name="LOCATION" type="jp:tLocation" minOccurs="0"/>
      <xsd:element ref="jp:PERSON" minOccurs="0" maxOccurs="unbounded"/>
      <xsd:element ref="jp:THING" minOccurs="0" maxOccurs="unbounded"/>
      <xsd:element ref="jp:ORGANIZATION" minOccurs="0" maxOccurs="unbounded"/>
      <xsd:element ref="jp:EVENT" minOccurs="0" maxOccurs="unbounded"/>
      <xsd:element ref="jp:AUDIO" minOccurs="0" maxOccurs="unbounded"/>
      <xsd:element ref="jp:PROPERTY" minOccurs="0" maxOccurs="unbounded"/>
      <xsd:element ref="jp:DICTIONARY" minOccurs="0" maxOccurs="unbounded"/>
      <xsd:element ref="jp:COMMENT" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>
```

Figure N.20 – Schema of the Content Description metadata

GROUP_CAPTION: This element specifies the subject or purpose of the image. It may be additionally used to provide any other type of information related to the image.

CAPTION: This element specifies the subject or purpose of the image. It may be additionally used to provide any other type of information related to the image.

CAPTURE_TIME: This element specifies the time and date the image was initially generated. This may be different to the capture device date where the capture device is a scanner that scans the image at a different time to when it was initially captured. See DateTime type (N.7.1.8) for the format of this element.

LOCATION: The element describes the location of the image. This location is the physical location of the image (e.g., address, GPS coordinate), not the position of an object within the image. See Location type (N.7.1.15) for the format of this element.

PERSON: Person Description. This element specifies a person within an image. The syntax of this element is specified in N.6.2.1.

THING: Thing Description. This element specifies the names of tangible things depicted in the image. The syntax of this element is specified in N.6.2.2.

ORGANIZATION: Organization Description. This element specifies an organization within an image. The syntax of this element is specified in N.6.2.3.

EVENT: Event description. This element specifies events depicted in the image. The syntax of this element is specified in N.6.2.4.

AUDIO: This element specifies audio streams associated with an image. The syntax of this element is specified in N.6.2.7.

PROPERTY: This element specifies information used to describe an image or an object within an image. The syntax of this element is specified in N.6.2.8.

DICTIONARY: This element specifies a dictionary of a property. The syntax of this element is specified in N.6.2.9.

COMMENT: This element specifies user- and/or application-defined information beyond the scope of other properties in this group. See Comment element (N.7.3.1) for the format of this element.

N.6.2.1 Person Description metadata

This element specifies a person within an image. See Person type (N.7.1.13) for the format of this element. This element may contain the sub-elements listed below.

```
<xsd:element name="PERSON">
  <xsd:complexType>
    <xsd:complexContent>
      <xsd:extension base="jp:tPerson">
        <xsd:sequence>
          <xsd:element name="POSITION" type="jp:tPosition" minOccurs="0"/>
          <xsd:element name="LOCATION" type="jp:tLocation" minOccurs="0"/>
          <xsd:element ref="jp:PROPERTY" minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:extension>
    </xsd:complexContent>
  </xsd:complexType>
</xsd:element>
```

Figure N.21 – Schema of the Person Description metadata

POSITION: This element specifies the position of the person within the image. See Position type (N.7.1.17) for the format of this element.

LOCATION: This element specifies the physical location of the person. This element does not specify the relative position of the person. See Location type (N.7.1.15) for the format of this element.

PROPERTY: This element specifies additional information describing the person. See Property metadata (N.6.2.8) for the format of this element.

N.6.2.2 Thing Description metadata

This element specifies the names and/or properties of tangible things depicted in the image (for example, Washington Monument) or of abstract regions. This element may contain the sub-elements listed below.

```
<xsd:element name="THING">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="NAME" type="jp:tLangString" minOccurs="0"/>
      <xsd:element ref="jp:COMMENT" minOccurs="0"/>
      <xsd:element name="POSITION" type="jp:tPosition" minOccurs="0"/>
      <xsd:element name="LOCATION" type="jp:tLocation" minOccurs="0"/>
      <xsd:element ref="jp:PROPERTY" minOccurs="0" maxOccurs="unbounded"/>
      <xsd:element ref="jp:THING" minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
    <xsd:attribute name="ID" type="xsd:string"/>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>
```

Figure N.22 – Schema of the Thing Description metadata

NAME:	This element specifies the name of the Thing.
COMMENT:	This element specifies user- and/or application-defined information beyond the scope of other properties in the Thing. See Comment element (N.7.3.1) for more information on this element.
POSITION:	This element specifies the position of the thing within the image. See Position type (N.7.1.17) for the format of this element.
LOCATION:	This element specifies the physical location of the thing. This element does not specify the relative position of the thing within the image. See Location type (N.7.1.15) for the format of this element.
PROPERTY:	The Thing also contains multiple Property*s*. These Property*s* describe the thing. See Property metadata (N.6.2.8) for the format of this element.
THING	Sub-thing description. The Thing element may contain zero or more Thing elements, with the interpretation that these are sub-things of the containing thing.
ID:	This element is the identifier attribute for the Thing.

N.6.2.3 Organization Description metadata

This element specifies an organization depicted within an image. This description can also be used to describe the entire image. See Organization type (N.7.1.14) for the format of this element. This element may contain the sub-elements listed below.

```
<xsd:element name="ORGANIZATION">
  <xsd:complexType>
    <xsd:complexContent>
      <xsd:extension base="jp:tOrganization">
        <xsd:sequence>
          <xsd:element name="POSITION" type="jp:tPosition" minOccurs="0"/>
          <xsd:element name="LOCATION" type="jp:tLocation" minOccurs="0"/>
          <xsd:element ref="jp:PROPERTY" minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:extension>
    </xsd:complexContent>
  </xsd:complexType>
</xsd:element>
```

Figure N.23 – Schema of the Organization Description metadata

POSITION:	This element specifies the position of the organization within the image. See Position type (N.7.1.17) for the format of this element.
LOCATION:	This element specifies the physical location of the organization. This element does not specify the relative position of the organization. See Location type (N.7.1.15) for the format of this element.
PROPERTY:	This element specifies additional information describing the organization. See Property metadata (N.6.2.8) for the format of this element.

N.6.2.4 Event Description metadata

This element specifies a description of the event depicted in the image. An Event is the most likely reason why an image is captured. This element may contain the sub-elements listed below unless otherwise stated.

```
<xsd:element name="EVENT">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="EVENT_TYPE" type="jp:tLangString"/>
      <xsd:element name="DESCRIPTION" type="jp:tLangString" minOccurs="0"/>
      <xsd:element name="LOCATION" type="jp:tLocation" minOccurs="0"/>
      <xsd:element name="EVENT_TIME" type="jp:tDateTime" minOccurs="0"/>
      <xsd:element name="DURATION" type="xsd:duration" minOccurs="0"/>
      <xsd:element ref="jp:COMMENT" minOccurs="0"/>
      <xsd:element ref="jp:PARTICIPANT" minOccurs="0" maxOccurs="unbounded"/>
      <xsd:element ref="jp:EVENT_RELATION" minOccurs="0" maxOccurs="unbounded"/>
      <!-- Sub-events -->
      <xsd:choice minOccurs="0" maxOccurs="unbounded">
        <xsd:element ref="jp:EVENT"/>
        <xsd:element name="EVENT_REF" type="xsd:string"/>
      </xsd:choice>
    </xsd:sequence>
    <xsd:attribute name="ID" type="xsd:string"/>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>
```

Figure N.24 – Schema of the Event Description metadata

EVENT_TYPE: Event type. If there is an Event or Sub-event element, the Event type element shall exist. The Event type element may occur only once in a node level of an Event tree or Sub-event branch.

DESCRIPTION: This element specifies a description of the event. This element is used to describe an event in text human readable format.

LOCATION: This element identifies the physical location of the Event and not the position within the image. See Location type (N.7.1.15) for more information on this element.

EVENT_TIME: Event date and time. This element specifies the start time of the event. See DateTime type (N.7.1.8) for the format of this element.

DURATION: This element specifies the duration of the Event.

COMMENT: This element specifies user- and/or application-defined information beyond the scope of other properties in the Event. See Comment element (N.7.3.1) for more information on this element.

PARTICIPANT: This element specifies the participants of the event. A participant may be a Person, an Organization or a Thing. The syntax of this element is specified in N.6.2.5.

EVENT_RELATION: Event relationships. This element specifies relationships to other events. The syntax of this element is specified in N.6.2.6.

Sub-events. The Event element may contain one or more Sub-event elements of the encompassing event. A Sub-event element may contain Sub-events. The sub-event element may be either contained within the event element, or referenced:

EVENT: Sub-event description.

EVENT_REF: Event reference. A reference to the sub-event. This element is a link to one of the other Event elements.

ID: This element specifies the unique identifier for the Event.

N.6.2.5 Participant metadata

This element specifies the participants in the event. A participant may be a Person, an Organization or a Thing.

```
<xsd:element name="PARTICIPANT">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="ROLE" type="jp:tLangString" minOccurs="0"
                                                                maxOccurs="unbounded"/>
      <xsd:choice>
        <xsd:element name="OBJECT_REF" type="xsd:string"/>
        <xsd:element ref="jp:PERSON"/>
        <xsd:element ref="jp:THING"/>
        <xsd:element ref="jp:ORGANIZATION"/>
      </xsd:choice>
    </xsd:sequence>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>
```

Figure N.25 – Schema of the Participant metadata

ROLE: This element specifies the role of the participant within the event.

OBJECT_REF: Object reference. This element is a reference to a participant. This element is a link to one of the Person, Organization or Thing elements within the Content Description metadata.

PERSON: This element specifies a Person who is a participant of an event yet not depicted within the image. See Person description metadata (see N.6.2.1) for the format of this element.

THING: This element specifies a Thing that is a participant of an event yet not depicted within the image. See Thing description metadata (see N.6.2.2) for the format of this element.

ORGANIZATION: This element specifies the Organization that is a participant of an event yet not depicted within the image. See Organization description metadata (see N.6.2.3) for the format of this element.

N.6.2.6 Event Relationship metadata

This element specifies relationships to other events. These are used for relationships between events that are not directly sub-events of each other. An example of a relationship might be a link to a previous event of the same type.

```
<xsd:element name="EVENT_RELATION">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="RELATION" type="jp:tLangString" minOccurs="0"

maxOccurs="unbounded"/>
      <xsd:element name="EVENT_REF" type="xsd:string" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
```

Figure N.26 – Schema of the Event Relationship metadata

RELATION: This element specifies a description of the relationship(s) to the other event(s).

EVENT_REF: Event reference. This element is a reference to related events. This element is a link to one of the other Event elements within the Event description metadata.

N.6.2.7 Audio metadata

This element specifies audio metadata associated with an image. Image metadata can contain zero or more audio streams. Each audio stream can contain a comment element describing the audio. A single comment should also be able to describe more than one audio stream.

```
<xsd:element name="AUDIO">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="AUDIO_STREAM" type="xsd:anyURI"/>
      <xsd:element name="AUDIO_FORMAT" type="jp:tLangString" minOccurs="0"/>
      <xsd:element name="MIME_TYPE" type="xsd:string" minOccurs="0"/>
      <xsd:element name="DESCRIPTION" type="jp:tLangString" minOccurs="0"/>
      <xsd:element ref="jp:COMMENT" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>
```

Figure N.27 – Schema of the Audio metadata

AUDIO_STREAM: This element specifies an URI reference to an audio stream. The format of the stream is not defined.

AUDIO_FORMAT: Audio Stream Format. This element specifies the name of the audio stream format. For example, AIFF, MIDI, MP3 and WAV.

MIME_TYPE: This element specifies the Internet media type of the audio file.

DESCRIPTION: This element specifies a description of the audio stream.

COMMENT: This element specifies user- and/or application-defined information beyond the scope of other properties in the Audio. See Comment element (N.7.3.1) for more information on this element.

N.6.2.8 Property metadata

This element specifies a description of an image or an object within an image. This element shall contain a name and may optionally contain a value and sub-property elements. A Property is either a single word or a small phrase and an optional value. The property is a non-exact language-specific definition of the image or part of the image. This element may contain the sub-elements listed below.

```
<xsd:element name="PROPERTY">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="NAME" type="jp:tLangString" minOccurs="0"/>
      <xsd:element name="VALUE" type="jp:tLangString" minOccurs="0"/>
      <xsd:element ref="jp:COMMENT" minOccurs="0"/>
      <xsd:element ref="jp:PROPERTY" minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
    <xsd:attribute name="DICT_REF" type="xsd:string"/>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>
```

Figure N.28 – Schema of the Property metadata

NAME: This element specifies the name of the Property.

VALUE: This element specifies the property value. A Property that contains a value cannot contain sub-property elements.

COMMENT: This element specifies user- and/or application-defined information beyond the scope of other properties in the Property. See Comment element (N.7.3.1) for more information on this element.

PROPERTY: Sub-property. This element specifies sub-Properties of the encompassing Property. A property that contains sub-properties cannot contain a value.

DICT_REF: Dictionary reference. This element specifies a reference to a Dictionary (see N.6.2.9).

N.6.2.9 Dictionary Definition metadata

This element specifies the name of a dictionary. A Property may be defined using a specific dictionary. The advantage of this is that there is a single definition for each Property metadata, and that two different Property metadata annotations are not used to define the same thing.

To give an example, a dictionary may define the word "Vehicle" to be used to describe a car, vehicle, truck, automobile, etc. A second example is the use of the word "Date." Date may be used to specify the fruit of the palm "date" and not the definition of date as a day. This element may contain the sub-elements listed below.

```
<xsd:element name="DICTIONARY">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="DICT_NAME" type="jp:tLangString" minOccurs="0"/>
      <xsd:element ref="jp:COMMENT" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute name="DICT_ID" type="xsd:string"/>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>
```

Figure N.29 – Schema of the Dictionary Definition metadata

DICT_NAME: Dictionary name. This element specifies the name of the dictionary.

COMMENT: This element specifies user- and/or application-defined information beyond the scope of other properties in the Dictionary. See Comment element (N.7.3.1) for more information on this element.

DICT_ID: Dictionary ID. This element specifies the unique identifier for the dictionary.

N.6.3 History metadata

The History element contains a summary of basic image editing operations that have already been applied to the image and previous version(s) of the image metadata. The History metadata is not designed to be used to reverse (undo) image editing operations. This element may contain the sub-elements listed below.

```
<xsd:element name="HISTORY">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element ref="jp:PROCESSING_SUMMARY" minOccurs="0"/>
      <xsd:element ref="jp:IMAGE_PROCESSING_HINTS" minOccurs="0"/>
      <xsd:element ref="jp:METADATA"/>
    <xsd:sequence>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>
```

Figure N.30 – Schema of the History metadata

PROCESSING_SUMMARY: This element specifies a list of operations previously applied to an image during the course of its workflow. The syntax of this element is specified in N.6.3.1.

IMAGE_PROCESSING_HINTS: This element specifies a list of the operations previously performed when editing an image. The syntax of this element is specified in N.6.3.2.

METADATA: Previous metadata. This element specifies a previous version of the metadata that may include metadata about portions of an image that was deleted (e.g., cropped). The syntax of this element is specified in N.6.3.3.

N.6.3.1 Processing Summary metadata

This element specifies a list of the operations performed over the life of the image, listing the operations performed and not the ordering or the number of times each operation is performed.

The processing summary defined below should be considered potential and in all likelihood partial information. That is because the presence of a particular hint, such as "Image Cropped," indicates that the image has been cropped. However, absence of a "Image Cropped" hint is no assurance that the image has never been cropped. This element may contain the sub-elements listed below.

```
<xsd:element name="PROCESSING_SUMMARY">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="IMG_CREATED" minOccurs="0">
        <xsd:complexType/>
      </xsd:element>
      <xsd:element name="IMG_CROPPED" minOccurs="0">
        <xsd:complexType/>
      </xsd:element>
      <xsd:element name="IMG_TRANSFORMED" minOccurs="0">
        <xsd:complexType/>
      </xsd:element>
      <xsd:element name="IMG_GTC_ADJ" minOccurs="0">
        <xsd:complexType/>
      </xsd:element>
      <xsd:element name="IMG_STC_ADJ" minOccurs="0">
        <xsd:complexType/>
      </xsd:element>
      <xsd:element name="IMG_SPATIAL_ADJ" minOccurs="0">
        <xsd:complexType/>
      </xsd:element>
      <xsd:element name="IMG_EXT_EDITED" minOccurs="0">
        <xsd:complexType/>
      </xsd:element>
      <xsd:element name="IMG_RETOUCHED" minOccurs="0">
        <xsd:complexType/>
      </xsd:element>
      <xsd:element name="IMG_COMPOSITED" minOccurs="0">
        <xsd:complexType/>
      </xsd:element>
      <xsd:element name="IMG_METADATA" minOccurs="0">
        <xsd:complexType/>
      </xsd:element>
    </xsd:sequence>
    <xsd:attribute ref="jp:TIMESTAMP"/>
  </xsd:complexType>
</xsd:element>
```

Figure N.31 – Schema of the Processing Summary metadata

IMG_CREATED: Digital image created. The presence of this element indicates that the image was created by a metadata-aware application or process. Where a number of operations are performed in the creation of an image (such as removing borders), then these operations should be summarized using Digital Image Created operation and not listed independently. This element is especially useful to show truncation of image metadata. Where this element is not present, the full history of the metadata is known to be incomplete. Presence of this element does not show that the metadata history is complete though.

IMG_CROPPED: Image cropped. The presence of this element indicates that an image editing application, program, or system has cropped the image.

IMG_TRANSFORMED: Image Transformed. The presence of this element indicates that an image has been transformed.

IMG_GTC_ADJ: Global Tone/Colour Adjustment. The presence of this element indicates that a contrast or density adjustment has been applied to the image, or that the image colouring has been adjusted.

IMG_STC_ADJ: Selective Tone/Colour Adjustment. The presence of this element indicates that a contrast or density adjustment has been applied to a selected region of the image.

IMG_SPATIAL_ADJ: Global Spatial Adjustment. The presence of this element indicates that the image has been sharpened, or compressed, or blurred, or re-sampled.

IMG_EXT_EDITED: Pixels Extensively Edited. The presence of this element indicates the image has been edited extensively – enough to change the captured scene content.

IMG_RETOUCHED: Image Retouched. The presence of this element indicates the image pixels have been edited to remove scratches or red-eye, or other minor image blemishes.

IMG_COMPOSITED: Image Composited. The presence of this element indicates the image has been created by compositing an image with another image, or a background, graphic, or text.

IMG_METADATA: Metadata Adjusted. The presence of this element indicates the image metadata has been modified.

N.6.3.2 Image Processing Hints metadata

This element specifies a list of the operations performed when editing an image. They differ from the Processing Summary in that the hints list all the operations in order and the operations may be listed more than once (if the operation was used more than once). The Processing Summary metadata lists all the operations performed during the life of an image while the Image Processing Hints metadata stores the most current set of operations in greater detail. The complete list of operations (and their order) can be generated by combining all Image Processing Hints metadata within a Metadata History tree.

The Image Processing Hints element contains the same elements as the Processing Summary metadata. See Processing Summary (N.6.3.1) for the definition of each element. Each sub-element may appear more than once within each field and each element may contain a textual description of the operation. The Image Processing Hints metadata defined below should be considered potentially partial information. That is because the presence of a particular hint, such as "Image Cropped," indicates that the image has been cropped and other metadata may have been omitted at the same time. However, absence of an "Image Cropped" hint is no assurance that the image has never been cropped.

```
<xsd:element name="IMAGE_PROCESSING_HINTS">
  <xsd:complexType>
    <xsd:sequence>
    <xsd:element name="MODIFIER" type="jp:tProductDetails"minOccurs="0"/>
      <xsd:choice minOccurs="0" maxOccurs="unbounded">
        <xsd:element name="IMG_CREATED" type="jp:tLangString"/>
        <xsd:element name="IMG_CROPPED" type="jp:tLangString"/>
        <xsd:element name="IMG_TRANSFORMED" type="jp:tLangString"/>
        <xsd:element name="IMG_GTC_ADJ" type="jp:tLangString"/>
        <xsd:element name="IMG_STC_ADJ" type="jp:tLangString"/>
        <xsd:element name="IMG_SPATIAL_ADJ" type="jp:tLangString"/>
        <xsd:element name="IMG_EXT_EDITED" type="jp:tLangString"/>
        <xsd:element name="IMG_RETOUCHED" type="jp:tLangString"/>
        <xsd:element name="IMG_COMPOSITED" type="jp:tLangString"/>
        <xsd:element name="IMG_METADATA" type="jp:tLangString"/>
      </xsd:choice>
    </xsd:sequence>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>
```

Figure N.32 – Schema of the Image Processing Hints metadata

MODIFIER: This element specifies the application (most probably software), that performed the operations listed in Processing Summary (N.6.3.1). See Product Details type (N.7.1.21) for the format of this element.

N.6.3.3 Previous metadata

This element contains a previous version of the metadata (including previous History metadata). The format of this element is defined along with the History metadata (Figure N.30).

Each time a new image is created as a result of editing an image or combining several images, some of the metadata from the previous image(s) may be moved to or referenced by the image history metadata. The contributing image(s) Image Creation, Content Description, History and IPR metadata may be recorded in a Previous metadata element. Careful consideration shall be made with regards to this previous metadata, particularly previous IPR metadata.

