

## Standardisation initiatives around Digital Rights Management

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## IPR Issues (2/2)

- ...
- **Negotiation**: Protocol
- **Agreement**: Contract
- **Control** : Passive and active



**MANAGEMENT**

## Multimedia content

- Identification
- Description
- Coding
- Business Models
- Distribution / Communication
- **Digital Rights!** (IPR, Intellectual Property Rights)

## IPR Issues

- **Representation**: Metadata
- **Negotiation**: Protocol
- **Agreement**: Contract
- **Control** : Passive and active

## IPR Issues (1/2)

- **Protection**: Watermarking, ...
- **Information representation**:
  - Metadata
  - Rules (*Rights expression language*)
  - Dictionary (*Rights Data Dictionary*)

## Metadata for Multimedia Content

- **Different approaches for different applications.**
- **Examples of initiatives:**
  - Dublin Core: Widely used. Originated in libraries
  - IEEE LOM: For educational material
  - MPEG-7: Focus on audiovisual material
- **Interoperability problem.**
- **IPR specific?**

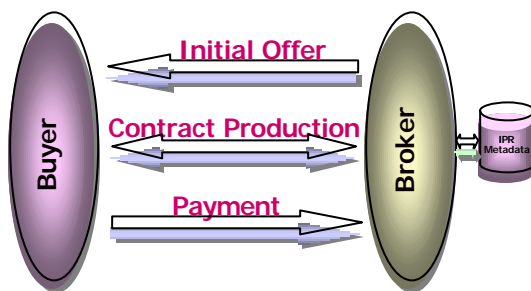
## IPR Issues

- **Representation:** Metadata
- **Negotiation:** Protocol
- **Agreement:** Contract
- **Control :** Passive and active

## IPR Issues

- **Representation:** Metadata
- **Negotiation:** Protocol
- **Agreement:** Contract
- **Control:** Passive and active

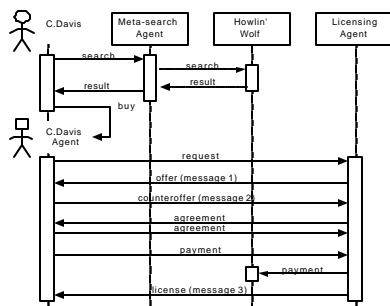
## IPR Negotiation



## Standardisation on DRM

- **Information representation :**
    - Metadata
    - Rules
    - Dictionary
- (Rights expression language)*  
*(Rights Data Dictionary)*

## Negotiation example



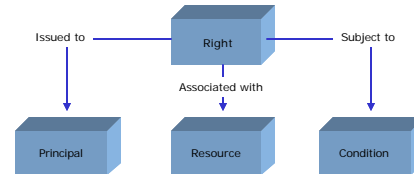
## Different initiatives

- <indecs> 2 rdd
- XrML
- ODRL
- MPEG-21
- Others
- IPR ontology

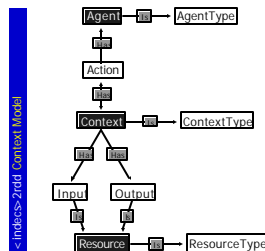
## <indecs> 2rdd Project

- <indecs> 2 Rights Data Dictionary Consortium based in previous <indecs> Project
- Objective: Interoperability of metadata
- Logical Data Models
  - *Context Model*: Basic structure for descriptions of Rights and Permissions. Action Model based.
  - *Resource Model*: Resource-based descriptive metadata
  - *Ascriptive Model*: Relationships between descriptive metadata and rights metadata at the semantic level

## XrML Data Model



## <indecs> 2rdd Context Model



## Open Digital Rights Language

- Expressions rights language and definitions of elements in the data dictionary
- ODRL Foundation Model (core entities):
  - *Assets*: Physical or digital content
  - *Rights*: Permissions which can contain Constraints, Requirements and Conditions
  - *Parties*: End Users and Rights Holders

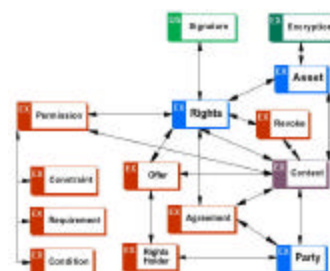


## eXtensible rights Markup Language

- **XrML** is a general purpose language based in XML to describe rights and conditions for using digital resource.
- XrML Data Model
  - *License*: Container of grants
  - *Grant*: Conveys to a principal the right to use a resource subject to certain conditions
  - *Principal*: Identify a resource
  - *Right*: Action that the principal may perform on or using the associate resource
  - *Resource*: Object to which the principal can be granted a right
  - *Condition*: Something that must exist before a right can be exercise or granted

