Project Acronym: Presto4U
Grant Agreement no: 600845
Project Title: European Technology for Digital
Audiovisual Media Preservation

D3.4: Recommendations on Rights Technology

Table of contents

Scope

The scope of Presto4U project is technology for digital audiovisual media preservation.

The long-term preservation of digital audiovisual media presents a range of complex technological, organisational, economic and rights-related issues. Presto4U focuses onto useful technological solutions, for raising awareness and improving the adoption of audiovisual preservation research results, both by service providers and media owners. Presto4U has created a series of Communities of Practice in the main sub-sectors of the audiovisual media preservation for developing knowledge about their practices and their unresolved issues for accessing to and taking advantage from research output.

The scope of this report is technology for handling audiovisual rights.

Beyond considering how to prevent the loss of content, rights information has to be included upstream in the preservation process before the sources of information become uncertain.

There are many areas of research into audiovisual rights, covering: definitions of formats and models or rights representations, such as rights expression languages and ontologies, development of innovative services for the management of rights information, and architectures for enforcing the appropriate use of rights.

The context is provided by the legal framework, the media contracts, the technologies for content distribution and fruition, the technologies for the information management, and the related standards and specifications.

Topics in the scope of this report include how to ascertain rights ownership, how to represent unambiguously the rights in machine-readable form, and which are the practical guidelines for handling rights expressed in that way.

Executive summary

The report describes the results of evaluating rights formats, models, and technologies.

It aims at providing both reference information and practical guidelines for handling rights. Thus it includes elements for understanding the domain of rights, from the legal to the technical aspects.

Handling rights is part of the audiovisual life-cycle.

Audiovisual works are the result of creations of the mind for which rights are recognised in the legal concept of intellectual property, protected by the Law. The legal framework establishes which are the "exploitation rights" that can be object of trades and thus can be transferred. The trade of rights is done by means of contracts in which the parties agree on terms and conditions. Such contracts and the parties are subject to the Law.

Research towards machine-readable rights

Over the last years, considerable research work has been carried out on rights management. The motivations of such effort can be found in the need to address a number of issues:

- the text of narrative contracts can be unclear and ambiguous: this occurrence implies the need to verify such text with the help of lawyers or specialised people, while the risk of infringements is not completely void;

- the introduction of automated processing on rights information is welcome to assist rights handling, when the amount of work grows;

- rights technology are often expected to assist in preventing infringements and/or increasing revenues.

Formats are related to technologies. Formats are required to be able to unambiguously represent "real" rights. Then tools supporting these formats can be developed and used. However it is important to have standard formats in order to build an open interoperable framework for rights management.

Rights formats and technologies aim at having electronic contract documents, expressed in a "machine-readable" form, and at binding, because the agreement of all the interested parties has to be ratified by means of their digital signatures.

On "machine-readable" rights, it is possible to perform rights clearance operation, also named "check-with" operation, which is automated verification of rights availability with respect to a target exploitation defined by the client user.

Knowledge on owned rights can thus be organised in order to provide optimisation of assets exploitation, such as estimating the value of opportunities of use and keeping track of rights close to expiration date.

When needed, some rights information has to be kept confidential, by means of encryption. Moreover rights technologies have to support mechanisms to automatically avoid rights infringements, by various possible degrees of enforcement.

Rights management has additionally to deal with related obligated actions, such as payments and notifications of use.

Exploitation actions have to be the object of accounting, for respecting conditions related to the temporal context or to the maximum number of runs, and for permitting the validation of possibly related rights.

Legal framework

In the European Union, the reference legal framework for issues related to rights is given by a number of Directives, implemented by means of national laws in the territory of the member countries, and in particular, not exhaustively:

- The Copyright Directive, 2001/29/EC
- The Directive on Audiovisual media service, 2007/65/EC
- The Term of protection of copyright, 2011/77/EU
- The Directive on Orphan Works, 2012/28/EU
- The Community framework for electronic signatures, 1999/93/EC

The authors are the holders of the inalienable "moral rights", which make the right of the author to be identified as such and to object to distortions of her work. The authors are also the original holders of the "economic rights", which can be transferred to other parties by means of contracts and deals. Special permissions allow the fruition of work without the authorisation of the copyright holder.

Orphan works can be used in some circumstances. For instance libraries could undertake digitisation projects for such content and make it available through the internet for educational and cultural purposes. However the status of "orphan work" can be recognised only if an appropriate "diligent search" for the legitimate copyright holders is executed without result. Rights holders can always appear later and can claim for a fair compensation, whether the use of the work carried an economical benefit or not.

Perspectives of the Communities of Practice

The perspectives of the Communities of Practice (CoP) with respect to rights are diverse. The broadcasters demonstrated their interest also by contributing to standardisation works and technical reports, and consider that implementing machine-readable rights should ensure the use of digital assets complies with the appropriate rights and restrictions. Other CoPs, such as Music & Sound, are almost concerned by the uncertainty of copyright laws with respect to preservation actions. Others, e.g. Footage Libraries think that they cannot get rid of lawyers easily for handling issues on intellectual property rights. They welcome standards to express rights but they think that broadly adopted platforms supporting rights negotiations are necessary. Rights issues related to the ownership of video artworks are managed within the general context of art ownership, thus the museum sector will not drive the adoption of novel technologies for rights; however video art distributors may take significant benefits from adopting emerging systems for rights management. Eventually other institutions, including those with learning & teaching repositories, are not interested in the exploitation of rights but in adopting open access policies for their libraries, as much as possible, and in avoiding infringements of the copyright laws.

Recommendation on standard formats

The main recommendation about formats for expressing rights and or media contract is for adopting standard formats. The EBU Report on Audiovisual Rights, EBU TR 030, and this report as well, identify two valid standardisation frameworks on rights:

- **MPEG-21**, the ISO/IEC multimedia framework, with the latest (2013) standards Contract Expression Language (CEL), purposely defined as an XML format,

normatively specified by XML Schemas, and Media Contract Ontology (MCO), an OWL/RDF format. The initiative for a second edition of these two standards was raised in October 2014, also on the basis of the work on rights carried out in Presto4U project. Both CEL and MCO are electronic formats for media contracts and they are almost semantically interchange-able.

- **W3C ODRL** Community Group, with the Open Digital Rights Language (ODRL) Initiative is an international effort aimed at developing and promoting an open standard for policy expressions. The ODRL Policy model is broad enough to support traditional rights expressions for commercial transaction, open access expressions for publicly distributed content, and privacy expressions for social media. Related to ODRL, it has to be mentioned RightsML, a profile of ODRL developed by specified by the International Press Telecommunications Council (IPTC), for application with the licensed distribution and use of news content by news gathering agencies, news publishers, news licensing organisations, business intermediaries and business consumers in the online news market-place.

ODRL would need further work in order to gain a good level of interchange-ability with the latest MPEG-21 standards. In particular it needs a mechanism for specifying complex conditions, based on logical constructs, and especially it lacks a vocabulary for the expression of actions and conditions related to the exploitation of intellectual property rights (IPRE).

RightsDraw

With the presentation of RightsDraw, the proof of concept rights management system firstly released in PrestoPRIME project, some practical details on how MCO rights information can be used are unveiled.

RightsDraw features include editing functionalities for MCO documents, either contracts or collection of rights holdings, rights clearance operations, support to rights update following to trades of rights, document exchange, integration with preservation platforms and other services.

This report includes the definition of which functions must be tested when performing assessment on rights management tools and, as an example, the assessment of "functional suitability" for RightsDraw is presented. A more complete assessment execution would have required a wide and appropriate data set.

Rights on Preservation Platforms

The analysis on how rights metadata are considered and handled within the preservation platforms evaluated in Presto4U revealed that one of them, the PrestoPRIME Preservation Platform (P4), supports integration with RightsDraw and is aware of needs related to operation with rights metadata, that are part of its Archival Information Package (AIP).

Another platform, Archivematica, expects rights to be expressed according to PREMIS (Preservation metadata implementation strategies), a standard of the library of congress the rights part of which aims at ensuring that preservation actions are executed on preservation object by agents to which the necessary permissions were granted.

The remaining considered platforms, DSpace and RODA, support licenses to be attached to archival items or entire collections, but mainly as narrative texts. However such rights can also be given by reference, i.e. a link to an external resource, and nothing would prevent the client users of such platforms from adopting machine-readable formats for

expressing their rights holding. Only the platforms would give poor support in operating on rights information.

Practical guidelines for dealing with rights

Regarding the selection of a format, a number of criteria are proposed for evaluation. They include technical aspects such as encoding and serialisation, the capability to express correctly the rights, the fact of being a standard format, the difference between exchange and persistence, and possible interchange-ability among formats.

It is recommended to pay attention to format conversion with rights metadata, because of the possible consequences of imperfect mapping. Moreover, in the case of electronic contracts, the only valid version is always the original one, because of the need to ensure the document authenticity.

A guide on how to create a complete contract from scratch, built on MCO format, informs about how to deal with the various aspects of the machine-readable contracts, even if typically they are not created from scratch, but on the basis of templates. The main aspects are: identification of the contract and of the parties, relations among contracts, clauses for governing law, object of the contract (which content the rights are about) and expression of the agreed deontics (i.e. permissions, obligations, prohibitions) with example of particular relevant cases, co-productions, constraints from performers, payments, technical quality and format of material, encryption and digital signatures.

Mapping from a pre-existing narrative contract is also described. As a particular kind of format conversion, the resulting contract is not going to be binding and there is no guarantee about the 100% of semantic equivalence.

The description of rights operations, in addition to the cases of "rights clearance" and "management of runs", discusses how to take into account the implications of the trade of rights, purchases and sales, on rights holdings.

Rights holdings can be defined as the set of permissions hold by a person or an organisation over a specific work, possibly resulting from multiple independent contracts.

While purchases just increase the holdings set, sales affect the rights of the seller when the permissions are issued with exclusivity. For both cases however a number of recommendations are given, such as verifying the actual owner of the right, before the trade, the properties of the involved permissions (exclusivity, sublicense, 100% use/ownership), and the correct identification of the work.

Besides guidelines about approaches to the "orphan works" issue, indications are given about "Public Domain works" that can be exploited, including the creation of derivative works, without any permission, because intellectual property rights have expired.

Similar to public domain, but slightly different, is the case when rights holders decide to surrender the exploitation rights, for instance by issuing a license to the general public such as the Creative Common CC0[1].

Regarding the future works, the outlook with respect to standards is positive, provided that already planned activities are pursued.

---

[1] https://creativecommons.org/publicdomain/zero/1.0/

1 Introduction

This report describes the results of evaluating rights formats, models, and technologies.

It aims at providing both reference information and practical guidelines for handling rights. Thus it includes elements for understanding the context, spanning from the legal to the technical aspects.

The report is organised as follows.

Chapter 2 explains the position of this document with respect to the latest related works. In particular it uses the outcomes of the European project PrestoPRIME, [19], as reference starting point and builds on the EBU report on rights technologies [28], and on all the latest standardisation activities carried in the MPEG-21 framework.

Chapter 3 introduces the issues related to rights in terms of "needs", related to activities dealing with rights or relying on an effective rights management process.

Chapter 4 provides background information about the legal framework, why there is a common international copyright framework, what is intellectual property, in which cases there can be exceptions, what the exploitation rights as opposite to moral rights.

Chapter 5 gives the perspectives of the various Communities of Practice, as organised in the Presto4U project, with respects to the issues of rights, possibly taking into account also the latest technologies.

Chapter 6 informs about the rights standards, and other initiatives related to rights, which have been carried on during the last years. A simple but meaningful example of rights agreement has been used with the various standard formats for giving the idea of how they can express such rights.

Chapter 7 presents the proof of concept rights management system, named RightsDraw (see [10], [11], and [31]), in terms of features and technical approaches, introducing the operation of Check-with (clause 7.5) and providing an assessment of functional suitability (clause 7.6) as defined in [50] and [51].

Chapter 8 provides information on how preservation platforms, such as that of PrestoPRIME (P4) [32], Archivematica [33], DSpace [36], or RODA [37], address rights metadata in practice.

Chapter 9 aims at being an "how-to guide", as much complete as possible, with sensible advices for approaching the expression of rights and media contracts in a completely machine-readable way.

Chapter 10 contains some conclusion assertions, with an outlook to possible future works.

2 Latest related works

2.1 The starting point

December 2012 was the closing date of European Project PrestoPRIME, [19], which produced various deliverables: a glossary of rights [26], a rights ontology [9], and a proof of concept [10], aiming at the progress of knowledge and technologies for the management of audiovisual rights.

In particular the work made for [9] and [10] resulted also in a standardisation activity carried out in MPEG [24], also during 2013, with two standards eventually approved: a Contract Expression Language (CEL) [3] and a Media Contract Ontology (MCO) [1].

The proof of concept was maintained to support the standardisation work and kept available, with open source license, at [11] and [31].

In the meantime a community group of W3C was developing and promoting the Open Digital Rights Language (ODRL) [22], for policy expression.

The outcomes of these initiatives and the expectations raised by the ongoing work provide the starting point of the analysis described in this document.

2.2 EBU report on rights technologies

In 2013 the EBU identified the need to produce a report on rights technologies, based on the experience of some of the member organisations and on the contribution of other experts somehow involved in activities of EBU working groups. Such reports, freely accessible to the general public, are intended to provide guidance to the other member and affiliated organisations, mainly public broadcasters.

RAI, as member of EBU and partner member of Presto4U project [20] and in charge for the activity related to the present document, committed for the task of editing such report in the framework of its Presto4U effort.

The contributors to the EBU report, [28] finally approved in November 2014, included the Universitat Politécnica de Catalunya (UPC) and the Universidad Politécnica de Madrid (UPM), with persons involved in the MPEG-21 standardisation, the Universitat of Lleida, with the person responsible for the Copyright Ontology [16] used in the MediaMixer Project [21], the responsible person of projects and activities on rights of RAI, the Australian Broadcasting Corporation (ABC), the Deutsche Welle (DW), the Norvegian broadcasting corporation (NRK), together with the expert from the EBU technical team [2].

This document reflects large parts of the EBU report [28], in some cases with a few modifications and additions, in particular Chapter 3   on the "Description of needs", and Chapters 4   and 6 , respectively on "Background on the legal framework" and "Rights standards and initiatives".

Regarding the latter, this deliverable doesn't provide the itemised description of the Copyright Ontology, which can be found in [16], [17], [18], in addition to [28], but provides some information on PREMIS [30], in clause 6.3 , as of interest for several digital preservation projects and platforms.

The sections of EBU report specific on the experience and perspective of ABC, DW, NRK, and RAI are not reported here, but are recommended references.

---

[2] The names of contributors to [28] are listed in the Acknowledgments

2.3 Ongoing standardisation activities in MPEG-21

After the final approval of Contract Expression Language (CEL) [3] and Media Contract Ontology (MCO) [1] in 2013, the work in the MPEG-21 framework has continued.

Part 8 of MPEG-21 that is the Reference Software, has been amended in order to take into account the two new parts. UPC was in charge of the part for CEL, while RAI contributed the part on MCO, actually derived from RightsDraw [11]. UPC contribution included a module for conversion from CEL to MCO and vice versa.

The working group made of RAI, UPC and UPM identified the need for a Corrigendum of MCO, proposed a solution to MPEG and took care of its approval.

The same working group was also involved in various dissemination activities, such as [7], [12], and [13]. Afterwards it became clear that a valuable informative resource, freely available to the general public was lacking, also because of the delays of ISO/IEC Information Technology Task Force (ITTF) in keeping up-to-date the publicly available standards web resource:

http://standards.iso.org/ittf/PubliclyAvailableStandards

Therefore an informative documentation resource was created by the group, specifically on MCO, divided into the core [5] and the extension for the exploitation of intellectual property rights (IPRE) [6].

Eventually a process has started for producing second editions of both standards, in order to take suitably into account a number of identified needs, ranging from completing the capability to express conditions, to cover the aspects related to payments defined in contracts, and addressing the requests of emerging contexts, such as the proposed Publication and Subscription Application Format (PS-AF).

The team has been active in elaborating the proposals [40], and in producing the current working draft documents, for CEL [41] and MCO [42], respectively.

3   Description of needs

3.1 Introduction

Handling rights is part of the audiovisual life-cycle.

Audiovisual works are the result of creations of the mind for which rights are recognised in the legal concept of intellectual property, protected by the law. Among those rights, the legal framework establishes which are the "exploitation rights" that can be object of trades and thus can be transferred. The trade of rights is done by means of contracts in which the parties agree on terms and conditions. Of course such contracts and the parties are subject to the Law.

It is assumed that any individual or organisation intending to act over an Intellectual Property Entity (IP-Entity) in an exploitation context has checked about the rights beforehand.

For example, media organisations hold large collections of AV materials, which are the manifestations of IP-Entities. in order to re-use archival items, it is clear that knowledge about rights is required. Otherwise, for instance, the cost of preservation might be wasted and the future (long tail) fruition of AV assets would be in jeopardy.

In this context, it is useful to keep the distinction between:

- handling rights transferred between business entities;
- handling rights granted to the final users (consumers).

Most general concepts might apply to both cases; however a significant difference exists in practice. While business entities are expected to avoid infringements without enforcements, because they have a number of good motivations to do so (e.g. honour-ability and reputation, costs of judgements), the final users are expected to be tempted to consider as permitted any action which is actually possible.

So rights technologies related to consumers are often focused on rights enforcement.

Over the last years, considerable research work has been carried out on rights management.

The motivations of such effort can be found in the need to address a number of issues:

- the text of narrative contracts could be unclear/ambiguous: this occurrence implies the need to verify such text with the help of lawyers or specialised people, while the risk of infringements is not completely void;
- the introduction of automated processing on rights information is welcome to assist rights handling, when the amount of work grows;
- rights technology is often expected to assist in preventing infringements and/or increasing revenues.

Formats are related to technologies. Formats are required to be able to unambiguously represent "real" rights. Then tools supporting these formats can be developed and used. However it is important to have standard formats in order to build an open interoperable framework for rights management.

3.2 Expectations on rights technologies

3.2.1 On contracts

The final aim is to have binding contractual documents expressed in a "machine-readable" form.

A binding contract is signed by all the interested parties.

Non binding contracts can be useful documents as well for defining general terms and offers during negotiations.

Regarding pre-existing textual contracts, it is required to be able to map them in a "machine-readable" form, although it is understood that these cannot themselves be binding without signatures and statements for superseding e.g. an older version.

3.2.2 On rights clearance

The goal is ability to perform clear "check-with" operations, which can be defined as automated verification of rights availability with respect to a user defined target exploitation.

This operation can be requested either after identification of appropriate content or exactly for identifying which content (and associated version) has associated matching rights.

For example Media Asset Management (MAM) systems have operational constraints that require the "rights-cleared" information to be rapidly and readily available. Sometimes the "rights-cleared" information is returned in the form of a traffic light, where "green" is for cleared rights (ok) and "red" is for rights not available (don't use), but the warning given by "yellow" is usually not helpful, unless used for a very temporary status, meaning "clearance in progress".

3.2.3 Optimisation of assets exploitation

The aim is to have the knowledge on owned rights organised in a way appropriate to support their best management. Examples include estimating value of exploitation opportunities and keeping track of rights close to expiration date.

3.2.4 Security, confidentiality, and privacy

This need is about support to keeping part of rights information confidential, when requested.

3.2.5 Enforcing

Enforcing is about mechanisms deployed to automatically avoid rights infringements. The expected configuration of such mechanisms can vary considerably, from raising simple warning/exception to absolute prevention of action.

Enforcing can be requested for automating obligations.

3.2.6 Usage reporting

The need for usage reporting is originated by various cases:

- reporting use of content to collecting societies;
- reporting use of content to original rights holder, as part of agreed terms;
- keeping up-to-date rights status depending on conditions on related actions or runs.

3.2.7   Licensing towards final users

In this case the goal is to support the definition and issue of licenses for the final users. This may be related to specific exploitation conditions on delivery modalities or technologies.

3.2.8   Establishing rights ownership

This need is about the process for completing the knowledge on rights ownership when information available from legacy system is not directly sufficient.

A way for addressing this issue is described in clause 9.5 , as the diligent search process for establishing if a work is orphan, because it implies the identification and location of all copyrights holders.

3.2.9   Performing operation on contracts and rights

This need relates on one hand with the simplest CRUD (Create, Read, Update, Delete) editing operations, while on the other hand with more complex operations such as:

- Validate – check standard compliance, information completeness and consistency;
- In/Out, Store - importing and exporting, and saving rights information in a non volatile way;
- Check-with – provide answer to rights clearance requests;
- Search – for finding which rights information match a given query;
- Sales/Purchase – updating rights holdings information of a given party, on the basis of a media contract in which that party issues/receives some rights.

4 Background on the legal framework

4.1 Origin of the common legal framework

The domain of rights is based on a legal framework, which regulates the rights of authors, performers, producers, and broadcasters, and over which the parties can freely define terms in agreed contracts.

Each country has its own laws and thus important differences from one country to another may exist. However a "common" legal framework does exist and is built over a number of international agreements or treaties and within the European Union by the EU directives.

To just mention some, international laws include: the Berne Convention (1886), the Universal Copyright Convention of Geneva (1952) and its revision of Paris (1971), the Rome Convention (1961), the WIPO Copyright Treaty and the WIPO Performances and Phonograms Treaty (1996). The various European Directives range from 89/552/EEC (Television Without Frontiers), to 2001/29/EC (Copyright Directive) [44], to 2007/65/EC (Audiovisual Media Service Directive) [45].

More recently, Directive 2012/28 EU [47] pertains to certain uses of orphan works, see 9.5

4.2 Intellectual property of authors, performers, producers, and broadcasters

The authors are the holders of the inalienable "moral rights", which make the right of the author to be identified as such and to object to distortions of her work. The authors are also the original holders of the "economic rights", which can be transferred to other parties by means of contracts and deals.

Performers, producers, and broadcasters are also the original holders of rights related to their contribution. Such related rights are independent from the authors' rights because their owners are auxiliary in the intellectual creation process since they lend their assistance to the authors.

Economic and related rights have duration of validity given by the law as a number of years after death, for the authors, or after performance, first publication or broadcast for performers, producers, and broadcasters.

4.3 Special permissions and restrictions

Special permissions allow the fruition of work without the authorisation of the copyright holder. Those copyright exceptions are governed by the law and include: temporary reproduction (without independent economic significance), private copy (of legally owned copy) not used commercially, research and educational purpose (not commercial), quotation, criticism, review and news reporting for the exercise of press freedom.

On the other hand laws also protect the personal rights to safeguard privacy, identity, and dignity. In principle the person rights includes also the "right to oblivion", i.e. to have the person details forgotten after a certain time. The objective evaluation of these exceptions is difficult, but in specific cases the person rights are the object of court sentences.

4.4 Exploitation Rights

Derived from the economic rights of the legal framework, it is possible to identify the actions which are the concept of exploitation of rights. The exploitation rights are the main object of trades in contracts.

- Fixation or Transcription – the action by which a work or a performance is materially recorded.

- Communication to the public - the action of making available the work to the public through a communication mean. This is what broadcasters do.

- Duplication – the action of producing copies

- Distribution – the action of issuing copies to the public, renting and/or lending

- Public Performance - to perform, or show, play the work in public (e.g. in a theatre)

- Transformation – the action of making adaptation or transformation of the work. This action results in a derivative work.

5 Perspectives of the Communities of Practice

As archive is the pivot of digital content life-cycle, shown in Figure 1, rights information have to be linked to the Archive in order to check it with the target exploitation.
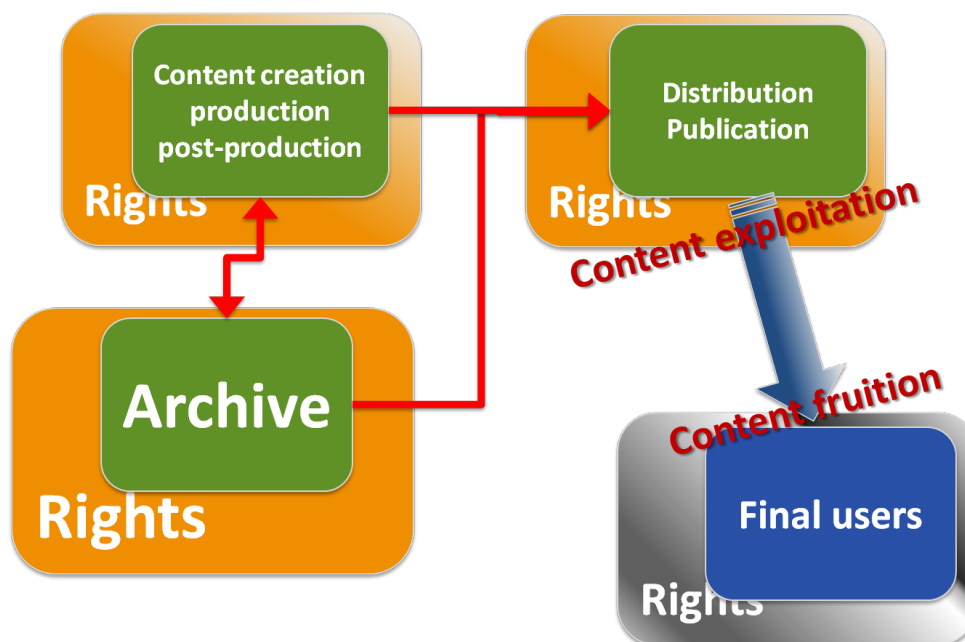
Figure 1 – Business model of AV content life-cycle

5.1 Broadcasters

5.1.1 Interest

The interest of the community of broadcasters in the latest technologies for rights management is undoubted. The complexity of content management has increased exponentially, which is due to the advent of today's fast-changing, multi-platform environment. Broadcasting houses' activities have been morphing from a traditional paradigm into a new one, dominated by digital technologies. Securing rights for a programme today means negotiating across every platform (analogue, DTT and satellite), multiple territories and languages (original language, English, etc) and various access types (free, PPV, PAY TV, etc). Ancillary rights (promotion rights, DVD, merchandising, etc.) must also be negotiated and agreed upon [59].

The main circumstances that influence the greater demand for attention to rights issues are briefly described in the following.

New technical modalities for communicating content to the public have led to greater use of archive content, with increase of rights clearance activities and a subdivision of rights, as defined in contracts, into smaller pieces, according to the various combinations of such technical means and modes.

New competitors have appeared in the national territories of the broadcasters, such as commercial versus public broadcasters (who used to be monopolists in the near European past), telecommunication companies, and eventually any organisation operating on the web, without particular territorial boundaries. This highly competitive reality involves careful dealing with rights.

We observed a lower importance of language as a barrier for content fruition by the end users; which implies on the one hand a wider potential audience and on the other hand greater competition to reach such an audience.

"Non linear" delivery modalities, also named "make available" or "delayed viewing" has increased in importance over the traditional linear broadcasting model; the trades of rights reflect this in the conditions defined in the contracts.

End users have become more and more involved in the content creation process, both in terms of user-generated content and in terms of interactions either with the broadcaster themselves or on social networks; this suggests the need to define agreements for end users regarding the use of their content by the broadcaster.

There are multiple concrete cases of end users infringing rights by making programmes and clips they recorded available as web content. From the broadcaster's perspective, in some cases, this might result in some unexpected exploitation, even with economical revenue, provided that an agreement exists with the third involved party (the organisation providing the services used by the consumers for making the content available) and that the broadcaster had the rights for such exploitation in the first place; otherwise (without rights) the broadcaster cannot receive any income.

Eventually the digitisation process supporting any business activity necessarily includes rights management.

5.1.2   Current options

The concrete alternatives for the broadcasters are:

- keep legacy systems and procedures as long as possible, waiting for the market to offer mature products and services supporting rights management;

- buy tools or services, innovative but already available on the market, possibly based on the experience of adoption by other organisations;

- develop internally, by means of the organisational IT departments, or commission to software development companies some new customised solution;

- develop internally, by means of the organisational IT departments, or commission to software development companies new solutions based on common and shared requirements, including the support and use of standard formats;

- buy innovative tools and services, which already take into account such common and shared requirements and which claim continuity in supporting the adoption and use of standard formats along their roadmap.

5.1.3   Positions on the latest standard formats

The contributions to [28] from the broadcasters, namely RAI and ABC, clearly indicate that the latest MPEG-21 standards, i.e. MCO and CEL, are addressing these use cases and the interest of broadcasters to be involved in the process carrying to the second editions of the two standards.

Specifically regarding the news domain, the broadcasters, and the European Broadcasting Union (EBU), are interested in the RightsML, [23]. It builds on ODRL, the framework for digital rights hosted by the W3C [22], by extending it to meet the specific needs of the media industry and is developed by the International Press Telecommunications Council (IPTC).