```
<xsd:element name="METADATA">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element ref="jp:BASIC_IMAGE_PARAM" minOccurs="0"/>
      <xsd:element ref="jp:IMAGE_CREATION" minOccurs="0"/>
      <xsd:element ref="jp:CONTENT_DESCRIPTION" minOccurs="0"/>
      <xsd:element ref="jp:HISTORY" minOccurs="0"/>
      <xsd:element ref="jp:IPR" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>
```

Figure N.33 – Schema of the Previous metadata

BASIC_IMAGE_PARAM: This element specifies references to previous versions of the image. The syntax of this element is specified in N.6.3.4.

IMAGE_CREATION: This element specifies the image creation information. The syntax of this element is specified in N.6.1.

CONTENT_DESCRIPTION: This element specifies the content description information. The syntax of this element is specified in N.6.2.

HISTORY: This element specifies previous history metadata. The syntax of this element is specified in N.6.3.

IPR: This element specifies image intellectual property. The syntax of this element is specified in N.6.4.

N.6.3.4 Image Referencing metadata

This element specifies information for referencing previous versions of the image. This element may contain the sub-elements listed below.

```
<xsd:element name="BASIC_IMAGE_PARAM">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="BASIC_IMAGE_INFO" minOccurs="0"/>
        <xsd:complexType>
          </xsd:sequence>
            <xsd:element name="FILE_FORMAT " minOccurs="0"/>
              <xsd:complexType>
                </xsd:sequence>
                  <xsd:element name="FILE_NAME" type="xsd:anyURI" minOccurs="0"/>
                  <xsd:element name="FORMAT_TYPE" type="xsd:string" minOccurs="0"/>
                  <xsd:element name="NIME_TYPE" type="xsd:string" minOccurs="0"/>
                  <xsd:element name="VERSION" type="xsd:string" minOccurs="0"/>
                </xsd:sequence>
              <xsd:complexType>
            </xsd:element>
            <xsd:element ref="jp:IMAGE_ID" minOccurs="0"/
          </xsd:sequence>
          <xsd:attribute ref="jp:TIMESTAMP"/>
          <xsd:attribute ref="xml:lang"/>
        <xsd:complexType>
      </xsd:element>
    </xsd:sequence>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  <xsd:complexType>
</xsd:element>
```

Figure N.34 – Schema of the Image Reference metadata

FILE_NAME: This field specifies the name of an image file.

FORMAT_TYPE: File Format Type. This field specifies the file format of the image.

MIME_TYPE: This field specifies the Internet media type of the image file.

VERSION: This field specifies the version of the file format.

IMAGE_ID: This element specifies the image identifier. The syntax of this element is specified in N.6.5.

N.6.4 Intellectual Property Rights metadata

This element specifies Intellectual Property Rights (IPR) related information associated with the image such as moral rights, copyrights as well as exploitation information.

Moral rights are those rights attached to the creation process; therefore, moral rights persistently pertain to the author or creator of the art work, whereas copyrights can be repeatedly transferred to different owners, under exploitation conditions which are also part of the IPR and exploitation metadata. Additional information such as conditions of use, names, content description, dates, as well as IPR-related administrative tasks, identification (e.g., a unique inventory number) and contact point for exploitation are also considered important metadata.

Use and interpretation of this information is beyond the scope of this Recommendation | International Standard. Nothing in this Recommendation | International Standard should be taken to imply or to waive legal obligations or restrictions that may apply within any particular jurisdiction.

NOTE – Implementors should take into account the World Intellectual Property Organization (WIPO) documents listed in the References and other WIPO publications, if appropriate.

This element may contain the sub-elements listed below.

```
<xsd:element name="IPR">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element ref="jp:IPR_NAMES" minOccurs="0"/>
      <xsd:element ref="jp:IPR_DESCRIPTION" minOccurs="0"/>
      <xsd:element ref="jp:IPR_DATES" minOccurs="0"/>
      <xsd:element ref="jp:IPR_EXPLOITATION" minOccurs="0"/>
      <xsd:element ref="jp:IPR_IDENTIFICATION" minOccurs="0"/>
      <xsd:element ref="jp:IPR_CONTACT_POINT" minOccurs="0"/>
      <xsd:element name="IPR_HISTORY" minOccurs="0">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element ref="jp:IPR" minOccurs="0" maxOccurs="unbounded"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
    </xsd:sequence>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>
```

Figure N.35 – Schema of the Intellectual Property Rights metadata

IPR_NAMES: This element specifies names related to the represented image. The syntax of this element is specified in N.6.4.1.

IPR_DESCRIPTION: This element specifies the description of the content such as the title and caption. The syntax of this element is specified in N.6.4.2.

IPR_DATES: This element specifies the IPR-related date information. The syntax of this element is specified in N.6.4.3.

IPR_EXPLOITATION: This element specifies exploitation information such as type of protection, use restriction and obligations to exploit an image. The syntax of this element is specified in N.6.4.4.

IPR_IDENTIFICATION: This element specifies an identifier of an image that is a link to a place where additional information is kept. The syntax of this element is specified in N.6.4.6.

IPR_CONTACT_POINT: This element specifies the contact point of the right holder. The syntax of this element is specified in N.6.4.9.

IPR_HISTORY: This element contains previous IPR metadata. The content is specified in N.6.4.10.

N.6.4.1 IPR Names metadata

This element specifies names related to the represented image. These names include different categories, such as the creator, photographer, and producer, all who claim rights. People appearing within the image amy also be named, as there are restrictions on publishing the image of a person who has not consented to publication that varies from country to country. "Who," "what," and "where" (i.e., the subject of the image) can also be names in the title of the image.

A name may be either a Person, an Organization, or a reference to a name or a person. See Person type (N.7.1.13) and Organization type (N.7.1.14), respectively for the format of this element. This element may contain the sub-elements listed below.

```
<xsd:element name="IPR_NAMES">
  <xsd:complexType>
    <xsd:choice maxOccurs="unbounded">
      <xsd:element ref="jp:IPR_PERSON"/>
      <xsd:element ref="jp:IPR_ORG"/>
      <xsd:element ref="jp:IPR_NAME_REF"/>
    </xsd:choice>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>


<xsd:element name="IPR_PERSON">
  <xsd:complexType>
    <xsd:complexContent>
      <xsd:extension base="jp:tPerson">
        <xsd:attribute name="DESCRIPTION" type="xsd:string"/>
      </xsd:extension>
    </xsd:complexContent>
  </xsd:complexType>
</xsd:element>


<xsd:element name="IPR_ORG">
  <xsd:complexType>
    <xsd:complexContent>
      <xsd:extension base="jp:tOrganization">
        <xsd:attribute name="DESCRIPTION" type="xsd:string"/>
      </xsd:extension>
    </xsd:complexContent>
  </xsd:complexType>
</xsd:element>


<xsd:element name="IPR_NAME_REF">
  <xsd:complexType>
    <xsd:simpleContent>
      <xsd:extension base="xsd:string">
        <xsd:attribute name="DESCRIPTION" type="xsd:string"/>
      </xsd:extension>
    </xsd:simpleContent>
  </xsd:complexType>
</xsd:element>
```

Figure N.36 – Schema of the IPR Names metadata

IPR_PERSON:	Person. This element specifies the person description. See Person type (N.7.1.13) for the format of this element.
IPR_ORG:	Organization. This element specifies the organization description. See Organization type (N.7.1.14) for the format of this element.
IPR_NAME_REF:	Name reference. This element specifies a reference to a person or organization within the IPR metadata.
DESCRIPTION:	This element is the description of the name. Table N.14 lists suggested values for this element which have the following meaning.

Table N.14 – Name description values

Value	Meaning
Original Work Author	This value specifies that the element is the name of the author who created the original work that is represented in the image (e.g., painter sculptor, architect, etc.), when the image is not a creation itself. By contrast, a photograph of a sunset will be considered as a creation of the photographer. An original work author may be "anonymous."
Image Creator	This value specifies that the element is the name of the image creator. The image creator may be, for example, the photographer who captured the original picture on film, the illustrator or graphic artist who conducted the image-creation process, etc.
Right Holder	This value specifies that the element is the name of the intellectual property right holder of the image. The right holder may be the author of the image, a stock photo agency, or vendor. He is the one to sell the license to anyone willing to exploit the image, such as a publisher who will also sell the result or an end user in a pay-per-view process. The right holder has acquired the rights from the creator or previous right holder in a transaction which usually has been registered officially.
Represented Individuals	This value specifies that the element is the name of an individual shown in the image. This may be used as a description of the image or because privacy rights may require that individuals depicted grant consent to publish their image. In such an example, this descriptive element may result in restriction of use for the image, as well as describing the image contents.

N.6.4.2 IPR Description metadata

This element specifies the description of the content. It may be desirable to have a complementary explanation about the content of the image in order to exploit the content. For instance, a technical description of the content may help users in understanding and, therefore, valuing the content of an image (e.g., circumstances under which the image was taken). The format is vendor specific. This element may contain the sub-elements listed below.

```
<xsd:element name="IPR_DESCRIPTION">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="IPR_TITLE" type="jp:tLangString" minOccurs="0"/>
      <xsd:element name="IPR_LEGEND" type="jp:tLangString" minOccurs="0"/>
      <xsd:element name="IPR_CAPTION" type="jp:tLangString" minOccurs="0"/>
      <xsd:element name="COPYRIGHT" type="jp:tLangString" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>
```

Figure N.37 – Schema of the IPR Description metadata

IPR_TITLE: Title of image. This element specifies the title of the image. It is a string that may be used, for instance, as a caption when printing. When the author creates the title, he may add meaning to the image. However, titles are not necessarily significant of IPR. This is determined on a case-by-case basis.

IPR_LEGEND: Legend. This element specifies the legend, a caption added to the picture, e.g., at the back of a photograph, written by the photographer to later classify the photos. It is generally a more detailed or technical description of what appears in the image. This element may answer the question, "why?" An example is saying, "image taken at dawn to test a 135 mm. zoom on stand."

IPR_CAPTION: Caption. This element specifies the caption of the image. This element addresses the text which has been added as complementary information to assist in understanding the image's content (e.g., second draft by Durer for a study on a Biblical scene). The caption often has a tutorial motivation.

COPYRIGHT: Copyright. This element specifies the copyright notice of the image. Usually this element defines the right holder who wants to be identified, saying e.g., "copyright agency XYZ." This is an indication that the property of the image is well defined and that the contact point is the designated agency.

N.6.4.3 IPR Dates metadata

This element specifies the IPR-related date information. There are a variety of valid DateTime formats. For example, a date may be an exact year, possibly with month and day, sometimes with hour, minute, second and thousandth (i.e., ISO timestamp, which is always GMT time). However, date may also be less delimiting. For example, the date may be "first half of the fifteenth century," "late middle-age," "early Roman," etc.

Professional applications may prefer an exact date, whereas specifying a year ± 5 years may satisfy users of early century photographs.

This element may contain the sub-elements listed below.

```
<xsd:element name="IPR_DATES">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="IPR_DATE" maxOccurs="unbounded">
        <xsd:complexType>
          <xsd:complexContent>
            <xsd:extension base="jp:tDateTime">
              <xsd:attribute name="DESCRIPTION" type="xsd:string"/>
            </xsd:extension>
          </xsd:complexContent>
        </xsd:complexType>
      </xsd:element>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
```

Figure N.38 – Schema of the IPR Dates metadata

IPR_DATE: The date element contains a date of arbitrary precision. See DateTime type (N.7.1.8) for the format of this element. The comment element defined in the DataTime type may be used for describing more information on the element.

DESCRIPTION: This element is the description of the date. The precision of IPR Dates may vary in accuracy depending on the age of the operation or item and other information known at the time of the metadata generation. Table N.15 lists suggested values for this element which have the following meaning.

Table N.15 – Date description values

Value	Meaning
Original Work Creation	This value specifies that the element is the date that the original work was created. All types of dates may appear here, as stated above.
Picture Taken	This value specifies that the element is the date that the picture was taken. Some digital cameras insert this information automatically.
Scanned	This value specifies that the element is the date that the image was scanned.
Processed	This value specifies that the element is the date that the image was processed.
Modified	This value specifies that the element is the date when any kind of modification was made to the original work. This element will store the most recent modification date. Although it is valid to have more than one modification date in this section, it would be more common that the entire IPR is updated during the modification, and the previous modifications moved to the IPR history. The processing tool may generate this date automatically.
Last Modified	This value specifies the last date the image was modified. This date should be easily found, because there may be either an automatic process putting this element and replacing the previous "last modification" as a "history element" or a manual process where the operator has to do the same operation by hand.

N.6.4.4 IPR Exploitation metadata

This element specifies metadata to identify IPR protection mechanisms, specific restrictions imposed by the right holder or obligations resulting from the use of the image, and the IPR management system in use for this IPR metadata. This element may contain the sub-elements listed below.

```
<xsd:element name="IPR_EXPLOITATION">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="IPR_PROTECTION" type="jp:tLangString" minOccurs="0"/>
      <xsd:element name="IPR_USE_RESTRICTION" type="jp:tLangString" minOccurs="0"/>
      <xsd:element name="IPR_OBLIGATION" type="jp:tLangString" minOccurs="0"/>
      <xsd:element ref="jp:IPR_MGMT_SYS" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>
```

Figure N.39 – Schema of the IPR Exploitation metadata

IPR_PROTECTION: This element either indicates that there is a watermark, that the image is registered, or that the image is protected by some other means. A value of zero specifies that the image is not protected and contains no watermark. Values between 1 and 255 are reserved for JPEG Utilities Registration Authority (JURA) use. Other values may exist. If this element is not present, then the watermark content (or its presence) is undefined.

IPR_USE_RESTRICTION: This element specifies the use restrictions of an image. Use restrictions may apply to an image that is not allowed outside the factory for industrial applications, or for which exclusive rights of copy have been delegated to a unique agency, or for which prior authorization of represented people is mandatory before publishing. Other restrictions may exist.

IPR_OBLIGATION: This element specifies the obligations of exploiting an image. Obligation may concern any mandatory condition for exploiting the content of a file. For example, the copyright information may be required to be written on the side of any printout for photographs; other obligations may concern the need to get allowance from persons represented on a picture if the picture is published. Obligations may vary with time. For example, it may be forbidden to publish a photograph before a given date, etc.

IPR_MGMT_SYS: IPR management system. This element specifies what management system is used. The syntax of this element is specified in N.6.4.5.

N.6.4.5 IPR Management System metadata

IPR Management Systems such as IPMP (Intellectual Property Management & Protection) or ECMS (Electronic Copyright Management System) use these elements to determine where information is kept regarding the management system. An example use of these elements is to track the usage of an image. During transfer, an agency determines the owner of the image from the management systems elements. It already knows the consumer, and uses this information to charge the user and credit the owner the amount as determined by the management system. This information is commonly stored on a server describing the IPR of the image, and depending upon whether IPR licensing is mandatory or recommended, there shall be a link to where all information about it is kept. This element may contain the sub-elements listed below.

```
<xsd:element name="IPR_MGMT_SYS">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="IPR_MGMT_TYPE" type="xsd:string" minOccurs="0"/>
      <xsd:element name="IPR_MGMT_SYS_ID" type="xsd:string" minOccurs="0"/>
      <xsd:element name="IPR_MGMT_SYS_LOCATION" type="xsd:anyURI" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>
```

Figure N.40 – Schema of the IPR Management Systems metadata

IPR_MGMT_TYPE: The type of IPR Management System being used.

IPR_MGMT_ID: Information of an ID.

IPR_MGMT_LOCATION: Information of the location. E.g., URL.

N.6.4.6 IPR Identification metadata

This element specifies a link to a place (e.g., secured database or other storage place) where critical information is kept. The identifier identifies a content; therefore, if an image is cropped, modified or made into a new image, then the image shall be registered again, and a new identifier shall be acquired, because there are now two objects instead of merely one. However, the parent image shall appear in the metadata set of the child. This element may contain the sub-elements listed below.

```
<xsd:element name="IPR_IDENTIFICATION">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element ref="jp:IPR_IDENTIFIER" minOccurs="0"/>
      <xsd:element ref="jp:LICENCE_PLATE" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>
```

Figure N.41 – Schema of the IPR Identification metadata

IPR_IDENTIFIER: Generic IPR identifier. This element contains a generic purpose IPR identifier. The syntax of this element is specified in N.6.4.7.

LICENCE_PLATE: This element specifies License plate of the content. The syntax of this element is specified in N.6.4.8.

N.6.4.7 Generic IPR Identifier metadata

This element specifies a generic IPR identifier. This element may contain the sub-elements listed below.

```
<xsd:element name="IPR_IDENTIFIER">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="IPR_ID_MODE" type="jp:tLangString" minOccurs="0"/>
      <xsd:element name="IPR_ID" type="jp:tLangString" minOccurs="0"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
```

Figure N.42 – Schema of the IPR Identifier metadata

IPR_ID_MODE: This element specifies the identification mode.

IPR_ID: This element specifies the identification. The Mode element describes the content of this element.

N.6.4.8 License Plate metadata

This element specifies the license plate of the original image, defined in ISO/IEC 10918-3. The combination of the elements in the license plate contains a globally unique identifying sequence of numbers. This element may contain the sub-elements listed below.

```
<xsd:element name="LICENCE_PLATE">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="LP_COUNTRY" type="xsd:string" minOccurs="0"/>
      <xsd:element name="LP_REG_AUT" type="xsd:string" minOccurs="0"/>
      <xsd:element name="LP_REG_NUM" type="xsd:string" minOccurs="0"/>
      <xsd:element name="DELIVERY_DATE" type="xsd:dateTime" minOccurs="0"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
```

Figure N.43 – Schema of the License Plate metadata

LP_COUNTRY: This element specifies the country of registration. The element contains the country code (3-digit number) for the License Plate as defined in ISO 3166-1.

LP_REG_AUT: This element specifies the registration authority number for the License Plate.

LP_REG_NUM: This element specifies the registration number for the License Plate.

LP_DELIVERY_DATE: This element specifies when the License Plate was delivered to the registrant by the Registration Authority.

N.6.4.9 IPR Contact Point metadata

This element specifies the contact point of the right holder. It includes a way to contact the current right holder in order to acquire the rights under the form of a licence. Such information may be a postal address, URL or any phone or fax number that is a non-ambiguous link to the right holder.

A contact point may be either a Person, an Organization, or a reference to a name or a person. This element may contain the sub-elements listed below.

```
<xsd:element name="IPR_CONTACT_POINT">
  <xsd:complexType>
    <xsd:choice>
      <xsd:element ref="jp:IPR_PERSON"/>
      <xsd:element ref="jp:IPR_ORG"/>
      <xsd:element ref="jp:IPR_NAME_REF"/>
    </xsd:choice>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>
```

Figure N.44 – Schema of the IPR Contact Point metadata

IPR_PERSON: This element specifies the person description. The syntax of this element is specified in N.6.4.1.

IPR_ORG: Organization. This element specifies the organization description. The syntax of this element is specified in IPR Names (see N.6.4.1).

IPR_NAME_REF: Name Reference. This element specifies a reference to a person or organization within the IPR metadata. This element is a link to one of the Person or Organization elements within the IPR Names metadata (see N.6.4.1).

DESCRIPTION: This element is the description of the contact point that is an additional value for the person or organization in Table N.14. The value listed in Table N.16 is added and has the following meaning.

Table N.16 – Additional name description values

Value	Meaning
Collection	This value is a link to a collector, museum, group, institution, etc. The contact point may be a link to a name specified in IPR Names.

N.6.4.10 IPR History metadata

This element specifies previous IPR metadata. The format of this element is defined along with the Intellectual Property Rights metadata (Figure N.35).

Each time the IPR information of an image is changed, some of the IPR metadata defined through N.6.4.1 and N.6.4.9 may be moved to this IPR History metadata element. The IPR History metadata stores all IPR metadata-related modifications.

N.6.5 Image Identifier metadata

This element specifies an image identifier that uniquely identifies the image. The format may be globally unique (e.g., UUID), vendor or application dependent. This element may contain the sub-elements listed below.

