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Information technology — Multimedia framework (MPEG-21) —

Part 19: Media Value Chain Ontology

Technologies de l'information — Cadre multimédia (MPEG-21) —

Partie 19: Ontologie de chaîne de valeur de média

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Foreword

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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.

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ISO/IEC 21000-19 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

ISO/IEC 21000 consists of the following parts, under the general title *Information technology — Multimedia framework (MPEG-21)*:

— *Part 1: Vision, Technologies and Strategy* [Technical Report]

— *Part 2: Digital Item Declaration*

— *Part 3: Digital Item Identification*

— *Part 4: Intellectual Property Management and Protection Components*

— *Part 5: Rights Expression Language*

— *Part 6: Rights Data Dictionary*

— *Part 7: Digital Item Adaptation*

— *Part 8: Reference Software*

— *Part 9: File Format*

— *Part 10: Digital Item Processing*

— *Part 11: Evaluation Tools for Persistent Association Technologies* [Technical Report]

— *Part 12: Test Bed for MPEG-21 Resource Delivery* [Technical Report]

— *Part 14: Conformance Testing*

— *Part 15: Event Reporting*

— *Part 16: Binary Format*

— *Part 17: Fragment Identification of MPEG Resources*

— *Part 18: Digital Item Streaming*

— *Part 19: Media Value Chain Ontology*

Introduction

Today, many elements exist to build an infrastructure for the delivery and consumption of multimedia content. There was, however, no “big picture” to describe how these elements, either in existence or under development, relate to each other. The aim for the set of standards ISO/IEC 21000 has been to describe how these various elements fit together. New standards as appropriate will be developed while other relevant standards may be developed by other bodies.

The result is an open framework for multimedia delivery and consumption, with both the content creator and content consumer as focal points. This open framework provides content creators and service providers with equal opportunities in the ISO/IEC 21000-enabled open market. This will also be to the benefit of the content consumer providing them access to a large variety of content in an interoperable manner. The vision for ISO/IEC 21000 is to define a multimedia framework *to enable transparent and augmented use of multimedia resources across a wide range of networks and devices* used by different communities.

This part of ISO/IEC 21000 specifies a machine readable ontology of the media value chain defining a minimal set of kinds of intellectual property, the roles of the users interacting with them, and the relevant actions regarding intellectual property among other features.

Information technology — Multimedia framework (MPEG-21) —

Part 19: Media Value Chain Ontology

1 Scope

This Part of ISO/IEC 21000 describes MPEG-21 Media Value Chain Ontology (MVCO). The MVCO may be used to capture knowledge about media value chains and to represent, in a computer readable way, concepts in the domain and the relationships between those concepts.

This Part of ISO/IEC 21000 consists of seven Clauses and two Annexes. This technology is described in the following sections of this Part of ISO/IEC 21000.

- Model:
  the model is described in Clause 6, by way of a narrative description of the Value Chain, its main elements and relations.

- Representation:
  the MVCO has been formalised as a normative OWL Ontology, and the description of which is given in this Clause. The description consists of listing the classes, the object properties, the datatype properties, and the class individuals. Classes are described by giving the name, an English definition, the class hierarchy, and the restrictions imposed on the class. The representation is given in Clause 7. Annex B contains the normative OWL (XML/RDF) comprising the entire semantics of the elements in the model.

- Ontology use:
  an Informative section is provided with non normative descriptions of use, extensions and an API (Annex A).

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC TR 21000-1, *Information technology — Multimedia framework (MPEG-21) — Part 1: Vision, Technologies and Strategy*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC TR 21000-1 and the following apply.

NOTE Some of these definitions are taken from the Digital Media Project terminology, see Reference [16].

3.1.1
action
process of performing functions

3.1.2
adaptation
IP entity that is a **work** derived or adapted from another work

3.1.3
AdaptationInstance
IP entity that is an example of an identified **AdaptationManifestation**, for example a file

3.1.4
AdaptationInstanceCopy
IP entity that is a copy of an **AdaptationInstance**

3.1.5
AdaptationManifestation
IP entity (object or event) which is an expression of an **Adaptation**

3.1.6
AdaptationManifestationCopy
IP entity that is a **copy** of an **AdaptationManifestation**

3.1.7
adaptor
user who produces an **adaptation** and its **AdaptationManifestations**

3.1.8
anonymous
user whose identity is unknown

3.1.9
broadcast
action that delivers **content** to a **device** in a point-to-multipoint modality

3.1.10
collective
set of two or more **users**

3.1.11
content
one or more **content elements**

EXAMPLE A type of content is a digital item.