This because of the need to adopt a common framework, including rights, for the distribution of news items collected and produced by the news agencies and to streamline a usually complicated, error-prone and manually-intensive setup.

Implementing a machine-readable rights expression language should ensure that both rights holders and clients can be confident that the use of digital assets complies with the appropriate rights and restrictions.

5.2 Music and Sound

In the Directive 2011/77/UE [46], the term of protection of a musical composition/sound recording was extended from 50 to 70 years after the composer's death. The extension applies to recordings first published in 1963 or later, so that earlier recordings stay in public domain as far as the rights of the producers and performers is concerned. During the preparation of the directive, the Commission proposed a term of 95 years. This was motivated with the need to harmonize European and US copyright law. However, there are other differences in the protection of sound recordings in EU and the USA.

In the United States sound recordings are treated differently (and more harshly) than any other type of intellectual property. Books, articles, published music, movies, photographs, and other creative works are generally protected for ninety-five years from publication or for the life of the author plus seventy years; so we can estimate in advance a fixed and predictable period before the work becomes of public domain.

Not so with sound recordings made before 1972: due to 1976 Copyright Act - Section 301(c), these Recordings are not covered by Federal copyright laws, but remain under state laws until 2067 (assuming that copyright term will not be extended again). This mean that these sound recordings for the moment are not in condition to fall into public domain, and probably they will never be.

The Association for Recorded Sound Collections (ARSC) has repeatedly pointed out that this situation creates considerable uncertainty for archives, libraries and users of historical sound recordings: for the fact that making copies of recordings is a violation of copyright law, much of the preservation work being carried out by archives on older copyrighted recordings is therefore technically illegal.

All countries except the United States recognize that recordings are derivative works and (for the lesser length of their economic viability) accord them shorter terms of protection than for the music or text they embody. Nearly every other country in the world recognizes the principle of a public domain for recordings after a reasonable period of commercial exploitation and encourages both archives and private parties to preserve and spread the historical record.

In the era of online distribution, the situation becomes even more complicated. It is not clear how US-owned streaming services such as *Spotify* and *iTunes* will handle historical recordings, which are in public domain in Europe but still protected in the USA. European sound archives that want to present historical recordings from their collections may face problems if their sites are accessed in the USA and it is therefore urgent for EU to find a consensus with the USA on the fair use of historical sound recordings.

5.3 Video production and post-production

The organisations active mainly in video production and post-production are not directly involved in the communication to the public, as the broadcasters are, but they are more close to the authors position along the media value chain.

So they are typically interested in the deal of rights:

- as buyers, of all rights from authors;
- as sellers (or brokers) of exploitation rights, for the communication to the public, to the broadcasters and other media companies.

As already remarked, any type of organisation has today the capability of providing fruition services to the final users, by means of the internet.

Alternatively these organisations are getting interesting in developing their trades of content and related rights by means of web based catalogue services, including search and browsing features. Firstly such services were conceived only for disseminating information about the available content to the potential customers. Later they have been completed with features with defined offers possibility to complete agreements on rights, even including delivery of material and payments. However such contracts include poor negotiation options and are not machine-readable.

5.4 Footage libraries

The members of these communities think that they cannot get rid of lawyers easily for handling issues on intellectual property rights. They welcome standards to represent and exchange rights information; however they remark that rights negotiation is not easy to automate unless broadly adopted B2B platforms come in place.

Footage libraries address their customers for commercial uses as well as non commercial and academic uses. In the latter situation material is sometimes provided for free or at discounted price, provided that the library logo, added to material in such cases, is retained by the principals when using the footage. Rights standards should allow expressing such obligation.

These organisations deliver content to their customers by means of the web or by distribution of physical carriers (such as DVDs).

Footage libraries tend to own exploitation rights without territory constraints, in order to avoid limitations to the catalogue offered to their customers; however this was not always the case in the past. Therefore their collections may include material for which they have exploitation rights only for their own country, while other organisations hold the rights for the rest of the world.

Some content is made available also on "YouTube", possibly on channels for the specific library, but the wish is to let it only for non commercial use, without modifications. Such case is almost covered by the Creative Commons license requiring attribution, share alike, non commercial, and non derivative works (CC-BY-SA-NC-ND).

5.5 Film and film-makers

The public film archives typically do not hold the rights to most of the collections they preserve. However, they collate many kinds of documentation regarding the audiovisual heritage, including information about the creators and to some extent updated rights ownership. The interest of the public mission film archives is less to gather rights

information to enable exploitation of films, but rather to gather filmography information, as well as rights in regards to providing access to the heritage, beyond the scope of the copyright exceptions endowed to these institutions. The main mission of the core CoP membership is to provide a link to the film heritage, through a number of public activities, including theatrical and educational screenings, on-site access and increasingly through web platforms such as the European Film Gateway [14] and Europeana.

Currently the public mission film heritage institutions are involved in the EU project Forward, [56], which looks into a solution to make the diligent search for orphan works clearance as cost efficient as possible. No doubt there might be developments in tagging and tracking rights for new productions, but for heritage films there often is less financial incentive and often broken links to the rights information.

In regards to the creators and owners of copyright, there is a close correlation with the CoP for Video Production.

5.6 Video Art

5.6.1 Introduction

Given the rights issues related to the ownership of video artworks are managed within the context of the broader system for art ownership it is unlikely that the adoption of novel technologies will be driven by requirements of the museum sector. Instead within the museum sector there will be a greater need for consistency across all types of artwork. However there may be significant benefits for video art distributors to adopt emerging systems for rights management.

Essential to an understanding of rights issues for video art, is an understanding of the financial models through which video art is bought or sold. The history of how video art came to be bought and sold and the different models of its distribution and circulation has, in itself, become an area of study

5.6.2 A short history

Artists began to use video technology in a fine art context from the mid 1960s. Although there is a longer history of artists' involvement in experimental film, in particular Dadists, Surrealists and Futurists, these works have largely had a different history compared to works created within mainstream artistic practice. The first video artwork to be sold in the US was via Nicholas Wilder who in 1969 sold a 1968 video piece by Bruce Nauman called *Video Pieces a-n* made in 1968. In 1969 Howard Wise brokered a deal to sell Paik's *Participation TV* (1963) to David Bermant, see [52] p. 114. In 1972 Leo Castelli and Ileana Sonnabend founded Castelli-Sonnabend Videotapes and Films (CSVF), which aimed to become the distribution arm of the gallery. They chose to distribute artists' films and videos only, selling them as limited and unlimited editions. In Europe, Videogallerie Schum was founded in Dusseldorf in Oct 1971 as the first commercial gallery dedicated to video art. All three of these ventures closed fairly quickly. Howard Wise in New York closed his gallery to establish the video distributor Electronic Arts Intermix in 1971; CSVF, the Castelli Sonnabend initiative, folded in 1975 with the collection being absorbed into the distributor Video Data Bank's collection and finally Videogallerie Schum folded in 1972. All suffered from poor sales despite interest and support for their ventures ([52] p. 115).

In the US, early attempts to sell video via the traditional gallery system largely gave way to the establishment of distributors who were more utopian in their vision. Here the main focus was to enable access to video tapes, both fine art and documentary, at a relatively

low price to colleges and museums, whist still providing an income for artists. By the establishment of a different economic model for art, early time-based media artists and their representatives deliberately sought to undermine the marketability of art based on exclusivity.

In Britain in the late 1960s and early 1970s there was also little market for artists working in video; it was a time of high inflation and high interest rates. This meant that the art market was conservative, with investors looking for investments alternatives to the stock market ([53], p 37-61).

After the recession of the 1980s and early 1990s there came a boom in the art market in the UK with collectors such as Charles Saatchi putting young British artists on an international stage. Artists working in video such as Steve McQueen, Gillian Wearing, Mark Wallinger, Mona Hatoum, Douglas Gordon and Jane and Louise Wilson began to be nominated and in some cases win the Turner Prize, a high profile UK art prize hosted by Tate. As well as museums, collectors such as Pamela and Richard Kramlich in San Francisco and Isabelle and Jean Conrad Lemaitre, based in both London and France also began to buy time-based media works of art at this time.

5.6.3   Certificates and editions: how to sell intangible arts

An artwork need not be a tangible object, with music providing an analogy for a means of creating commodities from the intangible through performances that audiences will pay to hear either live or as recordings or as scores or sheet music that can be bought and sold. Within contemporary artistic practice, conceptual artworks paved the way for intangible works to enter the market in the creation of works which were largely legal constructs ([54] p. 514-537) where instructions for the creation of works and accompanying certificates would be the artefact that changed hands. These are conceived of, from a copyright perspective, as a literary work.

For video artworks certificates are also often used to accompany any media and objects that might act as components of the work. In many cases the certificate will also contain instructions for the display of the work or other technical stipulations. In addition to the traditional paper certificate, certificates have also taken the form of signed video tapes or DVDs or presentation boxes. In the case of time-based media works some artists have followed the practice of using certificates to indicate installation instructions for their works for example the following certificate is for Bruce Nauman's *Good Boy Bad Boy*, 1985.

The first video works which Tate acquired were three videos by Gilbert and George; *In the bush, Portrait of the Artists as Young Men and Gordon's Makes us Drunk*. These works are thought to be the first video artworks sold as editions, in this case as editions of 25. Tate acquired the first of all three of these editions described on the certificates by the artists as 'Sculptures on Videotape'. The works came with a framed certificate which included a photograph as well as an ½" reel to reel tape, Figure 3.
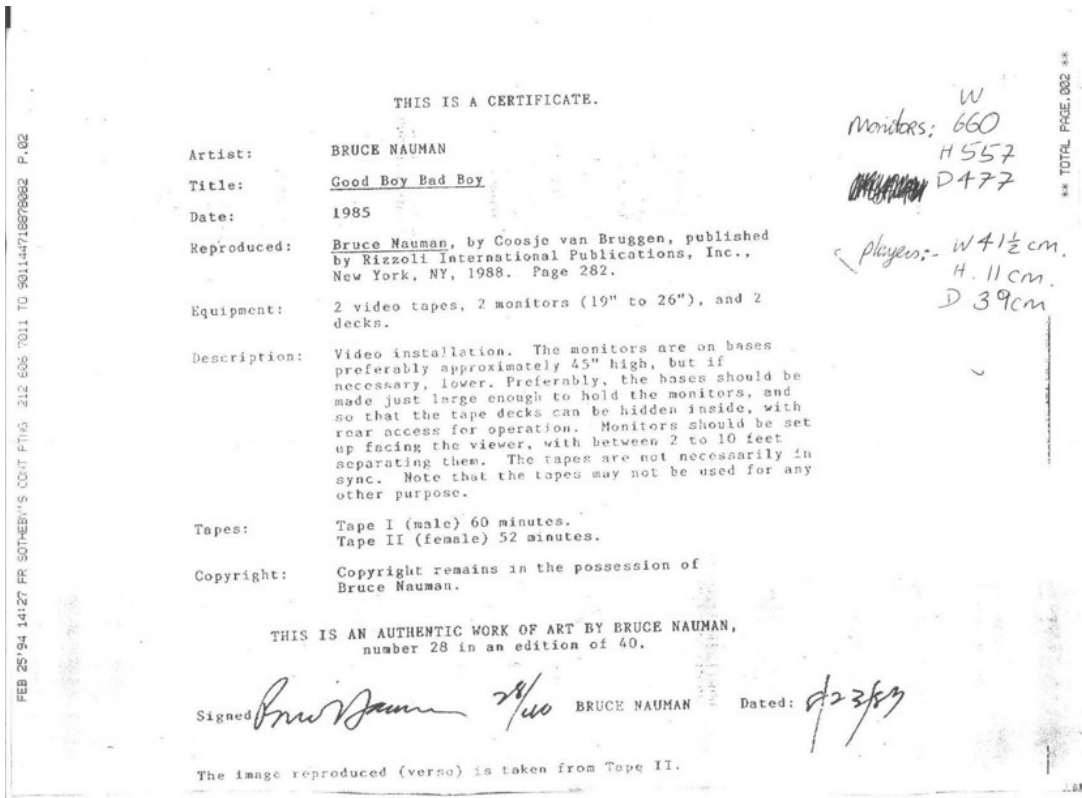
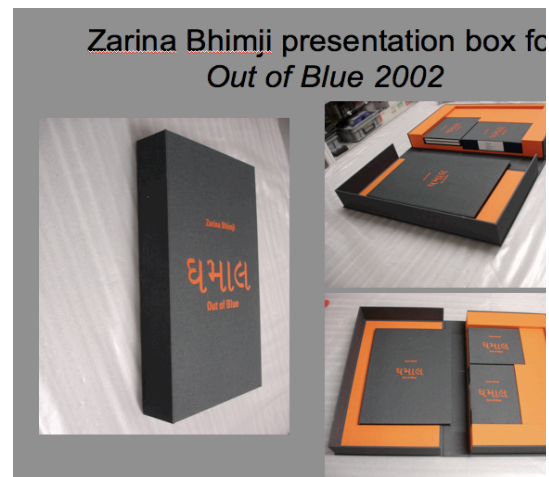**Figure 2 - Certificate for *Good Boy Bad Boy*, Bruce Nauman 1985**

Figure 3 - Certificate and original tape cassettes supplied on acquisition for *Gordon's Makes us Drunk*, Gilbert and George, 1972

Figure 4 - signed VHS tape from Sean Landers for *Remissionem Peccatorem*, 1994

Figure 5 - Zarina Bhimji presentation box for *Out of Blue*, 2002

Later artists sold their works as signed VHS tapes, Figure 4, or with the advent of new technologies signed laser discs or DVDs.

The Lisson Gallery in London worked with Bookworks to produce presentation boxes for video works. These included a Digital Betacam tape and also a DVD and often installation instructions as well as a certificate, Figure 5.

5.6.4 Title or license

Tate is governed by the 1992 Museums and Galleries Act which states that it is required to hold title to works accessioned into Tate's collection. This means that the title of the work must pass to Tate, whether for a unique work, a limited edition work or an unlimited edition work. This is not the case for other museums, particularly private institutions. Many museums are able to acquire works into their collection under license. Distributors such as Electronic Arts Intermix (EAI) in United States, or LiMA in the Netherlands provide works under different forms of license. Some of these licenses will enable a museum to both show the work and also hold a high quality master. Examples of such licenses from EAI are available at [55].

5.6.5 Clearing content

When a work is considered for acquisition into Tate's collection the content is checked for any possible copyright infringements. One of the clauses of the copyright agreement, which is made between Tate and the artist, asks for confirmation that all copyright belonging to any other party has been cleared by the artist prior to the transfer of title to Tate. The responsibility for any subsequent claim remains with the artist.

5.6.6 Present day

In the current climate, where the ethos is focussed on access and exposure, video works are being streamed in full on the web and the concern for older more traditional notions of ownership and exclusivity have diminished. Pierre Huyghe was the first artist to ask for his works to be streamed in full via Tate's website to coincide with his major exhibition at Tate Modern (*Celebration Park* 15th February – 7th May 2007).

Following similar requests, Tate Media also championed a programme to put suitable video works from the Tate Collection online, either as segments or in their entirety. The streaming of the three Gilbert and George works Gordon's Makes Me Drunk, In the Bush

and Portrait of the Artists as Young Men to coincide with the Gilbert & George Retrospective (Tate Modern 5th July – 17th September 2006) which in the early 1970s were thought to have been the first video artworks to be editioned, demonstrates rather neatly this change in attitude.

One can see signs that the museum might slowly be moving away from a competitive sense of exclusivity, built around the ownership of works in their collection that other collections might not have. In recent years there has been a rise in the sharing of collections. Take for example the collection of Antony D'Offay which is now shared between the National Gallery of Scotland and Tate with the explicit purpose of displaying it in regional centres around the UK. However, for the market it is hard to imagine a completely different model of distribution taking hold and eliminating the existing traditional modes of buying and selling art.

5.7 Research and scientific collections

The Community of Practice (CoP) of research and scientific collections consider audiovisual objects that have a prevalent value in relation to research that is, or has been, conducted on them. In fact, any audiovisual collection can, and often is, used for scientific research. Thus, the research and scientific collection would overlap with all the other ones if this assumption was not made.

Two very different types of collections exist in this CoP:

- collections specifically created for research have copyright owned by the researchers or by the research institutions;

- collections of pre-existing audiovisuals whose copyright can be very diverse.

The focus of the CoP with respect to the collections that have been created specifically for research purpose is on understanding which is the best copyright license to use in order to respect the research institution and, eventually, the research project founder (e.g., EU Commission) constraints.

There is typical a very low awareness of the importance of this topic between the research community. Typically Creative Commons license are much appreciated but with very few knowledge about the real implications.

Whenever pre-existing audiovisual works are used to build a collection in order to perform research on them, many copyright issues become relevant. Trying to solve them, some initiatives consider only videos with creative commons license. This is the case of the MediaEval Benchmarking Initiative for Multimedia Evaluation (http://www.multimediaeval.org/) that encourages the creation of collections containing only videos with open licenses.

A completely different experience is coming from the Gra.fo project – "*Le soffitte della voce*" (http://grafo.sns.it/) lead by "*Scuola Normal Superiore of Pisa*", that aims at discovering the Tuscan sound archives collected by scholars and private/public collections, preserving and cataloguing them, making a large part of them available to schools, museums and amateurs. While it is yet possible to perform research on the preserved material, the project is experiencing enormous problems in understanding which part of the collection can be made public available.

5.8 Learning and teaching repositories

There organisations aim at an open access policy, using creative commons licences where possible and reaching agreements with rights owners to create ad hoc licences.

For instance Digilab/La Sapienza (http://digilab.uniroma1.it/) has signed an agreement with the Italian copyright collection agency, SIAE, whereby the cultural aim of the university is recognised and they are granted the possibility to give their community (students, researchers, professors) access and duplication rights for some works.

These organizations have content with the following two possible rights situations:

- works for which they can let free access, to the general public, either being copyright free or having rights cleared by licenses;

- works with restricted rights, for which the access can be provided only within the community of the members of the organisation; for the case of university: students, teachers, researchers.

The case of Digilab/La Sapienza is based on the interpretation of the Italian copyright law, which refers to use of content for study and research in classroom as equally valid in the online context. This is seen as a close community who has access to content via the university platform Digilab, which requires a username and password. The user must agree to the terms and conditions specified by the university. The platform doesn't use specific filters; users can view videos on streaming but not download.

Digilab is currently using textual contracts and legal advice (including external consultants), but they have a plan to develop with partner CINECA an automatic system able to handle the different type of rights. In the past they have experienced difficulty explaining to IT their needs and the different type of rights scenarios within national and international law. There is a difference in the language used, and it's very difficult to translate the rights complexity into a schema. In the future Digilab would like to have an automatic management of rights according to the various types of content (maps, video, audio, text, photos etc.).

These organisations would like to have general rules for managing rights according to the kind of work, e.g. cinema vs theatre, based on the different regulations for the identification of the main rights holders. For example, while for a novel the main rights owner is the author (also owner of the moral rights); in the case of cinema the production company is the main owner of the economical rights.

In order to regulate the use of the made available content by persons accessing it, either as open or restricted access, the members of this community are oriented to experiment the adoption of Creative Commons licenses.

Interestingly such licenses include the use of all types of deontic expressions: permissions (use, distribute, duplicate), obligations (attribution, share-alike), and prohibitions (non-commercial, non-derivative).

The members of the restricted community of students, teachers and researchers, are also the potential authors of new works that can enrich the collection of their institution. The approach of Digilab/La Sapienza is that of inviting to "donate" such works to the University for free, under Creative Commons, attribution, non commercial, v3.0 (CC-BY-NC 3.0), recognising by that the author's moral rights, and make the works available to the general public through Digilab.

5.9 Personal collections

In Personal Collections repositories, rights are differently dealt if they concern old or recent material. For old material there is a presumption of out of rights situation, even if this is not clear at all. Often content producers are unknown, or there is no way of finding them, so in general donations are considered as heritage contributions that should not generate any rights and should in consequence not be used with a commercial purpose. This is the case for archives wanting to enrich their collections where the legal environment of archives guarantees that no commercial reuse will be done. In other cases there may be a donation agreement, where the author expressly indicates that they give usage of their material to the archive under the express condition that it will only be shown under a certain context and no copies will be made.

In any case copyrights legislation changes from country to country: in the U.S. [58], home movies are generally considered as "unpublished works," and as such are automatically protected for a term 70 years after the death of the author. In the common instance where the maker of the film is unknown, the term is 120 years after creation – so as of 2014, only home movies shot by individuals who died before 1944 could be in the public domain. Most home movies therefore will still be protected by copyright for many years and are not in the public domain, although often the mere possession of the document corresponds to a claim of ownership that can hardly be objected.

Concerning commercial uses of personal contributions, this is mainly the case where individual authors cooperate to create a collection of content, which will be used with a commercial intention. This may be the case of broadcasters looking for original footage related to news, which may propose commercial revenues to contributors. In this case a contract is done, establishing the usage context, the revenue share, the artists name or other protection issues. With audio-visual content, one of the objectives of collecting personal archives is to make them accessible; this implies making contents visible online and organizing the viewing and the access to contents within a legal frame. The agreement then should expressly indicate that the donation is likely to be put online for free access by users.

A main concern about personal collections is the authenticity of contents: were they really produced from the donator or are they a copy of existing content? In user-generated content (UGC) websites this is a real concern regarding the fact that a content may be copy protected or under other rights. We find the same issue with those personal contents that are involuntarily reproducing objects or elements under rights (as a painting, photography, music or film). Generally there is a common approach to this issue, even on UGC sites, where content producers certify that, to their knowledge, there are no rights associated to the contents they are sending or publishing.

6 Rights standards and initiatives

6.1 MPEG-21

6.1.1 Introduction

The Moving Picture Experts Group (MPEG), formally ISO/IEC JTC 1/SC29/WG11, recommends the MPEG-21 framework (ISO/IEC 21000) for representing and managing digital multimedia content.

The MPEG-21 framework deals with multimedia delivery and consumption across different networks, [25].

MPEG-21 has specified a number of standard parts as shown in Table 1, from 2002 to 2013. All the specifications are available, with fee, on www.iso.ch, while some related resources are publicly available for free on http://www.iso.ch/iso/en/ittf/PubliclyAvailableStandards.

MPEG REL and RDD (respectively Rights Expression Language and Rights Data Dictionary) were published first in 2004, while the latest initiatives CEL (Contract Expression Language) and MCO (Media Contract Ontology) were published in 2013.

MPEG-21 part with year	Title
ISO/IEC 21000-1:2004	Vision, Technologies and Strategy
ISO/IEC 21000-2:2002	Digital Item Declaration. (amendment 2012)
ISO/IEC 21000-3:2003	Digital Item Identification. (amendments 2007 and 2013)
ISO/IEC 21000-4:2006	Intellectual Property Management and Protection Components. (amendments 2007 and 2012, corrigendum 2012)
ISO/IEC 21000-5:2004	Rights Expression Language. (amendments 2007 and 2008)
ISO/IEC 21000-6:2004	Rights Data Dictionary (amendment 2006, corrigenda 2005 and 2007)
ISO/IEC 21000-7:2007	Digital Item Adaptation. (amendment and corrigendum 2008)
ISO/IEC 21000-8:2008	Reference Software. (amendments 2009 and 2011, and 2014)
ISO/IEC 21000-9:2005	File Format. (amendment 2008)
ISO/IEC 21000-10:2006	Digital Item Processing. (amendment 2006)
ISO/IEC 21000-11:2004	Evaluation Tools for Persistent Association Technologies
ISO/IEC 21000-12:2005	Test Bed for MPEG-21 Resource Delivery
ISO/IEC 21000-13:	☺
ISO/IEC 21000-14:2007	Conformance Testing
ISO/IEC 21000-15:2006	Event Reporting. (amendment and corrigendum 2008)
ISO/IEC 21000-16:2006	Binary Format
ISO/IEC 21000-17:2006	Fragment Identification of MPEG Resources
ISO/IEC 21000-18:2007	Digital Item Streaming (amendment 2008)
ISO/IEC 21000-19:2010	Media Value Chain Ontology
ISO/IEC 21000-20:2013	Contract Expression Language
ISO/IEC 21000-21:2013	Media Contract Ontology (corrigendum 2014)

Table 1 - List of MPEG-21 parts

6.1.2 Digital item identification and declaration

ISO/IEC 21000-2 is MPEG-21 part 2: Digital Item Declaration (DID) while ISO/IEC 21000-3 is MPEG-21 part 3: Digital Item Identification (DII).

The Digital Item is the unit of distribution and transaction in the MPEG-21 framework.

Its "declaration" implies the specification of the resources, the metadata, and the relationships information, according to the abstract model given in Figure 1. Part 2 of MPEG-21 also specifies an XML Schema, publicly available at http://standards.iso.org/ittf/PubliclyAvailableStandards/MPEG-21_schema_files/did/didl.xsd, as the definition of the XML based Digital Item Declaration Language (DIDL). See also [8].
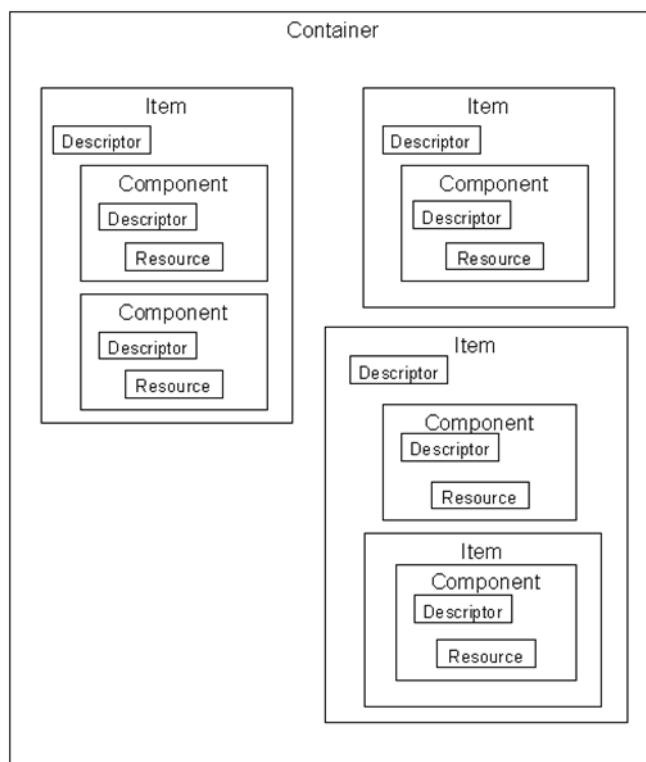
Figure 6 – Digital item declaration model

Part 3 of MPEG-21 provides a method, based on URNs, to use existing identification schemes to identify Digital Items, so that resources are uniquely identified together with the governing identification scheme. For example, the identifier element:

```
<dii:Identifier>urn:mpegRA:mpeg21:dii:isan:0000-0000-3A8D-0000-Z-
0000-0000-6</dii:Identifier>
```

contains the ISAN of "Gone with the wind".

6.1.3 Rights Expression Language

ISO/IEC 21000-5 is MPEG-21 part 5: Rights Expression Language (REL). Standardised in2004, it got later the following amendments to specify three different profiles:

- AMD1: MAM (Mobile And optical Media) profile, 2007
- AMD2: DAC (Dissemination and Capture) profile, 2007
- AMD3: OAC (Open Access Content) profile, 2008

REL aims at representing rights expression and, especially intended for licenses, is prevalently oriented to the business-to-consumer (B2C) scenario. MPEG-21 REL adopts a simple and extensible data model. For defining a rights expression a few basic entities and the relationship among those entities are given. The basic assertion is the "grant", which consists of the following:

- The Principal to whom the Grant is issued
- The Right that the Grant specifies
- The Resource to which the Right in the Grant applies
- The Conditions that must be met before the Right can be exercised

A typical REL license is made of a number of "grants" and an "issuer", which is the entity granting a right to the principal. The rights usually specify the action that can be performed by the principal on the resource.

REL, together with its profiles, is defined by means of XML Schemas that can be found at the link:
http://standards.iso.org/ittf/PubliclyAvailableStandards/MPEG-21_schema_files/rel-*/

A possible limitation of REL in some broader scenarios is that no obligations or prohibitions can be expressed, unless as "conditions of rights". Besides REL is not symmetric regarding the two agents, i.e. "Principal" and "Issuer", as there cannot be exchange of rights and conditions affecting both parties in the same REL document, but two distinct documents would be necessary.

6.1.4   Rights Data Dictionary

ISO/IEC 21000-6 is MPEG-21 part 6: Rights Data Dictionary (RDD). Standardised in2004, it got later one amendment (2006) and two corrigenda (2005, 2007). It is conceived to support REL.

