

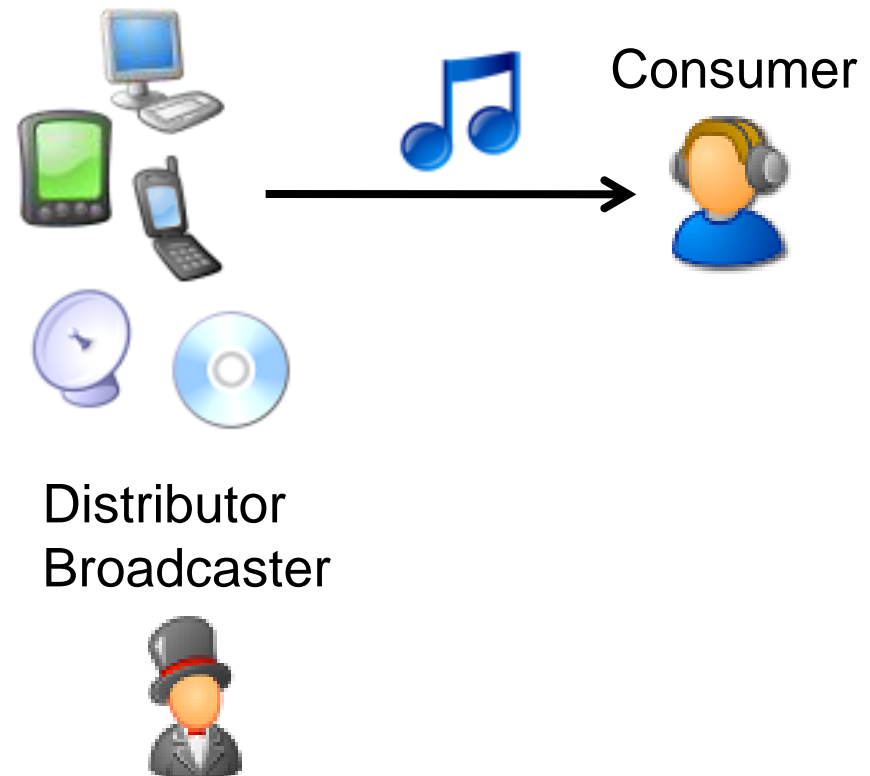
December, 2009
Graz, Austria

Semantic Expression and Execution of B2B Contracts on Multimedia Content

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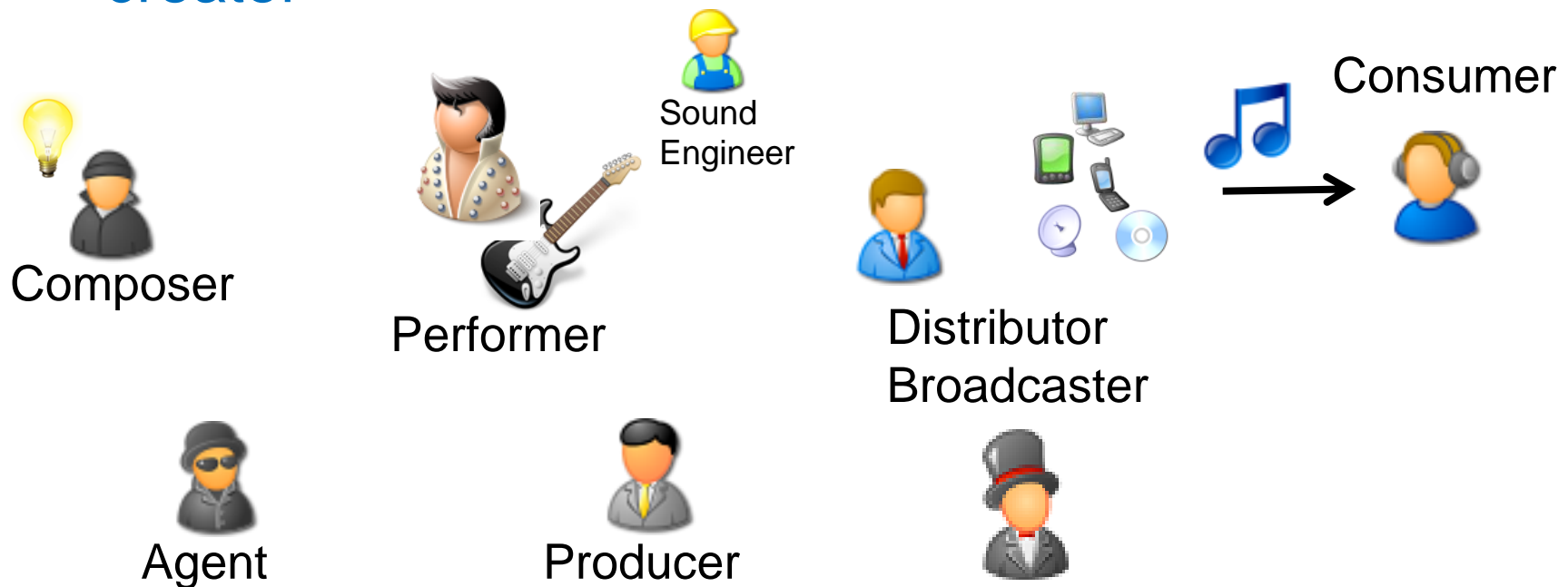
Consumption of multimedia content

- Consumption of multimedia content exploits (efficiently) business to consumer markets in digital environments
- Digital Right Management systems, content distribution systems.