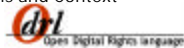


## ODRL Foundation Model

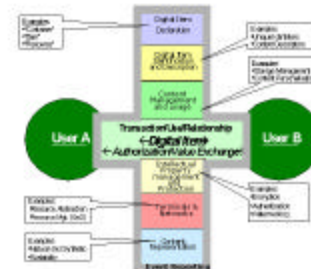


## Open Digital Rights Language

- ODRL Foundation Model for rights expressions
  - Permissions: Usage, Reuse, Transfer and Asset Management
  - Constraints: User, Device, Bounds, Temporal, Aspect, Target and Rights
  - Requirements: Fee, Interactions and Usage
  - Conditions: Permission and Constraint
  - Rights Holders: Royalty (Percentage, Fixed Amount)
  - Contexts: UID, Name, Role, Remark, Version, Date Time, Event, Physical Location, Digital Location, etc.
  - Offers: Asset, Rights Holder, Permission and Context
  - Agreements: Asset, Party, Permissions and Context
  - Revoking Rights: Context



## MPEG-21



## MPEG



### Working Group ISO/IEC

Development of standards for coded representation of digital audio and video

- **Moving Picture Experts Group**
  - MPEG-1: Standard for storage and retrieval of moving pictures and audio on storage media
  - MPEG-2: Standard for digital television
  - MPEG-4: Standard for multimedia applications
  - MPEG-7: Standard for description and search of audio and visual content
  - **MPEG-21: Multimedia Framework**

## MPEG-21 Multimedia Framework

- Part 1: Vision, Technologies and Strategy
- Part 2: Digital Item Declaration
- Part 3: Digital Item Identification and Description
- **Part 4: Intellectual Property Management and Protection (IPMP)**
- **Part 5: Rights Expression Language (REL)**
- **Part 6: Rights Data Dictionary (RDD)**



## MPEG-21 Multimedia Framework

- **MPEG-21 Key Elements:**
  - Digital Item Declaration
  - Digital Item Identification and Description
  - Content Handling and Usage
  - **Intellectual Property Management and Protection (IPMP)**
  - Terminals and Networks
  - Content Representation
  - Event Reporting



## MPEG-21 and DRM

- **Call for Requirements**
- **Call for Proposals** (March – Dec. 2001)
  - **Rights Data Dictionary (RDD)**
  - **Rights Expression Language (REL)**
- **Fulfil Requirements for Standard development**
- **Model to support the creation of a RDD and REL useful for Standard development**



## Different initiatives

- <indecs> 2 rdd
- XrML
- ODRL
- MPEG-21
- **Others**
- IPR ontology

## IPR ontology

- Existing initiatives use a syntactic approach (hidden semantics not machine-readable).
- MPEG syntactic approach (XML-Schema).
- Syntactic to semantic level  $\approx$  avoiding ambiguity and better interoperability of approaches.
- Development of a full **ontology** (expressed in RDF) that helps structuring IPR information and still allows to get a XML Schema and a Rights Data Dictionary?

## Other initiatives

- The Open eBook Forum (OeBF)
  - Digital Rights Management Strategy WG
- Publishing Requirements for Industry Standard Metadata (PRISM):
  - XML metadata standard
- OASIS Rights Language TC (XrML)

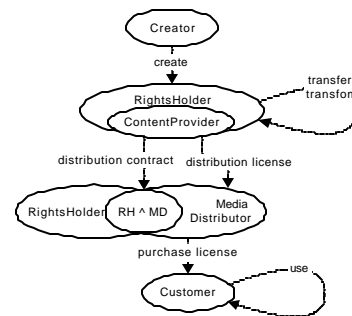
## IPR ontology

- Development by **UPF – DMAG**, <http://dmag.upf.es>
- IPR ontology to formalise the IPR domain (Semantic Web approach). It describes:
  - IPR contracts, actors, intellectual property creations, rights, etc.
  - Complete metadata framework.
  - Textual expression of semantics.
  - Rights data dictionary.
  - RDFSschema, DAML+OIL, ...

## Other initiatives

- TV-Anytime Forum
  - Working Group on Rights Management and Protection
- Digital Video Broadcasting (DVB)
  - Content Protection & Copy Management
  - Conditional Access
- Secure Digital Music Initiative (SDMI)

## IPR content life cycle



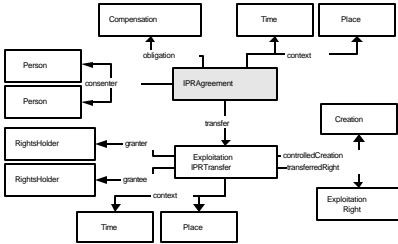
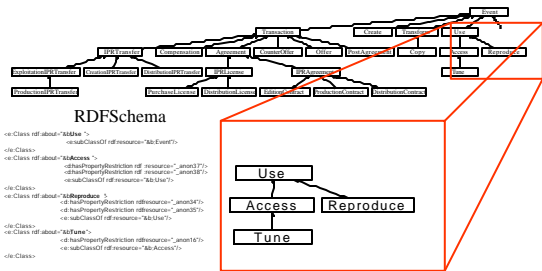
# IPROnto