3.1.12
content elements
any of the following types of data: **resource**, metadata, nested content, license, IPMP data, IPMP tools, and **use data**

3.1.13
ContentHandler
user who is appointed to act on **content** on behalf of another **user** and within the scope and responsibility of that second user's rights

3.1.14
copy
mechanical reproduction of analogue or digital representation of a given **IP entity**

NOTE In the case of a digital copy the result is of virtually identical quality whilst in the case of an analogue copy the result can vary considerably in quality.

3.1.15
CopyrightException
permission to invoke a right under exceptional circumstances, for example when a particular **fact** is true

3.1.16
CreateWork
action of creating a **work** without any previous **IP entity**

3.1.17
creator
author
user who generates a **work** and makes its **manifestations**

3.1.18
device
combination of hardware and software that allows a **user** to execute functions over **content** and/or **IP entities**

3.1.19
distribute
action of selling, renting or lending

3.1.20
distributor
user who **distributes** a **product**

3.1.21
download
action of transferring a file or program from a central computer to a smaller computer or to a computer at a remote location

3.1.22
EndUser
user in a **valuechain** who ultimately consumes **content**

3.1.23
EndUser action
action performed by an **EndUser**

3.1.24
fact
positive proposition

3.1.25
identify
function of assigning a unique signifier that establishes the identity of entities, devices, content and content elements

3.1.26
instance
IP entity (object or event) which is an example of an **identified manifestation** such as a file

3.1.27
instantiator
user who produces an **instance**

3.1.28
IP
intellectual property
any identifiable product of the mind attributable to any person(s) or one or more legal entities that can be represented or communicated physically and protectable by copyright or similar laws

3.1.29
IP entity
type of **IP represented** by **content**: **work**, **adaptation**, **manifestation**, **instance**, **product**

3.1.30
MakeAdaptation
action of making an **adaptation**

3.1.31
MakeAdaptationManifestationCopy
action of making an **AdaptationManifestationCopy**

3.1.32
MakeAdaptationInstanceCopy
action of making an **AdaptationInstanceCopy**

3.1.33
MakeAdaptationInstance
action of making an **instance** from an **AdaptationManifestation**

3.1.34
MakeAdaptationManifestation
action of making an **AdaptationManifestation**

3.1.35
MakeCopy
action of making a **copy**

3.1.36
MakeInstance
action of making an **instance** from a **manifestation**

3.1.37
MakeManifestation
action of making a **manifestation**

3.1.38
MakeWorkInstanceCopy
action of making a **WorkInstanceCopy**

3.1.39
MakeWorkManifestationCopy
action of making a **WorkManifestationCopy**

3.1.40
MakeWorkInstance
action of making an **instance** from a **WorkManifestation**

3.1.41
MakeWorkManifestation
action of making a **manifestation** of a work

3.1.42
manifestation
IP entity (object or event) which is an expression of a **work**

3.1.43
permission
authorisation from one **rights** owner to one or more **users** to realise one or more **actions** on a given **IP entity**

3.1.44
private copy
action of storing content and holding it privately for non-commercial purposes

3.1.45
produce
action of making **products**

3.1.46
producer
user that makes **products**

3.1.47
product
IP entity that adds value to **IP entities** by including them with an appropriate licence for the purpose of publishing

3.1.48
public communication
action of publicly displaying or performing

EXAMPLE Public communication can include live performance, radio, television, internet streaming, multicast of **instances** and **manifestations**, and download.

3.1.49
render
action of converting a **resource** to a human-perceivable form

3.1.50
represent
expressing information in a form that can be processed by either a digital or analogue **device**

3.1.51
resource
data, whose **representation** is not specified by ISO/IEC 21000 (e.g. an MP3 file or an executable code), that can be processed by a **device**

3.1.52
right
ability of performing one or more functions over **IP entities** as a consequence of ownership or **permissions**

3.1.53
role
defined set of **actions** and corresponding conditions attributed to, and required of, a **user**

3.1.54
synchronise
action of concurrently performing or displaying two or more distinct **IP entities** each for a different human sense, for example text and audio, or video and song

3.1.55
use data
data documenting the functions performed by a **device** on a **content** item and the associated context

3.1.56
valuechain
group of interacting **users**, connecting (and including) **creators** to **EndUsers**

3.1.57
work
IP entity that is an original or derived creation that retains intellectual or artistic attributes independently of its Manifestations

3.1.58
WorkInstance
IP entity (object or event) which is an example of an **identified manifestation** of a **work**

EXAMPLE A file is a WorkInstance.