It contains about 2000 terms, with a single defined meaning, however terms governed by other organisations (than MPEG) can be incorporated by using a mapping mechanism. The fourteen basic terms used to define rights in REL (actions) are:

- Adapt
- Install
- Delete
- Modify
- Diminish
- Move
- Embed

- Play
- Enhance
- Print
- Enlarge
- Reduce
- Execute
- Uninstall

There was a "Registration Authority" in charge of extending the vocabulary with additional terms at http://www.iso21000-6.net/. A recent check has returned that the registry is still formally constituted, but has never received any input, so that it is unlikely to be appropriate for a current management of controlled vocabularies or taxonomies.

6.1.5   Media Value Chain Ontology

ISO/IEC 21000-19 [2] is MPEG-21 part 19: Media Value Chain Ontology (MVCO). Standard published in 2010.

The ontology itself can be found at its IRI (which is a URL) http://purl.org/NET/mvco.owl , a good source of further information is found at http://dmag.ac.upc.edu/ontologies/mvco/ .

The essence of MVCO is made of Intellectual Property Entities (IP Entities) and Actions that can be performed on them by Users, according to Permissions issued by Users. New IP Entities can results from the execution of permitted actions.

The value chain of the IP-Entity begins with "Work" (a creation that retains intellectual or artistic attributes independently of its Manifestations) and ends with "Product", with the intermediated entities shown in Figure 7 (taken from [4]).
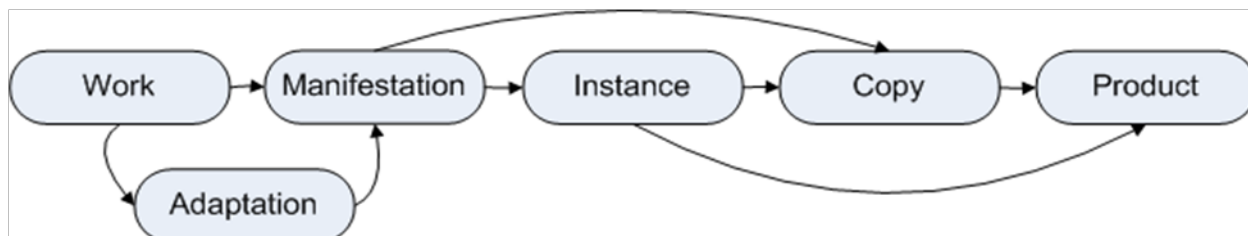
Figure 7 - Value chain of the IP-Entities in MVCO

MVCO was used in PrestoPRIME as the basis of its Rights Ontology [9] because of the permission model shown in Figure 8, where the Permission to be valid requires that a number of Facts hold (are true), allowing thus the definition of conditions.
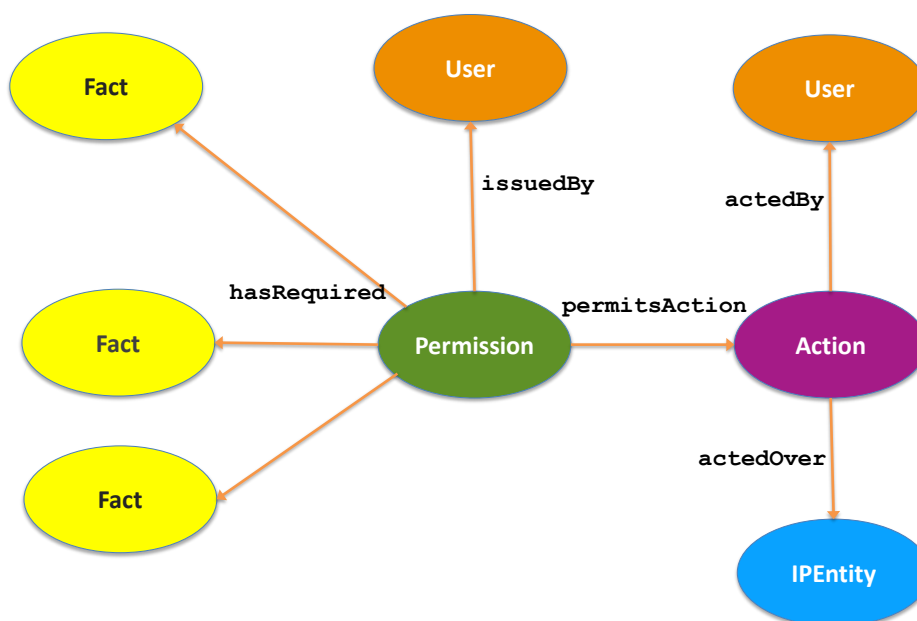
Figure 8 – Diagram of MVCO permission model

6.1.6   Contract Expression Language

ISO/IEC 21000-20 is MPEG-21 part 20: Contract Expression Language (CEL). Standard published in 2013.

This standard is one of the two electronic formats for the representation of media contracts, resulting from the latest initiative in MPEG-21 framework, the other one being part 21 Media Contract Ontology (MCO), described in 6.1.7 .

CEL is purposely defined as an XML format, normatively specified by XML Schemas. As it is conceived for extensions, one XML Schema is that of the core, with the structural elements; a first extension, namely for "the exploitation of intellectual property rights", is already defined with its XML Schema.

Most of the addressed requirements are the same than for MCO: identification of the contract itself, relationships with pre-existing contracts, identification of the parties, identification of the object of the contract, definition of deontic-expressions (permissions, obligation, prohibitions), with support to complex logical constructs, signatures and encryption (partial or complete).

Also CEL and MCO are similar in much more detail. For instance they share the approach for expressing complex constraints by means of logical constructs (intersection, union, or negation) and possible inter-dependencies between deontic-expressions (pre-conditions on actions), and their respective IPRE extensions address exactly the same domain.

It is possible to say that CEL and MCO are interchangeable, that is they can conceptually replace each other easily, although they were not defined to ensure 100% equivalence.

An example of CEL contract, implementing a simple narrative contract sample provided by RAI, is given in Box 1. The party details are given only for RAI, the party signatures have been omitted. The contract is about RAI being granted, with exclusivity for free linear communication to the public of an Animated Series (no details given), in Italy (including San Marino and the Vatican City), in Italian language, limited to 10 runs, with a license period of 5 years.

```
<cel-core:contract contractId="x275" xsi:schemaLocation="urn:mpeg:mpeg21:cel:ipre:2012
http://standards.iso.org/ittf/PubliclyAvailableStandards/MPEG-21_schema_files/celxsd-
mcoowl/cel-ipre.xsd" xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:cel-
ipre="urn:mpeg:mpeg21:cel:ipre:2012" xmlns:dii="urn:mpeg:mpeg21:2002:01-DII-NS"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:cel-
core="urn:mpeg:mpeg21:cel:core:2012">
  <cel-core:party id="rai.it">
    <cel-core:organization>
      <cel-core:name>RAI - Radiotelevisione Italiana S.p.A.</cel-core:name>
      <dc:identifier>VATIN:06382641006</dc:identifier>
      <dc:description>the Italian public broadcasting company</dc:description>
      <cel-core:signatory>
        <cel-core:name>LG</cel-core:name>
        <cel-core:jobTitle>CEO</cel-core:jobTitle>
      </cel-core:signatory>
    </cel-core:organization>
    <cel-core:address>viale Mazzini 14, 00195 Roma, Italy</cel-core:address>
  </cel-core:party>
  <cel-core:party id="XXXX">
    <cel-core:organization>
      <cel-core:name>XXXX</cel-core:name>
      <cel-core:signatory>
        <cel-core:name>XX</cel-core:name>
        <cel-core:jobTitle>CEO</cel-core:jobTitle>
      </cel-core:signatory>
    </cel-core:organization>
  </cel-core:party>
  <cel-core:body>
    <cel-core:operativePart>
      <cel-core:deonticStructuredClause id="x276" deonticType="Permission">
        <cel-core:subject partyRef="rai.it"/>
        <cel-core:act>
          <cel-ipre:communicationToThePublic/>
        </cel-core:act>
        <cel-core:object>
```

```
            <cel-core:item name="AnimatedSeries">
             <dii:Identifier>isan:ab123yz</dii:Identifier>
          </cel-core:item>
        </cel-core:object>
          <cel-core:constraint>
            <cel-ipre:accessPolicy access="freeOfCharge"></cel-ipre:accessPolicy>
            <cel-ipre:deliveryModality mod="linear"></cel-ipre:deliveryModality>
            <cel-ipre:temporalInterval>
              <cel-ipre:afterDate>2011-04-15T00:00:00</cel-ipre:afterDate>
              <cel-ipre:beforeDate>2016-04-15T23:59:59</cel-ipre:beforeDate>
            </cel-ipre:temporalInterval>
            <cel-ipre:spatialLocation>
              <cel-ipre:location>
                 <cel-ipre:country>IT</cel-ipre:country>
                 <cel-ipre:country>VA</cel-ipre:country>
                 <cel-ipre:country>SM</cel-ipre:country>
              </cel-ipre:location>
            </cel-ipre:spatialLocation>
            <cel-ipre:runs number="10"></cel-ipre:runs>
            <cel-ipre:language lang="it"/>
            <cel-ipre:isExclusive value="true"/>
        </cel-core:constraint>
        <cel-core:issuer partyRef="XXXX"/>
      </cel-core:deonticStructuredClause>
    </cel-core:operativePart>
  </cel-core:body>
</cel-core:contract>
```

Box 1 – Example of CEL contract

6.1.7   Media Contract Ontology

ISO/IEC 21000-21 is MPEG-21 part 21: Media Contract Ontology (MCO). Standard published in2013. A corrigendum was approved in 2014 (waiting for publication).

This standard is one of the two electronic formats for the representation of media contracts, resulting from the latest initiative in MPEG-21 framework, the other one being CEL, described in 6.1.6 .

MCO is based on MVCO. The MVCO permission model is extended to cover the other deontic expressions (prohibition and obligation in addition to permission), and structurally MCO addresses the same set of requirements than CEL, apart that MCO is clearly an OWL-based format. Similarly to CEL, also MCO is organized in a core/extensions structure, the first extension being again that for "the exploitation of intellectual property rights".

Although the text of the specification is available for purchase at www.iso.ch , the two ontologies `mco-core.owl` and `mco-ipre.owl` are publicly available resources.
An informative documentation is available at the following persistent links:

- http://purl.oclc.org/NET/mco-core

- http://purl.oclc.org/NET/mco-ipre

The contract model of MCO is shown in Figure 9, while the main elements of MCO contracts are represented in the diagram of Figure 10.
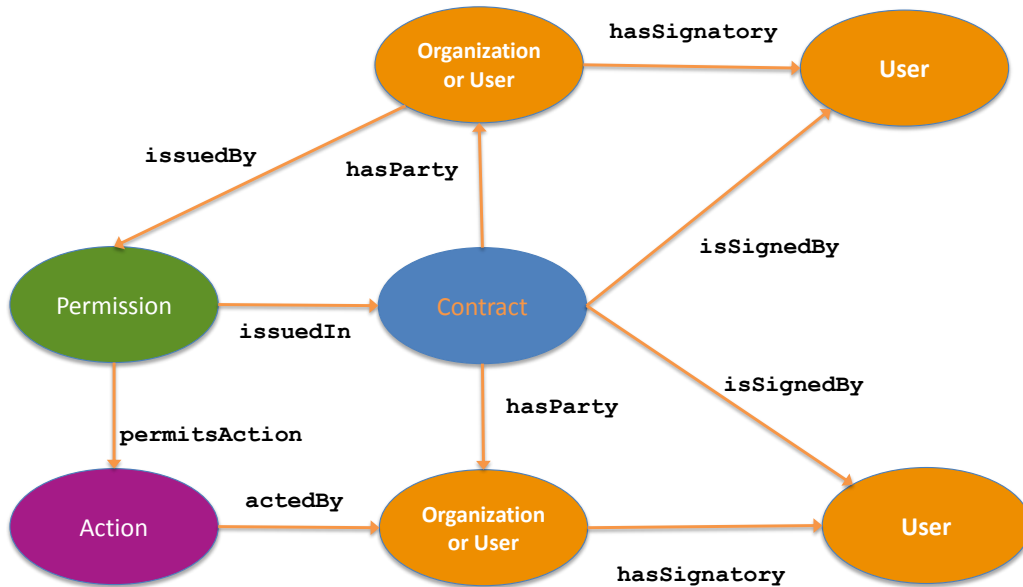
Figure 9 - Diagram of MCO Contract Model
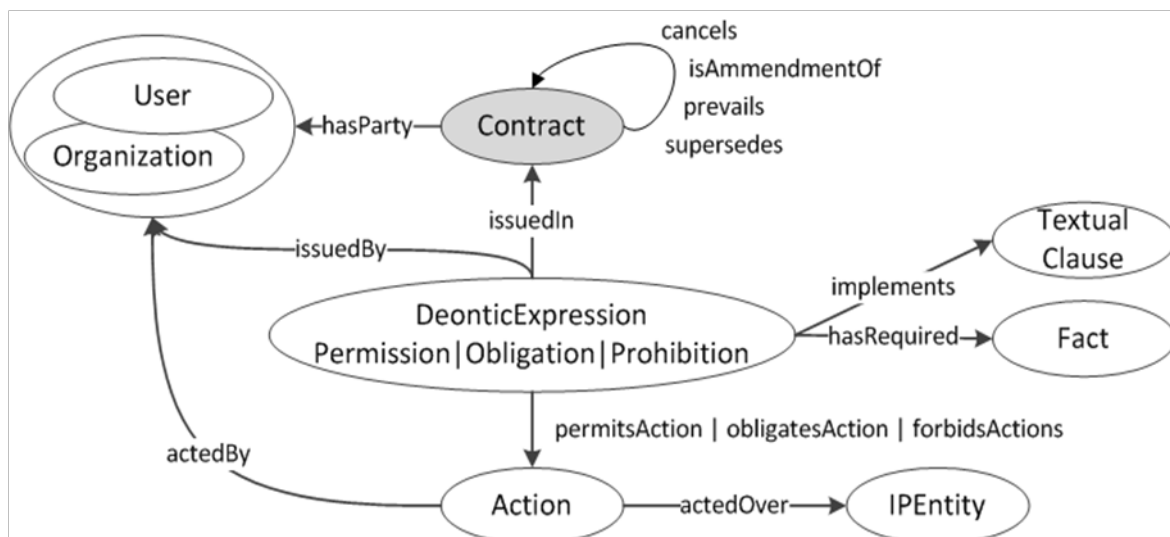
Figure 10 - Main elements of MCO contract

In MCO-IPRE the possible defined "actions", under the generic exploitation of intellectual property rights, are those mentioned in the common legal framework, specifically: "Fixate", "Transform", Duplicate", "Distribute", "Public-Performance", and "Communication-to-the-Public". They are organized in a hierarchy, as shown on the left side of Figure 11, so that it's possible to indicate an action with the desired level of generality/specificity. For example if a generic action is permitted, this is also true for any action defined by its sub-classes. Therefore the permission to "ExploitIPRights" is equivalent to the permission for any action under its hierarchy, i.e. having all the commercial rights.

Such basic rights are then refined within contracts by the definition of conditions. MCO allows the expression of conditions by requiring a number of "Facts" to be true, in order to make a deontic expression valid. MCO-IPRE defines a hierarchy of exploitation conditions, shown on the right side of Figure 11, which cover, with the desired degree of

generality/specificity, the various dimensions actually used in real contracts, and specifically:

- the Access Policy - which can be "free of charge" or "pay" under various forms;

- the Means - i.e. conditions on the technology;

- the Delivery Modality - which can be "linear" (i.e. simultaneously to many users) or "non linear" (i.e.at the moment chosen by the end user and at her individual request, a.ka. "make available") under various forms;

- the Service Access Policy - which can be "open" or "restricted";

- the Device - i.e. conditions on the end user's device for content fruition;

- the User Time Access - which can be "limited" (e.g. as for rental) or "unlimited";

- the Run - i.e. conditions on the number of times which an action is executed;

- the Temporal Context - which is the license period;

- the Spatial Context - which is the territory;

- the Language - of the communication to the public (e.g. dubbing or subtitles);

- the Length - the duration of the content resulting from the action;

- the IP-Entity Context - a condition on the content to be used within a specified editorial context.

Two further conditions are included in the working draft of the 2nd edition of MCO standard, [42], and are depicted in light yellow in Figure 11, right side:

- the Material Format – the technical properties of the material used in (or resulting from) the exploitation;

- the Service Channel Context – which is the set of outlets used for the exploitation of the right.

As an example, if the delivery modality is not constrained, then no fact belonging to its sub-hierarchy will be required, otherwise one among "linear", "non linear", and one their subclasses ("broadcasting" and "webcasting" are linear modalities, while "on demand basis", "on demand download", and "on demand streaming" a non linear modalities) will be required.

Two other smart mechanisms are present in MCO for the definition of conditions:
- logical expression of Facts (negation, intersection and union) - for example a condition on the technology can be defined as an alternative between two or more means, doesn't matter which one; or defining a negative spatial context (anywhere but not in a specified country);

- inter-dependency between deontic expressions - one being valid according to the start or completion of an action permitted or obligated or forbidden by another deontic expression.

The latter mechanism can be used for addressing real cases such as the so-called "Catch-up-TV" (right to make available content on the web in period of time related to its broadcast) or "cascading series" (stopping rights on episodes of series in relation with the publication of the last episode), and so on.
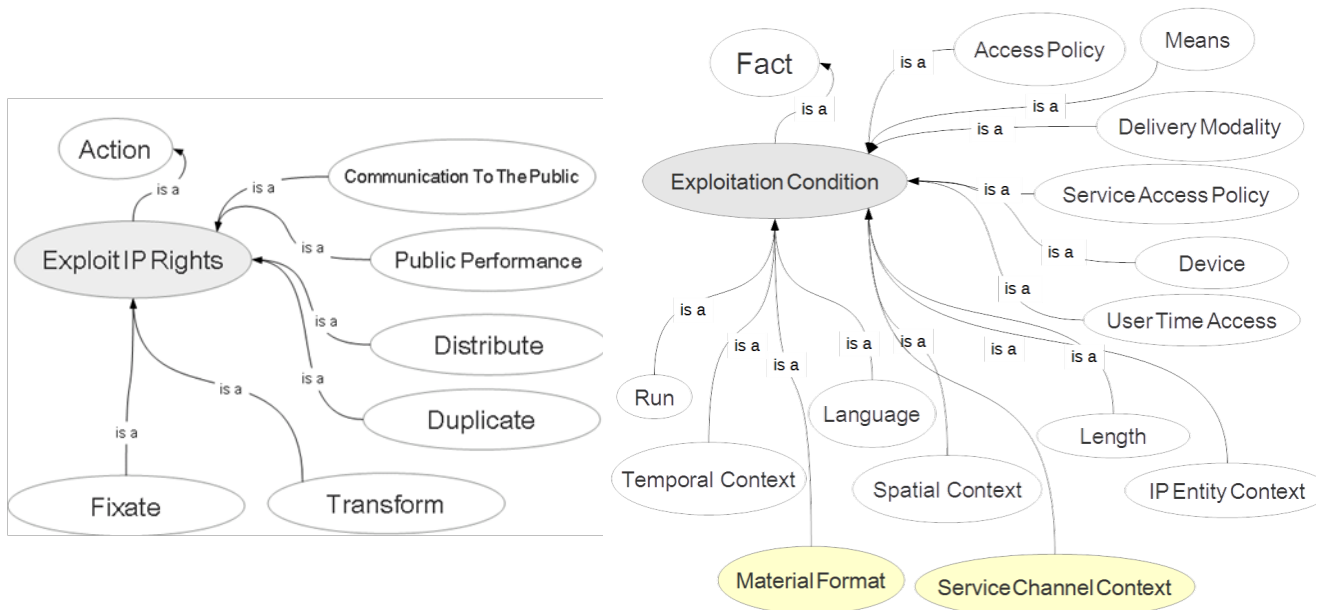
Figure 11 - Actions (left) and Conditions (right) for exploitation of Intellectual Property Rights

The same example used for mapping to CEL in 6.1.6 was mapped to MCO and the resulting RDF/XML serialization is given in Box 2. In the case of MCO other equivalent serializations are also possible, such as OWL/XML or Turtle.

While an XML structure is a tree, the OWL document instance is a graph. Therefore its serialized form is not as easy as for that of CEL for a human reading, although none of those formats are normally intended for human processing. However the graph of the same MCO contract can be presented in the form of diagram as shown in Figure 12.

```
<rdf:RDF xmlns="http://www.w3.org/2002/07/owl#" xml:base="http://www.w3.org/2002/07/owl"
xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:rdfs="http://www.w3.org/2000/01/rdf-
schema#"      xmlns:mco-core="urn:mpeg:mpeg21:mco:core:2012#"
xmlns:owl="http://www.w3.org/2002/07/owl#" xmlns:xsd="http://www.w3.org/2001/XMLSchema#"
xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:mco-
ipre="urn:mpeg:mpeg21:mco:ipre:2012#" xmlns:mvco="http://purl.oclc.org/NET/mvco.owl#"
xmlns:DII-NS="urn:mpeg:mpeg21:2002:01-DII-NS#">
    <Ontology rdf:about="urn:it.rai:mco-rights-mcosample">
        <imports rdf:resource="urn:mpeg:mpeg21:mco:ipre:2012"/>
    </Ontology>
    <NamedIndividual rdf:about="urn:it.rai:mco-rights-mcosample#AnimatedSeries">
        <rdf:type rdf:resource="http://purl.oclc.org/NET/mvco.owl#IPEntity"/>
        <DII-NS:Identifier >isan:ab123yz</DII-NS:Identifier>
    </NamedIndividual>
    <NamedIndividual rdf:about="urn:it.rai:mco-rights-mcosample#LG">
        <rdf:type rdf:resource="http://purl.oclc.org/NET/mvco.owl#User"/>
    </NamedIndividual>
    <NamedIndividual rdf:about="urn:it.rai:mco-rights-mcosample#XX">
        <rdf:type rdf:resource="http://purl.oclc.org/NET/mvco.owl#User"/>
    </NamedIndividual>
    <NamedIndividual rdf:about="urn:it.rai:mco-rights-mcosample#XXXX">
        <rdf:type rdf:resource="urn:mpeg:mpeg21:mco:core:2012#Organization"/>
        <mco-core:hasSignatory rdf:resource="urn:it.rai:mco-rights-mcosample#XX"/>
    </NamedIndividual>
    <NamedIndividual rdf:about="urn:it.rai:mco-rights-mcosample#rai.it">
        <rdf:type rdf:resource="urn:mpeg:mpeg21:mco:core:2012#Organization"/>
        <dc:title >RAI-Radiotelevisione Italiana S.p.A.</dc:title>
        <dc:identifier>VATIN:06382641006</dc:identifier>
        <dc:description>the Italian public broadcaster company</dc:description>
        <mco-core:Address>viale Mazzini14, 00195 Roma, Italy</mco-core:Address>
```

```
            <mco-core:hasSignatory rdf:resource="urn:it.rai:mco-rights-mcosample#LG"/>
    </NamedIndividual>
    <NamedIndividual rdf:about="urn:it.rai:mco-rights-mcosample#x275">
        <rdf:type rdf:resource="urn:mpeg:mpeg21:mco:core:2012#Contract"/>
        <mco-core:hasParty rdf:resource="urn:it.rai:mco-rights-mcosample#XXXX"/>
        <mco-core:hasParty rdf:resource="urn:it.rai:mco-rights-mcosample#rai.it"/>
    </NamedIndividual>
    <NamedIndividual rdf:about="urn:it.rai:mco-rights-mcosample#x276">
        <rdf:type rdf:resource="http://purl.oclc.org/NET/mvco.owl#Permission"/>
        <mco-ipre:isExclusive>true</mco-ipre:isExclusive>
        <mco-core:issuedBy rdf:resource="urn:it.rai:mco-rights-mcosample#XXXX"/>
        <mco-core:issuedIn rdf:resource="urn:it.rai:mco-rights-mcosample#x275"/>
        <mvco:permitsAction rdf:resource="urn:it.rai:mco-rights-mcosample#x277"/>
        <mvco:hasRequired rdf:resource="urn:it.rai:mco-rights-mcosample#x278"/>
        <mvco:hasRequired rdf:resource="urn:it.rai:mco-rights-mcosample#x279"/>
        <mvco:hasRequired rdf:resource="urn:it.rai:mco-rights-mcosample#x281"/>
        <mvco:hasRequired rdf:resource="urn:it.rai:mco-rights-mcosample#x282"/>
        <mvco:hasRequired rdf:resource="urn:it.rai:mco-rights-mcosample#x283"/>
        <mvco:hasRequired rdf:resource="urn:it.rai:mco-rights-mcosample#x284"/>
    </NamedIndividual>
    <NamedIndividual rdf:about="urn:it.rai:mco-rights-mcosample#x277">
        <rdf:type rdf:resource="urn:mpeg:mpeg21:mco:ipre:2012#CommunicationToThePublic"/>
        <mvco:actedOver rdf:resource="urn:it.rai:mco-rights-mcosample#AnimatedSeries"/>
        <mvco:actedBy rdf:resource="urn:it.rai:mco-rights-mcosample#rai.it"/>
    </NamedIndividual>
    <NamedIndividual rdf:about="urn:it.rai:mco-rights-mcosample#x278">
        <rdf:type rdf:resource="urn:mpeg:mpeg21:mco:ipre:2012#FreeOfCharge"/>
    </NamedIndividual>
    <NamedIndividual rdf:about="urn:it.rai:mco-rights-mcosample#x279">
        <rdf:type rdf:resource="urn:mpeg:mpeg21:mco:ipre:2012#Linear"/>
    </NamedIndividual>
    <NamedIndividual rdf:about="urn:it.rai:mco-rights-mcosample#x281">
        <rdf:type rdf:resource="urn:mpeg:mpeg21:mco:ipre:2012#TemporalContext"/>
        <mco-ipre:afterDate >20110415</mco-ipre:afterDate>
        <mco-ipre:beforeDate >20160415</mco-ipre:beforeDate>
    </NamedIndividual>
    <NamedIndividual rdf:about="urn:it.rai:mco-rights-mcosample#x282">
        <rdf:type rdf:resource="urn:mpeg:mpeg21:mco:ipre:2012#Run"/>
        <mco-ipre:hasNumberOfRuns >10</mco-ipre:hasNumberOfRuns>
    </NamedIndividual>
    <NamedIndividual rdf:about="urn:it.rai:mco-rights-mcosample#x283">
        <rdf:type rdf:resource="urn:mpeg:mpeg21:mco:ipre:2012#Language"/>
        <mco-ipre:hasLanguage >#it;</mco-ipre:hasLanguage>
    </NamedIndividual>
    <NamedIndividual rdf:about="urn:it.rai:mco-rights-mcosample#x284">
        <rdf:type rdf:resource="urn:mpeg:mpeg21:mco:ipre:2012#SpatialContext"/>
        <mco-ipre:inCountry >#IT;#VA;#SM;</mco-ipre:inCountry>
    </NamedIndividual>
</rdf:RDF>
```
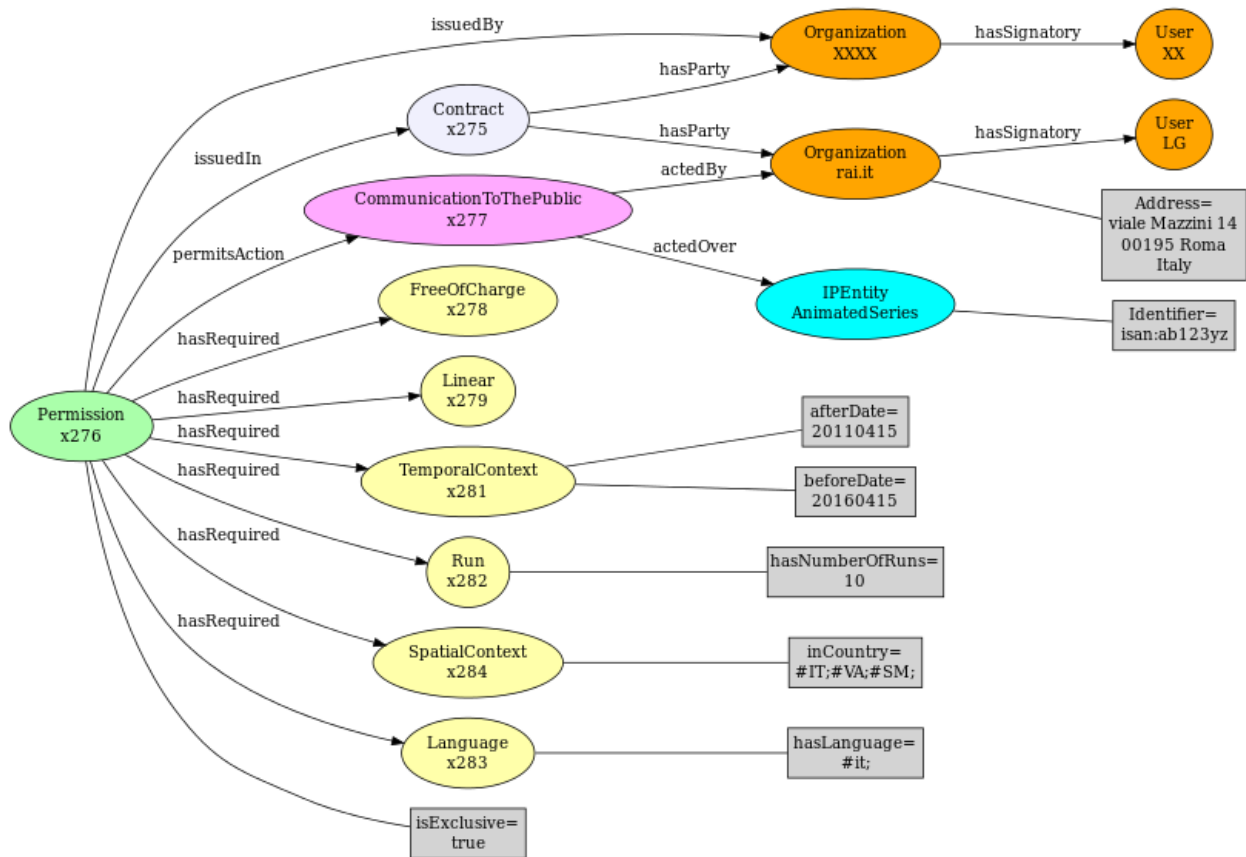
Box 2 – Example of MCO contract