```
<xsd:element name="IMAGE_ID">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="UID" type="xsd:string" minOccurs="0"/>
      <xsd:element name="ID_TYPE" type="xsd:anyURI" minOccurs="0"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
```

Figure N.45 – Schema of the Image Identifier metadata

UID:	Unique Identifier. This element specifies the unique identifier of an image. The ID_TYPE element specifies the format of the field.
ID_TYPE:	Unique Identifier Type. This element specifies the type of the UID element as a URI.

N.7 Fundamental type and element definitions

XML Schema Part 2 defines many built-in and derived datatypes, however, they are not sufficient to specify various metadata elements defined in this Recommendation | International Standard. This clause defines the common types and elements that are referenced within other metadata boxes. The types and elements defined are intended only to be used or referred to in other schemas, and have no intrinsic significance.

N.7.1 Defined types

N.7.1.1 Non-negative double type

This type is used for double numbers greater than or equal to zero.

```
<xsd:simpleType name="tNonNegativeDouble">
  <xsd:restriction base="xsd:double">
    <xsd:minInclusive value="0"/>
  </xsd:restriction>
</xsd:simpleType>
```

Figure N.46 – Schema of the non-negative double type

N.7.1.2 Rational type

This type is used to define rational numbers. It contains an enumerator and denominator in a single string.

```
<xsd:simpleType name="tRational">
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="(\-|\+)?[0-9]+/[0-9]+"/>
  </xsd:restriction>
</xsd:simpleType>
```

Figure N.47 – Schema of the rational type

N.7.1.3 String including language attribute type

This type is used to when an element requires a string and a language attribute definition. The content of this element is intended to store human readable data.

```
<xsd:complexType name="tLangString">
  <xsd:simpleContent>
    <xsd:extension base="xsd:string">
      <xsd:attribute ref="xml:lang"/>
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>
```

Figure N.48 – Schema of the string including language attribute type

N.7.1.4 Degree type

This type specifies a direction in degrees and fractions of degrees. The exact meaning of the values is dependant on usage.

```
<xsd:simpleType name="tDegree">
  <xsd:restriction base="xsd:double">
    <xsd:minExclusive value="-180"/>
    <xsd:maxInclusive value="180"/>
  </xsd:restriction>
</xsd:simpleType>
```

Figure N.49 – Schema of the degree type

N.7.1.5 Half degree type

This type specifies a direction in degrees and fractions of degrees. The exact meaning of the values is dependant on usage. This type defines a smaller range than Degree Type (see N.7.1.4).

```
<xsd:simpleType name="tHalfDegree">
 <xsd:restriction base="xsd:double">
  <xsd:minExclusive value="-90"/>
  <xsd:maxInclusive value="90"/>
 </xsd:restriction>
</xsd:simpleType>
```

Figure N.50 – Schema of the half degree type

N.7.1.6 Double size type

This type specifies a size in double coordinates.

```
<xsd:complexType name="tDoubleSize">
  <xsd:sequence>
    <xsd:element name="WIDTH" type="jp:tNonNegativeDouble"/>
    <xsd:element name="HEIGHT" type="jp:tNonNegativeDouble"/>
  </xsd:sequence>
</xsd:complexType>
```

Figure N.51 – Schema of the double size type

N.7.1.7 Integer size type

This type specifies a size in integer coordinates (e.g., pixels).

```
<xsd:complexType name="tIntSize">
  <xsd:sequence>
    <xsd:element name="WIDTH" type="xsd:positiveInteger"/>
    <xsd:element name="HEIGHT" type="xsd:positiveInteger"/>
  </xsd:sequence>
</xsd:complexType>
```

Figure N.52 – Schema of the integer size type

N.7.1.8 DateTime type

This type specifies a partial or exact date. A date can include either a specific day (e.g., 26 January 2000), or a more broad definition such as "Winter." A date may or may not include a time. This type may contain the sub-elements listed below.

```
<xsd:complexType name="tDateTime">
  <xsd:sequence>
    <xsd:choice minOccurs="0">
      <xsd:element name="EXACT" type="xsd:dateTime"/>
      <xsd:element name="DATE" type="xsd:date"/>
      <xsd:sequence>
        <xsd:element name="MONTH" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:positiveInteger">
              <xsd:minInclusive value="1"/>
              <xsd:maxInclusive value="12"/>
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="YEAR" type="xsd:gYear" minOccurs="0"/>
        <xsd:element name="CENTURY" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:integer"/>
          </xsd:simpleType>
        </xsd:element>
      </xsd:sequence>
    </xsd:choice>
    <xsd:element name="WEEK_DAY" type="xsd:string" minOccurs="0"/>
    <xsd:element name="SEASON" type="xsd:string" minOccurs="0"/>
    <xsd:element ref="jp:COMMENT" minOccurs="0"/>
  </xsd:sequence>
  <xsd:attribute ref="jp:TIMESTAMP"/>
  <xsd:attribute ref="xml:lang"/>
</xsd:complexType>
```

Figure N.53 – Schema of the DateTime type

EXACT:	This element contains an exact date and a time.
DATE:	This element contains a date (excluding the time of day).
MONTH:	This element contains a month of the year. An integer value is used rather than a string to be consistent with the other elements contained in the DateTime type. The value for January shall correspond to 1 and December to 12.
YEAR:	This element contains a calendar year. Positive values used for AD and negative values for BC. The year zero is not valid.
CENTURY:	This element contains the century that an event occurred. For example, the twentieth century is stored as "19." The century zero is not valid.
WEEK_DAY:	This element is a text description of the day. Examples include, "Monday" and "Friday."
SEASON:	This element is a text description of a season. Examples include, "Spring," "Summer," "Autumn," and "Winter."
COMMENT:	See Comment element (N.7.3.1) for more information on this element. Examples include "Easter Sunday," "Morning," "Just after lunch."

N.7.1.9 Address type

This type specifies the address of an object or location. For example, it may be used to describe the address an image was captured, or the address of the intellectual property owner of an image. This type may contain the sub-elements listed below.

```
<xsd:complexType name="tAddress">
  <xsd:sequence>
    <xsd:element name="ADDR_NAME" type="jp:tLangString" minOccurs="0"/>
    <xsd:element name="ADDR_COMP" minOccurs="0" maxOccurs="unbounded">
      <xsd:complexType>
        <xsd:simpleContent>
          <xsd:extension base="jp:tLangString">
            <xsd:attribute name="TYPE" type="xsd:string"/>
          </xsd:extension>
        </xsd:simpleContent>
      </xsd:complexType>
    </xsd:element>
    <xsd:choice minOccurs="0">
      <xsd:element name="ZIPCODE" type="xsd:string"/>
      <xsd:element name="POSTCODE" type="xsd:string"/>
    </xsd:choice>
    <xsd:element name="COUNTRY" type="jp:tLangString" minOccurs="0"/>
  </xsd:sequence>
  <xsd:attribute name="TYPE" type="xsd:string"/>
  <xsd:attribute ref="jp:TIMESTAMP"/>
  <xsd:attribute ref="xml:lang"/>
</xsd:complexType>
```

Figure N.54 – Schema of the Address type

ADDR_NAME: Address name. It is a descriptive element for the address.

ADDR_COMP: Address component. Multiple elements are used to specify the complete address. The order of the address elements specifies the full address. A full address shall be generated by concatenating the separate address elements. For example, if the type is a "state", this element contains the name of the state. Where the type is a "street," this element contains the name of the street. ISO 3166-2 lists country subdivision codes. These codes may be used in this element, when the element is being used to specify a country subdivision.

TYPE: This is the name of this part of the address. Examples include "street" or "state." ISO 3166-2 specifies country subdivisions and the types of these divisions. These subdivision types may be used to specify the address type. Suggested values and their corresponding meanings are listed in Table N.17. Multiple values shall not be specified within a single element.

Table N.17 – Address component type values

Value	Meaning
Unit	The unit number of the address to identify a house or a house name relative to a street.
Room	The room number within a building or an apartment.
Street	The street address in a postal address. Examples are street name, avenue and house number.
Postbox	The post office box number
City	The locality of a.geographic area.
State	The name of a geographical subdivision. Other terms such as "Province", "Prefecture", "County" may be used instead.

ZIPCODE/POSTCODE: This element specifies the postcode (or zip code) of the address. This element is not limited in length. The element has the title "Postcode" or "Zip code." An address cannot contain both a postcode and a zip code.

COUNTRY: This element specifies the country of the address. The element can either contain the country code as defined in ISO 3166-1 or a string identifying the country. The ISO 3166-1 country code is preferred.

TYPE: This element specifies the type of the whole address. The address type would include whether the address is a home address or a business address. Suggested type values are listed in Table N.18. Multiple type values may be specified delimited with a comma (",").

Table N.18 – Address type values

Value	Meaning
Domestic	The domestic delivery address.
International	The international delivery address.
Postal	The postal delivery address.
Home	The delivery address for a residence.
Work	The delivery address for a place of work.

N.7.1.10 Phone number type

This type specifies a phone number. This type may contain the sub-elements listed below.

```
<xsd:complexType name="tPhone">
  <xsd:sequence>
    <xsd:element name="COUNTRY_CODE" type="xsd:string" minOccurs="0"/>
    <xsd:element name="AREA" type="xsd:string" minOccurs="0"/>
    <xsd:element name="LOCAL" type="xsd:string" minOccurs="0"/>
    <xsd:element name="EXTENSION" type="xsd:string" minOccurs="0"/>
  </xsd:sequence>
  <xsd:attribute name="TYPE" type="xsd:string"/>
  <xsd:attribute ref="jp:TIMESTAMP"/>
</xsd:complexType>
```

Figure N.55 – Schema of the Phone number type

COUNTRY_CODE: This element contains the country code part of a phone number. This phone code does not include any prefix such as "00" used to dial international numbers, but instead just the international country code. This element also does not include a leading "+."

AREA: This element contains the local area code part of a phone number. This area code does not include leading zeros (or other digits) used to dial an interstate number from within a country. It appears as it would be appended directly to a country code.

LOCAL: This element contains the local phone number.

EXTENSION: This element contains the extension part of the phone number.

TYPE: This element defines the type of the phone number. The phone number type would include whether the phone number is a home phone number or a business phone number. Suggested type values are listed in Table N.19. Multiple type values may be specified delimited with a comma (",").

Table N.19 – Phone number type values

Value	Meaning
Home	Phone number associated with a residence.
Message	Phone number that has voice message support.
Work	Phone number associated with a place of work.
Voice	Phone number indicating a voice telephone.
Cell	Cellular telephone number.
Video	Video conference telephone number.
BBS	Bulletin board system telephone number.
Modem	A modem connected telephone number.
Car	A car-phone telephone number.
ISDN	ISDN service telephone number.
PCS	Personal communication service telephone number.

N.7.1.11 Email address type

This type specifies an email address. This type may contain the sub-elements listed below.

```
<xsd:complexType name="tEmail">
  <xsd:simpleContent>
    <xsd:extension base="jp:tLangString">
      <xsd:attribute name="TYPE" type="xsd:string"/>
      <xsd:attribute ref="jp:TIMESTAMP"/>
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>
```

Figure N.56 – Schema of the Email address type

TYPE: This element contains the type of the email address.

N.7.1.12 Web address type

This type specifies a web page address. This type may contain the sub-elements listed below.

```
<xsd:complexType name="tWeb">
  <xsd:simpleContent>
    <xsd:extension base="jp:tLangString">
      <xsd:attribute name="TYPE" type="xsd:string"/>
      <xsd:attribute ref="jp:TIMESTAMP"/>
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>
```

Figure N.57 – Schema of the Web address type

TYPE: This element contains the type of the web page.

N.7.1.13 Person type

This type specifies a person. The sub-elements are compatible with the vCard description defined in RFC 2426. This type may contain the sub-elements listed below.

```
<xsd:complexType name="tPerson">
  <xsd:sequence>
    <xsd:element name="NAME_TITLE" type="jp:tLangString" minOccurs="0"/>
    <xsd:element name="PERSON_NAME" minOccurs="0" maxOccurs="unbounded">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="NAME_COMP" maxOccurs="unbounded">
            <xsd:complexType>
              <xsd:simpleContent>
                <xsd:extension base="xsd:string">
                  <xsd:attribute name="TYPE" use="optional" default="Given">
                    <xsd:simpleType>
                      <xsd:restriction base="xsd:string">
                        <xsd:enumeration value="Prefix"/>
                        <xsd:enumeration value="Given"/>
                        <xsd:enumeration value="Family"/>
                        <xsd:enumeration value="Suffix"/>
                        <xsd:enumeration value="Maiden"/>
                      </xsd:restriction>
                    </xsd:simpleType>
                  </xsd:attribute>
                </xsd:extension>
              </xsd:simpleContent>
            </xsd:complexType>
          </xsd:element>
        </xsd:sequence>
        <xsd:attribute ref="jp:TIMESTAMP"/>
        <xsd:attribute ref="xml:lang"/>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="NICK_NAME" type="xsd:string" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element name="JOB_TITLE" type="xsd:string" minOccurs="0"/>
    <xsd:choice minOccurs="0">
      <xsd:element name="PERSON_ORG" type="jp:tOrganization"/>
      <xsd:element name="ORG_REF" type="xsd:string"/>
    </xsd:choice>
    <xsd:element name="ADDRESS" type="jp:tAddress" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element name="PHONE" type="jp:tPhone" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element name="EMAIL" type="jp:tEmail" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element name="WEB" type="jp:tWeb" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element name="BIRTH_DATE" type="xsd:date" minOccurs="0"/>
    <xsd:element name="AGE" type="xsd:duration" minOccurs="0"/>
    <xsd:element ref="jp:COMMENT" minOccurs="0"/>
  </xsd:sequence>
  <xsd:attribute name="ID" type="xsd:string"/>
  <xsd:attribute ref="jp:TIMESTAMP"/>
  <xsd:attribute ref="xml:lang"/>
</xsd:complexType>
```

Figure N.58 – Schema of the Person type

NAME_TITLE: The element contains the person's title.

PERSON_NAME: This element specifies a framework to describe a person's name. A person's name is composed of multiple name components (e.g., given name(s) and family name(s)). The order of the name component elements specifies the full name of the person. For example, in languages where the family name is usually placed before the given name, then they would appear in this order in the file.

NAME_COMP: Name component. This element contains a single portion (word) of the name of a person. A name component element may contain a single initial rather than a complete word. To specify the full name of a person, multiple name component elements are used. This element contains a type as specified below.

TYPE: Name component type. This element defines the type of the Name Component element. This element would include whether the name component is a Suffix, Prefix, Given or Family name. Suggested values and their corresponding meanings are listed in Table N.20. Multiple values shall not be specified within a single type filed.

Table N.20 – Name component type values

Value	Meaning
Prefix	A personal title. (e.g., Dr., Sir)
Given	A name construct that is normally given to an individual by the parent or is chosen by the individual. This is the default value of the name component type.
Family	A name component that is normally inherited by their parent or assumed by marriage.
Suffix	A generation qualifier (e.g., Jr., III), decorations and awards. (e.g., Q.C., Ph. D)
Maiden	A name component of a woman's family name before getting married.

NICK_NAME: This element specifies a nick name of the person. E.g., "Jimmy."

JOB_TITLE: This element specifies the person's job title.

ORGANIZATION: This element specifies the organization for which a person is a member of. The organization element may be either contained within the person element, or referenced.

ORG_REF: Organization reference. A reference to the organization. This element is a link to one of the Organization elements within the metadata.

ADDRESS: This element specifies address information for the person. For example, it can contain a home address or a work address. It does not necessarily contain the address depicted within the image, but instead information about the person. See Address type (N.7.1.9) for the format of this element.

PHONE: Phone number. This element specifies phone number information for the person. See Phone number type (N.7.1.10) for the format of this element.

EMAIL: Email address. This element specifies an email address for a person. See Email address type (N.7.1.11) for the format of this element.

WEB: Web page. This element contains a web page for a person. See Web address type (N.7.1.12) for the format of this element.

BIRTH_DATE: Date of birth. This element specifies the birth date of the person. This element shall specify an exact date. For non-specific information the Comment element shall be used.

AGE: This element contains the age of a person.

COMMENT: This element specifies user- and/or application-defined information beyond the scope of other properties in the person type. See Comment element (N.7.3.1) for more information on this element.

ID: This element specifies the unique identifier for the person.

N.7.1.14 Organization type

This type specifies an organization. The sub-elements are compatible with the vCard description defined in RFC 2426. This type may contain the sub-elements listed below.

```
<xsd:complexType name="tOrganization">
  <xsd:sequence>
    <xsd:element name="ORG_NAME" type="jp:tLangString" minOccurs="0"/>
    <xsd:element name="ADDRESS" type="jp:tAddress" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element name="PHONE" type="jp:tPhone" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element name="EMAIL" type="jp:tEmail" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element name="WEB" type="jp:tWeb" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element name="LOGO_FILE" type="xsd:anyURI" minOccurs="0"/>
    <xsd:element name="LOGO_FORMAT" type="xsd:string" minOccurs="0"/>
    <xsd:element name="MIME_TYPE" type="xsd:string" minOccurs="0"/>
    <xsd:element ref="jp:COMMENT" minOccurs="0"/>
  </xsd:sequence>
  <xsd:attribute name="ID" type="xsd:string"/>
  <xsd:attribute ref="jp:TIMESTAMP"/>
  <xsd:attribute ref="xml:lang"/>
</xsd:complexType>
```

Figure N.59 – Schema of the Organization type

ORG_NAME: Organization name. This element specifies the name of the organization.

ADDRESS: This element specifies address information for the organization. It does not necessarily contain the address depicted within the image, but instead information about the organization. See Address type (N.7.1.9) for the format of this element.

PHONE: Phone number. This element specifies phone number information. See Phone number type (N.7.1.10) for the format of this element.

EMAIL: Email address. This element specifies an email address for an Organization. See Email address type (N.7.1.11) for the format of this element.

WEB: Web page. This element specifies a web page for an Organization. See Web address type (N.7.1.12) for the format of this element.

LOGO_FILE: This element specifies a reference to a logo file of the organization.

LOGO_FILE_FORMAT: This element specifies the name of the logo file format. For example, EPS, JP2 and TIFF.

MIME_TYPE: This element specifies the Internet media type of the logo file.

COMMENT: This element specifies user- and/or application-defined information beyond the scope of other properties in the organization type. See Comment element (N.7.3.1) for more information on this element.

ID: This element specifies the unique identifier for the organization.

N.7.1.15 Location type

This type specifies the physical location of an object or a scene. For example, it may be used to describe an object within an image, or the location of a camera at the time of capture. The Location is the physical location, whereas the Position is the position of an object relative to the image.

```
<xsd:complexType name="tLocation">
  <xsd:sequence>
    <xsd:element ref="jp:COORD_LOC" minOccurs="0"/>
    <xsd:element name="ADDRESS" type="jp:tAddress" minOccurs="0"/>
    <xsd:element ref="jp:GPS" minOccurs="0"/>
    <xsd:element ref="jp:COMMENT" minOccurs="0"/>
  </xsd:sequence>
  <xsd:attribute ref="jp:TIMESTAMP"/>
  <xsd:attribute ref="xml:lang"/>
</xsd:complexType>
```

Figure N.60 – Schema of the Location type

COORD_LOC: Coordinate location. This element specifies the exact longitude, latitude and altitude of an object. The syntax of this element is specified in N.7.1.15.1.

ADDRESS: This element specifies the location of an object using an address. See Address type (N.7.1.9) for the format of this element.

GPS: Global Positioning System. This element specifies location information received from a GPS receiver. The syntax of this element is specified in N.7.1.15.2.

COMMENT: This element specifies the location of an object that cannot be described using the other location elements. For example, "Under the table." See Comment element (N.7.3.1) for the format of this element.

N.7.1.15.1 Coordinate location

This element specifies the terrestrial location (altitude/longitude/latitude) of an object. It may be used to describe the content of an image along with the location of a camera.

While the coordinate location may have come from a GPS (and a GPS block may or may not be present in the metadata), the values in the coordinate location may have come for some other means. For this reason, the location information is a more general system for storing the location than the GPS system. The location information and the raw GPS data are stored in different formats.

GPS is one of a number of methods that may be used to determine a location. If the GPS information is filled in, it is expected that the coordinate location is also specified. A reader shall only look in a single place to determine the coordinate location (this element).

The meridian through Greenwich (Great Britain) is defined with the value longitude $l = 0$. The longitude l of a point P on the surface is the angle between the planes through its meridian and the Greenwich meridian. The longitude is counted from Greenwich up to $l = \pm 180°$ in east(+) and west(–) directions.

The latitude j of a point P is the angle between a line normal to its parallel and the equatorial plane ($j = 0$). On a sphere this normal line will be the connecting line between its center and the point P. On the elliptical earth this line will only pass the center if P is situated at the equator. The latitude is counted from the equator up to $j = \pm 90°$ in north (+) and south (–) directions.