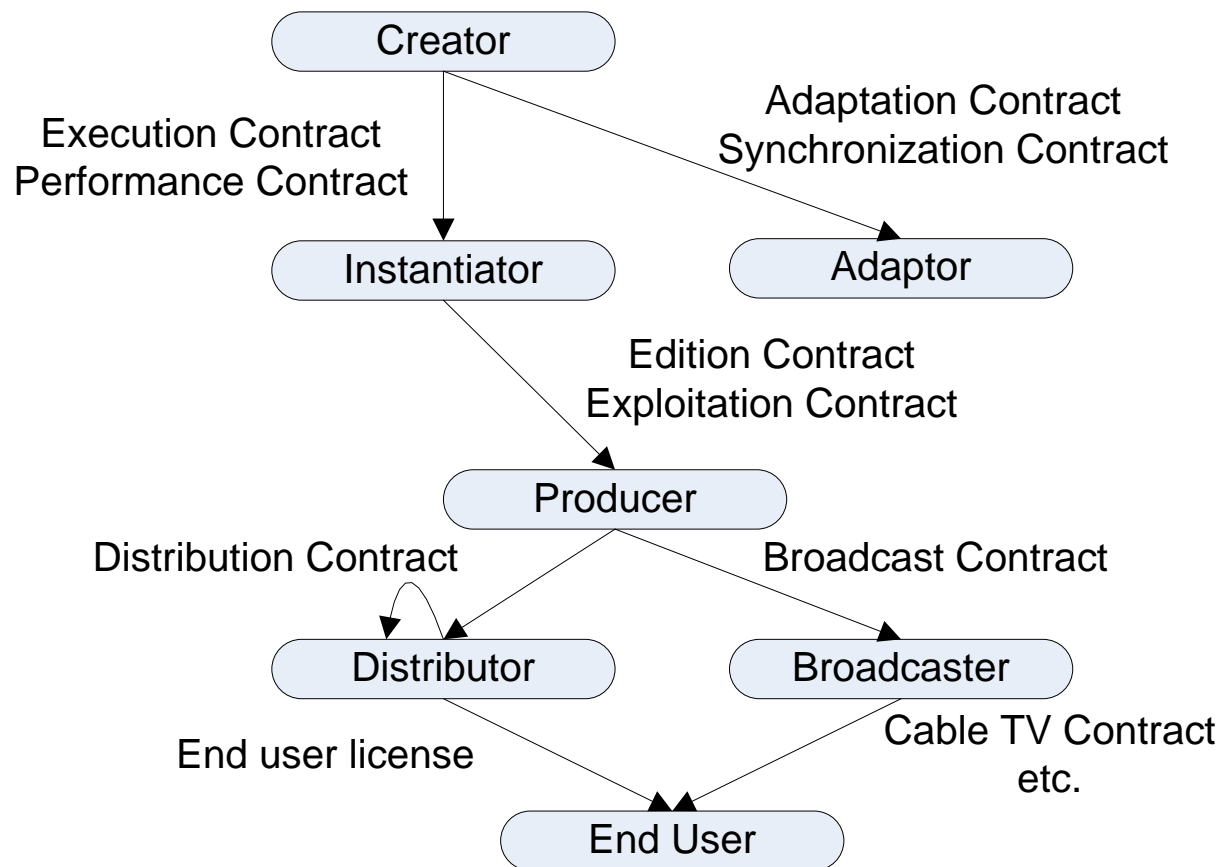
Consumption of multimedia content

- Consumption of multimedia content exploits (efficiently) business to consumer markets in digital environments ...but there is a value chain behind starting from the creator



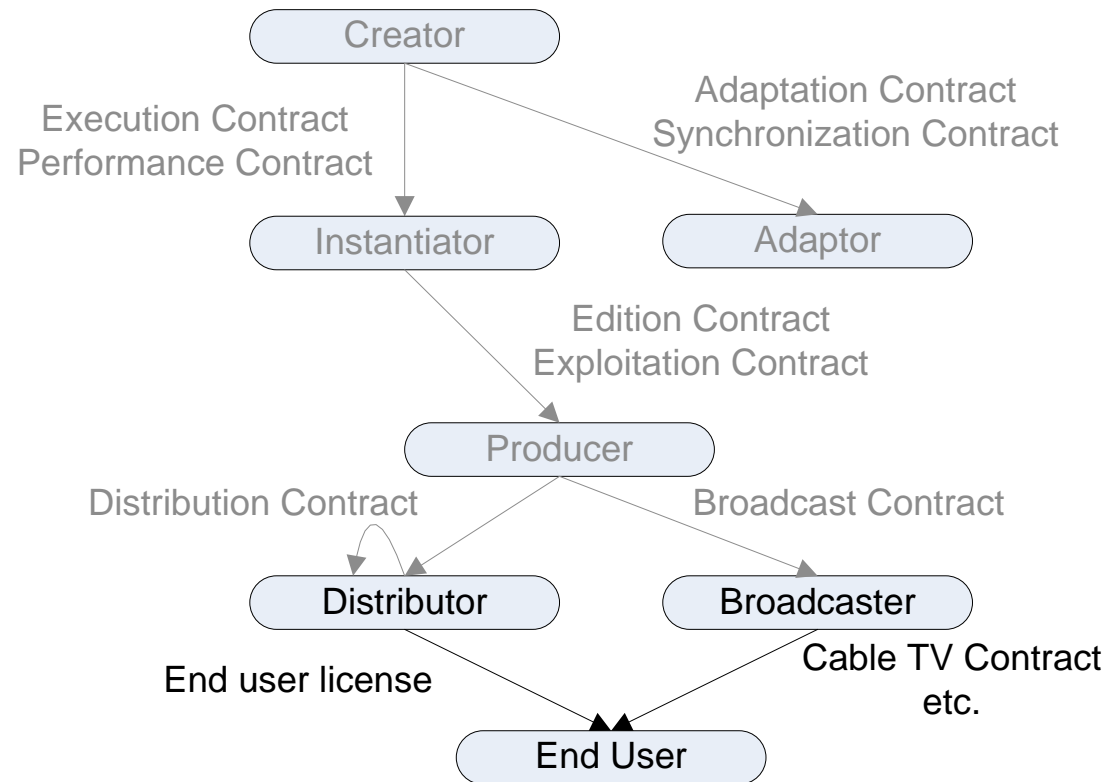
Media transactions

- Media transactions are governed by written agreements (contracts) of diverse nature