Figure 12 - Diagram representing the MCO contract sample of Box 2

The full hierarchy of exploitation conditions, up-to date according to MCO second edition working draft, [42], is given in Figure 13
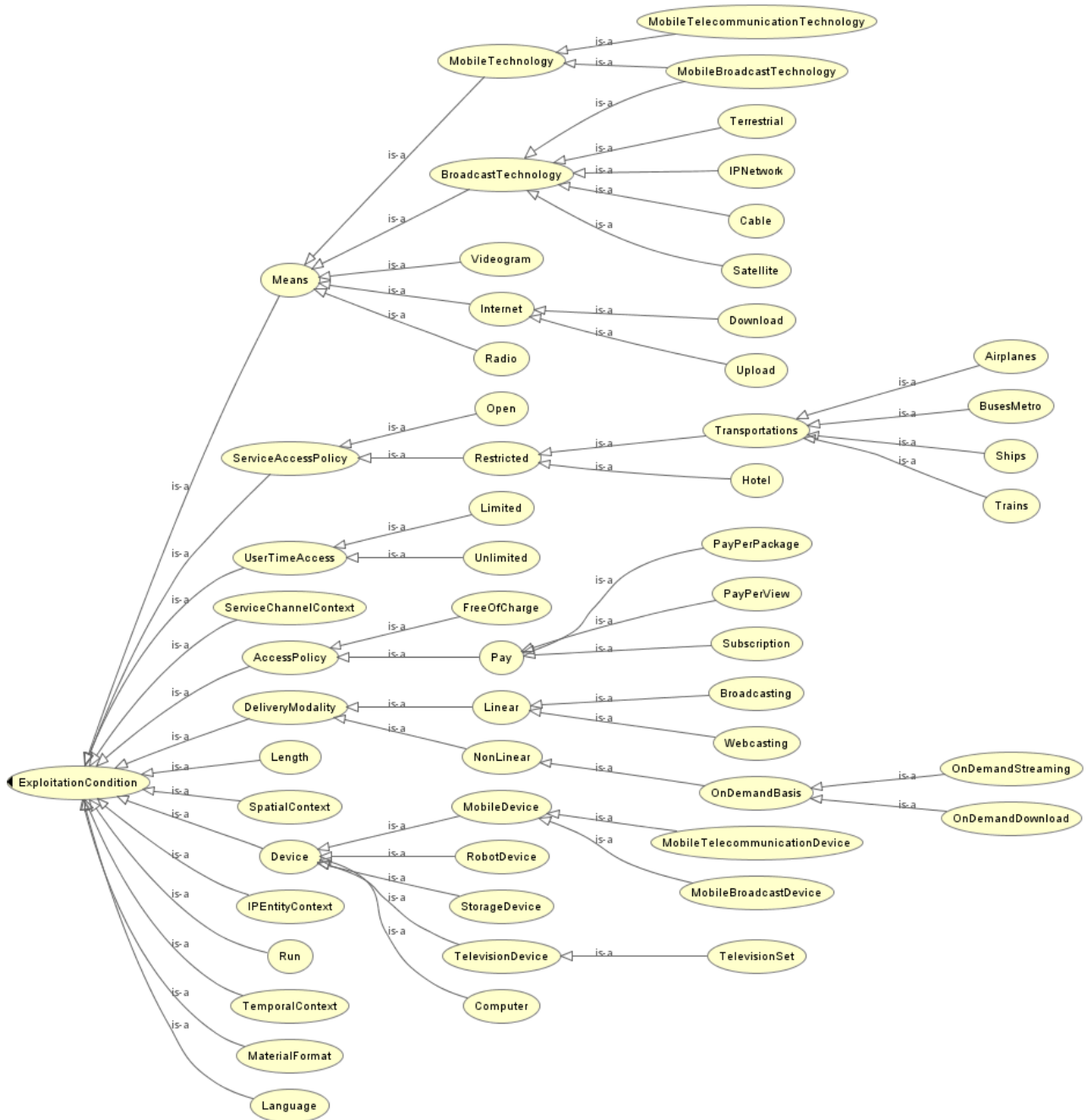
Figure 13 – Complete hierarchy of exploitation condition according to MCO 2nd edition working draft

6.2 ODRL

6.2.1 Introduction

As indicated on the page (http://www.w3.org/community/odrl/) of the W3C ODRL Community Group [22], the Open Digital Rights Language (ODRL) Initiative is an international effort aimed at developing and promoting an open standard for policy expressions. ODRL provides flexible and interoperable mechanisms to support transparent and innovative use of digital content in publishing, distribution and consumption of digital media across all sectors and communities. The ODRL Policy model is broad enough to support traditional rights expressions for commercial transaction, open access expressions for publicly distributed content, and privacy expressions for social media.

The Open Mobile Alliance (http://openmobilealliance.org/) profiled ODRL1.1 for OMA DRM.

The current finalized version is ODRL 2.0, which is made of:

- a Core Model;

- a Common Vocabulary;

- an XML Encoding.

A profile of ODRL 2.0 has been developed to represent Creative Commons statements. ODRL2.0 proposes an abstract core model which can be represented as JSON, XML or RDF. While the three of them can convey the same information, the latter is based on an ODRL2.0 Ontology which might be used to make inferences not possible with the others. While this feature is not likely to be exploited in practical settings, it permits rights expressions to be written as Linked Data. The ability to expose rights information as Linked Data (following the design principles in http://www.w3.org/standards/semanticweb/data) makes the RDF serialization the right choice if the rights expressions are to be publicly available and connected to other entities.

The current draft work is on ODRL 2.1 (due for release by end 2014), which defines:

- a Core Model;

- a Common Vocabulary;

- an XML Encoding;

- a JSON Encoding;

- an Ontology; and

- a Creative Commons Profile.

The namespace URI for ODRL will be changed in ODRL 2.1 to comply with W3C rules and the Vocabulary namespace will be merged into it, which has been made to strengthen its RDF representation. Version 2.1 will also provide a refined Actions Vocabulary. No other substantial changes are planned at the time of publishing this report.

IPTC's RightsML is a profile of ODRL, presented in detail in paragraph 6.2.3 .

6.2.2   Core model and common vocabulary

Figure 14 shows the complete version 2.0 ODRL Core Model. Policy is the central entity that holds an ODRL policy together. In its encoded form, e.g. in an XML document, it makes the policy addressable from the outside world via its uid attribute. Policy can refer to Permissions and Prohibitions.

A Permission allows a particular Action to be executed on a related Asset, e.g. "play the audio file abc.mp3″. A Constraint like "at most 10 times" might be added to specify the Permission more precisely. The Party that grants this Permission is linked to it with the Role "assigner", the Party that is granted the Permission is linked to it with the Role "assignee", e.g. "assigner VirtualMusicShop grants the Permission to assignee Alice". Additionally, a Permission MAY be linked to Duty entities.

Similar to Permission, a Duty states that a certain Action MAY be executed by the Party with the Role "assignee" for the Permission to be valid, e.g. "Alice must pay 5 EUR in order to get the Permission to play abc.mp3″.

The Prohibition entity is used in the same way as Permission, with the two differences that it does not refer to Duty and (obviously) that it forbids the Action, e.g. "*Alice is forbidden to use abc.mp3 commercially*".

For more information: http://www.w3.org/community/odrl/two/model/
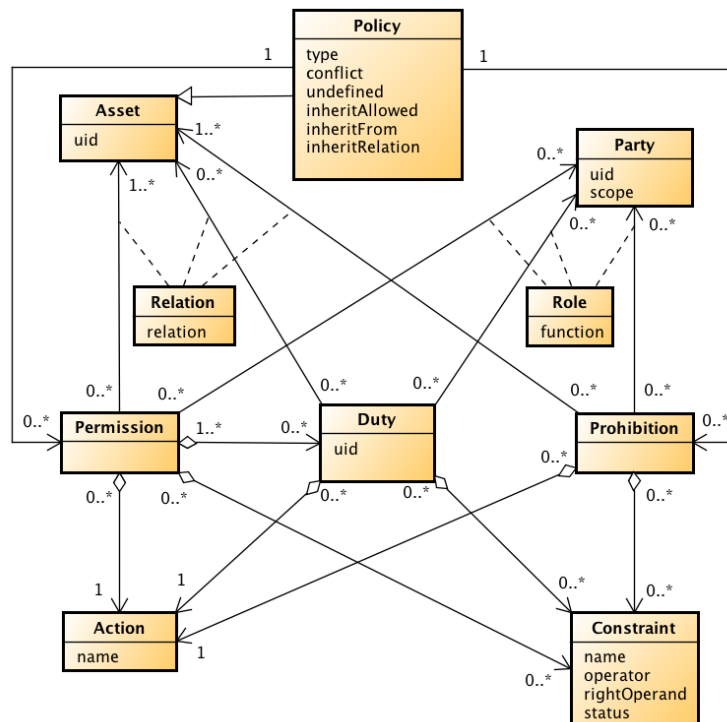

Figure 14 - Diagram of ODRL Core Model

The example already given for CEL and MCO, in clauses 6.1.6 and 6.1.5 respectively, can be partially mapped in ODRL v2.0 as well, as shown in Box 3 using the XML encoding of ODRL. Some characteristics, such as the signatories (and possibly their signatures) and the exclusivity flag, are not mapped. The attribute values with cyan background in Box 3 are actually URNs of MCO/IPRE, because they are not present in the current version of ODRL Vocabulary (http://www.w3.org/community/odrl/two/vocab/).

```xml
<o:policy type="http://w3.org/ns/odrl/vocab#agreement" uid="x275"
xsi:schemaLocation="http://w3.org/ns/odrl/2/ odrl2.0.xsd"
xmlns:o="http://w3.org/ns/odrl/2/" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <o:permission id="x276">
    <o:asset id="AnimatedSeries" uid="isan:ab123yz"
            relation="http://w3.org/ns/odrl/vocab#target"/>
    <o:action name="urn:mpeg:mpeg21:mco:ipre:2012#CommunicationToThePublic" id="x277"/>
    <o:constraint name="http://w3.org/ns/odrl/vocab#count"
       operator="http://w3.org/ns/odrl/vocab#lteq" rightOperand="10"/>
    <o:constraint name="http://w3.org/ns/odrl/vocab#language"
       operator="http://w3.org/ns/odrl/vocab#eq" rightOperand="it"/>
    <o:constraint name="http://w3.org/ns/odrl/vocab#spatial"
       operator="http://w3.org/ns/odrl/vocab#isAnyOf" rightOperand="IT SM VA"/>
    <o:constraint name="urn:mpeg:mpeg21:mco:ipre:2012#DeliveryModality"
       operator="http://w3.org/ns/odrl/vocab#isAnyOf"
       rightOperand="urn:mpeg:mpeg21:mco:ipre:2012#Linear"/>
    <o:constraint name="urn:mpeg:mpeg21:mco:ipre:2012#AccessPolicy"
       operator="http://w3.org/ns/odrl/vocab#isAnyOf"
       rightOperand="urn:mpeg:mpeg21:mco:ipre:2012#FreeOfCharge"/>
    <o:constraint name="http://w3.org/ns/odrl/vocab#dateTime"
       operator="http://w3.org/ns/odrl/vocab#gt" rightOperand="2011-04-15"/>
    <o:constraint name="http://w3.org/ns/odrl/vocab#dateTime"
       operator="http://w3.org/ns/odrl/vocab#lteq" rightOperand="2016-04-15"/>
```

```
     <o:party uid="www.rai.it" function="http://w3.org/ns/odrl/vocab#assignee"></o:party>
     <o:party uid="XXXX" function="http://w3.org/ns/odrl/vocab#assigner"></o:party>
   </o:permission>
</o:policy>
```

Box 3 - Example of ODRL 2.0 XML agreement

A similar exercise can be done with RDF version of ODRL (http://www.w3.org/ns/odrl/2/ODRL20.rdf) and the RDF/XML resulting serialization is given in Box 4 and its graph diagram is presented in Figure 15.

```
<rdf:RDF xmlns="urn:it.rai:odrl-rights-odrlsample#" xml:base="urn:it.rai:odrl-rights-
odrlsample"
     xmlns:odrl-rights-odrlsample="urn:it.rai:odrl-rights-odrlsample#"
xmlns:rdfs="http://www.w3.org/2000/01/rdf-
schema#"xmlns:owl="http://www.w3.org/2002/07/owl#"
xmlns:xsd="http://www.w3.org/2001/XMLSchema#"xmlns:rdf="http://www.w3.org/1999/02/22-rdf-
syntax-ns#" xmlns:odrl="http://www.w3.org/ns/odrl/2/">
    <owl:Ontology rdf:about="urn:it.rai:odrl-rights-odrlsample">
        <owl:imports rdf:resource="http://www.w3.org/ns/odrl/2/"/>
    </owl:Ontology>
    <owl:DatatypeProperty rdf:about="&odrl-rights-odrlsample;AccessPolicy">
        <rdfs:subPropertyOf rdf:resource="&odrl;rightOperand"/>
    </owl:DatatypeProperty>
    <owl:DatatypeProperty rdf:about="&odrl-rights-odrlsample;deliveryModality">
        <rdfs:subPropertyOf rdf:resource="&odrl;rightOperand"/>
    </owl:DatatypeProperty>
    <owl:DatatypeProperty rdf:about="&odrl-rights-odrlsample;spatial">
        <rdfs:subPropertyOf rdf:resource="&odrl;rightOperand"/>
    </owl:DatatypeProperty>
    <owl:Class rdf:about="&odrl-rights-odrlsample;CommunicationToThePublic">
        <rdfs:subClassOf rdf:resource="&odrl;Action"/>
    </owl:Class>
    <owl:NamedIndividual rdf:about="&odrl-rights-odrlsample;AnimatedSeries">
        <rdf:type rdf:resource="&odrl;Asset"/>
    </owl:NamedIndividual>
    <owl:NamedIndividual rdf:about="&odrl-rights-odrlsample;XXXX">
        <rdf:type rdf:resource="&odrl;Party"/>
    </owl:NamedIndividual>
    <owl:NamedIndividual rdf:about="&odrl-rights-odrlsample;rai.it">
        <rdf:type rdf:resource="&odrl;Party"/>
    </owl:NamedIndividual>
    <owl:NamedIndividual rdf:about="&odrl-rights-odrlsample;x275">
        <rdf:type rdf:resource="&odrl;Agreement"/>
        <odrl:permission rdf:resource="&odrl-rights-odrlsample;x276"/>
    </owl:NamedIndividual>
    <owl:NamedIndividual rdf:about="&odrl-rights-odrlsample;x276">
        <rdf:type rdf:resource="&odrl;Permission"/>
        <odrl:target rdf:resource="&odrl-rights-odrlsample;AnimatedSeries"/>
        <odrl:assigner rdf:resource="&odrl-rights-odrlsample;XXXX"/>
        <odrl:assignee rdf:resource="&odrl-rights-odrlsample;rai.it"/>
        <odrl:action rdf:resource="&odrl-rights-odrlsample;x277"/>
        <odrl:constraint rdf:resource="&odrl-rights-odrlsample;x278"/>
        <odrl:constraint rdf:resource="&odrl-rights-odrlsample;x279"/>
        <odrl:constraint rdf:resource="&odrl-rights-odrlsample;x281"/>
        <odrl:constraint rdf:resource="&odrl-rights-odrlsample;x281bis"/>
        <odrl:constraint rdf:resource="&odrl-rights-odrlsample;x282"/>
        <odrl:constraint rdf:resource="&odrl-rights-odrlsample;x283"/>
        <odrl:constraint rdf:resource="&odrl-rights-odrlsample;x284"/>
    </owl:NamedIndividual>
    <owl:NamedIndividual rdf:about="&odrl-rights-odrlsample;x277">
        <rdf:type rdf:resource="&odrl-rights-odrlsample;CommunicationToThePublic"/>
    </owl:NamedIndividual>
    <owl:NamedIndividual rdf:about="&odrl-rights-odrlsample;x278">
        <rdf:type rdf:resource="&odrl;Constraint"/>
        <AccessPolicy
rdf:datatype="&xsd;anyURI">urn:mpeg:mpeg21:mco:ipre:2012#FreeOfCharge</AccessPolicy>
        <odrl:operator rdf:resource="&odrl;isAnyOf"/>
```

```
    </owl:NamedIndividual>
    <owl:NamedIndividual rdf:about="&odrl-rights-odrlsample;x279">
        <rdf:type rdf:resource="&odrl;Constraint"/>
        <deliveryModality
rdf:datatype="&xsd;anyURI">urn:mpeg:mpeg21:mco:ipre:2012#Linear</deliveryModality>
        <odrl:operator rdf:resource="&odrl;isAnyOf"/>
    </owl:NamedIndividual>
    <owl:NamedIndividual rdf:about="&odrl-rights-odrlsample;x281">
        <rdf:type rdf:resource="&odrl;Constraint"/>
        <odrl:dateTime rdf:datatype="&xsd;dateTime">2011-04-15</odrl:dateTime>
        <odrl:operator rdf:resource="&odrl;gt"/>
    </owl:NamedIndividual>
    <owl:NamedIndividual rdf:about="&odrl-rights-odrlsample;x281bis">
        <rdf:type rdf:resource="&odrl;Constraint"/>
        <odrl:dateTime rdf:datatype="&xsd;dateTime">2016-04-15</odrl:dateTime>
        <odrl:operator rdf:resource="&odrl;lteq"/>
    </owl:NamedIndividual>
    <owl:NamedIndividual rdf:about="&odrl-rights-odrlsample;x282">
        <rdf:type rdf:resource="&odrl;Constraint"/>
        <odrl:count rdf:datatype="&xsd;nonNegativeInteger">10</odrl:count>
        <odrl:operator rdf:resource="&odrl;lteq"/>
    </owl:NamedIndividual>
    <owl:NamedIndividual rdf:about="&odrl-rights-odrlsample;x283">
        <rdf:type rdf:resource="&odrl;Constraint"/>
        <odrl:language rdf:datatype="&xsd;language">it</odrl:language>
        <odrl:operator rdf:resource="&odrl;eq"/>
    </owl:NamedIndividual>
    <owl:NamedIndividual rdf:about="&odrl-rights-odrlsample;x284">
        <rdf:type rdf:resource="&odrl;Constraint"/>
        <spatial rdf:datatype="&xsd;string">IT VA SM</spatial>
        <odrl:operator rdf:resource="&odrl;isAnyOf"/>
    </owl:NamedIndividual>
</rdf:RDF>
```
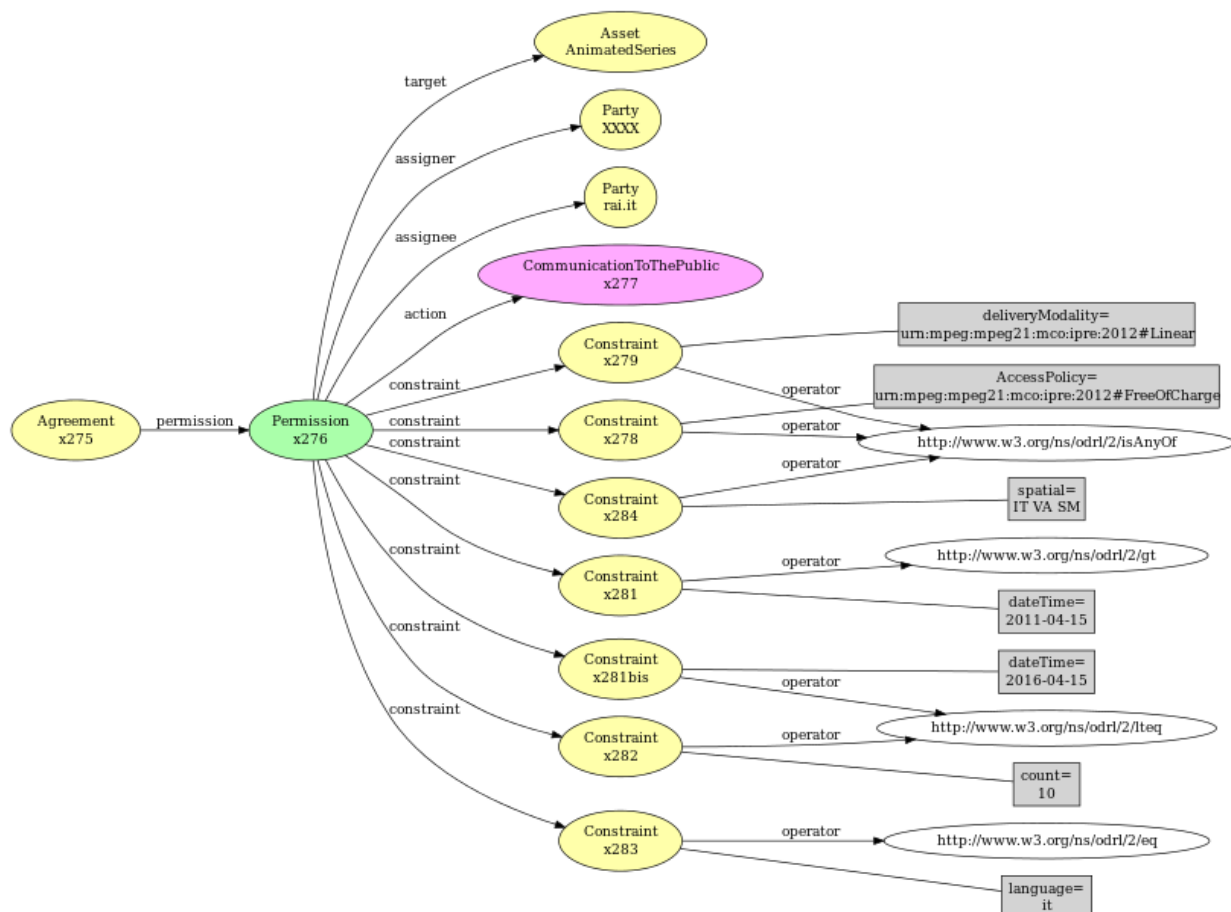
Box 4 - Example of ODRL 2.0 RDF Agreement

Figure 15 - Diagram representing the example of ODRL v2.0 RDF Agreement

6.2.3 IPTC's RightsML profile

RightsML is a profile of the Open Digital Rights Language (ODRL) Version 2.0 (to be further aligned when ODRL2.1 is released), specified by the International Press Telecommunications Council (IPTC), for application in the communication of usage policies, primarily in association with the licensed distribution and use of news content by news gathering agencies, news publishers, news licensing organisations, business intermediaries and business consumers in the online news market-place.

The RightsML use case is based upon the requirement, in the specific context of news syndication, to be able to associate a usage policy with an item of content for which usage rights are assigned by a licensing rights holder to a licensee. The assumption is that the licensee may not necessarily be the final consumer of the item in question, but is a licensed business entity that may wish to make any of a variety of permitted commercial uses of a content item, including using the item in the delivery of their own products or services to their own customers. The usage policy may therefore need to cover both the use that is made of the item by the immediate licensee to whom rights are being granted and the duty of the licensee to communicate specific usage policy terms to their own customers, associated with delivery of any content items or derivatives to their customers.

The requirement is to enable communication of the usage rights and constraints that are specific to a particular item. These might be delivered with the item – whether embedded in the item, or embedded in the communication payload that includes the item – or communicated separately.

The RightsML profile reuses specific elements of the ODRL 2.0 (and soon v2.1) vocabulary (policy types, actions, constraints, asset/groups of assets and relations, parties and roles), which semantics is occasionally refined to meet IPTC needs.

It is not an IPTC requirement that license contracts have to be expressed by ODRL in full. It is acknowledged that there are license contracts currently in use, which can be complex and would not efficiently be expressed using a Rights Expression Language. However, there is a need to express item-specific permissions or more often prohibitions by a Rights Expression Language. This is within the scope of primary use of ODRL/RightsML.

IPTC propose users to start with simple and widely used cases. This is facilitated by Simple Case examples and templates, including geographic and temporal constraints (http://dev.iptc.org/Forum-3). For IPTC, RightsML is only one of the possible representation formats for the expression of such rights.

RightsML is currently in an experimental phase by IPTC, for testing its applicability by the IPTC members. This will end when ODRL2.1 and RightsML1.2 are released by the end of 2014, early 2015, respectively.

For more information:

http://dev.iptc.org/RightsML, [23], and http://dev.iptc.org/rightsml-forum.

6.2.4   OMA profile

Provided by the OMA (Open Mobile Alliance) standard organization, OMA DRM is a Digital Rights Management (DRM) system to limit the usage of a mobile content (such as ringtones or wallpapers) in terms of diffusion and duplication. It has the aim to prevent the creation of illegal copies of a mobile digital content.

The standard has been adopted by several mobile phone manufacturers, mobile system companies and network operators [35].

Two versions of OMA DRM have been released so far: OMA DRMv1.0 and OMA DRMv2.0. The latter aims to extend some functionalities of the first version and improve the security by means of a Public Key Infrastructure (PKI) in order to prevent problems such as tapping and spoofing [35].
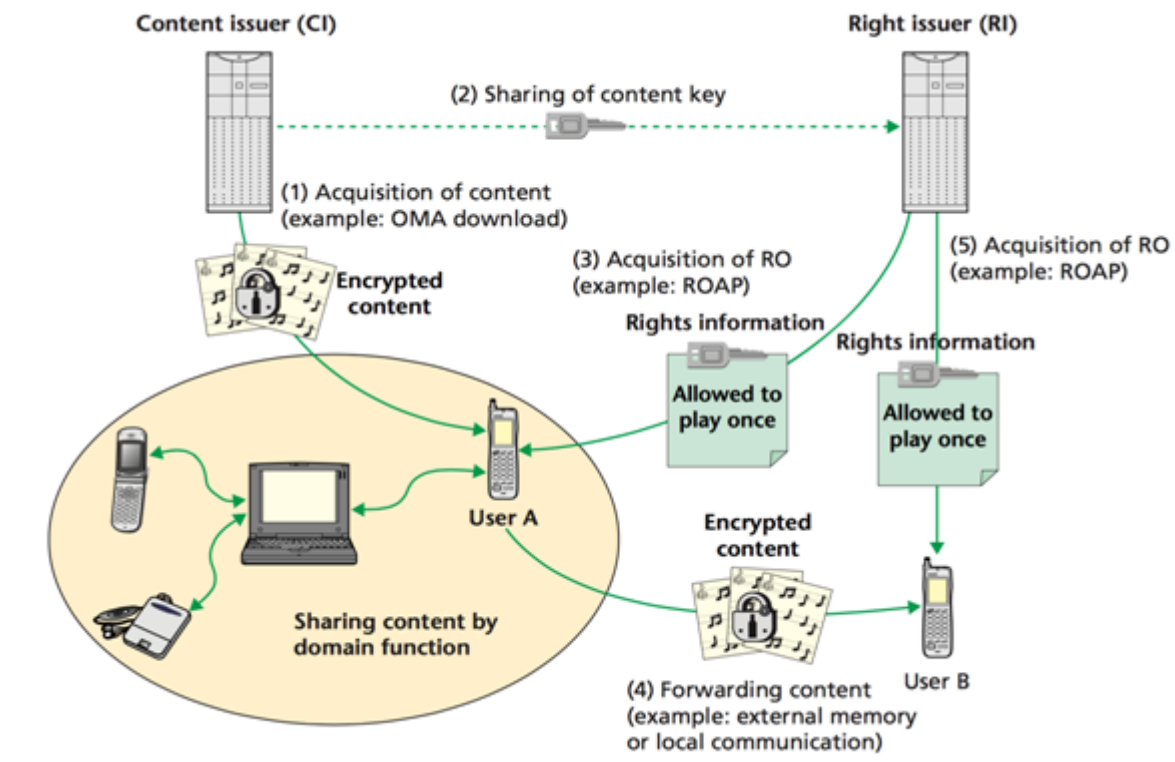
Figure 16 – Architecture of OMA DRM v2.0 [35]

As shown in Figure 16, which report the architecture of OMA DRM v2.0, the Content Issuer (CI) maintains and provides the encrypted content and shares the content key with the Right Issuer (RI) which manages the rights associated with the object.