```
<xsd:element name="COORD_LOC">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="LONGITUDE" type="jp:tDegree" minOccurs="0"/>
      <xsd:element name="LATITUDE" type="jp:tHalfDegree" minOccurs="0"/>
      <xsd:element name="ALTITUDE" type="xsd:double" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute ref="jp:TIMESTAMP"/>
  </xsd:complexType>
</xsd:element>
```

Figure N.61 – Schema of the Coordinate location element

LONGITUDE:	This element specifies the longitude, represented in double degrees and fractions of degrees. E.g., "138,700," "–122,450."
LATITUDE:	This element specifies the latitude, represented in double degrees and fractions of degrees. E.g., "35,383," "37,767."
ALTITUDE:	This element would contain the distance in meters. Zero is sea level, positive is above, and negative is below.

N.7.1.15.2 Raw GPS Information

The information in these elements is expected to be imported from a GPS system and is compatible with NMEA-0138. For this reason, the elements are not consistent with other metadata elements. For example, a distance on the GPS elements may be stored in miles, while all other metadata distances are stored in meters. These elements are compatible with Exif version 2.1.

If information for latitude, longitude and altitude are present in the raw GPS information, the matching elements in the Coordinate location shall be filled in.

This element may contain the sub-elements listed below.

```
<xsd:element name="GPS">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="GPS_LAT_REF" minOccurs="0">
        <xsd:simpleType>
          <xsd:restriction base="xsd:string">
            <xsd:enumeration value="N"/>
            <xsd:enumeration value="S"/>
          </xsd:restriction>
        </xsd:simpleType>
      </xsd:element>
      <xsd:element name="GPS_LATITUDE" minOccurs="0">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="D" type="xsd:nonNegativeInteger"/>
            <xsd:element name="M" type="xsd:nonNegativeInteger"/>
            <xsd:element name="S" type="jp:tNonNegativeDouble" minOccurs="0"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:element name="GPS_LONG_REF" minOccurs="0">
        <xsd:simpleType>
          <xsd:restriction base="xsd:string">
            <xsd:enumeration value="E"/>
            <xsd:enumeration value="W"/>
          </xsd:restriction>
        </xsd:simpleType>
      </xsd:element>
      <xsd:element name="GPS_LONGITUDE" minOccurs="0">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="D" type="xsd:nonNegativeInteger"/>
            <xsd:element name="M" type="xsd:nonNegativeInteger"/>
            <xsd:element name="S" type="jp:tNonNegativeDouble" minOccurs="0"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:element name="GPS_ALTITUDE" type="jp:tNonNegativeDouble" minOccurs="0"/>
      <xsd:element name="GPS_TIME" type="xsd:dateTime" minOccurs="0"/>
      <xsd:element name="GPS_SATELLITES" type="xsd:string" minOccurs="0"/>
      <xsd:element name="GPS_STATUS" minOccurs="0">
        <xsd:simpleType>
          <xsd:restriction base="xsd:string">
            <xsd:enumeration value="A"/>
            <xsd:enumeration value="V"/>
          </xsd:restriction>
        </xsd:simpleType>
      </xsd:element>
      <xsd:element name="GPS_MEASURE_MODE" minOccurs="0">
        <xsd:simpleType>
          <xsd:restriction base="xsd:positiveInteger">
            <xsd:minExclusive value="2"/>
            <xsd:maxInclusive value="3"/>
          </xsd:restriction>
        </xsd:simpleType>
      </xsd:element>
      <xsd:element name="GPS_DOP" type="jp:tNonNegativeDouble" minOccurs="0"/>
```

Figure N.62 – Schema of the Raw GPS Information element

```
<xsd:element name="GPS_SPEED_REF" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="K"/>
      <xsd:enumeration value="N"/>
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="GPS_SPEED" type="jp:tNonNegativeDouble" minOccurs="0"/>
<xsd:element name="GPS_TRACK_REF" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="T"/>
      <xsd:enumeration value="M"/>
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="GPS_TRACK" type="jp:tNonNegativeDouble" minOccurs="0"/>
<xsd:element name="GPS_IMAGE_DIR_REF" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="T"/>
      <xsd:enumeration value="M"/>
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="GPS_IMAGE_DIR" type="jp:tNonNegativeDouble" minOccurs="0"/>
<xsd:element name="GPS_MAP_DATUM" type="xsd:string" minOccurs="0"/>
<xsd:element name="GPS_DEST_LAT_REF" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="N"/>
      <xsd:enumeration value="S"/>
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="GPS_DEST_LATITUDE" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="D" type="xsd:nonNegativeInteger"/>
      <xsd:element name="M" type="xsd:nonNegativeInteger"/>
      <xsd:element name="S" type="jp:tNonNegativeDouble" minOccurs="0"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="GPS_DEST_LONG_REF" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="E"/>
      <xsd:enumeration value="W"/>
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="GPS_DEST_LONGITUDE" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="D" type="xsd:nonNegativeInteger"/>
      <xsd:element name="M" type="xsd:nonNegativeInteger"/>
      <xsd:element name="S" type="jp:tNonNegativeDouble" minOccurs="0"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="GPS_DEST_BEARING_REF" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="T"/>
      <xsd:enumeration value="M"/>
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="GPS_DEST_BEARING" type="jp:tNonNegativeDouble" minOccurs="0"/>
```

Figure N.63 – Schema of the Raw GPS Information element *(continued)*

```
        <xsd:element name="GPS_DEST_DISTANCE_REF" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string">
              <xsd:enumeration value="K"/>
              <xsd:enumeration value="N"/>
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="GPS_DEST_DISTANCE" type="jp:tNonNegativeDouble" minOccurs="0"/>
      </xsd:sequence>
    </xsd:complexType>
  </xsd:element>
```

Figure N.64 – Schema of the Raw GPS Information element *(concluded)*

GPS_LAT_REF: GPS Latitude Reference. This element specifies whether the GPS Latitude is North or South. Table N.21 lists legal values of this element.

Table N.21 – Latitude reference values

Value	Meaning
N	North Latitude
S	South Latitude

GPS_LATITUDE: GPS Latitude. This element contains the latitude of the GPS receiver. Table N.22 lists legal values of this element.

Table N.22 – Latitude values

Value	Meaning
D	The number of degrees of latitude.
M	The number of minutes of latitude.
S	The number of seconds of latitude.

GPS_LONG_REF: GPS Longitude Reference. This element specifies whether the GPS Longitude is East or West. Table N.23 lists legal values of this element.

Table N.23 – Longitude reference values

Value	Meaning
E	East longitude
W	West longitude

GPS_LONGITUDE: GPS Longitude. This element contains the longitude of the GPS receiver. Table N.24 lists legal values of this element.

Table N.24 – Longitude values

Value	Meaning
D	The number of degrees of longitude.
M	The number of minutes of longitude.
S	The number of seconds of longitude.

GPS_ALTITUDE: GPS Altitude. This element contains the altitude of the GPS receiver. The altitude reading is given in meters relative to sea level (geoid).

GPS_TIME: GPS Time. This element contains the time of the GPS location was determined. This element is in Greenwich Mean Time. This is not necessarily the camera capture time.

GPS_SATELLITES: GPS Satellites. This element contains information about the satellites used to determine the camera position. This element can be used to describe the number of satellites, their ID number, angle of elevation, azimuth, SNR and other information. The format is not specified.

GPS_STATUS: GPS Status. This element contains information on the GPS receiver at time of image capture. Table N.25 lists legal values of this element.

Table N.25 – GPS Status values

Value	Meaning
A	Measurement is in progress.
V	Measurement is interrupted.

GPS_MEASURE_MODE: GPS Measure Mode. This element contains information on the measurement mode used to determine the GPS location. Table N.26 lists legal values of this element.

Table N.26 – GPS Measure mode values

Value	Meaning
2	2 dimensional measurement.
3	3 dimensional measurement.

GPS_DOP: GPS Data Degree of Precision (DOP). This element contains a value indicating the GPS DOP. An HDOP (horizontal degree of precision) value is written during a two-dimensional measurement, and a PDOP (3D degree of precision) value is written during a three-dimensional measurement.

GPS_SPEED_REF: GPS Speed Reference. This element contains the units of measure for the GPS Speed element. Table N.27 lists legal values of this element.

Table N.27 – GPS Speed reference unit values

Value	Meaning
K	Kilometers per hour
N	Knots

GPS_SPEED: GPS Speed. This element contains a value indicating the speed of the GPS receiver. The value units are defined by the GPS Speed Reference.

GPS_TRACK_REF: GPS Track Reference. This element contains the reference for the GPS Track element. Table N.28 lists legal values of this element.

Table N.28 – Direction reference values

Value	Meaning
T	True north
M	Magnetic north

GPS_TRACK: GPS Track. This element contains the value in degrees indicating the direction of the GPS receiver movement. 0 indicates North and 90 indicate East.

GPS_IMAGE_DIR_REF: GPS Image Direction Reference. This element contains the reference for the GPS Image Direction element. Table N.28 lists legal values of this element.

GPS_IMAGE_DIR: GPS Image Direction. This element contains the value in degrees indicating the direction the camera is facing at the time of taking the picture. 0 indicates North and 90 indicate East.

GPS_MAP_DATUM: GPS Map Datum. This element specifies the geodetic survey data used by the GPS receiver. For example, if the survey data is restricted to Japan, the value of this tag is "TOKYO" or "WSG-84."

GPS_DEST_LAT_REF: GPS Destination Latitude Reference. This element specifies whether the GPS Destination Latitude is North or South. Table N.21 lists legal values of this element.

GPS_DEST_LATITUDE: GPS Destination Latitude. This element contains the destination latitude of the GPS receiver. Table N.22 lists legal values of this element.

GPS_DEST_LONG_REF: GPS Destination Longitude Reference. This element specifies whether the GPS Destination Longitude is East or West. Table N.23 lists legal values of this element.

GPS_DEST_LONGITUDE: GPS Destination Longitude. This element contains the destination longitude of the GPS receiver. Table N.24 lists legal values of this element.

GPS_DEST_BEARING_REF: GPS Destination Bearing Reference. This element contains the reference for the GPS Destination Bearing element. Table N.28 lists legal values of this element.

GPS_DEST_BEARING: GPS Destination Bearing. This element contains the value in degrees indicating the direction of the destination from the GPS receiver. 0 indicates North and 90 indicate East.

GPS_DEST_DISTANCE_REF: GPS Destination Distance Reference. This element contains the units of measure for the GPS Destination Distance element. Table N.29 lists legal values of this element.

Table N.29 – GPS Destination distance reference unit values

Value	Meaning
K	Kilometers per hour
N	Knots

GPS_DEST_DISTANCE: GPS Destination Distance. This element contains a value indicating the distance to the destination from the GPS receiver. The value units are defined by the GPS Destination Distance Reference.

N.7.1.16 Direction type

This type specifies a three-dimensional heading. While this type is primarily used to specify the direction a camera is facing, it may also be used to specify information about an object in a scientific photograph for example. When calculating the direction the camera is facing, first the yaw is applied, then the pitch, then the roll. This type may contain the sub-elements listed below.

```
<xsd:complexType name="tDirection">
  <xsd:sequence>
    <xsd:element name="YAW" type="jp:tDegree" minOccurs="0"/>
    <xsd:element name="PITCH" type="jp:tHalfDegree" minOccurs="0"/>
    <xsd:element name="ROLL" type="jp:tDegree" minOccurs="0"/>
    <xsd:element ref="jp:COMMENT" minOccurs="0"/>
  </xsd:sequence>
  <xsd:attribute ref="jp:TIMESTAMP"/>
  <xsd:attribute ref="xml:lang"/>
</xsd:complexType>
```

Figure N.65 – Schema of the Direction type

YAW: This element is the direction the capture device is facing. The element is measured in degrees. North is 0, East is 90, South 180 and West is –90.

PITCH: This element is a measure of the elevation angle of the capture device. This element is a Double value between –90 and +90, also measured in

degrees. 0 facing horizontal. 90 is facing vertically straight upwards, and –90 vertically downwards.

ROLL: This element is a measure of the rotation angle of the capture device. This element is a Double value between –180 and 180, also measured in degrees. 0 facing horizontal. 90 where the device is rotated clockwise and the left of the device is facing upwards, and –90 where the device is rotated anti-clockwise. 180 is upside down.

COMMENT: This element specifies user- and/or application-defined information beyond the scope of other properties in the direction types. For example, "Upwards," "To the left." See Comment element (N.7.3.1) for more information on this element.

N.7.1.17 Position type

This type is used to specify the position of an object, within an image. The Position type can be one of the following:

- An x, y single point.
- A rectangular area (specified as an x, y, width and height).
- A set of splines that represent an area of the image.
- A free-text comment element.

The image is described in a Cartesian system, with the X-axis horizontal and pointing to the right, the Y-axis vertical and pointing downward, and the origin at the upper left corner. The scale is such that the height of the image is normalized to 1.0. To keep the scale of the X-axis and the Y-axis the same, the image width (R) is its aspect ratio (width/height). Thus, a square part of any image has equal width and height in this coordinate system. The metadata coordinate system refers to the image area on the reference grid as defined in ITU-T T.800 | ISO/IEC 15444-1. See Figure B.1 in ITU-T T.800 | ISO/ IEC 15444-1 for an illustration of the image area. Coordinate (0, 0) refers to the top left of pixel (XOsiz, YOsiz) and coordinate (R, 1) refers to the bottom right of pixel (Xsiz–1, Ysiz–1) on the reference grid where XOsiz, YOsiz, Xsiz and Ysiz are the values of the respective fields in the SIZ marker (see A.2.3) in the codestream. Other coordinates map linearly into this image area.

This information may become useless if the image is cropped or manipulated. See Location type (N.7.1.15) for the difference between the Position and Location types.

```
<xsd:complexType name="tPosition">
  <xsd:sequence>
    <xsd:choice minOccurs="0">
      <xsd:element name="POINT" type="jp:tPoint"/>
      <xsd:element name="RECT" type="jp:tRect"/>
      <xsd:sequence>
        <xsd:element name="RECT" type="jp:tRect"/>
        <xsd:element name="REGION" type="jp:tRegion"/>
      </xsd:sequence>
    </xsd:choice>
    <xsd:element ref="jp:COMMENT" minOccurs="0"/>
  </xsd:sequence>
  <xsd:attribute ref="jp:TIMESTAMP"/>
</xsd:complexType>
```

Figure N.66 – Schema of the Position type

POINT: Single point. This element specifies a single point in the coordination system. See Point type (N.7.1.18) for more information of this element.

RECT: Rectangular region. This element specifies a rectangular region in the coordinate system. See Rect type (N.7.1.19) for more information of this element.

REGION: Arbitrary region. This element specifies an arbitrary region. See Region type (N.7.1.20) for more information on this element.

COMMENT: This element can describe the position of an object less accurately than one of the above methods. For example, this element may contain "Bottom left-hand corner" or "Second from the left in the top row." See Comment element (N.7.3.1) for more information on this element.

N.7.1.18 Point type

This type specifies details about a single point on an image. This type is used to describe a single point in the coordinate system. This type shall contain the sub-elements listed below.

```
<xsd:complexType name="tPoint">
  <xsd:sequence>
    <xsd:element name="X" type="jp:tNonNegativeDouble"/>
    <xsd:element name="Y" type="jp:tNonNegativeDouble"/>
  </xsd:sequence>
</xsd:complexType>
```

Figure N.67 – Schema of the Point type

X:	This element specifies the X coordinate of the point.
Y:	This element specifies the Y coordinate of the point.

N.7.1.19 Rect type

This type specifies details about a rectangular region on an image. This type is used to describe a rectangular region in the coordinate system. See Point type (N.7.1.18) for the base format of this type. Additionally, this type shall contain the sub-elements listed below.

```
<xsd:complexType name="tRect">
  <xsd:complexContent>
    <xsd:extension base="jp:tPoint">
      <xsd:sequence>
        <xsd:element name="WIDTH" type="jp:tNonNegativeDouble"/>
        <xsd:element name="HEIGHT" type="jp:tNonNegativeDouble"/>
      </xsd:sequence>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

Figure N.68 – Schema of the Rect type

X:	The left of the rectangle.
Y:	The top of the rectangle.
WIDTH:	The width of the rectangular (to the right of X).
HEIGHT:	The height of the rectangular (below Y).

N.7.1.20 Region type

This type specifies details about an arbitrary region on an image. This type consists of a start point and one or more segments. Each segment may be either a straight line (specified using a point), or a spline.

Where an arbitrary region is specified, a Rectangular Region shall also be specified (which is the bounding box of the Arbitrary Region). A standard JPX compliant metadata reader or editor has the option of not using the Arbitrary Region, even if the Rectangular Region is used.

This type shall contain the sub-elements listed below.

```
<xsd:complexType name="tRegion">
  <xsd:sequence>
    <xsd:element name="POINT" type="jp:tPoint"/>
    <xsd:choice minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="POINT" type="jp:tPoint"/>
      <xsd:element name="SPLINE">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="X1" type="jp:tNonNegativeDouble"/>
            <xsd:element name="Y1" type="jp:tNonNegativeDouble"/>
            <xsd:element name="X2" type="jp:tNonNegativeDouble"/>
            <xsd:element name="Y2" type="jp:tNonNegativeDouble"/>
            <xsd:element name="X" type="jp:tNonNegativeDouble"/>
            <xsd:element name="Y" type="jp:tNonNegativeDouble"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
    </xsd:choice>
  </xsd:sequence>
</xsd:complexType>
```

Figure N.69 – Schema of the Region type

POINT: Start Point: This is the starting point of the spline in the coordinate system. See Point type (N.7.1.18) for the format of this element.

POINT: This element specifies a line starting at the end of the previous spline and ending at the new point. See Point type (N.7.1.18) for the format of this element.

SPLINE: This element specifies a Bezier curve starting at the end of the previous spline, and ending at the new end point (x, y), with x1, y1 and x2, y2 being the first and second control points of the spline respectively.

N.7.1.21 Product details type

This type specifies details about a product (hardware or software). By combining these three elements, a unique value shall be created. This type may contain the sub-elements listed below.

```
<xsd:complexType name="tProductDetails">
  <xsd:sequence>
    <xsd:element name="MANUFACTURER" type="jp:tOrganization" minOccurs="0"/>
    <xsd:element name="MODEL" type="xsd:string" minOccurs="0"/>
    <xsd:element name="SERIAL" type="xsd:string" minOccurs="0"/>
    <xsd:element name="VERSION" type="xsd:string" minOccurs="0"/>
  </xsd:sequence>
  <xsd:attribute ref="jp:TIMESTAMP"/>
  <xsd:attribute ref="xml:lang"/>
</xsd:complexType>
```

Figure N.70 – Schema of the Product Details type

MANUFACTURER: Manufacturer name. This element specifies the name of the manufacturer or vendor of the product. It is recommended to set the manufacturer name shown on the device. See Organization type (N.7.1.14) for the format of this element.

MODEL: Model name. This element specifies the model name or number of the product.

SERIAL: Serial Number. This element specifies the serial number of a product.

VERSION: Version Number. This element specifies the version number of a product.

N.7.2 Defined attributes

N.7.2.1 Language attribute

The attribute is formatted according to RFC 3066. When a metadata element has a Language attribute, it specifies the language in which the metadata is stored. English (e.g., "en") is assumed where the language is not specified.

Where an element specifies a Language attribute, and also sub-elements, the Language of the sub-elements is the same as the enclosing element unless the Language attribute is specified separately within the sub-element.

```
<xsd:attribute name="xml:lang" type="xsd:language"/>
```

Figure N.71 – Schema of the Language attribute

xml:lang: This element contains a string values that is RFC 3066 compliant. The syntax of this element shall match the Language Identification format of XML 1.0.

N.7.2.2 Timestamp attribute

When a metadata element contains a Timestamp attribute, it specifies the time that the metadata was generated. Where an element specifies a Timestamp attribute, and also sub-elements, the Timestamp of the sub-elements is the same as the enclosing element unless the Timestamp attribute is specified separately within the sub-element.

```
<xsd:attribute name="TIMESTAMP" type="xsd:dateTime"/>
```

Figure N.72 – Schema of the Timestamp attribute

TIMESTAMP: This element contains a string that is ISO 8601 compliant.

N.7.3 Defined elements

N.7.3.1 Comment element

The Comment element is used to specify extra information to the element it contains that cannot be described otherwise within the defined metadata. It is recommended that the Comment element is used as a last resort only when the other metadata elements are not suitable to store a specific piece of metadata.

