LUISA

Learning Content Management System Using Innovative Semantic Web Services Architecture

IST- FP6 - 027149

Deliverable D5.3

Digital Rights Management integration

Tomás Pariente Lobo
Elisabetta Parodi

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Tomás Pariente Lobo
ATOS Origin

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EXECUTIVE SUMMARY

The mission of LUISA is that of exploiting the advantages of a Semantic Web Service Architecture to make richer and more flexible the processes of query and specification of learning needs in the context of Learning Management Systems and Learning Object Repositories.

This deliverable presents the LUISA DRM implementation. It takes from the requirements gathered in a previous deliverable (D5.1), but given the semantic foundations of the LUISA framework, the solution selected to implement DRM is accordingly semantic in nature. This semantic DRM architecture is based in previous work (Copyright Ontology) and presents an open and extensible approach that fits with the user requirements.

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Authors (Partner)	Tomás Pariente Lobo (ATOS), Elisabetta Parodi (GIUNTI)			
Responsible Author	Tomás Pariente Lobo		**Email**	Tomas.parientelobo@atosresearch.eu
	Partner	ATOS	**Phone**	+34 912149321

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Project Consortium Information

Partner	Acronym	Contact
Atos Origin S.A.E. (Coordinator)	ATOS	Nuria de Lama Atos Origin S.A.E. c/ Albasanz 12 E-28037 Madrid, Spain Email: nuria.delama@atosorigin.com Tel.: +34 91 214 9321 Fax:+34 91 754 3252
University of Alcalá de Henares	UAH	Dr. Miguel-Angel Sicilia Information Research Unit University of Alcalá Ctra. De Barcelona, Km 33.6 E-28871Alcalá de Henares (Madrid), Spain Email: msicilia@uah.es Tel.: +34 91 886 6603 Fax: +34 91 885 6646
University of Uppsala	ULL	Dr. Ambjorn Naeve University of Uppsala Kyrkogårdsgatan 2 C Uppsala Email: amb@nada.kth.se Fax: +46 184-716-294
Open University	OU	Dr. John Domingue Knowledge Media Institute, The Open University, Walton Hall, Milton Keynes, MK7 6AA, United Kingdom Email: j.b.domingue@open.ac.uk Tel.: +44 1908 655014 Fax: +44 1908-653-169
University Henri Poincaré	UHP	Dr. Monique Grandbastien University Henri Poincaré Vandoeuvre les Nancy 54506, PO Box 239, France. Email: monique.grandbastien@loria.fr Fax: +33 383-278-319
Giunti Labs S.r.l.	GIUNTI	Fabrizio Giorgini Giunti Interactive Labs S.r.l. Abbazia dell'Annunziata Via Portobello Baia del Silenzio 16039 Sestri Levante (GE), Italy Tel.: +39.0185.42123 Fax: +39.0185.43347
EADS FRANCE – Innovation works	EADS	Anne Monceaux EADS FRANCE – Innovation works Avenue Didier Daurat - Centreda 1,Toulouse, 31700, France. Email: anne.monceaux@airbus.com Tel.: +33 561-184-725 Fax: +33 561-187-611

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1 INTRODUCTION

This document describes the final status of the LUISA DRM prototype. The objective of this document is twofold:

- Describe DRM solution adopted by LUISA.
- Report on the implementation of the DRM module and the integration with the rest of the LUISA architecture.

This document is based on the requirements delivered in D5.1.[1]. However, as there are not special requirements from the case studies regarding DRM, the focus of the DRM prototype is the integration of a semantic open DRM solution in the LUISA architecture, serving as a proof of concept for further improvements.

The deliverable is structured as follows. Section 2 describes the selection of the kind of Digital Management Rights we decided to implement in LUISA. Section 3 describes the implementation of the prototype, defining DRM in the overall LUISA architecture and the technological solution and main technical aspects related with its implementation. Finally section 4 reports on the conclusions and future work.

The most important software listings, database schemas or ontologies specific to the prototype are listed in appendixes. The software delivered by the partners specifically for the DRM prototype is included in the LUISA prototype scheduled for M27.

2 SELECTION OF DRM

2.1 Recapitulation on the user requirements

The conclusions of the main DRM requirements gathered in D5.1 can be summarized basically in the following two bullet points:

- The two LUISA case studies did not have specific requirements about management of digital rights.
- On the other hand, a framework like the one developed within the LUISA project, should cater with an open DRM module that allows an scalable solution for the future.

In particular, DRM was found to be of special interest in some specific parts of LUISA:

- Management of the annotation of digital rights to Learning Objects.
- Management of rights when dealing with LOs coming from multiple repositories.
- How DRM affects the composition of LOs
- Openness to different standards.
- Definition of rights over metadata records.

From the fact of LUISA being a distributed architecture that deals with multiple repositories and potentially uses different standards, the interoperability aspect of the LUISA DRM module was relevant. The use of an ontology-based approach for DRM to bridge the gap between different DRM representations and other licensing schemes like Creative Commons was specially highlighted in D5.1.

The conclusion of D5.1 was that a module had to be accommodated in the LUISA architecture in order to give a minimal DRM functionality to the LUISA framework. On the other hand, it was highlighted that in LUISA we talked basically about DRM integration more than DRM development. One of the challenges was to identify possible Open Source modules and ontologies for minimizing the development effort on DRM.