6.3 Rights in PREMIS

6.3.1 Brief overview of PREMIS

The PREMIS data model has five primary types of entity: intellectual entities, objects, events, agents, and rights. Both a XML schema (xsd) and an ontology (owl) are provided at the PREMIS web page, http://www.loc.gov/standards/premis/. Figure 17 shows a schematic of the model.
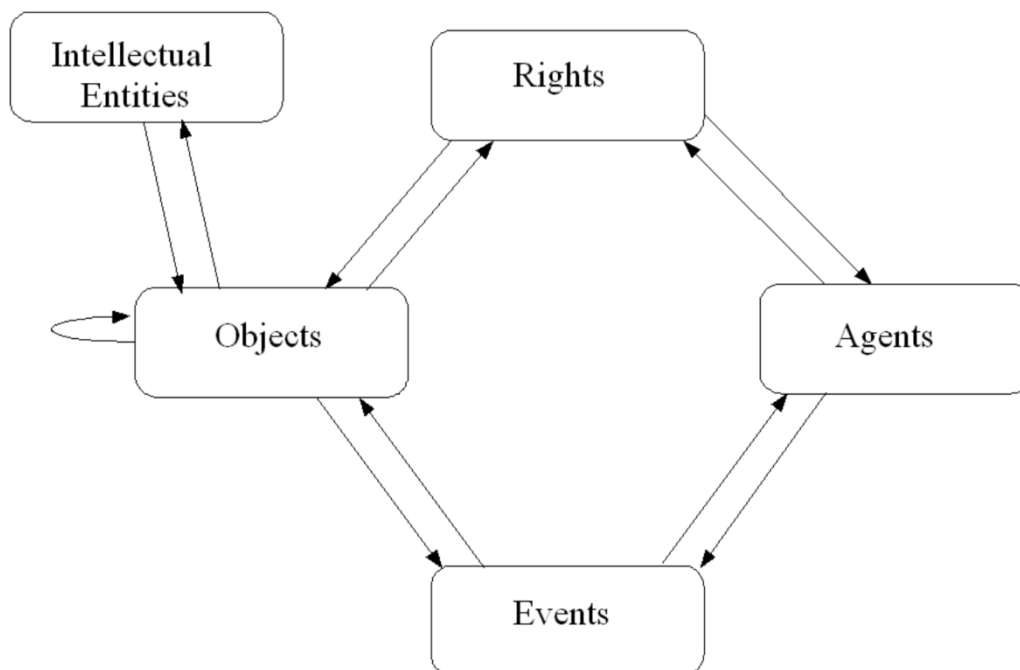
Figure 17 – PREMIS model, [29]

The intellectual entity can be considered as a group of contents linked together so that they constitute a coherent intellectual unit. Such units may be associated with descriptive metadata. These entities are related to object entities which are divided into *file*, *bit-stream* and *representation*. Event entities relate object entities to agents and actions performed on the objects themselves.

6.3.2 PREMIS Rights

The Rights entity, of the model given in Figure 17, takes the form of a structured permission statement that is linked to a digital object being preserved. Permissions are defined in terms of preservation actions that are described elsewhere in the PREMIS data dictionary. Each permission statement must have a granting agent.

According to PREMIS preservation rights may be viewed as explicit permissions. Such permissions can exist when there is a contract between the holders of intellectual property rights on the resource and the preservation agency; see also [29] and [30] for more details.

The management of the rights associated with the stored data is an issue for digital preservation platforms, mentioned in Chapter 8 , some of which take advantage of the PREMIS standard for that purpose.

6.4 Copyright ontology initiative in MediaMixer

The EBU report [28] describes in detail also the results of a non standard initiative, the Copyright Ontology, (2007) [16], which was implemented in 2012, within the European Project MediaMixer [21], [17], and [18], for media fragment mash-up.

The Copyright Ontology is a formal model of the copyright domain and takes into account the regulation of the copyright law, for its core part, andt can be found at following URL http://rhizomik.net/html/ontologies/copyrightonto/.

Modelled by an event-oriented approach, the action model of the Copyright ontology is somehow equivalent to that of exploitation of IP-rights defined in MCO IPRE extension.

7 RightsDraw: open-source proof-of-concept on rights management

7.1 Introduction

This proof of concept digital rights management system has been first released in December 2012, [10]. Then it has been maintained along 2013 and 2014 as an implementation supporting the standardization work related to MPEG-21 MCO. Information about RightsDraw, together with a stable version can be found at [11]. The software is also available from GitHub at [31]. It's licensed under AGPL v3.0.

RightsDraw is very useful for developing examples and analysis of rights patterns.

7.2 Features

RightsDraw deals with MPEG-21 MCO documents.

Not conceived for providing long term persistence for a large amount of documents, it feats a multi-user editing platform, with a limited local repository, including services for search and check-with tasks, together with import/export functionalities.

RightsDraw services, deployed on a Linux http server, can be accessed by its users by means of a web browser.

7.2.1 Editing contracts and holding

RightsDraw can be used creating and modifying MPEG-21 MCO documents, which in very general terms can be seen as a set of assertions about defined individuals of MCO ontology. At a higher level and according to which assertions are present in each document, there may be:

- an MCO contract document; named simply "contract" ;

- a set of Permissions, or other deontics expressions, about a specific work; this is named "holdings" in RightsDraw;

- a template of a single Permission; named "key pattern" in RightsDraw;

- any complex mix of the above.

RightsDraw's repository is structured in order to keep separate the different mentioned types of MCO documents, in order to provide functionalities appropriate to the document's context. The users of the platform have to take care about making an editing consistent with this approach in order to avoid undesired behaviour.

7.2.2 Import/Export

When desired, the users of RightsDraw can download and save the edited MCO documents on their local client system. They have a few options for the format of this export:

- OWL/XML – this serialization, http://www.w3.org/TR/owl2-xml-serialization/, is the default one used natively on RightsDraw, as most of the processing is developed in XSLT;
- RDF/XML – this serialization, http://www.w3.org/TR/rdf-syntax-grammar/, is the reference one, according to MPEG-21 MCO standard [1] and [49];

- Turtle – this serialization, http://www.w3.org/TeamSubmission/turtle/, considered more suitable for human reading, because more compact.

It is important to remark that all the serializations above are semantically equivalent. Also other options exist, such as Structural/Functional and Manchester syntaxes[3], although the conversion is not currently implemented on RightsDraw.

In the framework of the MPEG-21 reference software, which for MCO is actually derived from a version of RightsDraw, a conversion component from MCO to CEL and vice-versa is also available. This is not provided with current version of RightsDraw because that conversion was not complete and doesn't provide semantic equivalence.

Client users can browse the exported documents by means of various general purpose text editors, as well as most web browsers, XML viewers and editors, and application specific for ontologies, such as Protégé, see http://protege.stanford.edu/.

Similarly to export, RightsDraw feats the import functionality, permitting to the client users the uploading of already existing MCO documents, provided that they are in one of the three exported formats. The imported documents are converted into OWL/XML serialization for the subsequent work.

7.2.3 Search and Check-with

The search functionality allows the client users to find which of their repository MCO documents match queries against entities, their metadata and attributes. Once got a result list, the client user can select one document and open it for editing.

The search functionality above doesn't deal with any particular semantic of the expressed rights, which are the object of the "Check-with" operation, described in sub-clause 7.5

The "Check-with" functionality allows the client users to find which of their repository MCO document have permissions matching with a client defined target exploitation.

The target exploitation is made of a permission with a desired action and a number of acceptable conditions. The "Check-with" finds all the permissions having equal or less restrictive rights. The range of the query result can be further bounded by specifying the target User for the exploitation and the involved IP-Entity.

Implementation details and discussion of issues for this functionality are given in sub-clause 7.5

7.2.4 Sales and Purchases

The task performed by these functionalities is based on the subdivision made by RightsDraw between contract and holdings documents.

Any inconsistency in this scenario can affect the result of the operation.

The operation itself is named "Apply Contract", because a contract selected by the client user is "applied" over a selected holdings document, which is modified according to the contract terms.

This operation aims at keeping up-to-date the overall rights information on a specific content after that a new contract is defined, with some trade of rights related to that same content.

The consistency requirements for the operation to be effective are:

---

[3] http://www.w3.org/TR/owl2-syntax/ and http://www.w3.org/TR/owl2-manchester-syntax/

- both documents must be what they are expected to be, i.e. contract and holding;

- the holding must be about a single main IP-Entity, correctly identifiable;

- the contract must be about that same IP-Entity;

- the User (or Organisation) having rights on the IP-Entity in the holding document must be one of the Parties in the contract document; she can be issuer, for sale case, or principal, for purchase case.

The sales & purchases operation issues are also discussed respectively in clauses 9.4.4 and 9.4.3 9.4.4

7.2.5   Integration with Preservation Platforms

RightsDraw was conceived for supporting integration with Preservation Platforms and this integration was implemented specifically for P4, as described in 8.1 from P4 perspective.

The supported scenario requires the rights information to be associated to archive content within AIP; thus they must be expressed in terms of holdings. The architectural approach is for having RightsDraw services to be deployed externally to the preservation platform, but ideally sharing the same client users.

The client user of RightsDraw is responsible for creating and editing the rights information on preserved content. She can submit such information to P4, by using a specific feature of the export functionality. The rights can be accepted by P4 either as SIP containing only rights information, if the related content wasn't previously ingested into P4, or as an update of an already existing AIP. In the latter case the update is executed in overwrite mode, while P4 is responsible for handling the versions.

In case of need for updating rights information already saved on P4, the client user can retrieve the holdings document directly from P4 into her RightsDraw environment, then work on it in editing mode, and eventually submit them again into P4.

When a RightsDraw service is connected to a P4 platform, it is possible to re-direct "Check-with" queries from RightDraw to P4 repository, as P4 implements the same rights indexing than RightsDraw. The added value of doing so for the client user is that, once identified some content with rights criteria, she can also browse and access that content, together with its descriptive metadata, from the P4 service.

The same implementation approach can be extended for the integration of other systems, such as those for contract management, or content trade, production and communication to the public.

7.2.6   Integration with other services

RightsDraw operations can be integrated with other organisational services by means of its APIs, the documentation of which is provided together with the software package, and thus can be found on GitHub at the URL: https://GitHub.com/prestoprime/rightsdraw2

RightsDraw services are deployed on an http service (Apache, http://httpd.apache.org/) with CGI-BIN interfaces, [11]. The HTML/GUI of RightsDraw provides to its client user the means to interact with the services. The requests to RightsDraw services can be divided between those for which an impact (with modification) is expected on the MCO documents of the client user, on RightsDraw storage area, and those which only return application data. Regarding the format it must be noted that they are not all always idempotent.

The data format of output can be: text/html, intended for presentation through a web browser, text/plain or text/xml.

7.3 Diagrams

By default, RightsDraw presents MCO documents for editing to its client users by means of diagrams, including links that permit the opening of contextual forms for the interaction with the client users.

Such diagrams can also be saved by the client user, as PNG pictures without links, for documentation and dissemination purposes. Most of the diagrams included in this document (and in other documents as well) were produced in this way.

The RightsDraw diagrams are produced automatically from the OWL/RDF files, by means of an XSLT processing which provides produces directives for the "dot" command of graphviz package.

This means that the diagrams are almost semantically equivalent to the represented MCO document.

In particular they just don't show Dublin Core metadata and values of data properties with expected large size, such as a narrative text. Prefixes are normally omitted as well.

The drawing rules are the following:

- each named individual is represented by an ellipse, including as text the IRIs of the class and of the individual itself, without prefixes;

- depending on the class of the individual, the ellipse can be printed in various colour; default setting is: green for permissions, orange for parties, magenta for actions, cyan for IP-Entities, yellow for facts;

- object properties, which relates two individuals, are represented by arcs with an arrow going from the domain to the range; the IRI of property is printed nearby;

- object properties can be used in negative assertions; in this case the arc is printed in red colour and the arrow is replaced by a diamond sign;

- data properties, which are attributed to an individual, are represented by gray boxes, including as text the IRI of the property and its value, and connected to their individual by a line.

Normally the whole MCO document is represented by a single diagram, which might result too much rich for easy understanding, where the document contains many assertions.

However it is possible to zoom from a selected individual to a simpler diagram with only its related entities, following object properties either around or recursively top-down (from domain to range).

7.4 Key Patterns

7.4.1 Introduction

Key patterns are simply templates for permissions. The proposed approach is based on the remark that, for a particular organisation in a given time context, the media contracts include a limited amount of recurrent rights situations, to which some variants are applied.

Therefore such templates can be defined by:

- a mnemonic name for the key-pattern, for allowing easier re-use;

- an action;

- a number of conditions, which characterise the template; for the definition of the conditions it is possible to make use of Fact Unions, in order to define valid alternatives within the same branch of the MCO exploitation condition hierarchy.

7.4.2 Use of Key Patterns in the definition of permission

When editing a media contract or a rights holdings document, the client user can specify a permission on the basis of an already defined template, which has only to be completed by adding the specification of content, issuer and principal, and the specification of further conditions, which have normally no sense within a template, such as license period, territories, languages, and runs, because they must be attributed with values for the particular context.

7.4.3 Use of Key Patterns in presentation of rights to the client user

The reference to Key Patterns can be used by the client user during her examination of an MCO document. If the Key Patterns mode is selected, RightsDraw will check each permission against the set of defined templates. For each matching pattern, the result shown to the client user is limited to:

- the name of the matching template;

- the table of the further specified conditions, with attributed values;

- content, principal and issuer, if not given implicitly by the context.

7.4.4 Use of Key Patterns for Check-with

Similarly, Key Patterns can be used for defining the target exploitation of "Check-with" activity.

Figure 18 – RightsDraw form allowing queries based of key patterns rights

7.4.5 Examples of defined Key Patterns: RAI

The most representative cases of the rights reference patterns identified by RAI were given in [28]. A selected subset is given in Table 2.

RAI terms	MCO Action and Conditions (Facts)	
Internet rights	**Action:** mco-ipre:CommunicationToThePublic	**Facts:** mco-ipre:NonLinear mco-ipre:Internet OR mco-ipre:MobileTechnology
Free TV rights	**Action:** mco-ipre:CommunicationToThePublic	**Facts:** mco-ipre:FreeOfCharge mco-ipre:Linear mco-ipre:BroadcastTechnology OR mco-ipre:MobileTechnology OR mco-ipre:Internet
Pay TV rights	**Action:** mco-ipre:CommunicationToThePublic	**Facts:** mco-ipre:Pay mco-ipre:Linear mco-ipre:BroadcastTechnology OR mco-ipre:MobileTechnology OR mco-ipre:Internet
IPTV rights	**Action:** mco-ipre:CommunicationToThePublic	**Facts:** mco-ipre:Pay mco-ipre:Broadcasting mco-ipre:Restricted mco-ipre:IPNetwork mco-ipre:TelevisionSet
Video Rental rights	**Action:** mco-ipre:CommunicationToThePublic	**Facts:** mco-ipre:Pay mco-ipre:Videogram mco-ipre:Limited
Video Sell rights	**Action:** mco-ipre:CommunicationToThePublic	**Facts:** mco-ipre:Pay mco-ipre:Videogram mco-ipre:Unlimited
Home video rights	**Action:** mco-ipre:Distribute	**Facts:** mco-ipre:Pay mco-ipre:Videogram
Transform rights	**Action:** mco-ipre:Transform	
Excerpts rights	**Action:** mco-ipre:MakeExcerpt	
Theatrical rights	**Action:** mco-ipre:PublicPerformance	**Facts:** mco-ipre:Pay
Non theatrical rights	**Action:** mco-ipre:PublicPerformance	**Facts:** mco-ipre:FreeOfCharge

Table 2 – Subset of RAI reference rights patterns mapped to MCO Action and Fact vocabularies

7.4.6 Examples of defined Key Patterns: ABC

The rights reference patterns, identified by ABC for [28], are reported in Table 3

ABC terms	MCO Action and Conditions (Facts)	
Mobile program rights	**Action:** mco-ipre:ExploitIPRights	**Facts:** mco-ipre:MobileTelecommunicationTechnology
Online program rights	**Action:** mco-ipre:ExploitIPRights	**Facts:** mco-ipre:Internet
Pay per use	**Action:** mco-ipre:ExploitIPRights	**Facts:** mco-ipre:Pay
Rental rights	**Action:** mco-ipre:Distribute	**Facts:** mco-ipre:Pay mco-ipre:Limited

ABC terms	MCO Action and Conditions (Facts)	
Pay television rights	**Action:** mco-ipre:CommunicationToThePublic	**Facts:** mco-ipre:Pay mco-ipre:Restricted mco-ipre:BroadcastTechnology mco-ipre:TelevisionDevice
Free-to-air television rights	**Action:** mco-ipre:CommunicationToThePublic	**Facts:** mco-ipre:FreeOfCharge mco-ipre:BroadcastTechnology mco-ipre:TelevisionDevice
Clip licensing rights	**Action:** mco-ipre:MakeExcerpts	
Free website content rights	**Action:** mco-ipre:CommunicationToThePublic	**Facts:** mco-ipre:FreeOfCharge mco-ipre:Internet '*Service condition required*'
Download to own rights	**Action:** mco-ipre:Distribute	**Facts:** mco-ipre:Pay mco-ipre:Download mco-ipre:Unlimited
Free download rights	**Action:** mco-ipre:CommunicationToThePublic	**Facts:** mco-ipre:FreeOfCharge mco-ipre:Internet mco-ipre:Download '*Service condition required*'
Free streaming rights	**Action:** mco-ipre:CommunicationToThePublic	**Facts:** mco-ipre:FreeOfCharge mco-ipre:Internet mco-ipre:Webcasting OR mco-ipre:OnDemandStreaming '*Service condition required*'
Free-to-air television run	**Action:** mco-ipre:CommunicationToThePublic	**Facts:** mco-ipre:FreeOfCharge mco-ipre:BroadcastTechnology mco-ipre:Run mco-ipre:TelevisionDevice '*Service or channel condition required*'
	Action mco-ipre:CommunicationToThePublic	**Facts:** mco-ipre:FreeOfCharge mco-ipre:Run mco-ipre:Webcasting

Web site creation rights	**Action:** mvco:CreateWork
	        mvco:MakeManifestation
	        mvco:Produce
	        mco-ipre:CommunicationToThePublic	

Free simulcast streaming rights	**Action:** mco-ipre:CommunicationToThePublic	**Facts:** mco-ipre:FreeOfCharge mco-ipre:Webcasting mco-ipre:Internet mco-core:ActionStarted (related to free-tv) '*Service or channel condition required*'

Table 3 - Mapping of ABC its standard license terms to MCO Action and Fact vocabularies

7.4.7   Recommendations with Key Patterns

The client users are recommended to keep awareness about the nature of such reference rights patterns for their correct use.

They can provide a mnemonic label for recalling a well known recurrent rights situation, which would otherwise require a much itemised description. This mechanism can also be used for improving the GUI of application and make the work with rights quicker.

However it must be taken into account that the title given for naming the pattern is arbitrary, it is not part of the MCO, or any other, standard, and it is not recorded within the MCO document by RightsDraw.

Although it is technically possible to save that label as Dublin Core metadata of the permission and display it as title of the permission itself, it is recommended not to rely on it for inferring any details on the permitted action and related conditions.

A correct use of the Key Patterns is proposed in RightsDraw with the following modalities, and it is conceived for internal use within an organisational context:

- a registry of rights templates should be set up, so that all the applications needing to make reference to them can access the common approved version;

- a specific client user profile should be defined for developing the patterns, approving them, and deploying them on the registry service;

- the organisational applications have to compare rights with the approved template, in order to provide presentation or editing functionalities; ideally they should always use the version on the registry, although an indexing cache mechanism can be adopted for performances reasons;

- the generic client user can benefit of the approved key patterns, by means of the organisational applications using them the registry.

7.5 Check-with

This functionality of RightsDraw addresses the need introduced in clause 3.2.2 , for the verification of rights availability with respect to a target exploitation defined by a client user.

As explained in [10], the core of the check-with operation is a comparison between two permissions. Without considering the object of the permitted action and who is permitted to act it, such comparison can result in one of the following cases:

- they have nothing in common, that is they don't overlap; for instance one is for Distribution and the other one is for Public Performance;

- they partially overlap; for instance they are both for CTTP but one is constrained to France and the other is constrained to Germany;

- one is a subset of the other one; i.e. respecting one of them always implies the respect of the other, but not vice-versa; for instance "CTTP, in France, in 2014" against "CTTP, in EU, before 2020";

- they are exactly the same.

The result of comparing permissions A and B is Boolean:

- TRUE; A is equal or more restrictive than B;

- FALSE; otherwise.

In a Check-With process there are on one hand the permission defined by the client user for her query, that is permission B, and on the other hand all the candidate permissions involved in the query, playing in turn the role of A.

The number of candidate permissions (NP) provides the metric of difficulty of the performance, in terms of number of comparisons (NC).

- Check-with on a single specific content item (CI); aims at verifying if the wished exploitation is permitted for the given content:

$$NC = NP(CI)$$

- Check-with on all content items (NI), aims at finding which content have permissions compatible with the query:

$$NC = \sum_{j=1,NI} NP(CI_j) = NI * \overline{NP}$$

- Check-with for presenting rights to the client user by means of Key Patterns, assuming NK as the number of the reference templates:

$$NC = NK * NP(CI)$$

The current implementation of Check-with operation in RightsDraw is based on a two steps process, where in the first step the permissions are parsed in order to express them in a form suitable for the second step, which is the actual comparison.

In order to improve the performances of the Check-with operation, the result of the first step is cached into an index, which has to be updated in case of modification of the rights.

This implementation is also used by P4, see clause 8.1 , for providing Check-with query on the rights of content archived on the preservation platform.

Check-with can be configured for ignoring on purpose some conditions. This is done for Key Patterns presentation, in order to check the templates independently from the additional conditions, such as license periods and runs, which must be presented in details to the client user.

RightsDraw doesn't check with the details of related action facts, because each permission is evaluated independently from other permissions. The existence of such further condition can be easily taken into account, but the related context cannot be verified, (although it could be simulated).
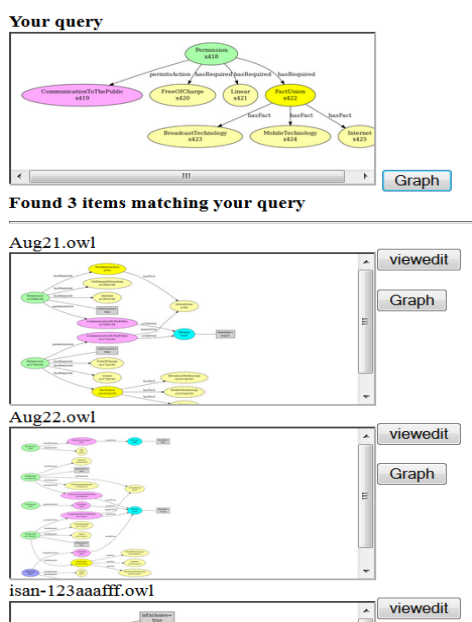

Figure 19 shows how RightsDraw presents the list of results from a Check-with operation. On top there is the diagram of query, that is the target exploitation defined by the client user. Below there is the list of the MCO documents which have at least one permission matching the query, each document being represented by its corresponding diagram. The client user can open the diagram full size for inspection or opening the editor interface on the select item.

Figure 19 - RightsDraw, presentation of results of Check-with

7.6 Assessment

7.6.1 Scope

Regarding "Media Rights Management" technologies, it is important to keep a clear distinction between "formats" and "tools":

- "formats" – we mean specifications on how to represent rights information on audio-visual assets. The formats are required to be unambiguous, machine readable, and as much complete as possible to cover the real businesses of audiovisual rights;

- "tools" – software components, devices, or services, which handle rights information for operating processes in which rights information are relevant.

This assessment template is limited to tools.

7.6.2 Definition of functions

In the assessments of [50] and [51], the functions required to be tested, according to a measurement plan are specialised for the particular category of tool and are classified with respect to the expected level of need, as follows:

- Mandatory - Must have.
- Recommended - Could deal also without, but it would be better to have.
- Desirable - May be appreciated in some cases, but in most cases it doesn't make the difference.

In the following the wording "rights information", possibly followed by "set" or "instance" or "document", is used for a limited set of rights information which is the object of a specific processing by a rights management tool. Depending on the context and on the purpose of use of the tool, the "rights information" can be one of the entities listed below, for aim of example and not exhaustively:

- A complete Media Contract;
- A part of a Media Contract;
- All the rights holdings of a given Person or Organization over a given IP-Entity;
- Part of the rights holdings of a given Person or Organization over a given IP-Entity;
- A License;
- A deontic expression (a Permission or Obligation or Prohibition)A template for the entities above.

The functions identified for the assessment of tools of the "Rights Management" category are listed in Table 4.

Functionality	Level of need	Description
Import / Read	Mandatory	The function of accepting in input rights information according to specified formats and parsing the information. Sub-functions can be defined according to which are the formats of interest.

Functionality	Level of need	Description
Validate	Recommended	The function of validating if a given rights information is compliant to a specified format or profile, complete, correct and consistent. In case of negative validation, the functions must return the an explanation of the encountered problems.
Create/Update / Delete	Mandatory	The function permitting and implementing the creation and the modification of a rights information set. This implies adding or removing entities and deleting the whole information set.
Save/Store	Mandatory	The function permitting to save the rights information instance in a non volatile way, allowing future access to the same information for performing other functions.
Version Management	Recommended	The function keeping tracks of various different versions of a rights information document. This include the logging of the changes with dates and users or agents responsible for the changes.
Export / Convert	Mandatory	The function making available a copy of a given rights information set, according to a given target specified format. Using the function with different target formats results in a format conversion function. The function must return if the conversion is faithful and complete or partial.
Index	Recommended	The function of indexing rights information for purpose of quicker search & retrieval or check with activities.
Search	Recommended	The function of searching and retrieving which rights information matches a given query. The query is not expected to provide an answer to rights clearance questions.
Check with	Mandatory	The function of verifying if a given target exploitation of a given IP-Entity, by a given Party is permitted according to the given rights holdings of that Party on the IP-Entity. The result is Boolean (true or false). A version of this function should permit to deliberately ignore some types of conditions.

Functionality	Level of need	Description
Present	Mandatory	The function of presenting the rights information to a human user, through a user interface. This function may be implemented in various modalities (graphics, symbols or labels, text). The advanced version of this function must permit to the user to interact with the "Create/Update/Delete" function.
Deliver	Recommended	The function of sending the given rights information to a distinct service or tool.
Integrate with Archive Package	Recommended	The function of associating the rights information to its content package into a common archival/preservation package.
Integrate with Descriptive Metadata	Recommended	The function of associating the rights information to content description information into a common metadata item.
Integrate with Content Material for Storage or Exchange	Recommended	The function of associating the rights information to its related content (or vice-versa) for the purpose of storage or exchange into a common item.
Integrate with Content Material for Display	Recommended	The function of browsing and/or playing an AV work together with the corresponding rights information. Note that the available rights can be different for the various media fragments.
Encryption/Decryption	Recommended	The function of encrypting and decrypting the whole or part of the given rights information.
Add Digital Signatures of Parties	Recommended	The function permitting to an authorized person to add her digital signature as Party of a binding media contract.
Verify Digital Signatures of Party	Recommended	The function permitting the verification of a digital signature of a signatory person of a binding media contract.
Sales	Recommended	The function of updating the rights holdings information of a given Party on a given IP-Entity on the basis of a Media Contract in which that Party issues some rights on the same IP-Entity to other Parties.

Functionality	Level of need	Description
Purchases	Recommended	The function of updating the rights holdings information of a given Party on a given IP-Entity on the basis of a Media Contract in which that Party receives some rights on the same IP-Entity from other Parties.
Action/Usage Reporting	Recommended	The function of communicating about the actual occurrence of Actions acted by Parties over IP-Entities and regulated by rights information. The function must return which action occurred, when, in which context and, if relevant, with which result.
Action/Usage Register	Recommended	The function of registering the occurrences of Actions, as reported by the function above and updating the status of related conditions.