The content of this element is intended to store human readable data. Storing non-human readable data can be performed using other metadata extension methods.

```
<xsd:element name="COMMENT">
  <xsd:complexType>
    <xsd:simpleContent>
      <xsd:extension base="jp:tLangString">
        <xsd:attribute ref="jp:TIMESTAMP"/>
      </xsd:extension>
    </xsd:simpleContent>
  </xsd:complexType>
</xsd:element>
```

Figure N.73 – Schema of the Comment element

N.8 JPX extended metadata document type definition

```
<!--
    Copyright (C) ISO/IEC 2001 - All rights reserved.

    Permission to copy in any form is granted for use with validating and conforming
    systems and applications as defined in ISO/IEC 15444-2:2001, provided this
    copyright notice is included with all copies.
-->


<!-- ================================================================== -->
<!-- Fundamental Type and Element Definitions                           -->
<!-- ================================================================== -->


<!-- HUMAN_SCHEMA_DTD_LOCATION:http://www.jpeg.org/metadata/15444-2.PDF -->


<!-- Attribute definitions -->


<!ENTITY % att-timestamp                    "TIMESTAMP CDATA #IMPLIED">
<!ENTITY % att-lang                         "xml:lang CDATA #IMPLIED">
<!ENTITY % att-lang-ts                      "%att-lang; %att-timestamp;">
<!ENTITY % att-lang-ts-id                   "%att-lang-ts; ID CDATA #IMPLIED">


<!-- Geometric Type -->
```

```
<!ENTITY % size                          "(WIDTH, HEIGHT)">

<!-- Date Type -->

<!ENTITY % jp2-tDateTime                 "(EXACT | DATE |
                                          (MONTH?, YEAR?, CENTURY?)),
                                          WEEK_DAY?, SEASON?, COMMENT?">


<!ELEMENT EXACT                          (#PCDATA)>
<!ELEMENT DATE                           (#PCDATA)>
<!ELEMENT MONTH                          (#PCDATA)>
<!ELEMENT YEAR                           (#PCDATA)>
<!ELEMENT CENTURY                        (#PCDATA)>
<!ELEMENT WEEK_DAY                       (#PCDATA)>
<!ELEMENT SEASON                         (#PCDATA)>

<!--  Address type -->

<!ENTITY % jp2-tAddress                  "(ADDR_NAME?, ADDR_COMP*,
                                          (POSTCODE | ZIPCODE)?,
                                          COUNTRY?)">
<!ELEMENT ADDRESS                        %jp2-tAddress;>
<!ATTLIST ADDRESS                        TYPE CDATA #IMPLIED
                                         %att-lang-ts;>


<!ELEMENT ADDR_NAME                      (#PCDATA)>
<!ATTLIST ADDR_NAME                      %att-lang;>


<!ELEMENT ADDR_COMP                      (#PCDATA)>
<!ATTLIST ADDR_COMP                      TYPE CDATA #IMPLIED>


<!ELEMENT POSTCODE                       (#PCDATA)>
<!ELEMENT ZIPCODE                        (#PCDATA)>


<!ELEMENT COUNTRY                        (#PCDATA)>
<!ATTLIST COUNTRY                        %att-lang;>

<!--  Phone number type -->

<!ENTITY % jp2-tPhone                    "(COUNTRY_CODE?, AREA?,
                                          LOCAL?, EXTENSION?)">
<!ATTLIST PHONE                          TYPE CDATA #IMPLIED
                                         %att-timestamp;>
<!ELEMENT PHONE                          %jp2-tPhone;>


<!ELEMENT COUNTRY_CODE                   (#PCDATA)>
<!ELEMENT AREA                           (#PCDATA)>
<!ELEMENT LOCAL                          (#PCDATA)>
<!ELEMENT EXTENSION                      (#PCDATA)>

<!-- Email Address Type-->

<!ELEMENT EMAIL                          (#PCDATA)>
<!ATTLIST EMAIL                          TYPE CDATA #IMPLIED>

<!-- Web Address Type-->

<!ELEMENT WEB                            (#PCDATA)>
<!ATTLIST WEB                            TYPE CDATA #IMPLIED>

<!-- Organization type -->

<!ENTITY % jp2-tOrganization             "(ORG_NAME?,
                                          ADDRESS*, PHONE*, EMAIL*, WEB*,
                                          LOGO_FILE?, LOGO_FORMAT?, MIME_TYPE?,
                                          COMMENT?)">


<!ELEMENT ORG_NAME                       (#PCDATA)>
<!ATTLIST ORG_NAME                       %att-lang;>


<!ELEMENT LOGO_FILE                      (#PCDATA)>
<!ELEMENT LOGO_FORMAT                    (#PCDATA)>
<!ELEMENT MIME_TYPE                      (#PCDATA)>
```

```
<!-- Person Type-->

<!ENTITY % jp2-tPerson                  "(NAME_TITLE?,
                                         PERSON_NAME*, NICK_NAME*,
                                         JOB_TITLE?,
                                         (PERSON_ORG | ORG_REF)?,
                                         ADDRESS*, PHONE*, EMAIL*, WEB*,
                                         BIRTH_DATE?, AGE?,
                                         COMMENT?)">

<!ELEMENT NAME_TITLE                    (#PCDATA)>
<!ATTLIST NAME_TITLE                    %att-lang;>

<!ELEMENT PERSON_NAME                   (NAME_COMP+)>
<!ATTLIST PERSON_NAME                   %att-lang-ts;>

<!ELEMENT NAME_COMP                     (#PCDATA)>
<!ATTLIST NAME_COMP                     TYPE (Prefix | Given | Family |
                                              Suffix | Maiden) "Given">

<!ELEMENT NICK_NAME                     (#PCDATA)>
<!ELEMENT JOB_TITLE                     (#PCDATA)>

<!ELEMENT PERSON_ORG                    %jp2-tOrganization;>
<!ATTLIST PERSON_ORG                    %att-lang-ts-id;>

<!ELEMENT ORG_REF                       (#PCDATA)>

<!ELEMENT BIRTH_DATE                    (#PCDATA)>
<!ELEMENT AGE                           (#PCDATA)>

<!-- Location type -->

<!ENTITY % jp2-tLocation                "(COORD_LOC?, ADDRESS?,
                                         GPS?, COMMENT?)">
<!ELEMENT LOCATION                      %jp2-tLocation;>
<!ATTLIST LOCATION                      %att-lang-ts;>

<!ELEMENT COORD_LOC                     (LONGITUDE?, LATITUDE?, ALTITUDE?)>
<!ATTLIST COORD_LOC                     %att-timestamp;>

<!ELEMENT LONGITUDE                     (#PCDATA)>
<!ELEMENT LATITUDE                      (#PCDATA)>
<!ELEMENT ALTITUDE                      (#PCDATA)>

<!-- GPS type -->

<!ELEMENT GPS                           (GPS_LAT_REF?, GPS_LATITUDE?,
                                         GPS_LONG_REF?, GPS_LONGITUDE?,
                                         GPS_ALTITUDE?, GPS_TIME?,
                                         GPS_SATELLITES?, GPS_STATUS?,
                                         GPS_MEASURE_MODE?, GPS_DOP?,
                                         GPS_SPEED_REF?, GPS_SPEED?,
                                         GPS_TRACK_REF?, GPS_TRACK?,
                                         GPS_IMAGE_DIR_REF?, GPS_IMAGE_DIR?,
                                         GPS_MAP_DATUM?,
                                         GPS_DEST_LAT_REF?,
                                         GPS_DEST_LATITUDE?,
                                         GPS_DEST_LONG_REF?,
                                         GPS_DEST_LONGITUDE?,
                                         GPS_DEST_BEARING_REF?,
                                         GPS_DEST_BEARING?,
                                         GPS_DEST_DISTANCE_REF?,
                                         GPS_DEST_DISTANCE?)>

<!ELEMENT GPS_LAT_REF                   (#PCDATA)>
<!ELEMENT GPS_LATITUDE                  (D, M, S?)>
<!ELEMENT GPS_LONG_REF                  (#PCDATA)>
<!ELEMENT GPS_LONGITUDE                 (D, M, S?)>
<!ELEMENT GPS_ALTITUDE                  (#PCDATA)>
<!ELEMENT GPS_TIME                      (#PCDATA)>
<!ELEMENT GPS_SATELLITES                (#PCDATA)>
<!ELEMENT GPS_STATUS                    (#PCDATA)>
<!ELEMENT GPS_MEASURE_MODE              (#PCDATA)>
<!ELEMENT GPS_DOP                       (#PCDATA)>
<!ELEMENT GPS_SPEED_REF                 (#PCDATA)>
<!ELEMENT GPS_SPEED                     (#PCDATA)>
```

```
<!ELEMENT GPS_TRACK_REF                  (#PCDATA)>
<!ELEMENT GPS_TRACK                      (#PCDATA)>
<!ELEMENT GPS_IMAGE_DIR_REF              (#PCDATA)>
<!ELEMENT GPS_IMAGE_DIR                  (#PCDATA)>
<!ELEMENT GPS_MAP_DATUM                  (#PCDATA)>
<!ELEMENT GPS_DEST_LAT_REF               (#PCDATA)>
<!ELEMENT GPS_DEST_LATITUDE              (D, M, S?)>
<!ELEMENT GPS_DEST_LONG_REF              (#PCDATA)>
<!ELEMENT GPS_DEST_LONGITUDE             (D, M, S?)>
<!ELEMENT GPS_DEST_BEARING_REF           (#PCDATA)>
<!ELEMENT GPS_DEST_BEARING               (#PCDATA)>
<!ELEMENT GPS_DEST_DISTANCE_REF          (#PCDATA)>
<!ELEMENT GPS_DEST_DISTANCE              (#PCDATA)>


<!ELEMENT D                              (#PCDATA)>
<!ELEMENT M                              (#PCDATA)>
<!ELEMENT S                              (#PCDATA)>


<!-- Direction type-->


<!ENTITY % jp2-tDirection               "(YAW?, PITCH?, ROLL?, COMMENT?)">
<!ELEMENT DIRECTION                      %jp2-tDirection;>
<!ATTLIST DIRECTION                      %att-lang-ts;>


<!ELEMENT YAW                            (#PCDATA)>
<!ELEMENT PITCH                          (#PCDATA)>
<!ELEMENT ROLL                           (#PCDATA)>


<!-- Position type -->
<!ENTITY % jp2-tPosition                "((POINT | RECT | (RECT, REGION))?,
                                         COMMENT?)">
<!ELEMENT POSITION                       %jp2-tPosition;>
<!ATTLIST POSITION                       %att-lang-ts;>


<!ELEMENT POINT                          (X, Y)>
<!ELEMENT RECT                           (X, Y, WIDTH, HEIGHT)>
<!ELEMENT SPLINE                         (X1, Y1, X2, Y2, X, Y)>
<!ELEMENT REGION                         (POINT, (POINT | SPLINE)*)>


<!ELEMENT X                              (#PCDATA)>
<!ELEMENT Y                              (#PCDATA)>
<!ELEMENT WIDTH                          (#PCDATA)>
<!ELEMENT HEIGHT                         (#PCDATA)>
<!ELEMENT X1                             (#PCDATA)>
<!ELEMENT Y1                             (#PCDATA)>
<!ELEMENT X2                             (#PCDATA)>
<!ELEMENT Y2                             (#PCDATA)>


<!-- Product Details Type -->


<!ENTITY % jp2-tProductDetails           "(MANUFACTURER?, MODEL?, SERIAL?, VERSION?)">


<!ELEMENT MANUFACTURER                   %jp2-tOrganization;>
<!ATTLIST MANUFACTURER                   %att-lang-ts-id;>
<!ELEMENT MODEL                          (#PCDATA)>
<!ELEMENT SERIAL                         (#PCDATA)>
<!ELEMENT VERSION                        (#PCDATA)>


<!-- Comment element -->


<!ELEMENT COMMENT                        (#PCDATA)>
<!ATTLIST COMMENT                        %att-lang-ts;>



<!-- ====================================================================== -->
<!-- Image Creation Metadata                                                -->
<!-- ====================================================================== -->


<!ELEMENT IMAGE_CREATION                 (GENERAL_CREATION_INFO?,
                                          CAMERA_CAPTURE?,
                                          SCANNER_CAPTURE?,
                                          SOFTWARE_CREATION?,
                                          CAPTURED_ITEM?)>
<!ATTLIST IMAGE_CREATION                 %att-lang-ts;>


<!-- General Image Creation -->
```

```
<!ELEMENT GENERAL_CREATION_INFO          (CREATION_TIME?, IMAGE_SOURCE?,
                                          SCENE_TYPE?, IMAGE_CREATOR?,
                                          OPERATOR_ORG?, OPERATOR_ID?)>
<!ATTLIST GENERAL_CREATION_INFO          %att-lang-ts;>

<!ELEMENT CREATION_TIME                  (#PCDATA)>

<!ELEMENT IMAGE_SOURCE                   (#PCDATA)>
<!ATTLIST IMAGE_SOURCE                   %att-lang;>

<!ELEMENT SCENE_TYPE                     (#PCDATA)>
<!ATTLIST SCENE_TYPE                     %att-lang;>

<!ELEMENT IMAGE_CREATOR                  %jp2-tPerson;>
<!ATTLIST IMAGE_CREATOR                  %att-lang-ts-id;>

<!ELEMENT OPERATOR_ORG                   %jp2-tOrganization;>
<!ATTLIST OPERATOR_ORG                   %att-lang-ts-id;>

<!ELEMENT OPERATOR_ID                    (#PCDATA)>
<!ATTLIST OPERATOR_ID                    %att-lang;>

<!-- Camera capture -->

<!ELEMENT CAMERA_CAPTURE                 (CAMERA_INFO?, SOFTWARE_INFO?,
                                          LENS_INFO?, DEVICE_CHARACTER?,
                                          CAMERA_SETTINGS?, ACCESSORY*)>
<!ATTLIST CAMERA_CAPTURE                 %att-lang-ts;>

<!ELEMENT CAMERA_INFO                    %jp2-tProductDetails;>
<!ATTLIST CAMERA_INFO                    %att-lang-ts;>

<!ELEMENT SOFTWARE_INFO                  %jp2-tProductDetails;>
<!ATTLIST SOFTWARE_INFO                  %att-lang-ts;>

<!ELEMENT LENS_INFO                      %jp2-tProductDetails;>
<!ATTLIST LENS_INFO                      %att-lang-ts;>

<!ELEMENT DEVICE_CHARACTER               (SENSOR_TECHNOLOGY?,
                                          FOCAL_PLANE_RES?,
                                          SPECTRAL_SENSITIVITY?,
                                          ISO_SATURATION?, ISO_NOISE?,
                                          SPATIAL_FREQ_RESPONSE?,
                                          CFA_PATTERN?, OECF?, MIN_F_NUMBER?)>
<!ATTLIST DEVICE_CHARACTER               %att-lang-ts;>

<!ELEMENT SENSOR_TECHNOLOGY              (#PCDATA)>

<!ELEMENT FOCAL_PLANE_RES                %size;>

<!ELEMENT SPECTRAL_SENSITIVITY           ANY>
<!ELEMENT ISO_SATURATION                 (#PCDATA)>
<!ELEMENT ISO_NOISE                      (#PCDATA)>

<!ELEMENT SPATIAL_FREQ_RESPONSE          (SPATIAL_FREQ_VAL+)>
<!ELEMENT SPATIAL_FREQ_VAL               (SPATIAL_FREQ, HORIZ_SFR, VERT_SFR)>
<!ELEMENT SPATIAL_FREQ                   (#PCDATA)>
<!ELEMENT HORIZ_SFR                      (#PCDATA)>
<!ELEMENT VERT_SFR                       (#PCDATA)>

<!ELEMENT CFA_PATTERN                    (COLOR_ROW+)>
<!ELEMENT COLOR_ROW                      (COLOR+)>
<!ELEMENT COLOR                          (#PCDATA)>

<!ELEMENT OECF                           (LOG_VAL+)>
<!ELEMENT LOG_VAL                        (LOG_EXPOSURE, OUTPUT_LEVEL+)>
<!ELEMENT LOG_EXPOSURE                   (#PCDATA)>
<!ELEMENT OUTPUT_LEVEL                   (#PCDATA)>

<!ELEMENT MIN_F_NUMBER                   (#PCDATA)>

<!-- Camera Capture Settings -->
```

```
<!ELEMENT CAMERA_SETTINGS                ((EXP_TIME | R_EXP_TIME)?,
                                          F_NUMBER?, EXP_PROGRAM?,
                                          BRIGHTNESS?, EXPOSURE_BIAS?,
                                          SUBJECT_DISTANCE?, METERING_MODE?,
                                          SCENE_ILLUMINANT?, COLOR_TEMP?,
                                          FOCAL_LENGTH?, FLASH?,
                                          FLASH_ENERGY?, FLASH_RETURN?,
                                          BACK_LIGHT?, SUBJECT_POSITION?,
                                          EXPOSURE_INDEX?, AUTO_FOCUS?,
                                          SPECIAL_EFFECT*, CAMERA_LOCATION?,
                                          ORIENTATION?, PAR?)>
<!ATTLIST CAMERA_SETTINGS                 %att-lang-ts;>