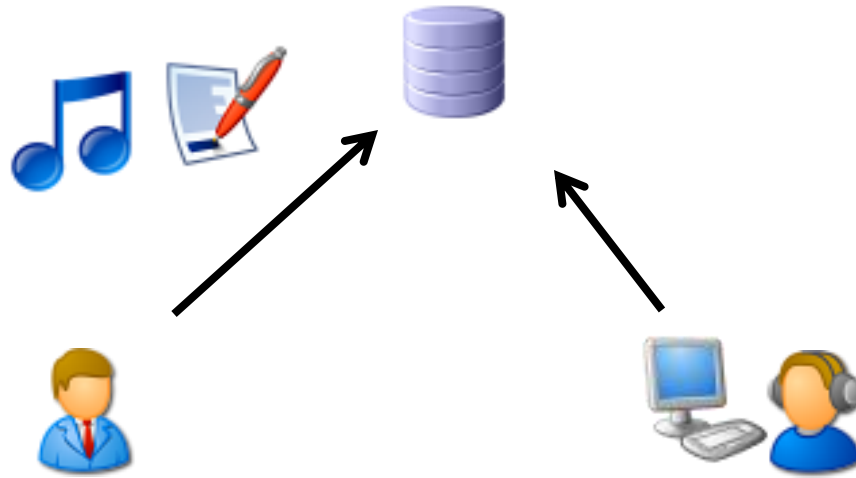


Media transactions

- Content distribution systems and current Digital Rights Management Systems can represent and enforce the contracts, but they have focused on the B2C



Digital licenses in DRM platforms



This International Video Distribution Agreement ("Agreement") is made as of [redacted] between the following Licensor and Distributor:

Licensor:
Address: [redacted]
Tel: [redacted] Fax: [redacted]
E-Mail: [redacted]

Distributor/Licensee:
Address: [redacted]
Tel: +39 [redacted] Fax: [redacted]
E-Mail: [redacted] Double: [redacted]

Type of Entity: [redacted]

Subject to timely payment of all monies due Licensor and Distributor's full performance under this Agreement, Licensor hereby irrevocably to Distributor, and Distributor accepts from Licensor, the Licensed Rights in the Picture throughout the Territory for the Agreement Term in the Authorized Languages subject to the Headbacks identified below on all the terms and conditions of this Agreement.

This Agreement has the following parts: this Cover Page, Table Of Contents, Deal Terms, International Standard Terms ("Standard Terms"), Schedule Of Definitions, and the following indicated Attachments:

Int	Standard Attachments
01	International Access Letter
02	International License Header
03	International Ownership Rider
04	Other:

This Agreement has been drafted based on the [redacted] trademark, first version V. 2000 ("Form"). If the heading of this Agreement used the [redacted] trademark, then Licensor represents that, except where terms are to be included in such form, no change has been made to pre-printed elements of the Form unless expressly indicated in double underlining, strike-out or similar formatting to designate changes. All parts of this Agreement will be interpreted together to form one contract, but in the event of a direct conflict, any terms inserted in the Deal Terms as part of completing the contract will prevail over pre-printed elements of the Form.

Licensor and Distributor have executed this Agreement as of the date written above to constitute a binding contract between them.

LICENSOR: [redacted] DISTRIBUTOR/LICENSEE: [redacted]

By: [redacted] For: [redacted]

```

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS"
  xmlns:xs1="http://www.w3.org/2001/XMLSchema-instance"
  schemaLocation="urn:mpeg:mpeg21:2003:01-REL-R-NS
  :schemas/rel-r.xsd urn:mpeg:mpeg21:2003:01-REL-SX-NS
  :schemas/rel-sx.xsd urn:mpeg:mpeg21:2003:01-REL-MX-NS
  :schemas/rel-mx.xsd">
  <rightGroup>
    <right>
      <keyHolder>
        <info>
          <dsig:KeyName
            .ns:dsig="http://www.w3.org/2000/09/xmldsig#">DemoEndUser</dsig:
            /KeyName>
          </r:info>
        </r:keyHolder>
        <mx:play xmlns:mx="urn:mpeg:mpeg21:2003:01-REL-MX-NS"/>
        <r:digitalResource>
          <r:nonSecureIndirect
            .ns="urn:xmldis:000000b336ed2d7040504fcca05112a74322ee14"/>
          <r:digitalResource>
            <r:allConditions>
              <sx:territory xmlns:sx="urn:mpeg:mpeg21:2003:01-REL-SX-
              />
                <sx:location>
                  <sx:country xmlns:iso="urn:mpeg:mpeg21:2003:01-REL-
                  NS:country">iso:CN</sx:country>
                </sx:location>
              </sx:territory>
            </r:allConditions>
          </r:right>
        </r:rightGroup>
        <r:issuer>
          <r:keyHolder>
            <r:info>
              <dsig:KeyName
                .ns:dsig="http://www.w3.org/2000/09/xmldsig#">DemoDistributor</d
                ;KeyName>
            </r:info>
          </r:keyHolder>
        </r:issuer>
      </right>
    </rightGroup>
  </license>

```

Hot question

Then...

how to represent digitally a contract wider on purpose?