Table 4 – List of function for rights management tools

7.6.3 Functional suitability

Degree to which a product or system provides functions that meet stated and implied needs when used under specified conditions.

Measurement function: FS = (X+Y+Z) / 3 where

FS = **Functional Suitability**
X = *Functional Completeness*
Y = *Functional Correctness*
Z = *Functional Appropriateness*

Functionality	Level of need	X	Y	Z
Check with	Mandatory	Yes	0.8 presumed	0.5
Create/Update / Delete	Mandatory	Yes		1
Export / Convert	Mandatory	Yes		1
Import / Read	Mandatory	Yes		1
Present	Mandatory	Yes		1
Save/Store	Mandatory	Yes		1
Deliver	Recommended	Yes		1
Index	Recommended	Yes		0.5
Integrate with Archive Package	Recommended	Yes		1
Integrate with Descriptive Metadata	Recommended	Yes		1
Purchases	Recommended	Yes	0.9 presumed	1
Sales	Recommended	Yes	0.7 presumed	0.5
Search	Recommended	Yes		0.5

Functionality	Level of need	X	Y	Z
Action/Usage Register	Recommended	No		
Action/Usage Reporting	Recommended	No		
Add Digital Signatures of Parties	Recommended	No		
Encryption/Decryption	Recommended	No		
Integrate with Content Material for Display	Recommended	No		
Integrate with Content Material for Storage or Exchange	Recommended	No		
Validate	Recommended	No		
Verify Digital Signatures of Party	Recommended	No		
Version Management	Recommended	No		

$$X = (1 + 0.5 * 7 / 16 + 0.25) / 1.75 = 0.839$$

$$X = (1 + 0.5 * 7 / 16) / 1.5 = 0.8125$$

$$Y = (0.8 + 0.9 + 0.7) / 3 = 0.8 \text{ (PRESUMED VALUES}[4])$$

$$Z = 11 / 13 = 0.8462$$

$$FS = (X + Y + Z) / 3 = 0{,}8196$$

7.6.4   Conclusions

For a complete assessment as defined in [50] and [51], an appropriated data set would be needed. The result of functional suitability can be considered satisfactory for RightsDraw, as proof of concept, while for considering a tool for adoption in a production environment, the assessment with respect to required performance values would be unavoidable.

---

[4] Evaluation of correctness can only be hypothesised at the moment, as it would require the availability of a wide and appropriate data set. The estimate is based on worst case assumption for the known limitations.

8 Digital rights in preservation platforms

In the following section we provide a description of how digital rights are managed by the assessed platforms: DSpace, Archivematica, RODA (Fedora Commons) and P4. For the assessment of each platform please refer to [50], for Archivematica and P4, and to [51] for DSpace, RODA, and Archivematica again.

8.1 PrestoPRIME Preservation Platform (P4)

The P4 preservation platform [32] has been described and assessed in Section 3.4.2 of deliverable D3.2 [50]. Among the several adopted standards, MPEG-21 MCO has been chosen to represent rights metadata. The platform takes advantage of the PREMIS standard for the preservation events and uses METS as the wrapper of the AIP, which includes a rights metadata section.

As for other metadata sections, rights can be either saved directly in the METS wrapper (mdWrap) or registered by reference to an external resourse (mdRef).

P4 interfaces for rights	Description of use
wf/execute/ingest_rights	SIP submission with only Rights
wf/execute/rights_update	update of OWL for an AIP
wf/execute/query_rights	for posting a rights query
wf/${jobid}/status	for tracking the status of a submitted job
wf/${jobid}/result	for getting the result of a submitted job
search/identifier/${identifier}	for checking about existence of an AIP regarding an IP-Entity
access/dip/${identifier}	for getting a complete DIP
access/dip/${identifier}/rights/result	for getting the URL of the rights document belonging to an AIP
access/dip/list/rights?available=true|false	for having the list of AIPs with/without rights information
access/dip/${identifier}/preview/	for serving a player with browsing quality content

Table 5 - P4 interfaces used by RightsDraw

P4 supports the integration with RightsDraw, described in Chapter 7 , offering the service interfaces listed in Table 5, see [10], as follows:

- P4 accepts rights metadata in MCO, with OWL/XML serialization, which is the format used in RightsDraw; such rights metadata are expected to be permissions related to the content object of the preservation;

- P4 accepts in ingest also SIPs containing only rights metadata, supporting subsequent update of AIP with actual content;

- P4 accepts update of rights metadata every time it is requested, in overwrite mode, keeping track of the older versions;

- P4 deploys two components of RightsDraw, for supporting check-with operation of AIP rights:

    o the RightsIndex component is used at ingest/update time for indexing the AIPs specifically for rights;

o the RightsCompare component is used for performing the check-with on P4;

- P4 returns to the client user of RightsDraw the results of check-with operation executed on P4, with the possibility to request the select item in export from P4 to RightsDraw, for modifications;

- P4 provides a search functionality for identifying archival items lacking rights metadata, in order to assist the client user of RightsDraw in the task of organising the recovering of such information from legacy systems, for completing the AIPs.

For persistence of rights metadata P4, uses the same native XML database used for the whole AIP.

8.2 Archivematica

Archivematica [33] allows the user to set rights metadata through the GUI depicted in Figure 20.

Figure 20 – rights data entry interface in Archivematica

The PREMIS file contains several rights bases: "Copyright", "Statute", "License", "Policy" and "Donor". They are linked to an external documentation so that the user can identify the relationship between the entities. It is also possible to indicate a start and end date to be associated with rights metadata. Box 5 shows the PREMIS xml file related to the data entry in Figure 20. See also [34].

```
<premis>
 <rights>
  <rightsStatement>
    <rightsStatementIdentifier>
       <rightsStatementIdentiferType>UUID</rightsStatementIdentiferType>
       <rightsStatementIdentifierValue>14cbad80-70nd-4f46-887f-klgv7f9f30h6
       </rightsStatementIdentifierValue>
    </rightsStatementIdentifier>
    <rightsBasis>Copyright</rightsBasis>
    <copyrightInformation>
       <copyrightStatus>Copyrighted</copyrightStatus>
       <copyrightJurisdiction>ca</copyrightJurisdiction>
       <copyrightStatusDeterminationDate>2009-09-16</copyrightStatusDeterminationDate>
       <copyrightNote>Copyright held by donor</copyrightNote>
       <copyrightDocumentationIdentifier>
           <copyrightDocumentationIdentifierType>Donor form
           </copyrightDocumentationIdentifierType>
           <copyrightDocumentationIdentifierValue>CCA-2009-67
           </copyrightDocumentationIdentifierValue>
           <copyrightDocumentationRole>Copyright holder statement
           </copyrightDocumentationRole>
       </copyrightDocumentationIdentifier>
       <copyrightApplicableDates>
           <startDate>2004-08-17</startDate>
           <endDate/>
       </copyrightApplicableDates>
    </copyrightInformation>
    <rightsGranted>
       <act>Publish</act>
       <restriction>Conditional</restriction>
       <term0fRestriction>
           <startDate>2011-09-16</startDate>
           <endDate>open</endDate>
       </term0fRestriclion>
       <rightsGrantedNote>Permission to publish must be obtained from the copyright
holder</rightsGrantedNote>
    </rightsGranted>
    <linkingObjectIdentifier>
       <linkingObjectIdentifierType>UUID<linkingObjectIdentifierType>
       <linkingObjectIdentifierValue>52ebad80-70fd-4f46-887f-albe7f9f30e0
        </linkingObjectIdentifierValue>
    </linkingObjectIdentifier>
  </rightsStatement>
 </rights>
</premis>
```
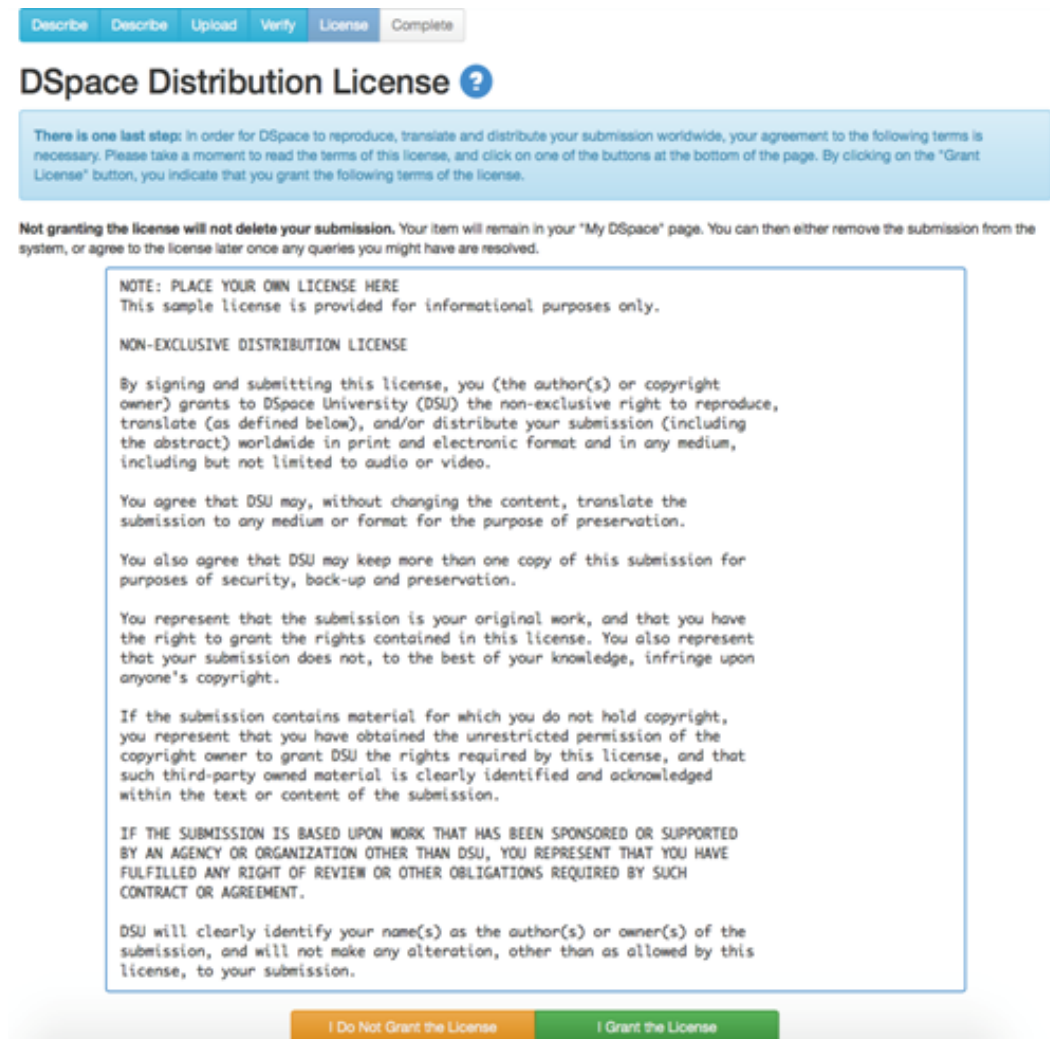
Box 5 – Example of PREMIS XML metadata in Archivematica

8.3 DSpace

DSpace platform [36] expects that a license is provided together with content at ingestion time, as a narrative text. The text of a DSpace non-exclusive distribution license is provided at the data entry interface, as an example, given for informational purposes, to be replaced by the license selected by the client user of the platform.

The screen shot of the GUI of DSpace, displaying such proposed license, is given in Figure 21. From reading the proposed text, it appears that the concern of the people running the platform is about obtaining a disclaimer by the producer, regarding the fact that she holds the permission to submit the content to the platform for preservation.

The client user can apply a defined license on a per collection and/or per producer basis, also by configuring the submission/ingestion process to apply that license by default.

The URI of the license is saved as Dublin Core element "Rights". For example this mechanism can be used for applying Creative Commons licenses.

Figure 21 – Text of DSpace placeholder license

From the considered documentation it appears that while on one hand licenses or other rights metadata are welcome, but they are not the object of specific operations, on the other hand the platform can implement access control on the archived objects, for example by hiding items to users without "read-permission". Such access control metadata could be encoded on this METS based platform, by means of METS Rights[5]

8.4 RODA / Fedora-Commons

RODA platform [37] doesn't make any explicit statement about the management of rights metadata. Thus it is possible to infer that rights can be handled in all the forms made available by METS and PREMIS formats, which are adopted on RODA.

This unlikely include management of "machine-readable" rights. However link to licenses and search on their narrative texts are possible. In fact the RODA search GUI includes the fields "*access restrictions*" and "*reproduction restrictions*" among those selectable by the client user for text based queries.

---

[5] http://www.loc.gov/standards/rights/METSRights.xsd, developed by the Stanford University, but maintained by the Library of Congress, published in 2003, probably discontinued after 2005

9 How to: practical guidelines for handling rights

9.1 Criteria for format selection

9.1.1 Technical

The formats presented in Chapters 6 fall in one or both of the following encoding technologies:

- XML - information elements are structured in a tree; XML formats are defined by XML Schemas that can be used for validation; XML is the only possible serialization of the format.

- OWL/RDF – information elements define a graph; actually the instance documents and the models are written in the same language, making very easy, on the one hand, the extension and the integration with other models, and a bit more difficult, on the other hand, the validation; there exist several possible serializations, which are semantically equivalent; according to [49] the RDF/XML should be the reference serialization.

Such encoding have their own respective advantages and disadvantages, however the criteria of selection here should be focused on the context of use of the information and the availability of tools and skills of personnel, with respect to the technical option.

For ODRL only, see 6.2.1 , also a JSON encoding is defined. JSON is used primarily to transmit data between server and web application, as a low-overhead alternative to XML

9.1.2 Expression capability

The capability of a format for rights to express, simply and unambiguously, all the necessary conditions and situations (rights patterns, together with the capability to relate the rights information to the other information domains of AV content and trade managements, is a key point for selection and adoption.

An assessment can be done over the following aspects:

- Coverage of the typical cases – The normal and mostly recurrent situations must be perfectly covered without gaps.

- Coverage of non typical but possible cases – There are rights patterns which are conceivable in theory but almost impossible in practice. Those cases are not really relevant for selection. However there are also rights patterns which are not frequent, but they really happen with certain regularity. It is important that a format selected for adoption is able to deal with such cases, with reasonable complexity, in order to avoid introduction of exceptions to the machine readable paradigm.

- Possibility to define extensions – A certain version of a format cannot foresee all the relevant cases that might appear in the future. This puts the format in a risky situation, because gaps might appear and affect its suitability. Some formats can mitigate this risk if they are conceived for being flexible, based on a robust core model, which must allow mechanisms for extensions and amendments, keeping a consistent approach.

9.1.3 Standard

A standard format has advantages and disadvantages with respect to non-standard solutions.

Standards are developed and issued by bodies, including experts, having a defined validation protocol, made by analysis of requirements and use cases, comparison of proposals, improvement steps, approval, and publication.

Modification to existing standards or development of new standard require to follow an establish process, which requires some time.

Standards must include normative definitions of the proposed concepts, entities and terms, so that the legal aspects, unavoidable for rights, find a more robust reference.

While the initiatives of authoritative community groups can provide the same quality than recognised international standard bodies, initiatives of individuals or single organisations cannot guarantee the necessary transparency of the development process and the continuous support for format maintenance.

However the less reliable formats are those strictly related to a single product or implementation from a single provider, because they are proprietary, with zero or very low interoperability, and not suitable from any adaptation by third parties.

9.1.4 Exchange versus persistence

The first goal of format for rights information is certainly the expression capability described above in 9.1.2 , however careful consideration must be accorded to keeping distinct the cases of exchange and persistence.

A format is for exchange when its instance documents can be transferred between contract (or business) parties, or between systems not necessarily hold by the same organisation and not necessarily running the same software.

Such independence from organisational and technical contexts makes the exchange format suitable to be the "official reference format" for important documents, such as media contracts.

A format suitable for exchange can in theory be used for persistence as well. However it might not be appropriate for practical reasons related to performances.

This means that a repository for large amount of "rights information" will have to include:

- an internal format for persistence;
- an index mechanism of improving performances of search & retrieval activities;
- an import procedure for ingesting rights information provided in the exchange format;
- an export procedure for disseminating rights information in the exchange format.

It must be ensured that the import/export round of procedures is always transparent.

9.1.5 Multi-format support and interchange-ability

Most likely there were always be an offer of several formats for the expression of media contracts and related rights, because each of them will be most appropriate to a limited number of contexts and because the reasons behind the format choice can vary.

The resulting scenario gives the need to handle the coexistence of multiple formats; also because any party might be required to deal with formats selected somewhere else.

On format selection, it is recommended to identify which formats have a degree of interchange-ability that is when they can be used easily in the place of each other, although a 100% mapping may not be ensured.

As an example CEL and MCO have been conceived for a high degree of interchange-ability between them.

It can be recommended to support the development of mapping tools and services; however these must be considered with caution in the case of rights, because any lack in expression capability may result in dangerous mapping errors.

Besides it must be taken into account that any electronic contract can be considered binding only with the signatures of all parties, so that only the contract in the original format will be considered valid.

9.2 Creation of a contract from scratch

In this section we focus in particular on the features of MPEG-21 MCO [1], although MPEG-21 CEL, [3], provides equivalent or similar features.

It is assumed that an application, as for instance RightsDraw, see [11] and Chapter 7 , is available to the users for performing this task.

Typically narrative contracts are not created from scratch, but they are rather created on the basis of templates, which may include the so called "general terms". This is true for electronic contracts as well. However the present section aims at going through all the main parts of the contract and provides guidelines for understanding in sufficient detail all the issues related to each of them.

9.2.1 Identification of the contract itself

When a contract is created you want to make sure to be able to reference it in the future. If the contract is going to be registered at some registry (it may be your administration) it will get a document number.

MPEG-21 MCO provides various means for identifying a media contract:

- Ontology IRI – this can be assigned to an OWL/RDF file, which imports the MCO-IPRE Ontology, assuming that your intention is that such file is your electronic contract; all the individual entities of your contract will have that IRI as prefix of their IRIs, making it clear to which contract they belong.

- IRI of the contract individual – An MCO contract must have an individual member of the Class mco-core:Contract; however it might not be the only one, because of the possible assertions on relations with other contracts.

- Dublin Core metadata – the elements Identifier, Title, Date, of Dublin Core can be used for attributing identification information to the contract individual.

However, there is no guarantee that an OWL/RDF file contains all and only the assertions of a single specific MCO contract.

Moreover if the persistence is implemented by means of a triple-store database, the overall resulting knowledge base will contain all the contracts that you will have ingested into it.

So exporting a contract from such a knowledge base can be implemented using the IRI of the contract individual and following the graph starting from its properties, without make recursion on related contracts.

9.2.2 Identification of the parties

A media contract can have any number of parties, but it's going to be binding only if there are at least two parties and their agreement is stated by their digital signatures.

A media contract with no parties or only one party can have sense as a template or a general offer.

A Party can be either an Organisation, e.g. a company, or a User, i.e. a Person. In the former case it is required that the signatory persons are also identified. Still it is recommended to include information indicating that the signatory person is effectively in charge for the task.

In MCO the parties are identified by their IRI, while also Dublin Core elements, identifier and title, can be given for supporting their identification.

For organisations, it is recommended to use their International VAT number (VATIN); for example for RAI we have: `<dc:identifier>VATIN:06382641006</dc:identifier>`

The digital signature, see clause 9.2.11   is eventually the main mechanism for attributing authentication and non repudiation to an identified party.

9.2.3 Relation with other contracts

In general a contract doesn't need to be in relation with other contracts, a part for a limited number of specific situations, which are defined in MCO as shown in Figure 10.

The purpose of such assertions is solving possible contradictions between distinct contracts.

If possible, it is recommended to avoid the creation of such situations, because they imply a higher level of complexity for checking the overall agreed deontics. For example one contract may define an Obligation for a certain party and such Obligation is cancelled by a subsequent contract.

Therefore, when a contract is evaluated, it should first be cleared that its terms are not modified by any subsequent contract.

However we have to remark that the ordinary trades of rights, with purchases and sales as described in clause 9.4.3   and 9.4.4 , can normally imply modifications to the validity of terms of older contracts.

9.2.4 Clauses for governing law and court of jurisdiction

The governing law clause is especially important in contracts where the parties to the contract are based in different countries: it enables the parties to specify which system of law which will be used to interpret a contract and deal with any disputes which arise in case of conflict. See [40] and [38].

Normally it corresponds to a country, but not always, [39]. United States for instance are the typical exception   because the contract would indicate the single State (e.g. New York).

Jurisdiction clauses are common provisions in contracts. They allow the parties to agree to submit any dispute arising from the contract to a particular jurisdiction's court. This clause

is "non-exclusive" if it leaves the parties free to commence legal proceedings in any other jurisdiction's court; in contrast it is "exclusive" if it stipulates that any dispute can only be submitted to the agreed jurisdiction.

The first editions of CEL and MCO don't take into account this issue that was raised at 110th MPEG meeting with input document [40]. The proposal is reflected in the current versions of working draft for second edition of the two standards, respectively [41] and[42].

For instance MCO would define two data properties of the contract, `mco-core:hasLaw` and `mco-core:hasCourt`, for specifying the agreed applicable law and the court having exclusive jurisdiction over any dispute related to the contract, while the non-exclusive jurisdiction is not covered by this working draft version. The implementation for CEL is semantically equivalent.

9.2.5 Object of the contract and related agreed deontics

9.2.5.1 Identification of the content object of rights

The object of the contract is the set of exploitation actions that are permitted, obligated or forbidden over a given content.

In MCO the content is an individual of the class `mvco:IPEntity` or one of each subclasses and it is related to the deontic expressions governing the right through the action, as shown in Figure 22.

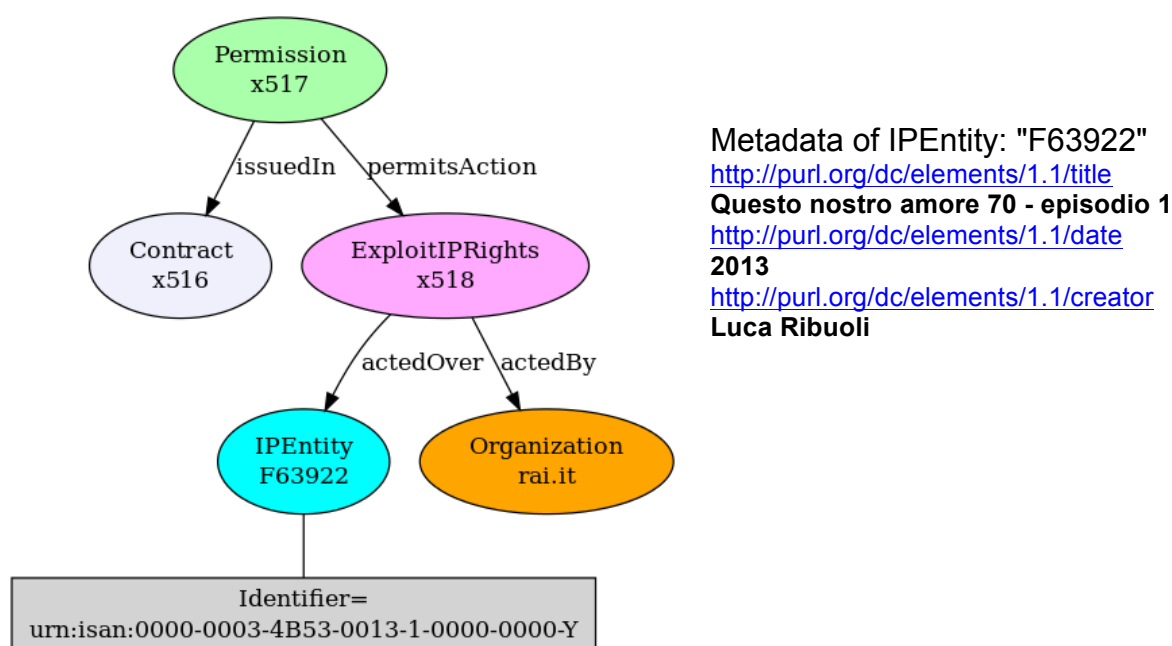Figure 22 – identification of content in MCO

The means provided by MCO for identifying the content are:

- The IRI of the individual of IPEntity;
- The Digital Item Identifier – according to MPEG-21 part 3, and attributed to that individual;
- Dublin Core metadata – especially the elements Title and Identifier, but other elements, such as Author and Date, can support identification of content.

Notice that the example of Figure 22, uses the ISAN identifier, which can be looked up at www.isan.org.

Audiovisual content items are not monolithic, but they are made up of various components of various types (audio, video, graphics, texts), and especially they are rendered over a timeline. Therefore it is always possible to define content items as fragments of other content items and to grant different rights to distinct items.

In MCO each distinct content item must be a distinct individual of IPEntity, identifiable by its IRI. However, if several or many fragments derive from the same Digital Item, their Digital Item Identifier can reflect the common origin provided that it is URI based, using as prefix the identifier of the common digital object and as suffix the identification of the segments. Two standards allow such fragment identification and are thus recommended in this case:

- MPEG-21 part 17 (Fragment Identification of MPEG Resources) – recommended for use in MPEG-21 framework;

- W3C Media Fragments - http://www.w3.org/TR/media-frags/.

For example the media fragment identifier:

urn:isan:0000-0003-4B53-0013-1-0000-0000-Y#t=300,600

identifies the time interval from 5th to 10th minute, given by the suffix substring after the '#' character, of the resource used in the example of Figure 22, indicated by the prefix. The start and end points of the time interval are given in seconds (other time notations are supported).

9.2.5.2 License period

Purchased rights may have no time restriction (for ever) or be bounded by a license period modelled, in MCO as well as in CEL, by a temporal context condition required for each permission. So in a contract several permissions are issued, they may either have their own license period or just share the same one.

The temporal context is defined by an interval between two dates, `afterDate` and `beforeDate`, with no need to specify both of them (open interval).

Issues

When there is the will to specify more than one time interval, it is necessary to define as many temporal contexts as needed and to put all of them under a `FactUnion`, with the result that any of them are good for exploiting the rights, see Figure 23. Indeed conditions are by default in logical intersection, so without the `FactUnion` the resulting valid temporal context (intersection o the time intervals) can be null.

In narrative contracts often the license period is defined as a temporal duration, starting from a reference event, such as the contract date.

For electronic contracts it is recommended to solve the ambiguity by specifying the absolute dates of the temporal context conditions.

If the date/time of the reference event is undetermined, at the moment of issuing the contract the definition of the license period is more complex.

In MCO it is possible to define a relative time interval, which is specified by offset and duration of validity, using the beginning or the completion of an action as reference. In this

way the license period is still specified unambiguously, but it requires a more complex process for checking it, because the effective status of the reference action must be verified.
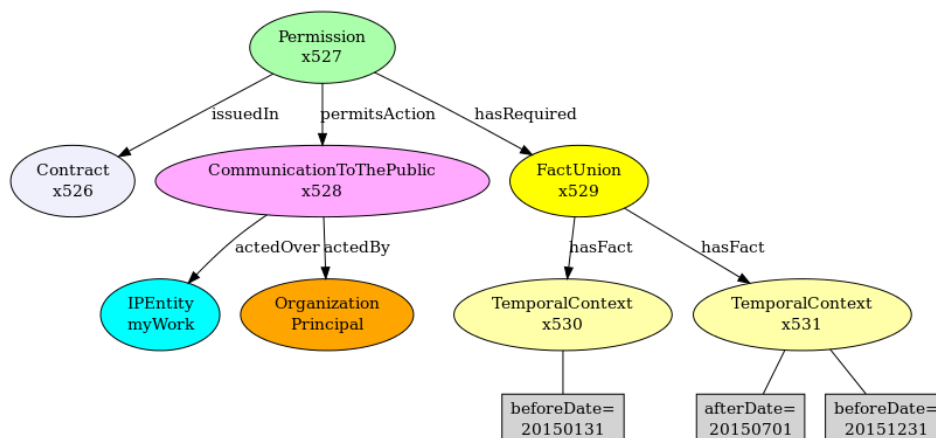

Figure 23 – Example of license period made of two distinct time intervals

9.2.5.3 Exclusivity and sublicensing

The texts of narrative contracts specify if rights are granted with exclusivity and with possibility of sublicense. The sentences often include also the indication of 100% of rights.

The concepts of exclusivity and sublicense refer to permissions; indeed MCO models them as Boolean data properties of permissions.

When a party (issuer) grants a right, on defined conditions, to another party <u>with exclusivity</u>, the implications are:

- the issuer cannot grant the same, or more restrictive, right to other parties;
- the issuer cannot exploit the same, or more restrictive, right.