<!ELEMENT EXP_TIME                        (#PCDATA)>
<!ELEMENT R_EXP_TIME                      (#PCDATA)>
<!ELEMENT F_NUMBER                        (#PCDATA)>
<!ELEMENT EXP_PROGRAM                     (#PCDATA)>
<!ATTLIST EXP_PROGRAM                     %att-lang;>
<!ELEMENT BRIGHTNESS                      (#PCDATA)>
<!ELEMENT EXPOSURE_BIAS                   (#PCDATA)>
<!ELEMENT SUBJECT_DISTANCE                (#PCDATA)>
<!ELEMENT METERING_MODE                   (#PCDATA)>
<!ATTLIST METERING_MODE                   %att-lang;>
<!ELEMENT SCENE_ILLUMINANT                (#PCDATA)>
<!ATTLIST SCENE_ILLUMINANT                %att-lang;>
<!ELEMENT COLOR_TEMP                      (#PCDATA)>
<!ELEMENT FOCAL_LENGTH                    (#PCDATA)>
<!ELEMENT FLASH                           (#PCDATA)>
<!ELEMENT FLASH_ENERGY                    (#PCDATA)>
<!ELEMENT FLASH_RETURN                    (#PCDATA)>
<!ELEMENT BACK_LIGHT                      (#PCDATA)>
<!ELEMENT SUBJECT_POSITION                %jp2-tPosition;>
<!ATTLIST SUBJECT_POSITION                %att-lang-ts;>
<!ELEMENT EXPOSURE_INDEX                  (#PCDATA)>
<!ELEMENT AUTO_FOCUS                      (#PCDATA)>
<!ELEMENT SPECIAL_EFFECT                  (#PCDATA)>
<!ELEMENT CAMERA_LOCATION                 %jp2-tLocation;>
<!ATTLIST CAMERA_LOCATION                 %att-lang-ts;>
<!ELEMENT ORIENTATION                     %jp2-tDirection;>
<!ATTLIST ORIENTATION                     %att-lang-ts;>
<!ELEMENT PAR                             (#PCDATA)>

<!ELEMENT ACCESSORY                       %jp2-tProductDetails;>
<!ATTLIST ACCESSORY                       %att-lang-ts;>

<!-- Scanner Capture -->

<!ELEMENT SCANNER_CAPTURE                 (SCANNER_INFO?, SOFTWARE_INFO?,
                                          SCANNER_SETTINGS?)>
<!ATTLIST SCANNER_CAPTURE                 %att-lang-ts;>

<!ELEMENT SCANNER_INFO                    %jp2-tProductDetails;>
<!ATTLIST SCANNER_INFO                    %att-lang-ts;>

<!ELEMENT SCANNER_SETTINGS                (PIXEL_SIZE?, PHYSICAL_SCAN_RES?)>
<!ATTLIST SCANNER_SETTINGS                %att-timestamp;>

<!ELEMENT PIXEL_SIZE                      (#PCDATA)>
<!ELEMENT PHYSICAL_SCAN_RES               %size;>

<!-- Software Creation -->
<!ELEMENT SOFTWARE_CREATION               (SOFTWARE_INFO?)>

<!-- Captured Item -->

<!ELEMENT CAPTURED_ITEM                   (REFLECTION_PRINT | FILM)>
<!ATTLIST CAPTURED_ITEM                   %att-lang-ts;>

<!-- Reflection print -->

<!ELEMENT REFLECTION_PRINT                (DOCUMENT_SIZE?, MEDIUM?, RP_TYPE?)>

<!ELEMENT DOCUMENT_SIZE                   %size;>
<!ELEMENT MEDIUM                          (#PCDATA)>
<!ELEMENT RP_TYPE                         (#PCDATA)>

<!-- Film -->
```

```
<!ELEMENT FILM                              (BRAND?, CATEGORY?, FILM_SIZE?,
                                             ROLL_ID?, FRAME_ID?, FILM_SPEED?)>
<!ATTLIST FILM                              %att-lang-ts;>


<!ELEMENT BRAND                             %jp2-tProductDetails;>
<!ATTLIST BRAND                             %att-lang-ts;>
<!ELEMENT CATEGORY                          (#PCDATA)>
<!ELEMENT FILM_SIZE                         %size;>
<!ELEMENT ROLL_ID                           (#PCDATA)>
<!ATTLIST ROLL_ID                           %att-lang;>
<!ELEMENT FRAME_ID                          (#PCDATA)>
<!ELEMENT FILM_SPEED                        (#PCDATA)>



<!-- ========================================================================= -->
<!-- Content Description                                                       -->
<!-- ========================================================================= -->

<!ELEMENT CONTENT_DESCRIPTION               (GROUP_CAPTION?, CAPTION?,
                                             CAPTURE_TIME?, LOCATION?,
                                             PERSON*, THING*, ORGANIZATION*,
                                             EVENT*, AUDIO*, PROPERTY*,
                                             DICTIONARY*, COMMENT?)>
<!ATTLIST CONTENT_DESCRIPTION               %att-lang-ts;>



<!ELEMENT GROUP_CAPTION                     (#PCDATA)>
<!ATTLIST GROUP_CAPTION                     %att-lang;>


<!ELEMENT CAPTION                           (#PCDATA)>
<!ATTLIST CAPTION                           %att-lang;>


<!ELEMENT CAPTURE_TIME                      (%jp2-tDateTime;)>
<!ATTLIST CAPTURE_TIME                      %att-lang-ts;>


<!-- Person -->


<!ELEMENT PERSON                            (%jp2-tPerson;, POSITION?,
                                             LOCATION?, PROPERTY*)>
<!ATTLIST PERSON                            %att-lang-ts-id;>


<!-- Thing -->


<!ELEMENT THING                             (NAME?, COMMENT?, POSITION?,
                                             LOCATION?, PROPERTY*, THING*)>
<!ATTLIST THING                             %att-lang-ts-id;>


<!-- Organization -->


<!ELEMENT ORGANIZATION                      (%jp2-tOrganization;, POSITION?,
                                             LOCATION?, PROPERTY*)>
<!ATTLIST ORGANIZATION                      %att-lang-ts-id;>


<!-- Event -->


<!ELEMENT EVENT                             (EVENT_TYPE?, DESCRIPTION?,
                                             LOCATION?, EVENT_TIME?, DURATION?,
                                             COMMENT?, PARTICIPANT*,
                                             EVENT_RELATION*,
                                             (EVENT | EVENT_REF)*)>
<!ATTLIST EVENT                             %att-lang-ts-id;>


<!ELEMENT EVENT_TYPE                        (#PCDATA)>
<!ATTLIST EVENT_TYPE                        %att-lang;>


<!ELEMENT DESCRIPTION                       (#PCDATA)>
<!ATTLIST DESCRIPTION                       %att-lang;>


<!ELEMENT EVENT_TIME                        (%jp2-tDateTime;)>
<!ATTLIST EVENT_TIME                        %att-lang-ts;>


<!ELEMENT DURATION                          (#PCDATA)>
```

```
<!ELEMENT PARTICIPANT                       (ROLE+,
                                             (OBJECT_REF | PERSON | THING | ORGANIZATION))>
<!ATTLIST PARTICIPANT                        %att-lang;>


<!ELEMENT ROLE                               (#PCDATA)>
<!ATTLIST ROLE                               %att-lang;>


<!ELEMENT OBJECT_REF                        (#PCDATA)>


<!ELEMENT EVENT_RELATION                    (RELATION*, EVENT_REF+)>


<!ELEMENT RELATION                           (#PCDATA)>
<!ATTLIST RELATION                           %att-lang;>


<!ELEMENT EVENT_REF                          (#PCDATA)>


<!-- Audio -->


<!ELEMENT AUDIO                             (AUDIO_STREAM?, AUDIO_FORMAT?,
                                             MIME_TYPE?, DESCRIPTION?, COMMENT?)>
<!ATTLIST AUDIO                              %att-lang-ts;>


<!ELEMENT AUDIO_STREAM                       (#PCDATA)>
<!ELEMENT AUDIO_FORMAT                       (#PCDATA)>


<!-- Property -->


<!ELEMENT PROPERTY                          (NAME?, VALUE*, COMMENT?, PROPERTY*)>
<!ATTLIST PROPERTY                           %att-lang-ts;
                                             DICT_REF CDATA #IMPLIED>


<!ELEMENT NAME                              (#PCDATA)>
<!ATTLIST NAME                               %att-lang;>


<!ELEMENT VALUE                             (#PCDATA)>
<!ATTLIST VALUE                              %att-lang;>


<!-- Dictionary Reference -->


<!ELEMENT DICTIONARY                        (DICT_NAME?, COMMENT?)>
<!ATTLIST DICTIONARY                         %att-lang-ts-id;>


<!ELEMENT DICT_NAME                          (#PCDATA)>
<!ATTLIST DICT_NAME                          %att-lang;>


<!-- ===================================================================== -->
<!-- History                                                               -->
<!-- ===================================================================== -->


<!ELEMENT HISTORY                           (PROCESSING_SUMMARY?,
                                             IMAGE_PROCESSING_HINTS?, METADATA*)>
<!ATTLIST HISTORY                            %att-lang-ts;>
<!ELEMENT METADATA                           (BASIC_IMAGE_PARAM?, IMAGE_CREATION?,
                                              CONTENT_DESCRIPTION?,
                                              HISTORY?,
                                              IPR?)>


<!-- Summary -->


<!ELEMENT PROCESSING_SUMMARY                (IMG_CREATED?, IMG_CROPPED?,
                                             IMG_TRANSFORMED?, IMG_GTC_ADJ?,
                                             IMG_STC_ADJ?, IMG_SPATIAL_ADJ?,
                                             IMG_EXT_EDITED?, IMG_RETOUCHED?,
                                             IMG_COMPOSITED?, IMG_METADATA?)>
<!ATTLIST PROCESSING_SUMMARY                 %att-timestamp;>


<!ELEMENT IMAGE_PROCESSING_HINTS(MODIFIER?, (IMG_CREATED | IMG_CROPPED |
                                             IMG_TRANSFORMED | IMG_GTC_ADJ |
                                             IMG_STC_ADJ | IMG_SPATIAL_ADJ |
                                             IMG_EXT_EDITED | IMG_RETOUCHED |
<!ELEMENT MODIFIER%jp2-tProductDetails;>     IMG_COMPOSITED | IMG_METADATA)*)*>
<!ATTLIST IMAGE_PROCESSING_HINTS             %att-lang-ts;>
```

```
<!ELEMENT IMG_CREATED                       (#PCDATA)>
<!ELEMENT IMG_CROPPED                       (#PCDATA)>
<!ELEMENT IMG_TRANSFORMED                   (#PCDATA)>
<!ELEMENT IMG_GTC_ADJ                       (#PCDATA)>
<!ELEMENT IMG_STC_ADJ                       (#PCDATA)>
<!ELEMENT IMG_SPATIAL_ADJ                   (#PCDATA)>
<!ELEMENT IMG_EXT_EDITED                    (#PCDATA)>
<!ELEMENT IMG_RETOUCHED                     (#PCDATA)>
<!ELEMENT IMG_COMPOSITED                    (#PCDATA)>
<!ELEMENT IMG_METADATA                      (#PCDATA)>


<!-- Previous -->
<!ELEMENT BASIC_IMAGE_PARAM                (BASIC_IMAGE_INFO)>
<!ATTLIST BASIC_IMAGE_PARAM                 %att-lang-ts;>


<!ELEMENT BASIC_IMAGE_INFO                 (FILE_FORMAT?, IMAGE_ID?)>
<!ATTLIST BASIC_IMAGE_INFO                  %att-lang-ts;>



<!-- ====================================================================== -->
<!-- Intellectual Property Rights                                           -->
<!-- ====================================================================== -->


<!ELEMENT IPR                              (IPR_NAMES?, IPR_DESCRIPTION?,
                                            IPR_DATES?, IPR_EXPLOITATION?,
                                            IPR_IDENTIFICATION?,
                                            IPR_CONTACT_POINT?, IPR_HISTORY?)>
<!ATTLIST IPR                               %att-lang-ts;>


<!-- IPR people -->


<!ELEMENT IPR_NAMES                        (IPR_PERSON?, IPR_ORG?, IPR_NAME_REF?)+>
<!ATTLIST IPR_NAMES                         %att-lang-ts;>


<!ELEMENT IPR_PERSON                        %jp2-tPerson;>
<!ATTLIST IPR_PERSON                        DESCRIPTION CDATA #IMPLIED
                                            %att-lang-ts-id;>


<!ELEMENT IPR_ORG                           %jp2-tOrganization;>
<!ATTLIST IPR_ORG                           DESCRIPTION CDATA #IMPLIED
                                            %att-lang-ts-id;>


<!ELEMENT IPR_NAME_REF                     (#PCDATA)>
<!ATTLIST IPR_NAME_REF                      DESCRIPTION CDATA #IMPLIED>


<!-- IPR description -->


<!ELEMENT IPR_DESCRIPTION                  (IPR_TITLE?, IPR_LEGEND?,
                                            IPR_CAPTION?, COPYRIGHT?)>


<!ELEMENT IPR_TITLE                        (#PCDATA)>
<!ATTLIST IPR_TITLE                         %att-lang-ts;>


<!ELEMENT IPR_LEGEND                       (#PCDATA)>
<!ATTLIST IPR_LEGEND                        %att-lang-ts;>


<!ELEMENT IPR_CAPTION                      (#PCDATA)>
<!ATTLIST IPR_CAPTION                       %att-lang-ts;>


<!ELEMENT COPYRIGHT                        (#PCDATA)>
<!ATTLIST COPYRIGHT                         %att-lang-ts;>



<!ELEMENT IPR_DATES                        (IPR_DATE+)>
<!ATTLIST IPR_DATES                         %att-lang-ts;>


<!ELEMENT IPR_DATE                         (%jp2-tDateTime;)>
<!ATTLIST IPR_DATE                          DESCRIPTION CDATA #IMPLIED
                                            %att-lang-ts;>


<!-- IPR exploitation -->
```

```
<!ELEMENT IPR_EXPLOITATION                (IPR_PROTECTION?,
                                           IPR_USE_RESTRICTION?,
                                           IPR_OBLIGATION?,
                                           IPR_MGMT_SYS?)>
<!ATTLIST IPR_EXPLOITATION                 %att-lang-ts;>

<!ELEMENT IPR_PROTECTION                  (#PCDATA)>

<!ELEMENT IPR_USE_RESTRICTION             (#PCDATA)>
<!ATTLIST IPR_USE_RESTRICTION              %att-lang;>

<!ELEMENT IPR_OBLIGATION                  (#PCDATA)>
<!ATTLIST IPR_OBLIGATION                   %att-lang;>

<!-- IPR management system -->

<!ELEMENT IPR_MGMT_SYS                    (IPR_MGMT_TYPE?,
                                           IPR_MGMT_SYS_ID?,
                                           IPR_MGMT_SYS_LOCATION?)>
<!ATTLIST IPR_MGMT_SYS                     %att-lang-ts;>

<!ELEMENT IPR_MGMT_TYPE                   (#PCDATA)>
<!ELEMENT IPR_MGMT_SYS_ID                 (#PCDATA)>

<!ELEMENT IPR_MGMT_SYS_LOCATION           (#PCDATA)>



<!-- IPR identification -->

<!ELEMENT IPR_IDENTIFICATION              (IPR_IDENTIFIER?,
                                           LICENCE_PLATE?)>
<!ATTLIST IPR_IDENTIFICATION               %att-lang-ts;>

<!ELEMENT IPR_IDENTIFIER                  (IPR_ID_MODE?, IPR_ID?)>

<!ELEMENT IPR_ID_MODE                     (#PCDATA)>
<!ATTLIST IPR_ID_MODE                      %att-lang;>
<!ELEMENT IPR_ID                          (#PCDATA)>
<!ATTLIST IPR_ID                           %att-lang;>

<!ELEMENT LICENCE_PLATE                   (LP_COUNTRY?,
                                           LP_REG_AUT?,
                                           LP_REG_NUM?,
                                           LP_DELIVERY_DATE?)>

<!ELEMENT LP_COUNTRY                      (#PCDATA)>
<!ELEMENT LP_REG_AUT                      (#PCDATA)>
<!ELEMENT LP_REG_NUM                      (#PCDATA)>
<!ELEMENT LP_DELIVERY_DATE                (#PCDATA)>

<!-- IPR contact point -->

<!ELEMENT IPR_CONTACT_POINT               (IPR_PERSON | IPR_ORG | IPR_NAME_REF)>
<!ATTLIST IPR_CONTACT_POINT                %att-lang-ts;>

<!-- IPR History -->

<!ELEMENT IPR_HISTORY                     (IPR+)>
<!ATTLIST IPR_HISTORY                     %att-lang-ts;>



<!-- ========================================================================= -->
<!-- Image Identifier                                                          -->
<!-- ========================================================================= -->

<!ELEMENT IMAGE_ID                         (UID?, ID_TYPE?)>
<!ELEMENT UID                              (#PCDATA)>
<!ELEMENT ID_TYPE                          (#PCDATA)>
```