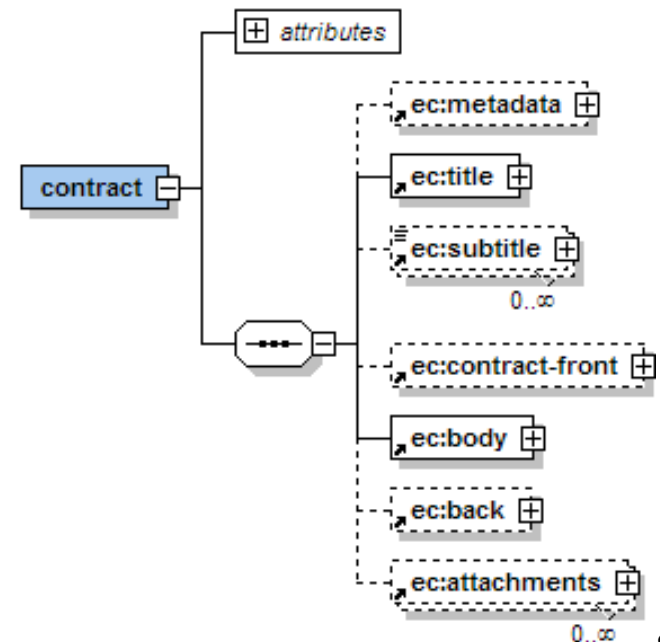
Answers

A) Extending existing Right Expression Languages

- MPEG-21 REL
- But non-enforceable clauses have to be kept for other reasons
- But its expressivity is limited to plain XML interpretation

B) Using new format of contract representation

- eContracts (OASIS standard to represent generic contracts)
- But none of them offers enforcement mechanisms



Joint solution

- Use eContract with:
 - Non enforceable clauses with narrative content
 - Enforceable clauses with extended REL expressions
- Enforceable expressions
 - Permission model more flexible than unidirectional RELs
 - Extended vocabulary
 - Extended parties with a semantic representation
 - Extended rights
 - Extended conditions



- Typical contract clauses

- *Rights transferred (object of the contract).*
- *Resource..*
- *Report and Auditing.*
- *Fee.*
- *Territory.*
- *Term.*
- *Confidentiality.*
- *Disclaimer.*
- *Jurisdiction..*
- *Breach and termination.*

Components

- Enforceable clauses are made of:
 - Permission model of the Media Value Chain Ontology
 - Elements specific of audiovisual contracts missing in MPEG-21 REL

Enforceable clauses classification

- Enforceable clauses are classified according to the meaning they convey.
 - Permission. What can be done (e.g. licensee rights)
 - Prohibition. What cannot be done (e.g. confidentiality, exclusivity)
 - Obligation. What must be done (e.g. fee, territory, term)
 - Assertion. What it is. (e.g. parties)
- Permissions, obligations, prohibitions are expressions of the **deontic logic**

Deontic logic

- Traditional logic systems: Propositional logic, predicate logic, modal logics
 - Deontic logic is a branch of modal logic
- Deontic logic introduces two new operators
 - *it is necessary that* (\square)
 - Obligation: $\square P$
 - Prohibition: $\sim \square P$
 - *it is possible that* (\diamond)
 - Permission $\diamond P$ (or $\neg \square \neg P$)

Is it possible deontic logic in OWL??

- OWL DL is a Description Logics is fully mappable to a **First Order Predicate Logic**, OWL DL can be expressed with traditional logic operators

$\forall \wedge \neg \rightarrow$ etc. $\perp \equiv \subseteq \dots$ etc. $\forall \exists$

- But FOPL can also be used to express deontic sentences (Kripke work) if two axioms are added...

$$\Box(A \rightarrow B) \rightarrow (\Box A \rightarrow \Box B)$$

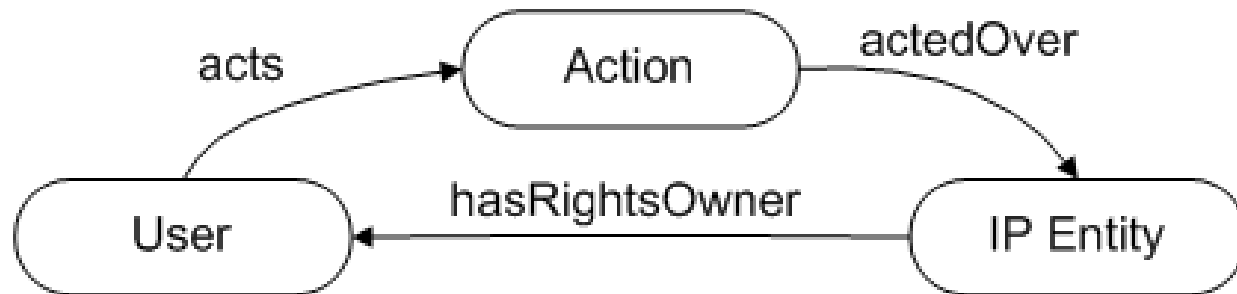
$$\Box A \rightarrow \neg \Box \neg A$$

- The obligation operator as an OWL object property
 - But owl:complementOf cannot be used for classes and remain within OWL DL
 - Therefore we need two object properties (obligatory and not obligatory).