It is important to consider that the right is defined together with its conditions, in order to compare it with a target right to verify if it is "equal or more restrictive".

So, for example, assuming that BBC had all rights on a documentary and grants, with exclusivity the CTTP right to RAI for Italy in the Italian language, then BBC has lost the right to CTTP the documentary in Italy, in the Italian language but can still act CTTP in Italy in any other language, or CTTP in the Italian language, everywhere but Italy.

In MCO, if not explicitly given, the exclusivity shall not be considered granted.

The sublicense flag, attributed to a permission, is used for explicitly grant or deny to the principal the possibility to become the issuer of the received right (or parts of them) to third parties. In MCO, if not explicitly given, the permission to sublicense <u>can be considered as granted</u>.

While sublicense flag makes the right less restrictive for the principal, the exclusivity flag has restrictive implications for the issuer.

Warning: in case of grant with exclusivity, without sublicense, and with unbounded time, such right could not be the object of any further trade.

9.2.5.4 Territories and languages

The definition of conditions on territories and languages is the most established mechanism for subdivision of the AV rights and of their related market; the two conditions are often used together.

Terrestrial based broadcasting is physically related to the territory of a country, which has usually one official language.

Other technologies, such as satellite and the internet, have less or zero natural barriers to the CTTP; therefore, in order to respect such conditions, the service providers have to set up artificial barriers, such as geo-blocked web sites.

Narrative contracts usually include statements about tolerance with respect to minor (technically unavoidable) infringement of territory conditions.

Some old narrative contracts may have strange mixture of territory and language conditions, with inappropriate territory definitions, such as "*the Italian speaking Belgium*".

Examples of better but still ambiguous territory definitions found in some narrative contracts are: "*the German speaking countries*" or the "*French speaking countries*"; Switzerland should fall under both sets, but the language of the CTTP if not explicitly mentioned should be considered unconstrained.

The recommendation for new electronic contracts is to define conditions on territory and language separately and independently.

This is actually the approach of MCO.

The territory is constrained by fact `mco-ipre:SpatialContext`, which is currently specified by a list of countries (encoded with ISO 3166 country codes), while the language is constrained by the fact `mco-ipre:Language,` specified by a list of languages (encoded with ISO 639 language codes).

It is useful to remark that the condition can be positive, i.e. listed countries/languages are the permitted ones, or negative, in which case the listed countries/languages are the forbidden ones.

9.2.5.5 Linear exploitations

A linear exploitation is a CTTP for which the media service providers deliver content simultaneously to many end users, on the basis of a programme schedule. In other words all the users can access the same content at the same time, linearly, i.e. they cannot pause, rewind, repeat and make random access to the content, unless they have recorded it on their own devices during the delivery.

Traditional radio and television have linear delivery modality.

With MCO a further distinction is possible between "Broadcasting", that implies the use of point-to-multipoint technology, and "Webcasting", that implies the use of streaming via internet. Such distinction is somehow redundant, as MCO allows defining conditions on the means used for the delivery, including broadcast technology and internet.

Linear exploitations can be either free of charge or pay, or unconstrained with respect to the access policy.

In the case of linear exploitation, each delivery event (a broadcast) is named a "run" and the maximum number of runs can be constrained.

MCO addresses flexible definition of constraints on "runs" by means of suitable data properties. In the simplest case there is just the number of runs. Otherwise it's possible to also specify the time validity for the single run, implying possible unbounded repetitions within a time window. Eventually it's also possible to limit the number of repetitions, as shown in the example of Figure 24.
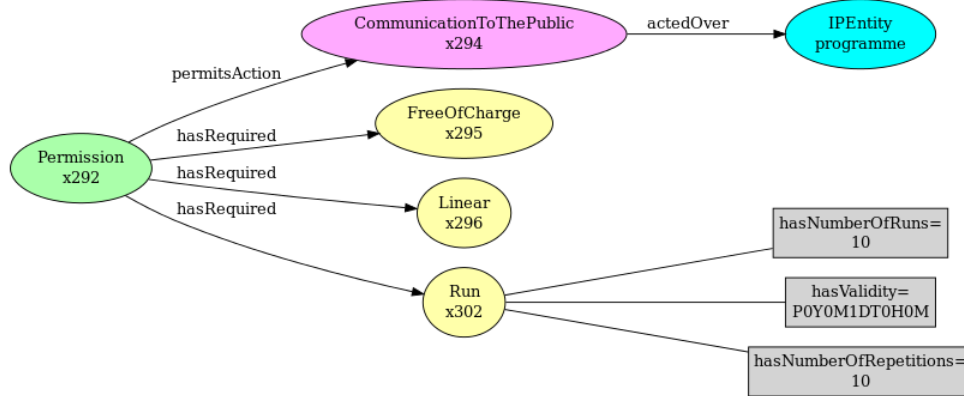

Figure 24 - Example of use for "runs" condition

9.2.5.6 Non linear exploitations

A non linear exploitation is a CTTP for which the media service provider makes content available for fruition at the moment chosen by the end user and at her individual request, on the basis of a catalogue of programmes. In fact a non linear CTTP is also known as "make available". Currently non linear exploitations are related to the use of internet, although other means are also possible.

MCO defines a few further specialisations, all under `mco-ipre:OnDemandBasis`, almost for discerning between the download and the streaming cases.

Non linear exploitations can be either free of charge or pay, or unconstrained with respect to the access policy.

The "make available" act, for a given content, begins when the content becomes available and ends when the content is withdrawn, with indeterminate duration. Thus the meaning of a possible constraint on the number of runs is different from the linear CTTP, for which the duration of the run is just the same than the duration of the content.

The constraint on run can be used here, for limiting the time of the "make available" act, as shown in the example of Figure 25.
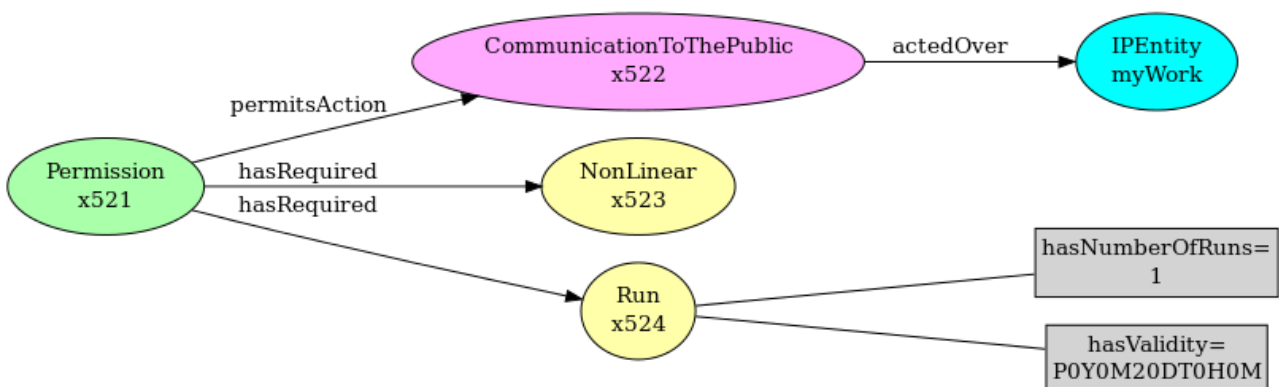

Figure 25 - Diagram of example of non linear CTTP, for 20 days

9.2.5.7 Interdependent exploitations

Two distinct permissions of exploitation of content have a dependency relation when one of them has some constraint related to the occurrence of the other one.

The most typical real example is that of "Catch-up TV", which is an entanglement of linear and non linear exploitations, where the latter is limited to a time period specified by the occurrence of the related broadcast event.

Figure 26 presents such case. Four hours later the completion of the linear CTTP, which can be exploited independently, the non-linear one is permitted for a period of seven days.
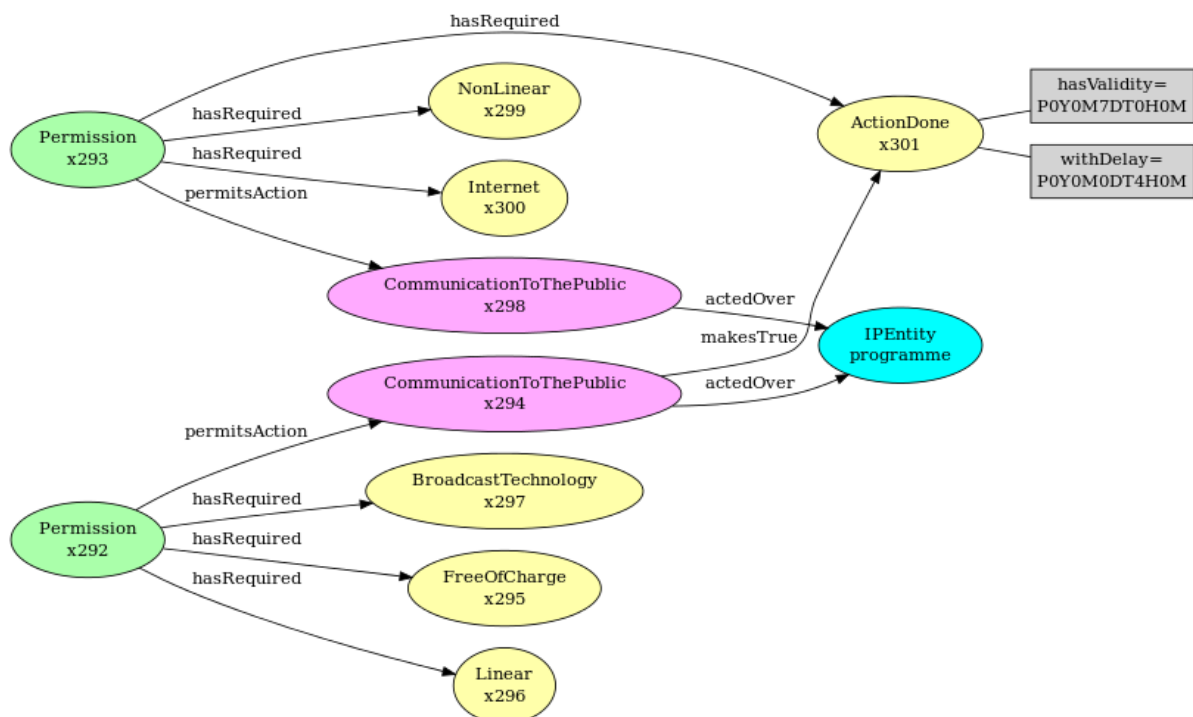
Figure 26 - Diagram representing implementation of Catch-up TV rights

Such patterns can involve also distinct content items, such as the episodes of a series, and can deal with both linear and non linear exploitations.

Cascading series

The broadcast of each episode triggers the permission for its "make available", while the broadcast of the last episode ends, with some delay, the "make available", for all the episodes of the series.

9.2.6 Co-productions

A production company normally gets, with some possible exceptions, all the exploitation rights over the resulting content.

In a co-production scenario, unless differently stated, the various partners share those rights with equal percentages.

Such percentage can be expressed in MCO by means of a data property of the permission of each partner (`mco-ipre:hasUsePercentage`). The value lower than 100% implies that the permissions cannot be actually exploited by any of the partners.

The deadlock can be solved either through a subdivision of the exploitation rights among the partners or by peer-to-peer trades in which one partner buys from the other ones the missing percentages for her target exploitation.

Often the subdivision of income from exploitation rights is dealt separately from the subdivision of uses, which are the rights themselves.

An income percentage can be attributed to permission with `mco-ipre:hasIncomePercentage`. Not having 100% of the income percentage doesn't affect the permission to use the right, but implies that some payment is probably due to other parties for the remaining percentage.

Payments issues are discussed in section 9.2.8 .

9.2.7 Constraints from performers

Performers, such as actors, singers, dancers, musicians, and other kind of artists, contribute to the creation of content together with the production company.

Some of them have an employment contract with the production company, generally implying that the result of their performances is exploited by the company.

Other performers (can be single persons or organisations) might get contracted for the specific production. The most important ones can be in a negotiation position that allows them to request conditions on the result of their performance.

An example of this is the main actor of "Il commissario Montalbano", a successful TV series, produced by RAI and whose rights have been sold in many countries. Possibly in order to protect his image from over-exposure or for ensuring the integrity of his performance, he got an agreement on a constraint which forbids the use of excerpts in which he appears, unless an ad-hoc agreement is reached on specific request.

This kind of constraints raise a number of issues, related to the correct identification of content parts with different rights. The contract between the company and the performer was probably agreed before the actual creation of the content and, after all, it's quite easy to express such condition in a narrative way.

A machine readable condition can be expressed in MCO on an individual of IPEntity with only a fake identification, which is going to be difficult to link with the real content after its creation as Digital Item.

This scenario implies an additional activity for the identification of the content fragments subject to the performer's constraints. Such activity can of course be implemented to be manual, but it could be supported by the output of some automated content analysis tool.

A practical alternative to this approach is that of defining a condition on the whole content requiring a manual check against the occurrence of the protected performance in the selected fragment.

9.2.8 Payments

Definitions of payments could be considered out of the scope of the expression of rights and, in fact, the first editions of MCO and CEL don't take payments in any account, a part the possibility to attribute an income percentage lower than 100% to permissions (without any direct consequence on the management of the right).

Other formats and technologies, conceived for DRM with enforcing, aimed at addressing scenarios, usually "business-to-consumers", in which payments play a key role, mostly

considering the occurrence of the payment as a pre-condition for the fruition of the content. Such platforms may even include components for handling the payments.

The contributors to the development of the two MPEG-21 standards, recognised that, for completion, the electronic formats for media contracts need to provide the capability to express payment information. This was proposed at the 110th MPEG meeting, together with other requests of additions, and the discussion carried to the decision to develop a second edition. The working drafts of such 2nd editions are part of the official output of the meeting, [41] and [42].

The selected approach supports the following:

- a payment is going to be expressed as an obligation for one of the contract's parties, having another party as the beneficiary;

- the payment amount can be expressed either with an absolute value, with currency, or as a percentage of the net income from some related exploitation of rights;

- the obligation indicates the terms of payment either with a temporal context with an absolute deadline (`mco-ipre:beforeDate`) or with a time interval related to a triggering event, such as reception of invoice or accomplishment of an exploitation action.

At the moment the proposal doesn't include the expression of technical details related to the execution of the payment, as considered out of the scope of the contract and subject to information and modifications independent from the contracts.

In practice, nothing prevents the parties to decide to include their IBAN as one of their Dublin Core / Identifier metadata elements in the contract.

Two examples built on the current working draft of MCO 2nd edition are presented in Figures 27 and 28. Please note how the income percentage of Figure 28 is related to the payment.
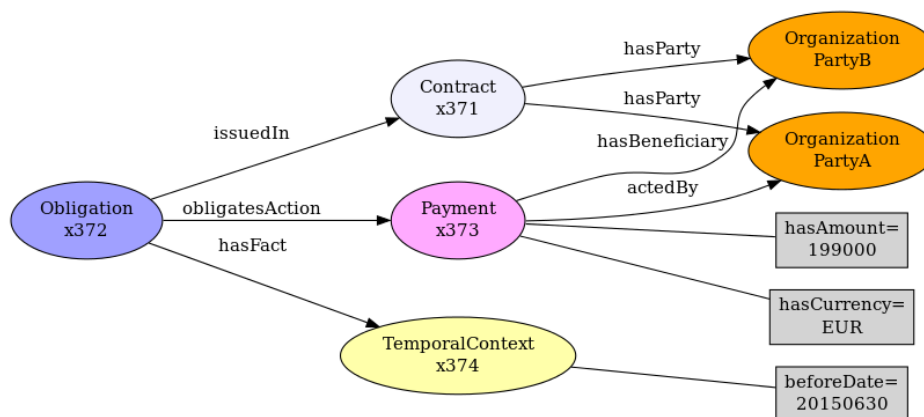

Figure 27 – Diagram of an example of obligation of payment for a defined amount
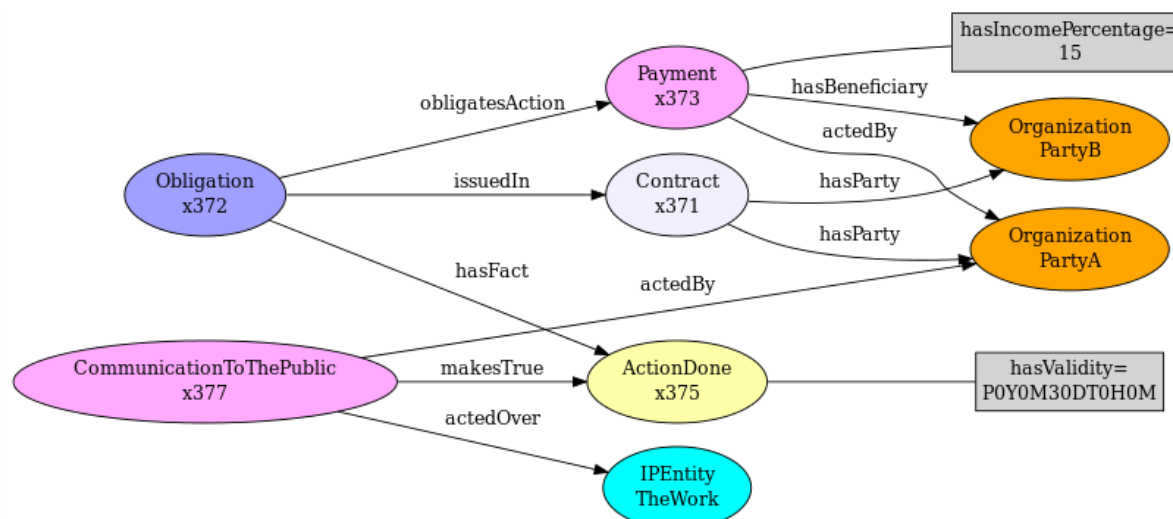
Figure 28 - Diagram of an example of payment expressed as a percentage of an exploitation income

9.2.9 Technical quality and format of the content material

The working draft of MCO 2nd edition includes the possibility to specify conditions on the technical quality and the format of the content material used for, or resulting from, the exploitation of rights.

The reasons for requesting such conditions are:

- Requiring low quality of content in order to protect another modality of exploitation; for example it might be asked a lower resolution for download services if the copyright holder wants to promote the streaming services.

- Requiring high quality of content for fruition by the final user, in order to promote the content itself and the reputation of the production company / media provider.

- Requiring accurate respect of material technical properties in order to guarantee its usability in particular technical contexts; this case is typical of deals in which the parties exchange material.

The first two cases can be addressed by constraining a very limited number of properties, in terms of upper or lower boundaries, such as for bit-rate or video resolution, or as fixed value, such as for specifying a given format, without particular details.

The third case can be described as a constraint of compliance to some technical profile. The proposed approach expects that such profile, either defined by third parties and available to the general public or defined on purpose by the same contract parties, is identifiable univocally by its URI and its content are known. The technicalities for defining the profile and running the compliance assessment are not in the scope.

The current draft defines a single condition, `mco-ipre:MaterialFormat`, which has to be specified with the desired number of data properties, taken from following list:

- `mco-ipre:matchesFormatComplianceProfile`, with the URI of the profile for the itemized technical assessment;

- `mco-ipre:hasFormat`,
- `mco-ipre:hasAudioFormat`,
- `mco-ipre:hasVideoFormat`, for attributing the material format by name or URI;

- `mco-ipre:hasMaxBitrate`,

- `mco-ipre:hasMinBitrate`, for attributing boundaries to the bit-rate, expressed in kilobits per second;
- `mco-ipre:hasAspectRatio`, for constraining display aspect ratio;
- `mco-ipre:hasMaxLines,`
- `mco-ipre:hasMinLines`, for attributing boundaries to height of picture or video, constraining its resolution.

9.2.10 Encryption

Encryption is about the need mentioned in 3.2.4

The aim is to avoid that the contract and rights information get available to users different from those intended to access it.

The technical contexts around access to contract or rights information need to be analysed with respects to different cases:

- when there are distinct files/documents, subject to exchange;

- when there are distinct files/documents, under the control of a repository service;

- when there are records on databases or other persistence services without distinction of contracts files/document.

Encryption is based on the principle that only the holders of decryption keys are able to access the encrypted information. So encryption is appropriate only for the first one of the cases above, while for the remaining two, it is better to implement features of access control. Indeed encryption would prevent the access also to components providing indexing, searching and retrieving functionalities. Providing decryption keys to those components would shift the access control problem to their input/output interface.

Access control is a well know information technology need and many implementations exist, with various degrees of security. Basically the access is granted to some content if the access properties of that content match with the user properties. Technically it ends to be a user authentication issue.

Encryption has to be used when the data are likely to be accessible to everybody, assuming that they are exchanged over an unsecure channel, but encryption makes the data useless without the keys for reaching the real information hidden in them.

Both MCO and CEL claim the capability to offer both partial and complete encryption of the media contracts.

This raises the issue, for the user perspective, to decide which part of the contract can or must be kept unencrypted. The question has sense only if at least the main identification of the contract has to be readable, otherwise any other general file encryption technology can be used.

Organisations interested in encryption features must check how the candidate tools and systems support it. RightsDraw, described in Chapter 7 , doesn't.

9.2.11 Digital signatures

Digital signature is the mean to ensure that the parties of a contract eventually agreed on the specified terms and this makes the contract binding.

In particular the use of digital signature must ensure:

- the integrity of the contract, in the version that was signed by the parties, who must be sure that no modification occurred after they signed it;

- the identification and authentication of the signatories;

- non repudiation; i.e. the signatories cannot claim not having signed the contract.

EU law supports the legal acceptance of digital signature, [43] and following decisions.

Some practical issues on the use of digital signature are described on Wikipedia[6]. For instance it must be paid attention to the difference with a written signature, for which here the user "does not see what she signs", because the digital signature applies to a sequence of bits, while the intention of the human signatory is to sign their semantic interpretation.

This argument put in stronger evidence the need for the electronic expression of rights to be unambiguous and also the need that no ambiguity is introduced by the modality of presenting that information to the human users.

Therefore the contract must not contain hidden information that the signer is unaware of and that can be revealed after the signature has been applied.
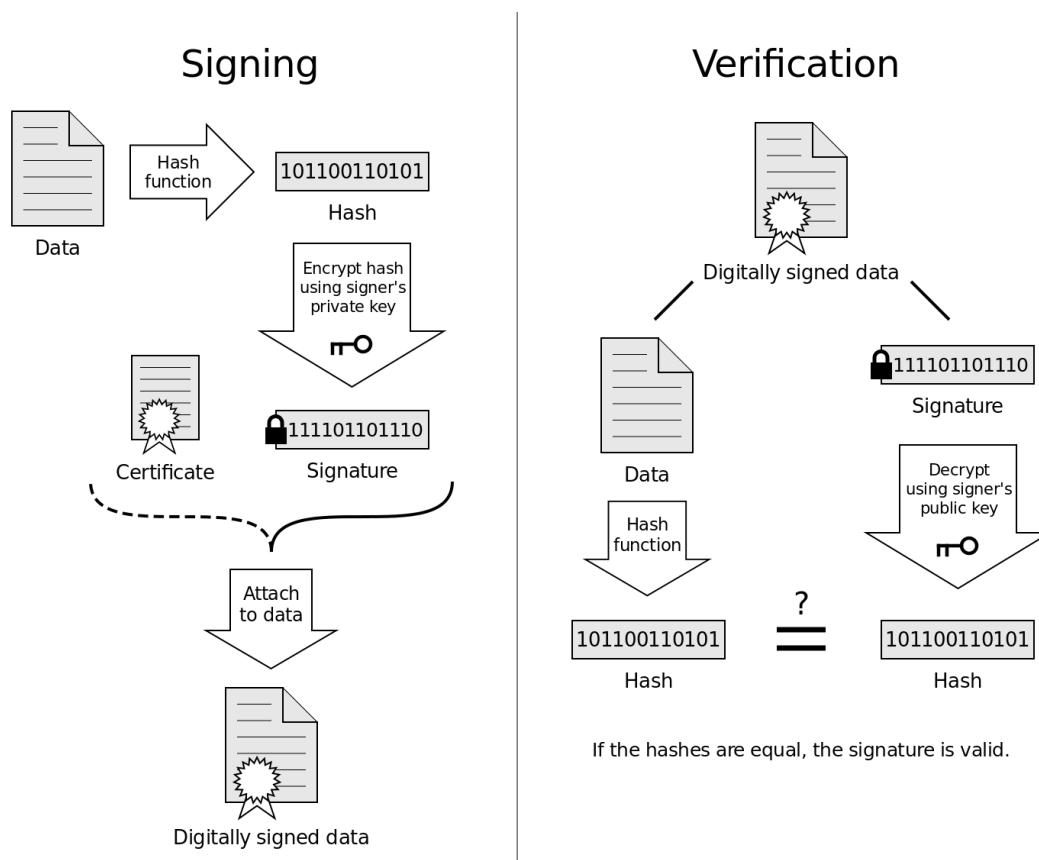

Figure 29 – application and verification of digital signature (Wikipedia)

---

[6] http://en.wikipedia.org/wiki/Digital_signature

9.3 Mapping from a pre-existing narrative contract

In this section it is discussed the matter of translating a pre-existing narrative contract into a machine-readable electronic contract and how this is different from the case discussed in clause 9.2

The major differences to be taken into account are:

- the mapped contract is not going to be binding, as it is not the signed version; if the aim is to have a binding contract it would necessary to have the consensus for signing the resulting mapped digital one by all the parties;

- there is no guarantee about the 100% of semantic equivalence, because the old contract may have clauses not possible to be expressed in the standard format, or the text of the original contract may even be ambiguous by itself, requiring a legal advice for correct interpretation; the mapping must be executed by skilled staff and validated by experts, in case of any doubt.

MCO and CEL provides the following features to address this case:

- inclusion of the text of the original narrative contract; the aim is to have a machine readable operative part of the contract, but keeping the possibility to verify the mapping against the text and improve it if necessary;

- make a reference from a deontic expression to the narrative textual clause which is implemented; again the aim is to support mapping verification; the structure of the narrative contract can make this difficult to do or poorly useful.

It is however recommended to execute massive mapping for open ended, or longer term time limit, contracts, focusing on the recurrent rights patterns, easy to be recognised and mapping with the approach described in clause 7.4 .

9.4 Rights operations

9.4.1 Rights clearance

Rights clearance need was presented in clause 3.2.2 as an activity of rights check-with.

The possible use cases are:

- One content item, which rights?

- One content item, one target exploitation, do they match? This case is the typical rights clearance paradigm.

- One target exploitation, which content items match?

RightsDraw addresses all of the cases above by means of the indexing strategy and implementation described in clause 7.5   that is the same also provided by the PrestoPRIME Preservation Platform (see 8.1   P4). Other approaches for alternative implementations have to be analysed. The known issues are:

- performances, in terms of time of response, limited to the third use case; problem can be mitigated by adoption of parallel indexes and appropriate definition of limitation of the content set boundaries;

- indexing and rights comparison require specific development, thus modifications to the MCO ontologies might imply the need for software update;
- currently works only on single permissions, with limited complexity.

9.4.2 Management of runs

When there are conditions on runs, normally for linear exploitations, a kind of run management is necessary for the organisation using the rights. How many runs have been consumed? And how many are still available? How can be respected sub-conditions on time validity window and number of repetitions?

The pre-requisite for the implementation of a run-manager is that the occurrence of the permitted CTTP actions, identifiable uniquely by their IRI, is logged and recorded.

The problem for the broadcasters is that of simulating the use of rights for defining the planning and the schedule for putting the content on air.

For instance having one run available for a given content, makes it possible to schedule a broadcast for next week, and no run must result available for further planning. However if the scheduled broadcast is cancelled, for any reason, then the run must become available again.

9.4.3 Purchases

One organisation being a party in a media contract, with the role of principal for some defined permission, is making purchasing of rights.

Simple recommendations for purchasing rights:

- make the best for ensuring that the issuer of the purchased permissions is the actual rights-holder for the traded rights; for instance ask the other party to show her purchasing contracts;
- ensure the content is identified properly and avoid purchasing rights that you already have; the problem may arise from mismatch in content identification or when previously owned rights come from non-machine readable contracts;
- keep a summarisation of rights for the target content, even if they come from different contracts; this approach is supported by RightsDraw in its "*holdings*" section.

9.4.4 Sales

One organisation being a party in a media contract, with the role of issuer for some defined permission, is making sales of rights.

Two activities are recommended in this case:

- checking pre-conditions; i.e. being the actual owner of the rights object of trade and having the sublicense rights for then;
- updating the "remaining rights" for the concerned content; please notice that this is necessary only if the rights are sold with exclusivity, as otherwise nothing changes for the rights of the issuer.