N.9 JPX extended metadata XML Schema

```
<?xml version="1.0" encoding="utf-8"?>
<!DOCTYPE xsd:schema PUBLIC "-//W3C//DTD XMLSchema 200102//EN"

"http://www.w3.org/2001/XMLSchema.dtd" [
  <!ENTITY % p 'xsd:'>
  <!ENTITY % s ':xsd'>
]>


<!--
    Copyright (C) ISO/IEC 2001 – All rights reserved.

    Permission to copy in any form is granted for use with validating and conforming
    systems and applications as defined in ISO/IEC 15444-2:2001, provided this
    copyright notice is included with all copies.
-->


<!-- HUMAN_SCHEMA_DTD_LOCATION:http://www.jpeg.org/metadata/15444-2.PDF -->


<xsd:schema targetNamespace="http://www.jpeg.org/jpx/1.0/xml"
            xmlns:jp="http://www.jpeg.org/jpx/1.0/xml"
            xmlns:xsd="http://www.w3.org/2001/XMLSchema"
            xmlns:xml="http://www.w3.org/XML/1998/namespace"
             xmlns="http://www.jpeg.org/jpx/1.0/xml"
             elementFormDefault="qualified">


   <!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
     -  Fundamental Metadata Types, Fields and Attributes
     - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -->


   <!--
     -  See section Annex N.7.2.1 Language attribute
     -->
   <!-- Import the xml:lang attribute definition defined by W3C -->
   <xsd:import namespace="http://www.w3.org/XML/1998/namespace"
                                    schemaLocation="http://www.w3.org/2001/xml.xsd"/>


   <!--
     -  See section Annex N.7.2.2 Timestamp attribute
     -->
   <xsd:attribute name="TIMESTAMP" type="xsd:dateTime"/>


   <!--
     -  See section Annex N.7.1.3 String including language attribute type
     -->
   <xsd:complexType name="tLangString">
     <xsd:simpleContent>
       <xsd:extension base="xsd:string">
         <xsd:attribute ref="xml:lang"/>
       </xsd:extension>
     </xsd:simpleContent>
   </xsd:complexType>


   <!--
     -  See section Annex N.7.1.1 Non-negative double type
     -->
   <xsd:simpleType name="tNonNegativeDouble">
     <xsd:restriction base="xsd:double">
       <xsd:minInclusive value="0"/>
     </xsd:restriction>
   </xsd:simpleType>


   <!--
     -  See section Annex N.7.1.2 Rational type
     -->
   <xsd:simpleType name="tRational">
     <xsd:restriction base="xsd:string">
       <xsd:pattern value="(\-|\+)?[0-9]+/[0-9]+"/>
     </xsd:restriction>
   </xsd:simpleType>


  <!--
    -  See section Annex N.7.1.4 Degree type
    -->
  <xsd:simpleType name="tDegree">
    <xsd:restriction base="xsd:double">
      <xsd:minExclusive value="-180"/>
      <xsd:maxInclusive value="180"/>
    </xsd:restriction>
  </xsd:simpleType>
```

```
<!--
  -  See section Annex N.7.1.5 Half degree type
  -->
<xsd:simpleType name="tHalfDegree">
 <xsd:restriction base="xsd:double">
  <xsd:minExclusive value="-90"/>
  <xsd:maxInclusive value="90"/>
 </xsd:restriction>
</xsd:simpleType>


<!--
  -  See section Annex N.7.1.6 Double size type  and
  -->
<xsd:complexType name="tDoubleSize">
  <xsd:sequence>
    <xsd:element name="WIDTH" type="jp:tNonNegativeDouble"/>
    <xsd:element name="HEIGHT" type="jp:tNonNegativeDouble"/>
  </xsd:sequence>
</xsd:complexType>


<!--
  -  See section Annex N.7.1.7 Integer size type
  -->
<xsd:complexType name="tIntSize">
  <xsd:sequence>
    <xsd:element name="WIDTH" type="xsd:positiveInteger"/>
    <xsd:element name="HEIGHT" type="xsd:positiveInteger"/>
  </xsd:sequence>
</xsd:complexType>


<!--
  -  See section Annex N.7.1.8 DateTime type
  -->
<xsd:complexType name="tDateTime">
  <xsd:sequence>
    <xsd:choice minOccurs="0">
      <xsd:element name="EXACT" type="xsd:dateTime"/>
      <xsd:element name="DATE" type="xsd:date"/>
      <xsd:sequence>
        <xsd:element name="MONTH" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:positiveInteger">
              <xsd:minInclusive value="1"/>
              <xsd:maxInclusive value="12"/>
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="YEAR" type="xsd:gYear" minOccurs="0"/>
        <xsd:element name="CENTURY" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:integer"/>
          </xsd:simpleType>
        </xsd:element>
      </xsd:sequence>
    </xsd:choice>
    <xsd:element name="WEEK_DAY" type="xsd:string" minOccurs="0"/>
    <xsd:element name="SEASON" type="xsd:string" minOccurs="0"/>
    <xsd:element ref="jp:COMMENT" minOccurs="0"/>
  </xsd:sequence>
  <xsd:attribute ref="jp:TIMESTAMP"/>
  <xsd:attribute ref="xml:lang"/>
</xsd:complexType>


<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.7.1.9 Address type
  -->
<xsd:complexType name="tAddress">
  <xsd:sequence>
    <xsd:element name="ADDR_NAME" type="jp:tLangString" minOccurs="0"/>
    <xsd:element name="ADDR_COMP" minOccurs="0" maxOccurs="unbounded">
      <xsd:complexType>
        <xsd:simpleContent>
          <xsd:extension base="jp:tLangString">
            <xsd:attribute name="TYPE" type="xsd:string"/>
          </xsd:extension>
        </xsd:simpleContent>
      </xsd:complexType>
    </xsd:element>
    <xsd:choice minOccurs="0">
      <xsd:element name="ZIPCODE" type="xsd:string"/>
      <xsd:element name="POSTCODE" type="xsd:string"/>
    </xsd:choice>
    <xsd:element name="COUNTRY" type="jp:tLangString" minOccurs="0"/>
  </xsd:sequence>
  <xsd:attribute name="TYPE" type="xsd:string"/>
  <xsd:attribute ref="jp:TIMESTAMP"/>
```

```
  <xsd:attribute ref="xml:lang"/>
</xsd:complexType>


<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.7.1.10 Phone number type
  -->
<xsd:complexType name="tPhone">
  <xsd:sequence>
    <xsd:element name="COUNTRY_CODE" type="xsd:string" minOccurs="0"/>
    <xsd:element name="AREA" type="xsd:string" minOccurs="0"/>
    <xsd:element name="LOCAL" type="xsd:string" minOccurs="0"/>
    <xsd:element name="EXTENSION" type="xsd:string" minOccurs="0"/>
  </xsd:sequence>
  <xsd:attribute name="TYPE" type="xsd:string"/>
  <xsd:attribute ref="jp:TIMESTAMP"/>
</xsd:complexType>


<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.7.1.11 Email address type
  -->
<xsd:complexType name="tEmail">
  <xsd:simpleContent>
    <xsd:extension base="jp:tLangString">
      <xsd:attribute name="TYPE" type="xsd:string"/>
      <xsd:attribute ref="jp:TIMESTAMP"/>
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>


<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.7.1.12 Web address type
  -->
<xsd:complexType name="tWeb">
  <xsd:simpleContent>
    <xsd:extension base="jp:tLangString">
      <xsd:attribute name="TYPE" type="xsd:string"/>
      <xsd:attribute ref="jp:TIMESTAMP"/>
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>


<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.7.1.13 Person type
  -->
<xsd:complexType name="tPerson">
  <xsd:sequence>
    <xsd:element name="NAME_TITLE" type="jp:tLangString" minOccurs="0"/>
    <xsd:element name="PERSON_NAME" minOccurs="0" maxOccurs="unbounded">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="NAME_COMP" maxOccurs="unbounded">
            <xsd:complexType>
              <xsd:simpleContent>
                <xsd:extension base="xsd:string">
                  <xsd:attribute name="TYPE" use="optional" default="Given">
                    <xsd:simpleType>
                      <xsd:restriction base="xsd:string">
                        <xsd:enumeration value="Prefix"/>
                        <xsd:enumeration value="Given"/>
                        <xsd:enumeration value="Family"/>
                        <xsd:enumeration value="Suffix"/>
                        <xsd:enumeration value="Maiden"/>
                      </xsd:restriction>
                    </xsd:simpleType>
                  </xsd:attribute>
                </xsd:extension>
              </xsd:simpleContent>
            </xsd:complexType>
          </xsd:element>
        </xsd:sequence>
        <xsd:attribute ref="jp:TIMESTAMP"/>
        <xsd:attribute ref="xml:lang"/>
      </xsd:complexType>
    </xsd:element>
    <xsd:element name="NICK_NAME" type="xsd:string" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element name="JOB_TITLE" type="xsd:string" minOccurs="0"/>
    <xsd:choice minOccurs="0">
      <xsd:element name="PERSON_ORG" type="jp:tOrganization"/>
      <xsd:element name="ORG_REF" type="xsd:string"/>
    </xsd:choice>
    <xsd:element name="ADDRESS" type="jp:tAddress" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element name="PHONE" type="jp:tPhone" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element name="EMAIL" type="jp:tEmail" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element name="WEB" type="jp:tWeb" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element name="BIRTH_DATE" type="xsd:date" minOccurs="0"/>
    <xsd:element name="AGE" type="xsd:duration" minOccurs="0"/>
    <xsd:element ref="jp:COMMENT" minOccurs="0"/>
```

```
  </xsd:sequence>
  <xsd:attribute name="ID" type="xsd:string"/>
  <xsd:attribute ref="jp:TIMESTAMP"/>
  <xsd:attribute ref="xml:lang"/>
</xsd:complexType>


<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.7.1.14 Organization type
  -->
<xsd:complexType name="tOrganization">
  <xsd:sequence>
    <xsd:element name="ORG_NAME" type="jp:tLangString" minOccurs="0"/>
    <xsd:element name="ADDRESS" type="jp:tAddress" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element name="PHONE" type="jp:tPhone" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element name="EMAIL" type="jp:tEmail" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element name="WEB" type="jp:tWeb" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element name="LOGO_FILE" type="xsd:anyURI" minOccurs="0"/>
    <xsd:element name="LOGO_FORMAT" type="xsd:string" minOccurs="0"/>
    <xsd:element name="MIME_TYPE" type="xsd:string" minOccurs="0"/>
    <xsd:element ref="jp:COMMENT" minOccurs="0"/>
  </xsd:sequence>
  <xsd:attribute name="ID" type="xsd:string"/>
  <xsd:attribute ref="jp:TIMESTAMP"/>
  <xsd:attribute ref="xml:lang"/>
</xsd:complexType>


<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.7.1.15 Location type
  -->
<xsd:complexType name="tLocation">
  <xsd:sequence>
    <xsd:element ref="jp:COORD_LOC" minOccurs="0"/>
    <xsd:element name="ADDRESS" type="jp:tAddress" minOccurs="0"/>
    <xsd:element ref="jp:GPS" minOccurs="0"/>
    <xsd:element ref="jp:COMMENT" minOccurs="0"/>
  </xsd:sequence>
  <xsd:attribute ref="jp:TIMESTAMP"/>
  <xsd:attribute ref="xml:lang"/>
</xsd:complexType>


<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.7.1.15.1 Coordinate location
  -->
<xsd:element name="COORD_LOC">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="LONGITUDE" type="jp:tDegree" minOccurs="0"/>
      <xsd:element name="LATITUDE" type="jp:tHalfDegree" minOccurs="0"/>
      <xsd:element name="ALTITUDE" type="xsd:double" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute ref="jp:TIMESTAMP"/>
  </xsd:complexType>
</xsd:element>


<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.7.1.15.2 Raw GPS Information
  -->
<xsd:element name="GPS">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="GPS_LAT_REF" minOccurs="0">
        <xsd:simpleType>
          <xsd:restriction base="xsd:string">
            <xsd:enumeration value="N"/>
            <xsd:enumeration value="S"/>
          </xsd:restriction>
        </xsd:simpleType>
      </xsd:element>
      <xsd:element name="GPS_LATITUDE" minOccurs="0">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element name="D" type="xsd:nonNegativeInteger"/>
            <xsd:element name="M" type="xsd:nonNegativeInteger"/>
            <xsd:element name="S" type="jp:tNonNegativeDouble" minOccurs="0"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:element name="GPS_LONG_REF" minOccurs="0">
        <xsd:simpleType>
          <xsd:restriction base="xsd:string">
            <xsd:enumeration value="E"/>
            <xsd:enumeration value="W"/>
          </xsd:restriction>
        </xsd:simpleType>
      </xsd:element>
      <xsd:element name="GPS_LONGITUDE" minOccurs="0">
        <xsd:complexType>
```

```
    <xsd:sequence>
      <xsd:element name="D" type="xsd:nonNegativeInteger"/>
      <xsd:element name="M" type="xsd:nonNegativeInteger"/>
      <xsd:element name="S" type="jp:tNonNegativeDouble" minOccurs="0"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="GPS_ALTITUDE" type="jp:tNonNegativeDouble" minOccurs="0"/>
<xsd:element name="GPS_TIME" type="xsd:dateTime" minOccurs="0"/>
<xsd:element name="GPS_SATELLITES" type="xsd:string" minOccurs="0"/>
<xsd:element name="GPS_STATUS" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="A"/>
      <xsd:enumeration value="V"/>
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="GPS_MEASURE_MODE" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:positiveInteger">
      <xsd:minExclusive value="2"/>
      <xsd:maxInclusive value="3"/>
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="GPS_DOP" type="jp:tNonNegativeDouble" minOccurs="0"/>
<xsd:element name="GPS_SPEED_REF" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="K"/>
      <xsd:enumeration value="N"/>
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="GPS_SPEED" type="jp:tNonNegativeDouble" minOccurs="0"/>
<xsd:element name="GPS_TRACK_REF" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="T"/>
      <xsd:enumeration value="M"/>
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="GPS_TRACK" type="jp:tNonNegativeDouble" minOccurs="0"/>
<xsd:element name="GPS_IMAGE_DIR_REF" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="T"/>
      <xsd:enumeration value="M"/>
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="GPS_IMAGE_DIR" type="jp:tNonNegativeDouble" minOccurs="0"/>
<xsd:element name="GPS_MAP_DATUM" type="xsd:string" minOccurs="0"/>
<xsd:element name="GPS_DEST_LAT_REF" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="N"/>
      <xsd:enumeration value="S"/>
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="GPS_DEST_LATITUDE" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="D" type="xsd:nonNegativeInteger"/>
      <xsd:element name="M" type="xsd:nonNegativeInteger"/>
      <xsd:element name="S" type="jp:tNonNegativeDouble" minOccurs="0"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="GPS_DEST_LONG_REF" minOccurs="0">
  <xsd:simpleType>
    <xsd:restriction base="xsd:string">
      <xsd:enumeration value="E"/>
      <xsd:enumeration value="W"/>
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
<xsd:element name="GPS_DEST_LONGITUDE" minOccurs="0">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="D" type="xsd:nonNegativeInteger"/>
      <xsd:element name="M" type="xsd:nonNegativeInteger"/>
      <xsd:element name="S" type="jp:tNonNegativeDouble" minOccurs="0"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
<xsd:element name="GPS_DEST_BEARING_REF" minOccurs="0">
  <xsd:simpleType>
```

```
          <xsd:restriction base="xsd:string">
            <xsd:enumeration value="T"/>
            <xsd:enumeration value="M"/>
          </xsd:restriction>
        </xsd:simpleType>
      </xsd:element>
      <xsd:element name="GPS_DEST_BEARING" type="jp:tNonNegativeDouble" minOccurs="0"/>
      <xsd:element name="GPS_DEST_DISTANCE_REF" minOccurs="0">
        <xsd:simpleType>
          <xsd:restriction base="xsd:string">
            <xsd:enumeration value="K"/>
            <xsd:enumeration value="N"/>
          </xsd:restriction>
        </xsd:simpleType>
      </xsd:element>
      <xsd:element name="GPS_DEST_DISTANCE" type="jp:tNonNegativeDouble" minOccurs="0"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>


<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.7.1.16 Direction type
  -->
<xsd:complexType name="tDirection">
  <xsd:sequence>
    <xsd:element name="YAW" type="jp:tDegree" minOccurs="0"/>
    <xsd:element name="PITCH" type="jp:tHalfDegree" minOccurs="0"/>
    <xsd:element name="ROLL" type="jp:tDegree" minOccurs="0"/>
    <xsd:element ref="jp:COMMENT" minOccurs="0"/>
  </xsd:sequence>
  <xsd:attribute ref="jp:TIMESTAMP"/>
  <xsd:attribute ref="xml:lang"/>
</xsd:complexType>


<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.7.1.17 Position type
  -->
<xsd:complexType name="tPosition">
  <xsd:sequence>
    <xsd:choice minOccurs="0">
      <xsd:element name="POINT" type="jp:tPoint"/>
      <xsd:element name="RECT" type="jp:tRect"/>
      <xsd:sequence>
        <xsd:element name="RECT" type="jp:tRect"/>
        <xsd:element name="REGION" type="jp:tRegion"/>
      </xsd:sequence>
    </xsd:choice>
    <xsd:element ref="jp:COMMENT" minOccurs="0"/>
  </xsd:sequence>
  <xsd:attribute ref="jp:TIMESTAMP"/>
</xsd:complexType>


<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.7.1.18 Point type
  -->
<xsd:complexType name="tPoint">
  <xsd:sequence>
    <xsd:element name="X" type="jp:tNonNegativeDouble"/>
    <xsd:element name="Y" type="jp:tNonNegativeDouble"/>
  </xsd:sequence>
</xsd:complexType>


<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.7.1.19 Rect type
  -->
<xsd:complexType name="tRect">
  <xsd:complexContent>
    <xsd:extension base="jp:tPoint">
      <xsd:sequence>
        <xsd:element name="WIDTH" type="jp:tNonNegativeDouble"/>
        <xsd:element name="HEIGHT" type="jp:tNonNegativeDouble"/>
      </xsd:sequence>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>


<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.7.1.20 Region type
  -->
<xsd:complexType name="tRegion">
  <xsd:sequence>
    <xsd:element name="POINT" type="jp:tPoint"/>
    <xsd:choice minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="POINT" type="jp:tPoint"/>
      <xsd:element name="SPLINE">
        <xsd:complexType>
```

```
          <xsd:sequence>
            <xsd:element name="X1" type="jp:tNonNegativeDouble"/>
            <xsd:element name="Y1" type="jp:tNonNegativeDouble"/>
            <xsd:element name="X2" type="jp:tNonNegativeDouble"/>
            <xsd:element name="Y2" type="jp:tNonNegativeDouble"/>
            <xsd:element name="X" type="jp:tNonNegativeDouble"/>
            <xsd:element name="Y" type="jp:tNonNegativeDouble"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
    </xsd:choice>
  </xsd:sequence>
</xsd:complexType>


<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.7.1.21 Product details type
  -->
<xsd:complexType name="tProductDetails">
  <xsd:sequence>
    <xsd:element name="MANUFACTURER" type="jp:tOrganization" minOccurs="0"/>
    <xsd:element name="MODEL" type="xsd:string" minOccurs="0"/>
    <xsd:element name="SERIAL" type="xsd:string" minOccurs="0"/>
    <xsd:element name="VERSION" type="xsd:string" minOccurs="0"/>
  </xsd:sequence>
  <xsd:attribute ref="jp:TIMESTAMP"/>
  <xsd:attribute ref="xml:lang"/>
</xsd:complexType>


<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.7.3.1 Comment element
  -->
<xsd:element name="COMMENT">
  <xsd:complexType>
    <xsd:simpleContent>
      <xsd:extension base="jp:tLangString">
        <xsd:attribute ref="jp:TIMESTAMP"/>
      </xsd:extension>
    </xsd:simpleContent>
  </xsd:complexType>
</xsd:element>



<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.6.1 Image Creation metadata
  - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -->
<xsd:element name="IMAGE_CREATION">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element ref="jp:GENERAL_CREATION_INFO" minOccurs="0"/>
      <xsd:element ref="jp:CAMERA_CAPTURE" minOccurs="0"/>
      <xsd:element ref="jp:SCANNER_CAPTURE" minOccurs="0"/>
      <xsd:element ref="jp:SOFTWARE_CREATION" minOccurs="0"/>
      <xsd:element ref="jp:CAPTURED_ITEM" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>


<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.6.1.1 General Creation Information metadata
  -->
<xsd:element name="GENERAL_CREATION_INFO">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="CREATION_TIME" type="xsd:dateTime" minOccurs="0"/>
      <xsd:element name="IMAGE_SOURCE" type="jp:tLangString" minOccurs="0"/>
      <xsd:element name="SCENE_TYPE" type="jp:tLangString" minOccurs="0"/>
      <xsd:element name="IMAGE_CREATOR" type="jp:tPerson" minOccurs="0"/>
      <xsd:element name="OPERATOR_ORG" type="jp:tOrganization" minOccurs="0"/>
      <xsd:element name="OPERATOR_ID" type="jp:tLangString" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>


<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.6.1.2 Camera Capture metadata
  -->
<xsd:element name="CAMERA_CAPTURE">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="CAMERA_INFO" type="jp:tProductDetails" minOccurs="0"/>
      <xsd:element name="SOFTWARE_INFO" type="jp:tProductDetails" minOccurs="0"/>
```

```
        <xsd:element name="LENS_INFO" type="jp:tProductDetails" minOccurs="0"/>
        <xsd:element ref="jp:DEVICE_CHARACTER" minOccurs="0"/>
        <xsd:element ref="jp:CAMERA_SETTINGS" minOccurs="0"/>
        <xsd:element name="ACCESSORY" type="jp:tProductDetails" minOccurs="0"

maxOccurs="unbounded"/>
      </xsd:sequence>
      <xsd:attribute ref="jp:TIMESTAMP"/>
      <xsd:attribute ref="xml:lang"/>
    </xsd:complexType>
  </xsd:element>


  <!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
    -  See section Annex N.6.1.3 Device Characterization metadata
    -->
  <xsd:element name="DEVICE_CHARACTER">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element name="SENSOR_TECHNOLOGY" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string">
              <xsd:enumeration value="One-Chip Color Area"/>
              <xsd:enumeration value="Two-Chip Color Area"/>
              <xsd:enumeration value="Three-Chip Color Area"/>
              <xsd:enumeration value="Color Sequential Area"/>
              <xsd:enumeration value="Trilinear"/>
              <xsd:enumeration value="Color Sequential Linear Sensor"/>
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="FOCAL_PLANE_RES" type="jp:tDoubleSize" minOccurs="0"/>
        <xsd:element name="SPECTRAL_SENSITIVITY" type="xsd:string" minOccurs="0"/>
        <xsd:element name="ISO_SATURATION" type="jp:tNonNegativeDouble" minOccurs="0"/>
        <xsd:element name="ISO_NOISE" type="jp:tNonNegativeDouble" minOccurs="0"/>
        <xsd:element ref="jp:SPATIAL_FREQ_RESPONSE" minOccurs="0"/>
        <xsd:element ref="jp:CFA_PATTERN" minOccurs="0"/>
        <xsd:element ref="jp:OECF" minOccurs="0"/>
        <xsd:element name="MIN_F_NUMBER" type="jp:tNonNegativeDouble" minOccurs="0"/>
      </xsd:sequence>
      <xsd:attribute ref="jp:TIMESTAMP"/>
      <xsd:attribute ref="xml:lang"/>
    </xsd:complexType>
  </xsd:element>


  <!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
    -  See section Annex N.6.1.4 Spatial Frequency Response metadata
    -->
  <xsd:element name="SPATIAL_FREQ_RESPONSE">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element name="SPATIAL_FREQ_VAL" maxOccurs="unbounded">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="SPATIAL_FREQ" type="jp:tNonNegativeDouble"/>
              <xsd:element name="HORIZ_SFR" type="jp:tNonNegativeDouble"/>
              <xsd:element name="VERT_SFR" type="jp:tNonNegativeDouble"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
      </xsd:sequence>
    </xsd:complexType>
  </xsd:element>


  <!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
    -  See section Annex N.6.1.5 Color Filter Array Pattern metadata
    -->
  <xsd:element name="CFA_PATTERN">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element name="COLOR_ROW" maxOccurs="unbounded">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="COLOR" maxOccurs="unbounded">
                <xsd:simpleType>
                  <xsd:restriction base="xsd:string">
                    <xsd:enumeration value="Red"/>
                    <xsd:enumeration value="Green"/>
                    <xsd:enumeration value="Blue"/>
                    <xsd:enumeration value="Cyan"/>
                    <xsd:enumeration value="Magenta"/>
                    <xsd:enumeration value="Yellow"/>
                    <xsd:enumeration value="White"/>
                  </xsd:restriction>
                </xsd:simpleType>
              </xsd:element>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
```

```
      </xsd:sequence>
    </xsd:complexType>
  </xsd:element>


  <!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
    -  See section Annex N.6.1.6 Opto-electronic Conversion Function metadata
    -->