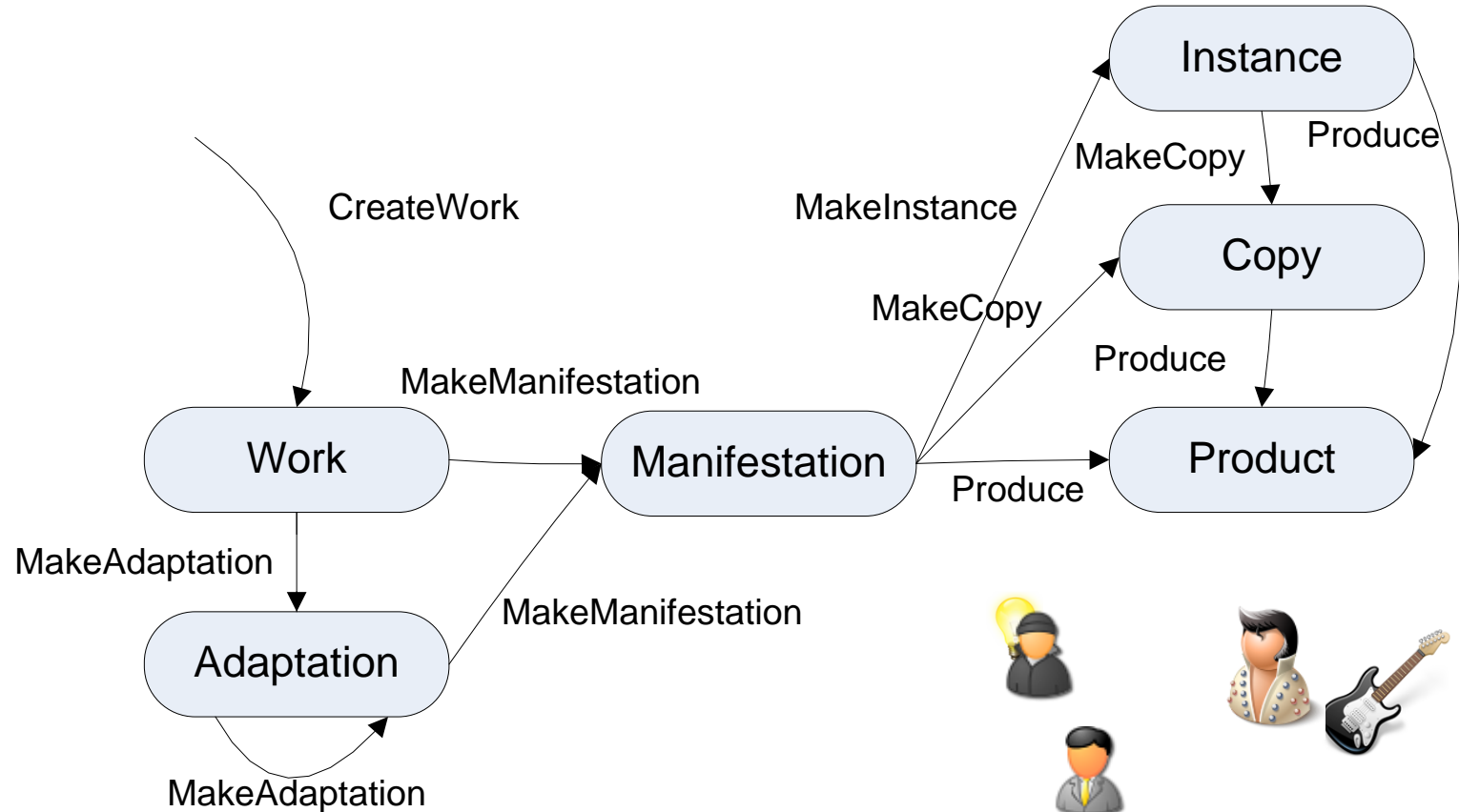
The Media Value Chain Ontology

- MVCO is Part 19 of MPEG-21
- Integrates with the MPEG-21 framework
- Provides
 - The minimal representation of the intellectual property value chain for multimedia content.
 - A permissions mechanism allowing the expression of more complex agreements