Rights transfer event

```
classDiagram
    class Person
    class IPRAgreement
    class Exploitation_IPRTransfer
    class RightHolder
    class Compensation
    class Time
    class Place
    class Creation
    class Exploitation_Right

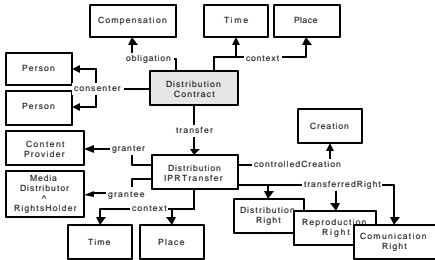
    Person --> IPRAgreement : consent
    Person --> IPRAgreement : obligation
    IPRAgreement --> Compensation
    IPRAgreement --> Time
    IPRAgreement --> Place
    IPRAgreement --> Exploitation_IPRTransfer : transfer
    RightHolder --> Exploitation_IPRTransfer : grant
    RightHolder --> Exploitation_IPRTransfer : grantee
    Exploitation_IPRTransfer --> Time
    Exploitation_IPRTransfer --> Place
    Exploitation_IPRTransfer --> Creation : controlledCreation
    Exploitation_IPRTransfer --> Exploitation_Right : transferredRight
```

The diagram illustrates the relationships between various entities in the IPROnto ontology during a rights transfer event. The central entity is **IPRAgreement**, which is associated with **Person** (via **consent** and **obligation**), **Compensation**, **Time**, **Place**, and **Exploitation\_IPRTransfer** (via **transfer**). **Exploitation\_IPRTransfer** is further associated with **RightHolder** (via **grant** and **grantee**), **Time**, **Place**, **Creation** (via **controlledCreation**), and **Exploitation\_Right** (via **transferredRight**).

[illegible]

The diagram illustrates the 'Distribution contract event' within the IPRonto ontology. It shows the relationships between various entities and events:

- Entities (White Boxes):** Person, Content Provider, Media Distributor, RightsHolder, Distribution Contract, Distribution IPRTransfer, Creation, Distribution Right, Reproduction Right, Communication Right, Compensation, Time, Place.
- Events (Shaded Boxes):** Distribution Contract, Distribution IPRTransfer.
- Relationships (Arrows):**
  - obligation:** From **Distribution Contract** to **Compensation**.
  - context:** From **Distribution Contract** to **Time** and **Place**.
  - consenter:** From **Person** to **Distribution Contract**.
  - transfer:** From **Distribution Contract** to **Distribution IPRTransfer**.
  - grantee:** From **Distribution IPRTransfer** to **Media Distributor** and **RightsHolder**.
  - granted:** From **Distribution IPRTransfer** to **Time** and **Place**.
  - transferedRight:** From **Distribution IPRTransfer** to **Distribution Right**, **Reproduction Right**, and **Communication Right**.
  - controlledCreation:** From **Distribution IPRTransfer** to **Creation**.
  - grantor:** From **Content Provider** to **Distribution IPRTransfer**.



## Conclusions

- Digital Rights (IPR) management:
  - Representation, Negotiation, Control, ...
- Rights Expression Languages
- Rights Data Dictionaries
- Many unrelated initiatives
- MPEG-21?
- IPR ontology? **IPR knowledge management!**

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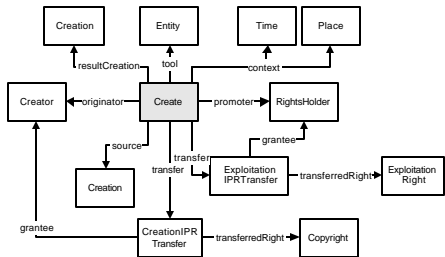
# IPROnto

Creation event

```

graph TD
    Creator[Creator] -- "originator" --> Create[Create]
    Create -- "resultCreation" --> Creation[Creation]
    Create -- "tool" --> Entity[Entity]
    Create -- "context" --> Time[Time]
    Create -- "context" --> Place[Place]
    Create -- "promoter" --> RightsHolder[Rights-Holder]
    Create -- "source" --> Creation2[Creation]
    Create -- "transfer" --> ExploitationIPRTransfer[Exploitation IPR Transfer]
    Create -- "grantee" --> RightsHolder
    ExploitationIPRTransfer -- "transferredRight" --> ExploitationRight[Exploitation Right]
    Creation2 -- "grantee" --> CreationIPRTransfer[Creation IPR Transfer]
    CreationIPRTransfer -- "transferredRight" --> Copyright[Copyright]
  
```

The diagram illustrates the 'Creation event' in the IPROnto ontology. It features a central 'Create' entity (shaded grey) which is the core of the event. 'Create' is connected to several other entities: 'Creator' (via 'originator'), 'Creation' (via 'resultCreation'), 'Entity' (via 'tool'), 'Time' and 'Place' (via 'context'), 'Rights-Holder' (via 'promoter'), 'Creation' (via 'source'), 'Exploitation IPR Transfer' (via 'transfer'), and 'Rights-Holder' (via 'grantee'). Additionally, 'Exploitation IPR Transfer' is connected to 'Exploitation Right' (via 'transferredRight'). 'Creation' (via 'source') is connected to 'Creation IPR Transfer' (via 'grantee'), which in turn is connected to 'Copyright' (via 'transferredRight').



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