  <xsd:element name="OECF">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element name="LOG_VAL" maxOccurs="unbounded">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="LOG_EXPOSURE" type="xsd:double"/>
              <xsd:element name="OUTPUT_LEVEL" type="jp:tNonNegativeDouble"

maxOccurs="unbounded"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
      </xsd:sequence>
    </xsd:complexType>
  </xsd:element>


  <!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
    -  See section Annex N.6.1.7 Camera Capture Settings metadata
    -->
  <xsd:element name="CAMERA_SETTINGS">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:choice minOccurs="0">
          <xsd:element name="EXP_TIME" type="jp:tNonNegativeDouble"/>
          <xsd:element name="R_EXP_TIME" type="jp:tRational"/>
        </xsd:choice>
        <xsd:element name="F_NUMBER" type="jp:tNonNegativeDouble" minOccurs="0"/>
        <xsd:element name="EXP_PROGRAM" type="jp:tLangString" minOccurs="0"/>
        <xsd:element name="BRIGHTNESS" type="xsd:double" minOccurs="0"/>
        <xsd:element name="EXPOSURE_BIAS" type="xsd:double" minOccurs="0"/>
        <xsd:element name="SUBJECT_DISTANCE" type="jp:tNonNegativeDouble" minOccurs="0"/>
        <xsd:element name="METERING_MODE" type="jp:tLangString" minOccurs="0"/>
        <xsd:element name="SCENE_ILLUMINANT" type="jp:tLangString" minOccurs="0"/>
        <xsd:element name="COLOR_TEMP" type="jp:tNonNegativeDouble" minOccurs="0"/>
        <xsd:element name="FOCAL_LENGTH" type="jp:tNonNegativeDouble" minOccurs="0"/>
        <xsd:element name="FLASH" type="xsd:boolean" minOccurs="0"/>
        <xsd:element name="FLASH_ENERGY" type="jp:tNonNegativeDouble" minOccurs="0"/>
        <xsd:element name="FLASH_RETURN" type="xsd:boolean" minOccurs="0"/>
        <xsd:element name="BACK_LIGHT" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string">
              <xsd:enumeration value="Front Light"/>
              <xsd:enumeration value="Back Light 1"/>
              <xsd:enumeration value="Back Light 2"/>
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="SUBJECT_POSITION" type="jp:tPosition" minOccurs="0"/>
        <xsd:element name="EXPOSURE_INDEX" type="xsd:double" minOccurs="0"/>
        <xsd:element name="AUTO_FOCUS" minOccurs="0">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string">
              <xsd:enumeration value="Auto Focus Used"/>
              <xsd:enumeration value="Auto Focus Interrupted"/>
              <xsd:enumeration value="Near Focused"/>
              <xsd:enumeration value="Soft Focused"/>
              <xsd:enumeration value="Manual"/>
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="SPECIAL_EFFECT" minOccurs="0" maxOccurs="unbounded">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string">
              <xsd:enumeration value="Colored"/>
              <xsd:enumeration value="Diffusion"/>
              <xsd:enumeration value="Multi-Image"/>
              <xsd:enumeration value="Polarizing"/>
              <xsd:enumeration value="Split-Field"/>
              <xsd:enumeration value="Star"/>
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:element>
        <xsd:element name="CAMERA_LOCATION" type="jp:tLocation" minOccurs="0"/>
        <xsd:element name="ORIENTATION" type="jp:tDirection" minOccurs="0"/>
        <xsd:element name="PAR" type="jp:tRational" minOccurs="0"/>
      </xsd:sequence>
      <xsd:attribute ref="jp:TIMESTAMP"/>
      <xsd:attribute ref="xml:lang"/>
    </xsd:complexType>
  </xsd:element>
```

```
<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.6.1.8 Scanner Capture metadata
  -->
<xsd:element name="SCANNER_CAPTURE">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="SCANNER_INFO" type="jp:tProductDetails" minOccurs="0"/>
      <xsd:element name="SOFTWARE_INFO" type="jp:tProductDetails" minOccurs="0"/>
      <xsd:element ref="jp:SCANNER_SETTINGS" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>


<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.6.1.9 Scanner Settings metadata
  -->
<xsd:element name="SCANNER_SETTINGS">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="PIXEL_SIZE" type="jp:tNonNegativeDouble" minOccurs="0"/>
      <xsd:element name="PHYSICAL_SCAN_RES" type="jp:tDoubleSize" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute ref="jp:TIMESTAMP"/>
  </xsd:complexType>
</xsd:element>


<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.6.1.10 Software Creation metadata
  -->
<xsd:element name="SOFTWARE_CREATION">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="SOFTWARE_INFO"   type="jp:tProductDetails"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>


<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.6.1.11 Captured Item metadata
  -->
<xsd:element name="CAPTURED_ITEM">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:choice>
        <xsd:element ref="jp:REFLECTION_PRINT" minOccurs="0"/>
        <xsd:element ref="jp:FILM" minOccurs="0"/>
      </xsd:choice>
    </xsd:sequence>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>


<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.6.1.12 Reflection Print metadata
  -->
<xsd:element name="REFLECTION_PRINT">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="DOCUMENT_SIZE" type="jp:tDoubleSize" minOccurs="0"/>
      <xsd:element name="MEDIUM" minOccurs="0">
        <xsd:simpleType>
          <xsd:restriction base="xsd:string">
            <xsd:enumeration value="Continuous Tone Image"/>
            <xsd:enumeration value="Halftone Image"/>
            <xsd:enumeration value="Line Art"/>
          </xsd:restriction>
        </xsd:simpleType>
      </xsd:element>
      <xsd:element name="RP_TYPE" minOccurs="0">
        <xsd:simpleType>
          <xsd:restriction base="xsd:string">
            <xsd:enumeration value="B/W Print"/>
            <xsd:enumeration value="Color Print"/>
            <xsd:enumeration value="B/W Document"/>
            <xsd:enumeration value="Color Document"/>
          </xsd:restriction>
        </xsd:simpleType>
      </xsd:element>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>
```

```
<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.6.1.13 Film metadata
  -->
<xsd:element name="FILM">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="BRAND" type="jp:tProductDetails" minOccurs="0"/>
      <xsd:element name="CATEGORY" minOccurs="0">
        <xsd:simpleType>
          <xsd:restriction base="xsd:string">
            <xsd:enumeration value="Negative B/W"/>
            <xsd:enumeration value="Negative Color"/>
            <xsd:enumeration value="Reversal B/W"/>
            <xsd:enumeration value="Reversal Color"/>
            <xsd:enumeration value="Chromagenic"/>
            <xsd:enumeration value="Internegative B/W"/>
            <xsd:enumeration value="Internegative Color"/>
          </xsd:restriction>
        </xsd:simpleType>
      </xsd:element>
      <xsd:element name="FILM_SIZE" type="jp:tDoubleSize" minOccurs="0"/>
      <xsd:element name="ROLL_ID" type="jp:tLangString" minOccurs="0"/>
      <xsd:element name="FRAME_ID" type="xsd:positiveInteger" minOccurs="0"/>
      <xsd:element name="FILM_SPEED" type="xsd:positiveInteger" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>



<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.6.2: Content Description metadata
  - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -->
<xsd:element name="CONTENT_DESCRIPTION">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="GROUP_CAPTION" type="jp:tLangString" minOccurs="0"/>
      <xsd:element name="CAPTION" type="jp:tLangString" minOccurs="0"/>
      <xsd:element name="CAPTURE_TIME" type="jp:tDateTime" minOccurs="0"/>
      <xsd:element name="LOCATION" type="jp:tLocation" minOccurs="0"/>
      <xsd:element ref="jp:PERSON" minOccurs="0" maxOccurs="unbounded"/>
      <xsd:element ref="jp:THING" minOccurs="0" maxOccurs="unbounded"/>
      <xsd:element ref="jp:ORGANIZATION" minOccurs="0" maxOccurs="unbounded"/>
      <xsd:element ref="jp:EVENT" minOccurs="0" maxOccurs="unbounded"/>
      <xsd:element ref="jp:AUDIO" minOccurs="0" maxOccurs="unbounded"/>
      <xsd:element ref="jp:PROPERTY" minOccurs="0" maxOccurs="unbounded"/>
      <xsd:element ref="jp:DICTIONARY" minOccurs="0" maxOccurs="unbounded"/>
      <xsd:element ref="jp:COMMENT" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>

<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.6.2.1 Person Description metadata
  -->
<xsd:element name="PERSON">
  <xsd:complexType>
    <xsd:complexContent>
      <xsd:extension base="jp:tPerson">
        <xsd:sequence>
          <xsd:element name="POSITION" type="jp:tPosition" minOccurs="0"/>
          <xsd:element name="LOCATION" type="jp:tLocation" minOccurs="0"/>
          <xsd:element ref="jp:PROPERTY" minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:extension>
    </xsd:complexContent>
  </xsd:complexType>
</xsd:element>

<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.6.2.2 Thing Description metadata
  -->
<xsd:element name="THING">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="NAME" type="jp:tLangString" minOccurs="0"/>
      <xsd:element ref="jp:COMMENT" minOccurs="0"/>
      <xsd:element name="POSITION" type="jp:tPosition" minOccurs="0"/>
      <xsd:element name="LOCATION" type="jp:tLocation" minOccurs="0"/>
      <xsd:element ref="jp:PROPERTY" minOccurs="0" maxOccurs="unbounded"/>
      <xsd:element ref="jp:THING" minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
    <xsd:attribute name="ID" type="xsd:string"/>
    <xsd:attribute ref="jp:TIMESTAMP"/>
```

```
      <xsd:attribute ref="xml:lang"/>
    </xsd:complexType>
  </xsd:element>


  <!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
    -  See section Annex N.6.2.3 Organization Description metadata
    -->
  <xsd:element name="ORGANIZATION">
    <xsd:complexType>
      <xsd:complexContent>
        <xsd:extension base="jp:tOrganization">
          <xsd:sequence>
            <xsd:element name="POSITION" type="jp:tPosition" minOccurs="0"/>
            <xsd:element name="LOCATION" type="jp:tLocation" minOccurs="0"/>
            <xsd:element ref="jp:PROPERTY" minOccurs="0" maxOccurs="unbounded"/>
          </xsd:sequence>
        </xsd:extension>
      </xsd:complexContent>
    </xsd:complexType>
  </xsd:element>


  <!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
    -  See section Annex N.6.2.4 Event Description metadata
    -->
  <xsd:element name="EVENT">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element name="EVENT_TYPE" type="jp:tLangString"/>
        <xsd:element name="DESCRIPTION" type="jp:tLangString" minOccurs="0"/>
        <xsd:element name="LOCATION" type="jp:tLocation" minOccurs="0"/>
        <xsd:element name="EVENT_TIME" type="jp:tDateTime" minOccurs="0"/>
        <xsd:element name="DURATION" type="xsd:duration" minOccurs="0"/>
        <xsd:element ref="jp:COMMENT" minOccurs="0"/>
        <xsd:element ref="jp:PARTICIPANT" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element ref="jp:EVENT_RELATION" minOccurs="0" maxOccurs="unbounded"/>
        <!-- Sub-events -->
        <xsd:choice minOccurs="0" maxOccurs="unbounded">
          <xsd:element ref="jp:EVENT"/>
          <xsd:element name="EVENT_REF" type="xsd:string"/>
        </xsd:choice>
      </xsd:sequence>
      <xsd:attribute name="ID" type="xsd:string"/>
      <xsd:attribute ref="jp:TIMESTAMP"/>
      <xsd:attribute ref="xml:lang"/>
    </xsd:complexType>
  </xsd:element>


  <!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
    -  See section Annex N.6.2.5 Participant metadata
    -->
  <xsd:element name="PARTICIPANT">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element name="ROLE" type="jp:tLangString" minOccurs="0"
                                                              maxOccurs="unbounded"/>
        <xsd:choice>
          <xsd:element name="OBJECT_REF" type="xsd:string"/>
          <xsd:element ref="jp:PERSON"/>
          <xsd:element ref="jp:THING"/>
          <xsd:element ref="jp:ORGANIZATION"/>
        </xsd:choice>
      </xsd:sequence>
      <xsd:attribute ref="xml:lang"/>
    </xsd:complexType>
  </xsd:element>


  <!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
    -  See section Annex N.6.2.6 Event Relationship metadata
    -->
  <xsd:element name="EVENT_RELATION">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element name="RELATION" type="jp:tLangString" minOccurs="0"

maxOccurs="unbounded"/>
        <xsd:element name="EVENT_REF" type="xsd:string" maxOccurs="unbounded"/>
      </xsd:sequence>
    </xsd:complexType>
  </xsd:element>


  <!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
    -  See section Annex N.6.2.7 Audio metadata
    -->
  <xsd:element name="AUDIO">
    <xsd:complexType>
      <xsd:sequence>
```

```
      <xsd:element name="AUDIO_STREAM" type="xsd:anyURI"/>
      <xsd:element name="AUDIO_FORMAT" type="jp:tLangString" minOccurs="0"/>
      <xsd:element name="MIME_TYPE" type="xsd:string" minOccurs="0"/>
      <xsd:element name="DESCRIPTION" type="jp:tLangString" minOccurs="0"/>
      <xsd:element ref="jp:COMMENT" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>

<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.6.2.8 Property metadata
  -->
<xsd:element name="PROPERTY">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="NAME" type="jp:tLangString" minOccurs="0"/>
      <xsd:element name="VALUE" type="jp:tLangString" minOccurs="0"/>
      <xsd:element ref="jp:COMMENT" minOccurs="0"/>
      <xsd:element ref="jp:PROPERTY" minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
    <xsd:attribute name="DICT_REF" type="xsd:string"/>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>

<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.6.2.9 Dictionary Definition metadata
  -->
<xsd:element name="DICTIONARY">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="DICT_NAME" type="jp:tLangString" minOccurs="0"/>
      <xsd:element ref="jp:COMMENT" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute name="DICT_ID" type="xsd:string"/>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>



<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.6.3 Metadata History metadata
  - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -->
<xsd:element name="HISTORY">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element ref="jp:PROCESSING_SUMMARY" minOccurs="0"/>
      <xsd:element ref="jp:IMAGE_PROCESSING_HINTS" minOccurs="0"/>
      <xsd:element name="METADATA" minOccurs="0" maxOccurs="unbounded">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element ref="jp:IMAGE_CREATION" minOccurs="0"/>
            <xsd:element ref="jp:CONTENT_DESCRIPTION" minOccurs="0"/>
            <xsd:element ref="jp:HISTORY" minOccurs="0"/>
            <xsd:element ref="jp:IPR" minOccurs="0"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
    </xsd:sequence>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>

<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.6.3.1 Processing Summary metadata
  -->
<xsd:element name="PROCESSING_SUMMARY">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="IMG_CREATED" minOccurs="0">
        <xsd:complexType/>
      </xsd:element>
      <xsd:element name="IMG_CROPPED" minOccurs="0">
        <xsd:complexType/>
      </xsd:element>
      <xsd:element name="IMG_TRANSFORMED" minOccurs="0">
        <xsd:complexType/>
      </xsd:element>
      <xsd:element name="IMG_GTC_ADJ" minOccurs="0">
        <xsd:complexType/>
      </xsd:element>
```

```
      <xsd:element name="IMG_STC_ADJ" minOccurs="0">
        <xsd:complexType/>
      </xsd:element>
      <xsd:element name="IMG_SPATIAL_ADJ" minOccurs="0">
        <xsd:complexType/>
      </xsd:element>
      <xsd:element name="IMG_EXT_EDITED" minOccurs="0">
        <xsd:complexType/>
      </xsd:element>
      <xsd:element name="IMG_RETOUCHED" minOccurs="0">
        <xsd:complexType/>
      </xsd:element>
      <xsd:element name="IMG_COMPOSITED" minOccurs="0">
        <xsd:complexType/>
      </xsd:element>
      <xsd:element name="IMG_METADATA" minOccurs="0">
        <xsd:complexType/>
      </xsd:element>
    </xsd:sequence>
    <xsd:attribute ref="jp:TIMESTAMP"/>
  </xsd:complexType>
 </xsd:element>


 <!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   -  See section Annex N.6.3.2 Image Processing Hints metadata
   -->
 <xsd:element name="IMAGE_PROCESSING_HINTS">
   <xsd:complexType>
     <xsd:sequence>
     <xsd:element name="MODIFIER" type="jp:tProductDetails" minOccurs="0"/>
       <xsd:choice minOccurs="0" maxOccurs="unbounded">
         <xsd:element name="IMG_CREATED" type="jp:tLangString"/>
         <xsd:element name="IMG_CROPPED" type="jp:tLangString"/>
         <xsd:element name="IMG_TRANSFORMED" type="jp:tLangString"/>
         <xsd:element name="IMG_GTC_ADJ" type="jp:tLangString"/>
         <xsd:element name="IMG_STC_ADJ" type="jp:tLangString"/>
         <xsd:element name="IMG_SPATIAL_ADJ" type="jp:tLangString"/>
         <xsd:element name="IMG_EXT_EDITED" type="jp:tLangString"/>
         <xsd:element name="IMG_RETOUCHED" type="jp:tLangString"/>
         <xsd:element name="IMG_COMPOSITED" type="jp:tLangString"/>
         <xsd:element name="IMG_METADATA" type="jp:tLangString"/>
       </xsd:choice>
     </xsd:sequence>
     <xsd:attribute ref="jp:TIMESTAMP"/>
     <xsd:attribute ref="xml:lang"/>
   </xsd:complexType>
 </xsd:element>



<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   -  See section Annex N.6.4 Intellectual Property Rights metadata
   - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -->
 <xsd:element name="IPR">
   <xsd:complexType>
     <xsd:sequence>
       <xsd:element ref="jp:IPR_NAMES" minOccurs="0"/>
       <xsd:element ref="jp:IPR_DESCRIPTION" minOccurs="0"/>
       <xsd:element ref="jp:IPR_DATES" minOccurs="0"/>
       <xsd:element ref="jp:IPR_EXPLOITATION" minOccurs="0"/>
       <xsd:element ref="jp:IPR_IDENTIFICATION" minOccurs="0"/>
       <xsd:element ref="jp:IPR_CONTACT_POINT" minOccurs="0"/>
       <xsd:element name="IPR_HISTORY" minOccurs="0">
         <xsd:complexType>
           <xsd:sequence>
             <xsd:element ref="jp:IPR" minOccurs="0" maxOccurs="unbounded"/>
           </xsd:sequence>
         </xsd:complexType>
       </xsd:element>
     </xsd:sequence>
     <xsd:attribute ref="jp:TIMESTAMP"/>
     <xsd:attribute ref="xml:lang"/>
   </xsd:complexType>
 </xsd:element>


 <!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   -  See section Annex N.6.4.1:IPR Names metadata
   -->
 <xsd:element name="IPR_NAMES">
   <xsd:complexType>
     <xsd:choice maxOccurs="unbounded">
       <xsd:element ref="jp:IPR_PERSON"/>
       <xsd:element ref="jp:IPR_ORG"/>
       <xsd:element ref="jp:IPR_NAME_REF"/>
     </xsd:choice>
     <xsd:attribute ref="jp:TIMESTAMP"/>
     <xsd:attribute ref="xml:lang"/>
   </xsd:complexType>
```

```
</xsd:element>

<xsd:element name="IPR_PERSON">
  <xsd:complexType>
    <xsd:complexContent>
      <xsd:extension base="jp:tPerson">
        <xsd:attribute name="DESCRIPTION" type="xsd:string"/>
      </xsd:extension>
    </xsd:complexContent>
  </xsd:complexType>
</xsd:element>

<xsd:element name="IPR_ORG">
  <xsd:complexType>
    <xsd:complexContent>
      <xsd:extension base="jp:tOrganization">
        <xsd:attribute name="DESCRIPTION" type="xsd:string"/>
      </xsd:extension>
    </xsd:complexContent>
  </xsd:complexType>
</xsd:element>

<xsd:element name="IPR_NAME_REF">
  <xsd:complexType>
    <xsd:simpleContent>
      <xsd:extension base="xsd:string">
        <xsd:attribute name="DESCRIPTION" type="xsd:string"/>
      </xsd:extension>
    </xsd:simpleContent>
  </xsd:complexType>
</xsd:element>

<!- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.6.4.2 IPR Description metadata
  -->
<xsd:element name="IPR_DESCRIPTION">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="IPR_TITLE" type="jp:tLangString" minOccurs="0"/>
      <xsd:element name="IPR_LEGEND" type="jp:tLangString" minOccurs="0"/>
      <xsd:element name="IPR_CAPTION" type="jp:tLangString" minOccurs="0"/>
      <xsd:element name="COPYRIGHT" type="jp:tLangString" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>

<!- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.6.4.3 IPR Dates metadata
  -->
<xsd:element name="IPR_DATES">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="IPR_DATE" maxOccurs="unbounded">
        <xsd:complexType>
          <xsd:complexContent>
            <xsd:extension base="jp:tDateTime">
              <xsd:attribute name="DESCRIPTION" type="xsd:string"/>
            </xsd:extension>
          </xsd:complexContent>
        </xsd:complexType>
      </xsd:element>
    </xsd:sequence>
  </xsd:complexType>
</xsd:element>

<!- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.6.4.4 IPR Exploitation metadata
  -->
<xsd:element name="IPR_EXPLOITATION">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element name="IPR_PROTECTION" type="jp:tLangString" minOccurs="0"/>
      <xsd:element name="IPR_USE_RESTRICTION" type="jp:tLangString" minOccurs="0"/>
      <xsd:element name="IPR_OBLIGATION" type="jp:tLangString" minOccurs="0"/>
      <xsd:element ref="jp:IPR_MGMT_SYS" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute ref="jp:TIMESTAMP"/>
    <xsd:attribute ref="xml:lang"/>
  </xsd:complexType>
</xsd:element>

<!- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -  See section Annex N.6.4.5 IPR Management System metadata
```

```
    -->
  <xsd:element name="IPR_MGMT_SYS">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element name="IPR_MGMT_TYPE" type="xsd:string" minOccurs="0"/>
        <xsd:element name="IPR_MGMT_SYS_ID" type="xsd:string" minOccurs="0"/>
        <xsd:element name="IPR_MGMT_SYS_LOCATION" type="xsd:anyURI" minOccurs="0"/>
      </xsd:sequence>
      <xsd:attribute ref="jp:TIMESTAMP"/>
      <xsd:attribute ref="xml:lang"/>
    </xsd:complexType>
  </xsd:element>


  <!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
    -  See section Annex N.6.4.6 IPR Identification metadata
    -->
  <xsd:element name="IPR_IDENTIFICATION">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element ref="jp:IPR_IDENTIFIER" minOccurs="0"/>
        <xsd:element ref="jp:LICENCE_PLATE" minOccurs="0"/>
      </xsd:sequence>
      <xsd:attribute ref="jp:TIMESTAMP"/>
      <xsd:attribute ref="xml:lang"/>
    </xsd:complexType>
  </xsd:element>


  <!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
    -  See section Annex N.6.4.7 Generic IPR Identifier metadata
    -->
  <xsd:element name="IPR_IDENTIFIER">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element name="IPR_ID_MODE" type="jp:tLangString" minOccurs="0"/>
        <xsd:element name="IPR_ID" type="jp:tLangString" minOccurs="0"/>
      </xsd:sequence>
    </xsd:complexType>
  </xsd:element>


  <!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
    -  See section Annex N.6.4.8 License Plate metadata
    -->
  <xsd:element name="LICENCE_PLATE">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element name="LP_COUNTRY" type="xsd:string" minOccurs="0"/>
        <xsd:element name="LP_REG_AUT" type="xsd:string" minOccurs="0"/>
        <xsd:element name="LP_REG_NUM" type="xsd:string" minOccurs="0"/>
        <xsd:element name="DELIVERY_DATE" type="xsd:dateTime" minOccurs="0"/>
      </xsd:sequence>
    </xsd:complexType>
  </xsd:element>


  <!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
    -  See section Annex N.6.4.9 IPR Contact Point metadata
    -->
  <xsd:element name="IPR_CONTACT_POINT">
    <xsd:complexType>
      <xsd:choice>
        <xsd:element ref="jp:IPR_PERSON"/>
        <xsd:element ref="jp:IPR_ORG"/>
        <xsd:element ref="jp:IPR_NAME_REF"/>
      </xsd:choice>
      <xsd:attribute ref="jp:TIMESTAMP"/>
      <xsd:attribute ref="xml:lang"/>
    </xsd:complexType>
  </xsd:element>


<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
    -  See section Annex N.6.5 Image Identifier metadata
    - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -->
  <xsd:element name="IMAGE_ID">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element name="UID" type="xsd:string" minOccurs="0"/>
        <xsd:element name="ID_TYPE" type="xsd:anyURI" minOccurs="0"/>
      </xsd:sequence>
    </xsd:complexType>
  </xsd:element>


</xsd:schema>
```