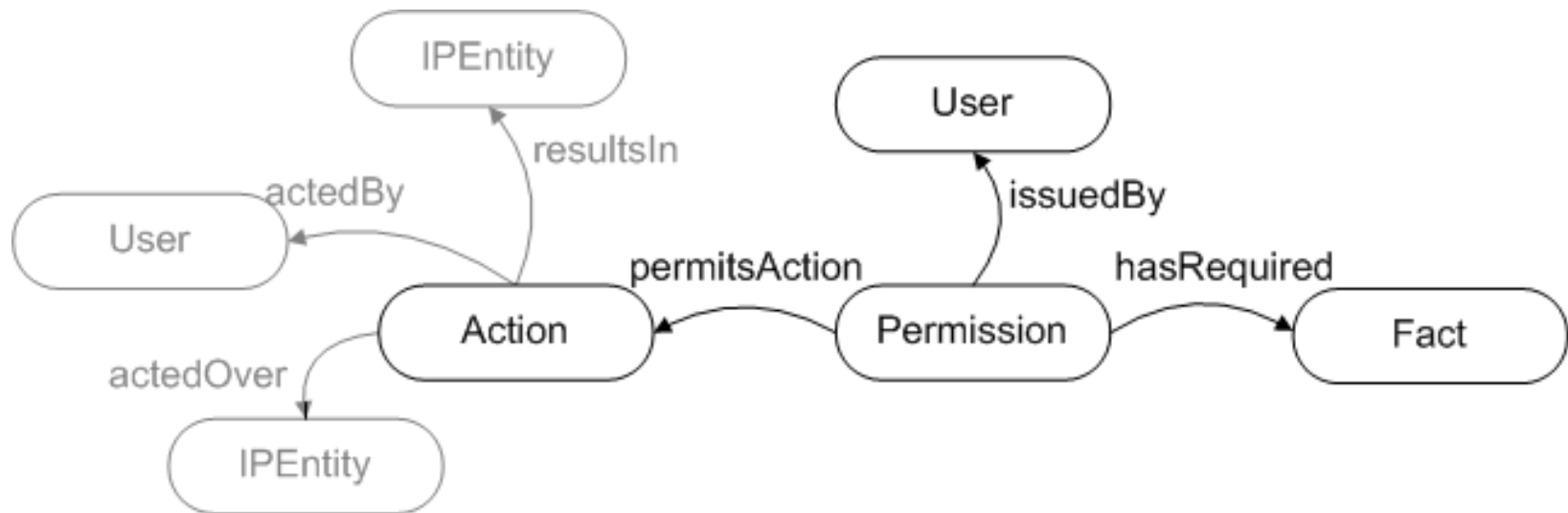
Basic MVCO model



Kinds of Intellectual Property objects



Permission model in the MVCO



Extended elements of MPEG-21 REL

Vocabulary of MPEG-21 REL is extended. (Other RELs did not suffice either)
REL rights and conditions are not enough.

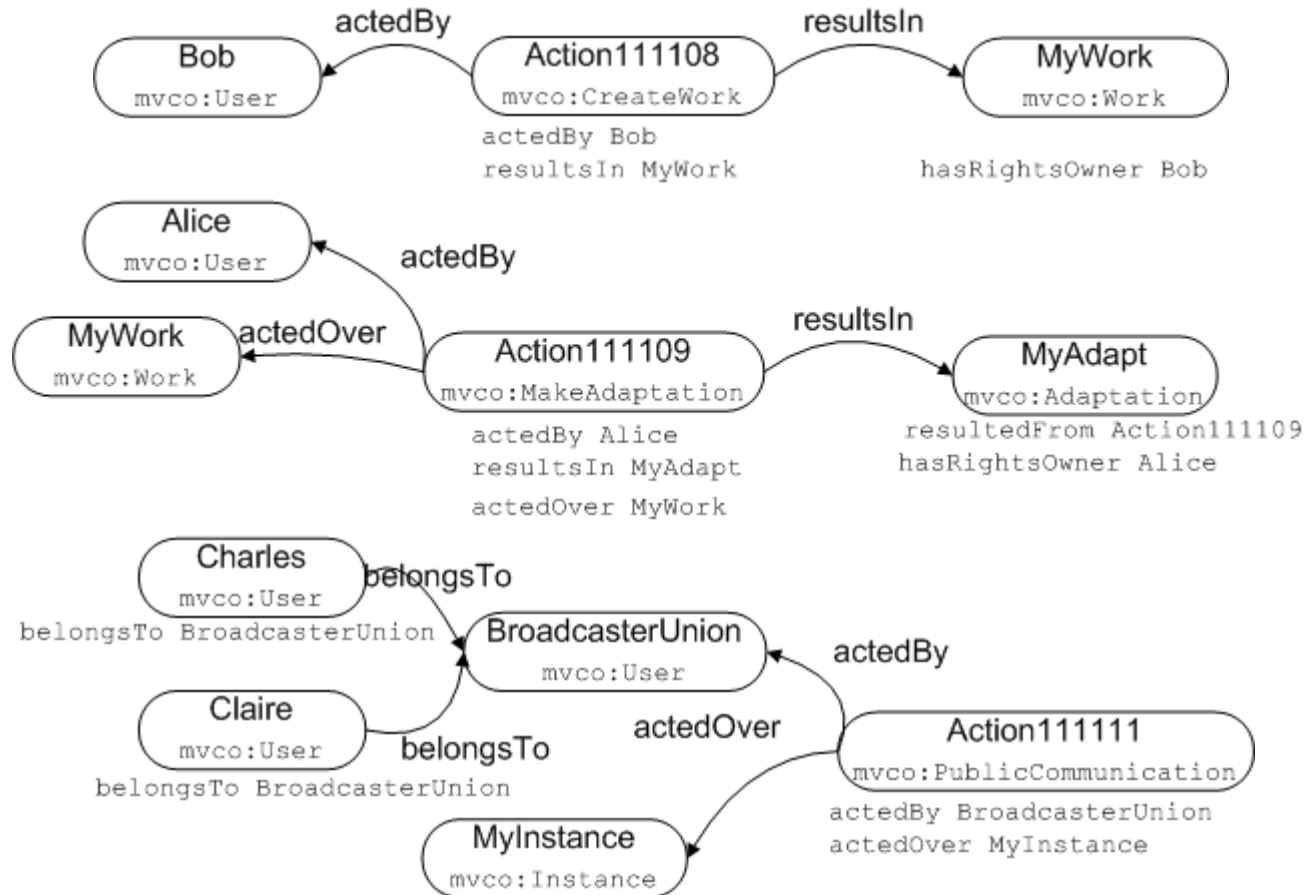
MPEG-21 REL rights			ODRL permissions			
			Usage	Reuse	Asset Management	Transfer
End user	End user	Distributor	End-user			Distributor
Enlarge	Play	Issue	Display	Modify	Move	Sell
Reduce	Print	Revoke	Print	Excerpt	Duplicate	Lend
Move	execute	Obtain	Play	Annotate	Delete	Give
Adapt	Install	modify	Execute	Aggregate	Verify	Lease
Extract	Uninstall				Backup/Restore	
Embed	delete				Install/Uninstall	