3.1.59
WorkInstanceCopy
IP entity copy of a **WorkInstance**

3.1.60
WorkManifestation
IP entity (object or event) which is an expression of a **work**

3.1.61
WorkManifestationCopy
IP entity copy of a **WorkManifestation**

3.2 Abbreviated terms

B2B	Business to Business
B2C	Business to Consumer
IP	Intellectual Property
MVCO	Media Value Chain Ontology
OWL	Web Ontology Language
OWL-DL	OWL Description Logic
RDF	Resource Description Framework
REL	Rights Expression Language
URI	Uniform Resource Identifier

URL	Uniform Resource Locator
URN	Uniform Resource Name
W3C	World Wide Web Consortium
XML	Extensible Markup Language

4 Conventions

4.1 Documentation conventions

The reader is informed that terms beginning with a capital letter (like “Work”) are used according to definitions given in Clause 3. Terms referred to in the ontology elements are given with its namespace (e.g. `mvco:Work`).

4.1.1 Class description

7.2.4 provides a systematic enumeration of the MVCO classes. Some conventions are explained in this subclause. For each OWL class, the following features may be given:

- **Class name**. The OWL class name, given as an `owl:Class` in the Ontology. Class names follow the convention of using an uppercase for the first letter, and leaving no blankspaces or dashes between words if more words are included. Qualified names start with the ontology URI, like `http://purl.oclc.org/NET/MVCO.owl#User`
- **Comment**. The English definition, given as a `rdfs:comment` in the Ontology.
- **Restrictions**. A set of expressions with an accompanying human explanation that must hold for an individual to belong to the class in question. Each of these propositions is either *necessary* (introduced by the symbol ⊆) or *necessary and sufficient* (introduced by the symbol ≡). The former is a condition that each class individual must satisfy, and the later is a condition which, if held, is enough to state that the individual belongs to this class. Each restriction is given as a parent class of the class in question, and can be one of the following:
  - **Existential restriction (“some”).** Expressed by means of the `owl:someValuesFrom` OWL element and represented here by the symbol ∃, it expresses the fact that an individual of this class **must be related to at least one** individual of the given Range class. This is a *quantifier restriction*.
  - **Universal restriction (“only”).** Expressed by means of the `owl:allValuesFrom` OWL element and represented here by the symbol ∀, it expresses the fact that an individual of this class **can only** be related to individuals of the given Range class. This is a *quantifier restriction*.
  - **Cardinality restrictions (“min”, “max,”, “exactly”).** Determine the number of relationships that an individual of this class must participate in (by giving a minimum, a maximum or an exact number).
  - **Disjoint classes restriction.** Classes can be required to be disjoint (i.e., a class individual may not be allowed to belong to two given classes at the same time.), but disjoint classes have not been represented in the enumeration.
- **In-domain-of.** Object Properties for which the given class is the *Domain*, if any.
- **Known subclasses.** Graphical representation of the known subclasses, if any.

Classes can be joint with the union operator, so that (`mvco:Creator` ∪ `mvco:Adaptor`) means the set of individuals which are either Creator or Adaptor individuals (or both). The intersection operators ∩ defines individuals belonging to both classes. Propositions can use the operators AND, OR and NOT (¬).

4.1.2 Property description

7.4 lists all the defined relations in the ontology. For each relation the following features may be given:

- **Name.** The name of the relation. Properties follow the convention of including as a first word an English verb starting with a lowercase letter, followed by subsequent words starting with an uppercase letter and no blankspaces or dashes in between.
- **Description.** Description of the relation, given as an English text in the `rdfs:comment` element.
- **Domain of the property.** Limits the individuals to which the property can be applied.
- **Range of the property.** Limits the individuals that the property may have as its value. In datatype properties, only literal values are accepted.
- **Characteristics of the property**. These give a more precise description of the relation, stating whether the property is symmetric, transitive, functional or inverse of the other property.