The former of the above is exactly a check-with activity, having the rights to be sold as target exploitation, in addition with the check of the sublicense flag.

The latter, in case of grant of exclusivity, reflects the complexity of the dynamicity of the rights. The proposed approach is again that of keeping up-to-date the summarisation of the owned rights for each content item, for example with the modalities demonstrated by RightsDraw.
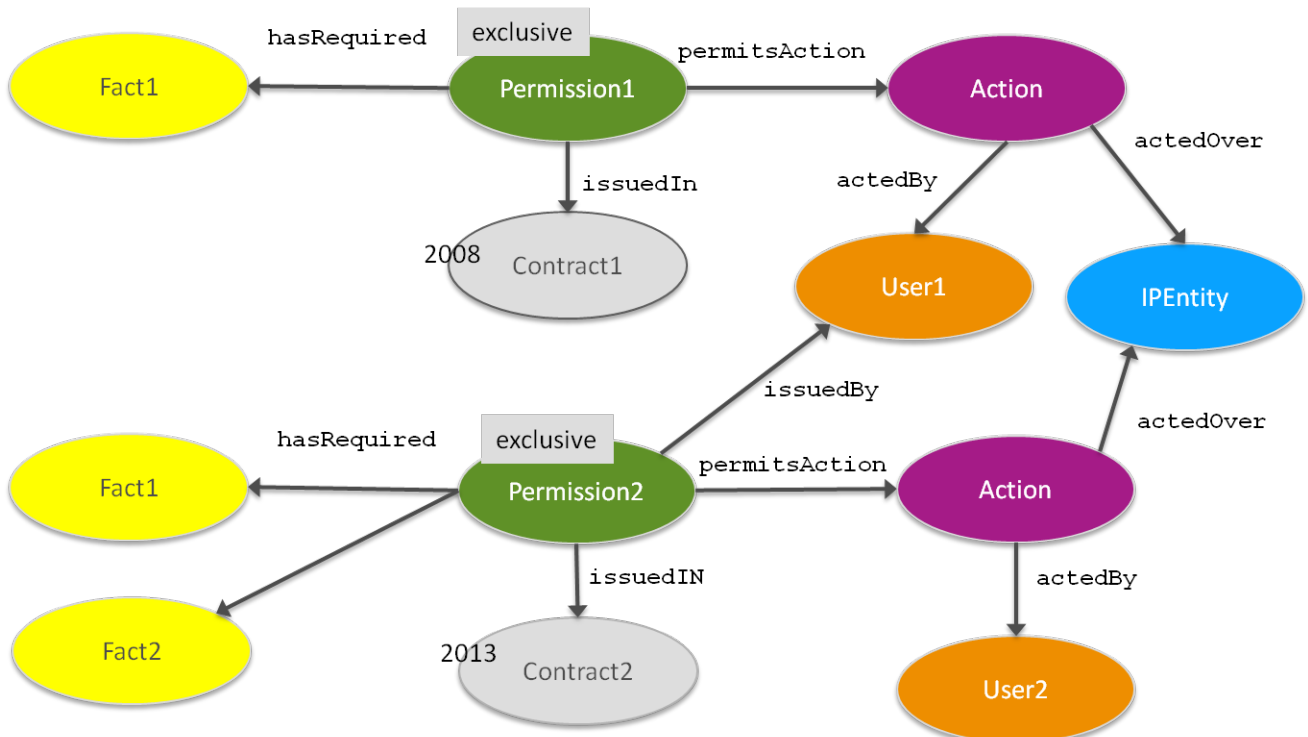
Figure 30 – diagram with a sale scenario for User1

An example of sale scenario, with result of computation of its consequences for the holdings of the issuer, is given in Figures 30 and 31. On the top of Figure 30 Permission1, issued in a contract dated 2008, provides the evidence that User1 owns some rights, which are specified here only generally with an Action conditioned by Fact1. Contract2, shown in the bottom part of the same Figure 30, which is a "sale contract" for User1 and "purchase contract" for User2, issues Permission2 that is clearly a restriction of Permission1, because it has a further condition, specified with Fact2.

Figure 31 shows the remaining rights for User1, expressed by Permission3 that is not issued within a contract, but just the result of a "sale computation". User1, in order to avoid infringement of her agreement with User2, will have simply to check that Fact2 is FALSE. Notice that the red object property in the diagram specifies a negative assertion.
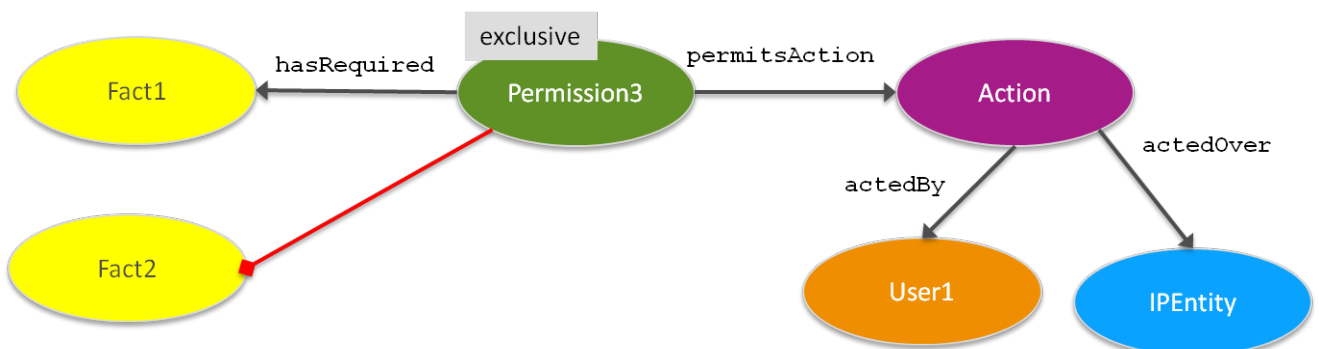
Figure 31 - results of sale example for the holdings of User1

9.5 Orphan works

9.5.1 Origin of the issue

Orphan works are content for which the actual rights holders are not known, i.e. they might still be protected by copyright but authors, or other rights holders, are not known or cannot be located or contacted to obtain copyright permissions; often it may also be impossible to determine when exactly a work was created and/or published for the first time.

Where there are several rights holders, e.g. co-authors, it is also possible that some of them, but not all, are located and can be contacted. In this case permissions issued by the located holders are necessary, but not sufficient.

Some of the reasons for the existence of orphan works are:

- uncertainty about heirs of deceased authors;

- discontinuance, without legal successor, of the organisation formerly holding the rights;

- increasing availability, especially on line, of content lacking rights and metadata information, although the work is automatically protected by law without need for copyright registration or notification to any authority.

9.5.2 Legal framework and diligent search

Orphan works in the legal framework [48].

Directive 2012/28/EU, "Orphan works" [47], sets out common rules on the digitisation and online display of so-called orphan works.

The EU member states have to implement the Directive in their respective national laws.

The aim of the EU Directive is the permission to use orphan works in some circumstances. For instance libraries could undertake digitisation projects for such content and make it available through the internet for educational and cultural purposes.

How to assess that some content can be considered orphan work?

The EU Directive defines a concept of "diligent search", to be carried out in good faith, by consulting appropriate sources determined by the States for each category of work.

If search is not "diligent enough", the use of work can be considered a copyright infringement. Therefore the activities for finding the rights holders, must be recorded.

The suggestions, see [15] and [57], can be summarised as follows:

- search for persons; the authors, and their heirs;

- search for production companies or other related legal entities;

- check if someone else has already made the same search;

- make search before using the work; and a specific search for each specific work;

- make public announcement (web and/or press);

- document all the steps with dates and names of the contacted resources.

9.5.3 What happens if rights holders appear

Rights holders can appear after that a work was considered orphan and was used as such; thus the work is no more orphan. No infringement is assumed in the case of diligent search, but still the rights holders can claim for a fair compensation, whether the use of the work carried an economical benefit or not.

The issue of fair compensation is expected to be solved by an agreement among the parties, taking into account the context/purpose of use and the kind of work. If no agreement is reached, the compensation is going to be decided by a court.

This is a warning for the organisations planning to use orphan works, as rights holders may have no interest in being found (not being collaborative in answering to the "diligent search"), until they see their economical benefit for appearing.

9.6 Public domain works

Works can fall in public domain either when all intellectual property rights have expired or when the legitimate rights holders decide to surrender the exploitation rights (not the moral rights), for instance issuing an open ended license to the general public such as the CC0 license from Creative Commons, available at:

https://creativecommons.org/publicdomain/zero/1.0/

Public domain works can be exploited, including the creation of derivative works, without any permission.

Works derived from public domain are subject to copyright protection, provided that they contain new relevant creative elements.

Once that content is in public domain, the economical interest shifts from intellectual property rights to the ownership of material.

10 Conclusions and future works

10.1 *Current situation*

10.1.1 Legal framework

Laws on copyright, electronic contracts, access to media content for the general public, and digital preservation have been evolving for trying to take into account the various elements which influence the scenario of media.

In the European Union, the Directives mentioned in Chapter 4 contribute to build a common reference legal framework.

Wide adoption of electronic contracts for the deal of media rights has to rely on laws well defined, in order to minimise the risk of dispute and conflict between parties, especially if rights, expressed in machine-readable form, have to be evaluated by means of software components.

However in the EU the Directives have to be implemented by the national laws, with the possibility to get variations which may influence the application of laws in the various member countries.

At the world wide scale, differences in legislation are even more important and condition, not only the trade of rights, but also the possibility to apply preservation programs and give free access to archive contents, because of concerns related to copyright.

10.1.2 Rights formats

The definition of standard formats for the expression of rights and media contracts has been the object of various activities in the recent years.

The most promising standardisation contexts are that of the last specifications of MPEG-21, with CEL and MCO, and the ODRL, presented in clauses 6.1 , and 6.2 respectively.

Technically, both contexts offer solutions for both the XML and the RDF environments.

A relevant question is that of which scenarios are prevalently addressed.

A great effort is put into the expression of licenses towards end users, possibly for offering fruition platforms in which the respect of rights can be enforced, till on their personal fruition devices. In such scenario the same license is offered to all the end users, who have poor options for negotiations.

MPEG-21 CEL and MCO have also considered the business-to-business scenario, by defining formats aiming at expressing whole media contracts, agreed among parties having almost the same negotiation level. Such approach explicitly supports the expression of rights in the terms of exploitation of intellectual property, as defined in the common legal framework.

A comparison among these formats is given in [28], with the conclusion that, although several gaps can be identified, all have a valid basic approach, that lets prefigure the possibility of an acceptable level of interchange-ability, as discussed in 9.1.5

10.1.3 Rights management tools

This deliverable included some assessment only for RightsDraw, presented in Chapter 7 showing on one hand an encouraging score for functional suitability and various limitations, on the other hand, indicating the need for further work.

Above all a lack of offer for tools and services implementing and supporting standard rights formats can be remarked. As the current trend, till now, seems to prefer the development of customised solutions, which risk being satisfactory only in a restricted and limited in time context, together with problem of being proprietary.

10.2   Future works on standards

The outlook on future work is promising, if already started activities will be carried on as planned.

10.2.1 MPEG-21

The work on second edition for MPEG-21 CEL and MCO, as documented in [41] and [42], already takes into account some of the newly identified needs and are in line with the conclusions of [28].

In particular the already identified additions on the whole aims at making these formats capable of being used format for electronic contracts in the context of media rights.

As well as such addressed issues, i.e. better coverage of conditions, definitions of payments and other obligations, and assertions on governing law, other aspects are likely close to be considered:

- expression of constraints derived from decisions of courts or laws, in the context of protection of the rights of minors or the right of persons "to be forgotten"[7], in relation with the content of audiovisual work;

- expression of statements related to the respect of privacy; this is relevant in various contexts including: collections of interviews and possible interactions between end user, with information derived from her environment, and media content fruition;

- address the requests of other emerging MPEG contexts, such as the proposed Publication and Subscription Application Format (PS-AF).

10.2.2 ODRL

The comparison made in [28] permitted to identify possible areas of work in ODRL, in order to provide a minimum desired level of interchange-ability with CEL and MCO, as follows:

- introduce support to complex conditions based on logical constructs;

- add support for interdependencies between deontic expressions;

- improve ways for expressing exclusivity and sublicense rights;

- add support for taking into account percentages for use of and income from permissions;

- add vocabularies, also by definition of a specific profile, for the expression of exploitation rights actions and conditions.

---

[7] http://en.wikipedia.org/wiki/Right_to_be_forgotten

10.3 Future works related to tools

An agenda for tools development can be easily defined by the request of fulfilment of all the functions listed in Table 4, with a good level of appropriateness.

Also tools for rights management have to be integrated with other components and services. Such goal is likely quite challenging and requires awareness about the issues of rights also in the definition and development of the related resources.

Glossary

Term	Definition
ABC	Australian Broadcasting Corporation
AGPL	Affero General Public License
AMD	Amendment - A change to an already existing standard, in MPEG
API	Application Programming Interface
ARSC	Association for Recorded Sound Collections, http://www.arsc-audio.org
Assignee	Someone to whom a right is granted. In ODRL. See also Licensee, Principal
Assigner	Someone granting a right to someone else. In ODRL See also Licensor, Issuer.
CoP	Community of Practice
B2B	Business-to-Business
B2C	Business-to-Consumer
CEL	Contract Expression Language
CLI	Command Line Interface
CTTP	Communication To The Public
DDEX	Digital Data Exchange (DDEX), http://www.ddex.net
DID	Digital Item Declaration
DIDL	Digital Item Declaration Language
DII	Digital Item Identification
DW	Deutsche Welle (Germany's international broadcaster)
EAI	Electronic Arts Intermix
EBU	European Broadcasting Union
EFG	European Film Gateway, EU Project, http://www.efgproject.eu
EIFL	Electronic Information For Libraries, http://www.eifl.net/
EU	European Union
EUR-Lex	European Union resource for access to EU Law
GPL	General Public License
GUI	Graphical User Interface
IPRE	Extension for exploitation of intellectual property rights. Present in CEL and MCO.
IPTC	International Press Telecommunications Council
IRI	Internationalized Resource Identifier. A URI allowing Unicode characters. In Ontologies
ISAN	International Standard Audiovisual Number
ISO	International Organization for Standardization

Issuer	Someone granting a right to someone else. In REL. See also Licensor, Assigner
ITTF	ISO/IEC Information Technology Task Force
JSON	JavaScript Object Notation
Licensee	Same as Principal or Assignee
Licensor	Same as Issuer or Assigner
MCO	Media Contract Ontology
METS	Metadata Exchange and Transmission Standard
MPEG	Moving Pictures Expert Group, same as ISO/IEC SC 29 WG 11
MVCO	Media Value Chain Ontology
NRK	Norsk rikskringkasting (Norwegian Broadcasting Corporation)
PNG	Portable Network Graphics (lossless compressed format for still pictures)
ODRL	Open Digital Rights Language
OWL	Web Ontology Language
PREMIS	Preservation metadata implementation strategies, http://www.loc.gov/standards/premis/
Principal	Someone to whom a right is granted. In REL. See also Licensee, Assignee
RAI	RAI – Radiotelevisione Italiana, the Italian public broadcaster
RDD	Rights Data Dictionary
RDF	Resource Description Framework
REL	Rights Expression Language
RO	Research Output
SIAE	Società Italiana Autori Editori (English transl.: Italian Society for Authors and Publishers), the Italian copyrights collecting society.
UGC	User Generated Content
UPC	Universitat Politécnica de Catalunya
UPM	Universidad Politécnica de Madrid
URI	Uniform Resource Identifier
URN	Uniform Resource Name
W3C	World Wide Web Consortium, www.w3.org
WIPO	World Intellectual Property Organization
XML	eXtensible Markup Language
XSLT	eXtensible Stylesheet Language Transformations

References

[1] ISO/IEC 21000-21:2013. Information Technology ––Multimedia Framework (MPEG-21) –– Part 21: Media Contract Ontology, 2013

[2] ISO/IEC 21000-19:2010. Information Technology ––Multimedia Framework (MPEG-21) –– Part 19: Media Value Chain Ontology, 2010

[3] ISO/IEC 21000-20:2013. Information Technology ––Multimedia Framework (MPEG-21) –– Part 20: Contract Expression Language, 2013

[4] Rodríguez-Doncel,V., Introduction to the Media Value Chain Ontology, 2010, available at http://dmag.ac.upc.edu/ontologies/mvco/, accessed Aug. 2014

[5] Boch, L., Delgado, J., Llorente, S., Rodríguez-Doncel,V., Rodríguez, E., Informative description of Media Contract Ontology – Core, 2014, available at http://purl.oclc.org/NET/mco-core, accessed Aug. 2014

[6] Boch, L., Delgado, J., Llorente, S., Rodríguez-Doncel,V., Rodríguez, E., Informative description of Media Contract Ontology – Extension for the Exploitation of Intellectual Property Rights, 2014,available at http://purl.oclc.org/NET/mco-ipre, accessed Aug. 2014

[7] Rodríguez, E., Delgado, J., Boch, L., Rodríguez-Doncel, V. Media Contracts Formalization Using a Standardized Contract Expression Language, IEEE Multimedia, doi:10.1109/MMUL.2014.22, April 2014 (pre-print)

[8] Burnet, I., Davis, S., Drury, G. MPEG-21 Digital Item Declaration and Identification— Principles and Compression, IEEE Transaction Multimedia, doi:10.1109/TMM.2005.846789, June 2005

[9] Di Carlo, A., Boch, L. , Lucaferri, L., Messina, A., Picciotti, G., Allasia, W., Gallo, F., Lanza, S., Todarello, E., Delgado, J., Rodríguez, E., Rodríguez, V., Chiariglione, F., "Common Rights Ontology". PrestoPRIME Deliverable ID4.0.5B, 2010, available at https://prestoprimews.ina.fr/public/deliverables/PP_WP4_ID4.0.5b_RightsOntology_R0_v1.1 1.pdf, accessed Nov. 2013

[10] Boch, L., Di Carlo, A., "Proof of Concept Rights Management System".PrestoPRIME Deliverable D4.0.6, 2012, available at https://prestoprimews.ina.fr/public/deliverables/PP_ WP4_D4.0.6 ProofOfConceptRightsManagementSystemv1.11.pdf

[11] RightsDraw2, "Technical Report". Available at http://www.crit.rai.it/EN/attivita/opensource/RightsDraw_en_2013.pdf, accessed Nov. 2013

[12] Boch, L., Di Carlo, A., Rossetto, R., Standards and tools supporting audiovisual rights management. IASA Conference, Vilnius October 2013

[13] Rodríguez, V., Suarez, M., Gomez, A. Poveda, M., Licensing patterns for Linked Data. Poster available at http://delicias.dia.fi.upm.es/~vrodriguez/pdf/Poster-LicensingPatternsForLinkedData.pdf, accessed Nov. 2013

[14] Nina, Ñ., Bout, L., Report on legal frameworks in European Film Gateway (EFG) consortium member states, EFG Deliverable D5.1, April 2009, available at www.efgproject.eu/downloads/D.5.1_legal_frameworks_in_EFG_consortium_a.pdf, accessed Aug. 2014

[15] Nina, Ñ., Bout, L., Vooren, G., Final Guidelines on Copyright Clearance and IPR Management, EFG Deliverable D5.3, October 2010, available at http://www.efgproject.eu/downloads/D_5_3_Final_Guidelines_Copyright_Clearance_online.p df, accessed Aug. 2014

[16] Garcia, R., A Semantic Web Approach to Digital Rights Management, PhD Thesis, 2005, available at http://rhizomik.net/html/~roberto/thesis/Thesis.pdf, accessed Aug. 2014.

[17] Garcia, R., Copyright Management of User Generated Content, 2013, MediaMixer White paper, available at http://community.mediamixer.eu/documents/copyrightsmanagementugc, accessed Aug. 2014.

[18] Garcia, R., Copyright Reasoning Explained, 2013, Media Mixer Document, available at http://community.mediamixer.eu/documents/copyright/at_download/file, accessed Aug. 2014.

[19] PrestoPRIME, EU Project FP7-ICT-2007-3 23116, www.prestoprime.eu, accessed Aug. 2014

[20] Presto4U, EU Project ICT 2011.4.3 Coordination Action GA No. 600845, www.presto4u.eu, accessed Aug. 2014

[21] MediaMixer, EU Project FP7-318101, http://www.mediamixer.eu/, accessed Aug. 2014

[22] ODRL Community Group, W3C open forum , http://www.w3.org/community/odrl/, accessed Aug. 2014

[23] RightsML, IPTC Developer site. URL: http://dev.iptc.org/RightsML, accessed Dec. 2014

[24] MPEG, Working Group of ISO/IEC, www.chiariglione.org, accessed Aug. 2014

[25] Bormans, J., Hill, K., MPEG White Paper, MPEG-21 Overview v.5, 2002, available at http://mpeg.chiariglione.org/sites/default/files/files/standards/docs/w5231.zip, accessed Aug. 2014

[26] Di Carlo, A., Picciotti, G., Bartoleschi, M., Lucaferri, L., Glossary of Rights, 2012, available at https://www.prestocentre.org/system/files/library/resource/glossary_of_rights_2012.pdf, accessed Aug. 2014

[27] EBUCore, EBU, https://tech.ebu.ch/docs/tech/tech3293v1_5.pdf, accessed Sept.2014

[28] EBU TR 030, Report on Audio Visual Rights, EBU 2014, available at https://tech.ebu.ch/docs/techreports/tr030.pdf , accessed December 2014

[29] Library of Congress, PREMIS Data Dictionary for Preservation Metadata, version 2.2. URL: http://www.loc.gov/standards/premis/, accessed December 2014

[30] Koyle, K., Report of the Library of Congress, Rights in the PREMIS Data Model, 2006, URL: http://www.loc.gov/standards/premis/Rights-in-the-PREMIS-Data-Model.pdf, accessed December 2014

[31] RightsDraw on GitHub, URL: https://GitHub.com/prestoprime/rightsdraw2/, accessed December 2014

[32] P4, GitHub. URL: https://GitHub.com/prestoprime/p4, accessed December 2014

[33] Archivematica web page. URL: https://www.archivematica.org, accessed Dec. 2014

[34] Archivematica, PREMIS metadata: rights - 0.10, URL: https://www.archivematica.org/wiki/PREMIS_metadata:_rights_-_0.10 , accessed December 2014

[35] Ueno, H., Sumita, M., Ishikawa, N., Standardization of OMA DRM -Technologies for Handling Digital Content Distribution and Copyright Management-, NTT DoCoMo Technical Journal Vol. 6 No.4, URL: https://www.nttdocomo.co.jp/english/binary/pdf/corporate/technology/rd/technical_journal/bn/vol6_4/vol6_4_043en.pdf , accessed December 2014

[36] DSpace web page. URL: http://www.dspace.org, accessed December 2014

[37] Roda webpage. URL: http://www.roda-community.org/, accessed December 2014

[38] Roake, E., Governing law and jurisdiction: Getting it right is crucial, Agent Law Article, July 2010, available at http://www.agentlaw.co.uk/site/briefing_notes/Getting_it_right_is_crucial.html, accessed December 2014

[39] Scognamiglio, G., Governing Law Clauses and Jurisdiction Clauses in International Contracts, Website of international law firm, available at http://www.studiolegalescognamiglio.it/governing-law-clauses-jurisdiction-clauses-international-contracts/, accessed December 2014

[40] Boch, L., Delgado, J., Rodriguez-Doncel, V., Moore, L., Di Carlo, A., Llorente, S., Hoyne, T., Additions for second editions of ISO/IEC 21000-21 (Media Contract Ontology) and ISO/IEC 21000-20 (Contract Expression Language), ISO/IEC SC29/WG11/m35066, October 2014

[41] ISO/IEC SC29/WG11/w14843, Working Draft CEL 2nd edition, November 2014

[42] ISO/IEC SC29/WG11/w14844, Working Draft MCO 2nd edition, November 2014

[43] EUR-Lex, Directive 1999/93/EC, Community framework for electronic signatures, available at http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31999L0093 , accessed December 2014

[44] EUR-Lex, Directive 2001/29/EC, Copyright, available at http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32001L0029 , accessed December 2014

[45] EUR-Lex, Directive 2007/65/EC, Audiovisual media service, available at http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32007L0065 , accessed Dec. 2014

[46] EUR-Lex, Directive 2011/77/EU, Term of protection of copyright, available at http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32011L0077, accessed December 2014

[47] EUR-Lex, Directive 2012/28/EU, Orphan works, available at http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32012L0028, accessed Dec. 2014

[48] European Commission, The EU legal framework ("acquis"), Orphan works, available at http://ec.europa.eu/internal_market/copyright/orphan_works/ , accessed Dec- 2014

[49] OWL 2, OWL 2 Web Ontology Language Document overview, W3C Recommendation, 11 December 2012, http://www.w3.org/TR/owl2-overview/

[50] Chakravarthy A. et alii, Presto4U Deliverable D3.2, Research Output Assessments v1, December 2013

[51] Chakravarthy A. et alii, Presto4U Deliverable D3.3, Research Output Assessments v2, December 2014

[52] Horowitz, N., Art of the Deal : Contemporary Art in a Global Financial Market. Princeton, N.J. ; Woodstock: Princeton University Press, 2007

[53] Robertson, I., Art, Religion, History, Money. In: Robertson, I. (ed.), Understanding International Art Markets and Management, London: Routledge, 2005

[54] Buchloh, B., Conceptual Art 1962–1969: From the Aesthetics of Administration to the Critique of Institutions, In: Alberro, A.and Stimson, M. B. (eds.) Conceptual Art : A Critical Anthology. Cambridge, Mass.: MIT Press, 1999

[55] Electronic Arts Intermix, Collection Resources, Agreements and Contracts,URL, http://www.eai.org/resourceguide/collection/singlechannel/agreementscontracts.html accessed December 2014

[56] Forward, EU Project CIP-ICT-PSP-325135, http://project-forward.eu/ , accessed December 2014

[57] EIFL, The European Orphan Works Directive: An EIFL Guide, available at http://www.eifl.net/resources/european-orphan-works-directive-eifl-guide , accessed December 2014

[58] US Copyrights Office, Circular letter "Copyright Basics", 2012, available at http://www.copyright.gov/circs/circ01.pdf, accessed December 2014

[59] Venturini, F., di Alberto, E., Montani, S., Transforming Rights Management for High Performance, Accenture White Paper, 2010, available at http://www.accenture.com/SiteCollectionDocuments/PDF/Accenture_Rights_Management.pdf, accessed December 2014

Acknowledgments

Beyond the names of contributors listed in the "Document information", it is behove to thank particularly:

- Annarita Di Carlo, working at RAI Archive Rights Clearance department, for all the information, suggestions, and clarifications provided.

Moreover I want to mention here the various other contributors to the EBU Report on Rights Technologies, [28], although they don't appear formally, namely:

- Jaime Delgado (UPC)
- Victor Rodríguez-Doncel (UPM)
- Jean-Pierre Evain (EBU)
- Roberto García (Univ. Lleida)
- Lizbeth Moore (ABC)
- Ian Levenson (DW)
- Per Ole Hagen and Gunnar Dahl (NRK)
- Annarita Di Carlo (RAI)

Document information

Delivery Type	Report
Deliverable Number	D3.4
Deliverable Title	Recommendations on Rights Technology
Due Date	2014-12-31
Submission Date	
Work Package	3
Partners	RAI
Author(s)	Laurent Boch (RAI), editor Contributors: Annarita Di Carlo (RAI), Francesco Gallo, Jacopo Pellegrino (EURIX), Pip Laurenson (Tate), Marco Rendina (Luce), Linda Ligios (KCL), Silvia Ortolani (Univ. La Sapienza), Thomas Christensen (DFI), Luca Bagnoli and Daniel Teruggi (INA). Erwin Verbruggen (B&G), Fabrizio Falchi (CNR)
Reviewer(s)	Annarita Di Carlo (RAI), Francesco Gallo (Eurix)
Keywords	Rights, MPEG-21, Media Contract Ontology, ODRL, Guidelines,
Document Identifier	Deliverable_D3.4_presto4u_dd_mm_yyyy version
Dissemination level	PU
Document Status	Working Draft

Project Acronym	Presto4U
Project Full Title	European Technology for Digital Audiovisual Media Preservation
Grant Agreement	600845
Project Coordinator	Beeld en Geluid
Contact Details	Sumatralaan 45, 1217GP Hilversum, The Netherlands. msnyders@beeldengeluid.nl

Document Status Sheet

Version	Delivery Date	Comment	Author
0.1	2014-11-03	First outline created	
0.3 to 0.14	2014-11-25 2014-12-12	Working Draft	
0.15	2014-12-19	Final Draft	
1.0	2014-12-23	Draft for release	
1.0(R)	2014-12-29	Release	Coordinator