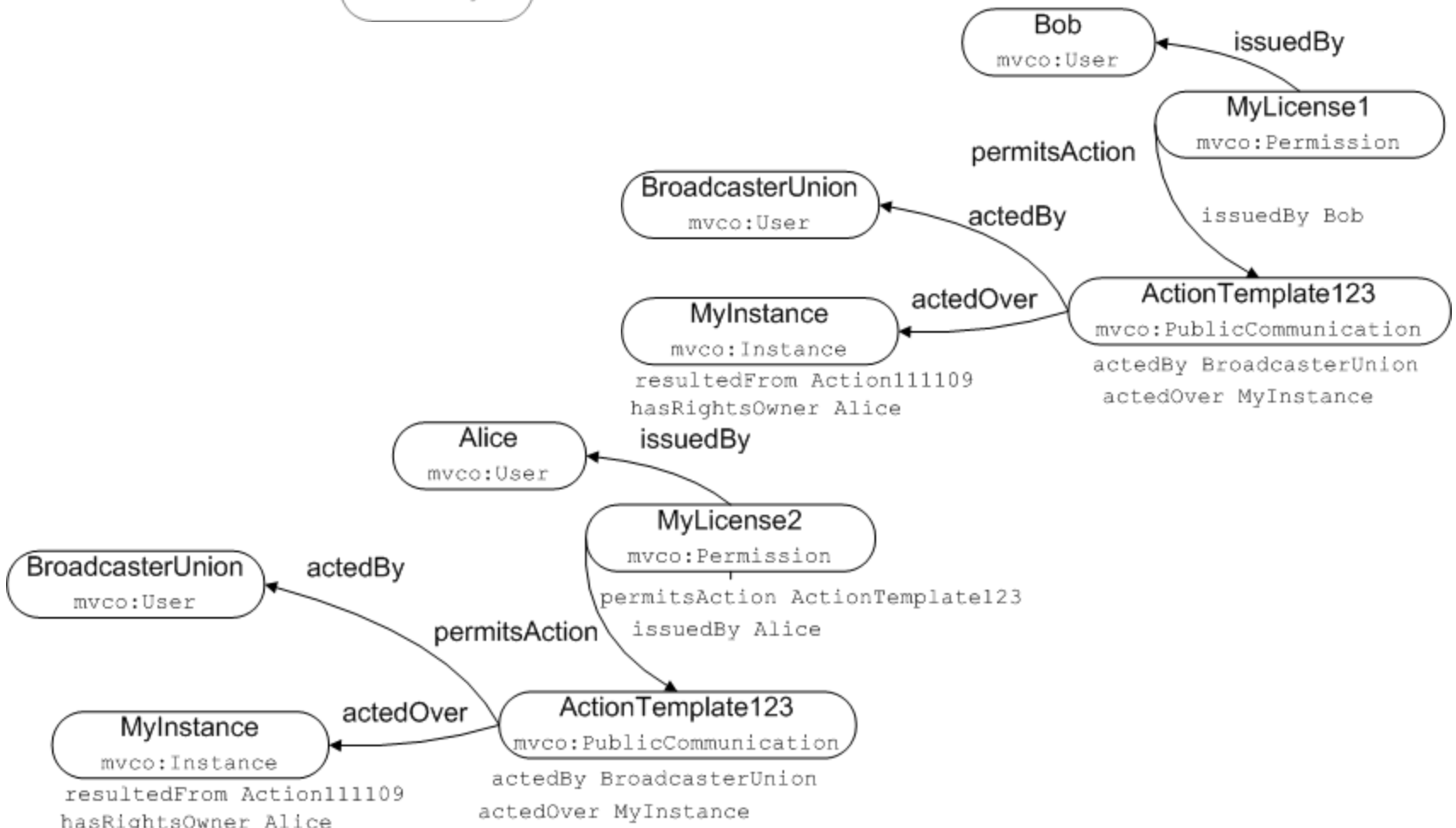
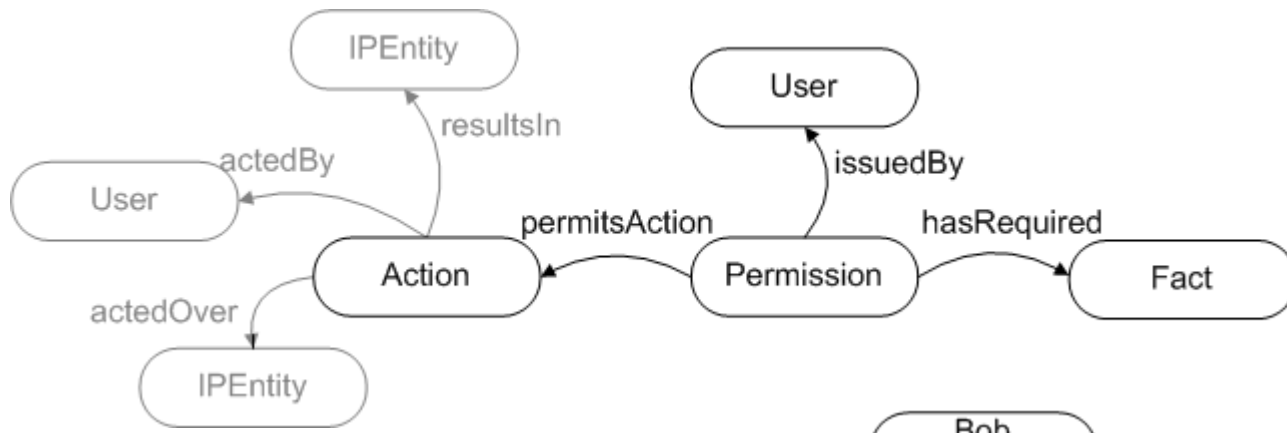
Most common rights appeared in contracts				
Reproduce	Broadcast	Adapt	Lease	Advertise
Download	Copy	Convert	License	Dub
Upload	Print	Transcode	Promote	Transmit
MakeAvailable	Record	Remix	Stream	Exhibit
PubliclyPerform	Modify	Distribute	Translate	Sell