Object properties are represented in Figure 1 and Figure 3 of this document following this convention:

- Arcs represent object properties, the name of which is next to its head. The cardinality is given next to its tail, indicating how many class individuals can be related to one individual. For example, `1.n` indicates that one individual can be linked with this property with one or more individuals.
- Source nodes are the domain of the object property.
- Sink nodes are the range of the object property.

4.2 Namespace prefix conventions

MVCO includes an initial `rdf:RDF` component with some XML namespace declarations. Namespaces provide a means to unambiguously interpret identifiers and make the rest of the ontology presentation much more readable. It also contains the base URI for this document and the default namespace, which has been chosen as the URI of the document containing the ontology.

The ontology URI shall be `http://purl.oclc.org/NET/mvco.owl`. This is a permanent URI deemed to provide a permanent reference regardless of the actual location of the MVCO ontology. The following namespace conventions have been adopted:

Table 1 — Namespace prefixes

Namespace prefix	Namespace
None (default namespace)	http://purl.oclc.org/NET/mvco.owl#
xsd	http://www.w3.org/2001/XMLSchema#
rdf	http://www.w3.org/1999/02/22-rdf-syntax-ns#
rdfs	http://www.w3.org/2000/01/rdf-schema#
owl	http://www.w3.org/2002/07/owl#
dc	http://purl.org/dc/elements/1.1/
dii	urn:mpeg:mpeg21:2002:01-DII-NS#
mx	urn:mpeg:mpeg21:2003:01-REL-MX-NS#
daml	http://www.daml.org/2001/03/daml+oil#

Dublin Core annotations (ISO 15836-2003) have been made to the ontology:

Annotation	Value
dc:title	Media Value Chain Ontology
dc:language	en

5 Relationship to other ISO/IEC 21000 Parts

The Digital Item is the fundamental unit of distribution and transaction in the Multimedia framework. While the different parts of ISO/IEC 21000 deal with the components and different aspects of Digital Items, together they form a complete integrated interoperable framework. This Clause describes the relationship of this part of ISO/IEC 21000 with other parts of ISO/IEC 21000 in addressing the Intellectual Property (IP) represented by Digital Items and their elements as well as how such IP is subsequently handled by Users.

The MVCO represents a model integrating different elements of the ISO/IEC 21000 interoperable framework.

MVCO defines different types of objects subject to intellectual property; these IP Entities are represented through Digital Items or parts thereof defined in ISO/IEC 21000-2. IP Entities represented as MVCO IP Entity class instances are identified with the Digital Item Identifiers as described in ISO/IEC 21000-3. MVCO User class instances refer to Users as conceived in ISO/IEC 21000-1.

Furthermore, MVCO based applications makes use of ISO/IEC 21000-15 (Event Reporting), e.g. events in MVCO trigger Event Reports (ISO/IEC 21000-15), and ISO/IEC 21000-5 (Rights Expression Language), e.g. to express permissions.

Also, ISO/IEC 21000-6 Rights Data Dictionary (RDD) and MVCO are complementary within the MPEG-21 Framework and their vocabularies may be jointly used within MVCO based applications according to users needs. Many relationships between the elements in these two standards may be established without logical contradictions or interpretative ambiguities.

6 Media Value Chain Model

6.1 Introduction

This Clause is intended to facilitate a high level understanding of the MVCO core model. Although all aspects referenced are normative, the complete formal description is given in Clause 7 of this document.

The Media Value Chain Ontology is designed to represent common aspects of content creation, distribution, use and handling. Central to this is the need to adhere to basic common notions related to Intellectual Property.

6.2 Fundamentals of Intellectual Property

Any notion of Intellectual Property implies the existence of a minimum and necessary set of entities, roles, rights and actions, each a corollary of the other. The objective and scope of the MVCO is to represent a minimum set in a machine readable fashion either directly in a core model or through appropriate extensions.

While there are clear differences in the legal treatment of IP between different jurisdictions, this does not mean that a common core between them does not exist. The existence of such a core is reflected by the numerous International World Intellectual Property Organization (WIPO [1)]) treaties such as the Berne Convention where if it were not for a clear understanding of common terms such as *work*, *adaptation*,

1) The World Intellectual Property Organization (WIPO) defines Intellectual Property as *the creations of the mind: inventions, literary and artistic works, and symbols, names, images, and designs used in commerce*.