An example

```
00 <ec:body>
01   <ec:item>
02     <aec:enforceable>
03       <mvco:permission rdf:about="#Permission000">
04         <mvco:permitsAction rdf:resource="#Action000"/>
05         <mvco:issuedBy rdf:resource="#Alice"/>
06         <mvco:hasRequired rdf:resource="#Germany"/>
07       </mvco:permission>
08     <aec:assertion>
09       <mvco:MakeAdaptation rdf:about="#Action000">
10         <mvco:actedBy rdf:resource="#Bob"/>
11         <mvco:actedOver rdf:resource="#mywork1"/>
12       </mvco:MakeAdaptation>
13     <aec:Territory rdf:about="#Germany">
14       <aec:hasCountry>ISO:DE</mvco:hasCountry>
15     </aec:Territory>
16     <mvco:Work rdf:about="#mywork1">
17       <mvco:hasRightsOwner rdf:resource="#Alice"/>
18     </mvco:Work>
19   </aec:assertion>
20 </aec:enforceable>
21 </ec:item>
22 </ec:body>
```

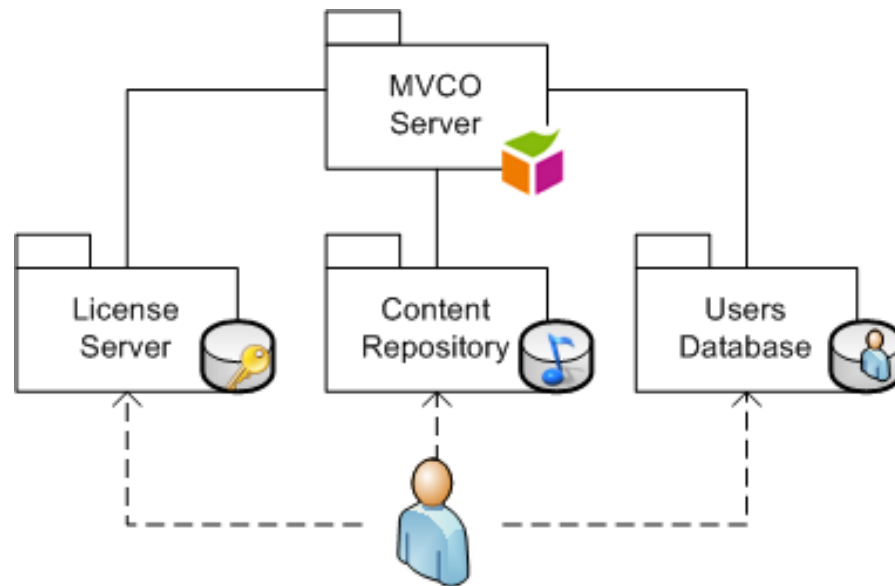
Class instances example





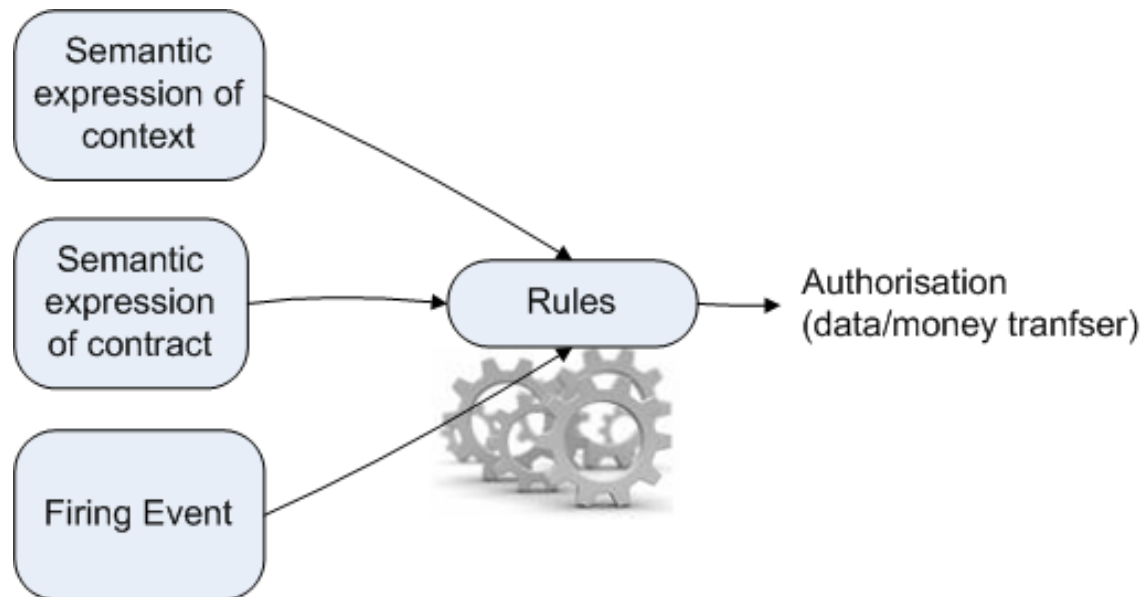
Architecture in the implementation

- The MVCO acting as a triple store and authorisation resolver, in contact with the other elements in a typical DRM platform.



Architecture in the implementation

- Authorisation process. A single SWRL rule determines whether the contract has been respected or not (the requested operation is authorised or not).



Summary

- eContracts as a container of audiovisual contracts
- Pasive clauses and active clauses separated
- The novelty use of the Media Value Chain Ontology to express the permission model
- SWRL as the authoriser, instead of Java code or C++ code, as it is done currently

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