2.2 Rational of the selection of a Semantic DRM approach

As it was pointed out in the previous section, the DRM solution was to be based on two pillars:

- Interoperability: The LUISA DRM solution should be open enough to be interoperable with other DRM standards and among different repositories.
- Integration: It is not in the scope of LUISA to develop a new approach to DRM, but to integrate an existing and open DRM solution or approach to the problem of dealing with digital rights in the scope of learning objects.

One of the main problems of existing e-Learning systems regarding interoperability and DRM is that they do not provide structured and formal ways to express the licensing terms of the learning objects they manage. Systems like the LMS LUISA GUI is based (Moodle), reuses LOM, which provides as set of attributes for stating for learning object rights, such as “Cost” and “Copyright and Other Restrictions” and “Description” attributes. However, there are no much formal restrictions that would allow automated processing. Some LOR have adopted a set of more expressive and legally formal licenses defined by the Creative Commons (CC) initiative. However, CC licenses are restricted to open licensing schemes, and suffer from the same limitations than in the previous case.

Given the fact of the LUISA semantic foundations, a Semantic Web approach to copyright management has been followed, which reuses a Copyright Ontology as the key component for interoperability among existing DRM systems and other licensing schemes. The Copyright Ontology, detailed in [2], produces a general conceptualisation that can be potentially used as an interoperability facilitator for the main DRM standards like MPEG-21 [4] or the Open Digital Rights Language (ODRL) [5].

The Copyright Ontology is implemented as an OWL-DL (Web Ontology Language, Description Logic) ontology. This implementation differs of the

WSML formalism adopted in the rest of the project components. However, as the description of digital rights is done in a separate module following a service-oriented approach, this issue does not affect the overall LUISA framework. The implementation chosen facilitates the development of license checking using a DL reasoner and SPARQL queries.

2.3 The copyright ontology in the eLearning domain

2.3.1 Actions, the building blocks

In [2] the Copyright ontology is described. The main part of the Copyright Ontology when dealing with license modelling is the Action Model. It defines the primitive actions that can be performed on the concepts defined in the Creation Model (Work, Manifestation, Performance, Fixation, Communication and Instance). The actions make creations evolve through their life cycle, from abstract creations to the concrete things or events that are consumed, as it is shown in Figure 1.

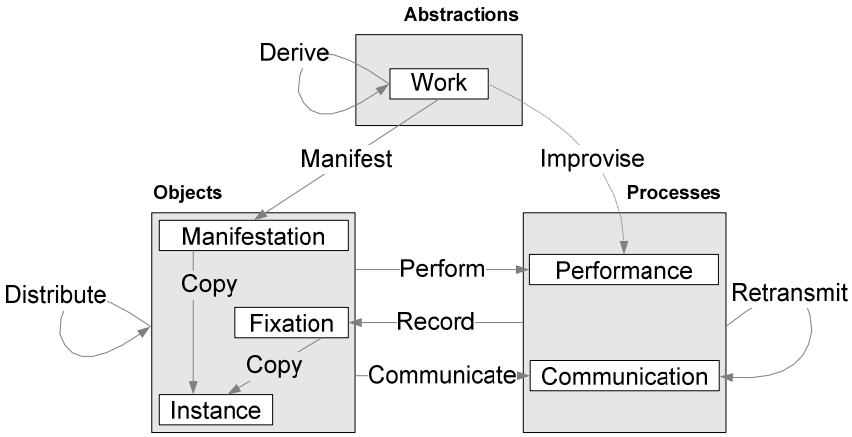

Figure 1. Relations between the Action and Creation Models

Actions are regulated by the rights in the Rights Model. For the economic rights, these are the governed actions:

- Reproduction Right: to reproduce, commonly speaking Copy.
- Distribution Right: Distribute. More specifically Sell, Rent and Lend.
- Public Performance Right: Perform; it is regulated when it is a public performance and not a private one.
- Fixation Right: to fix something, Record.
- Communication Right: Communicate when the subject is an object or Retransmit when communicating a performance or previous communication, e.g. a re-broadcast. Other related actions, which depend on the intended audience, are Broadcast or Make Available.
- Transformation Right: Derive. Some specializations are Adapt or Translate.

The action concepts are complemented with a set of relations that link them to the action participants.

2.3.2 Copyright Licenses Modelling

Licenses should capture the obligations, permissions and prohibitions that make sense in the copyright domain.

2.3.2.1 Action Patterns

First of all, action patterns should be introduced as the way to state what is obliged, permitted or prohibited by a license. The proposed actions and case roles are used to model event patterns in the copyright domain.

Patterns are implemented as OWL classes made up from the combination of classes for actions, e.g. *Copy* or *Access*, and a set of OWL restrictions. Each restriction defines a constraint on how members of the class, the domain, are related through the specified property to other ones, the range. The main restrictions in OWL are owl:allValuesFrom, owl:someValuesFrom, owl:hasValue and owl:[min/max]cardinality.

Restrictions are combined using the intersection, union and complement logical operators in order to compose action patterns. For instance, **Figure 2** shows the conceptual model for a license that combines commercial and open access terms.

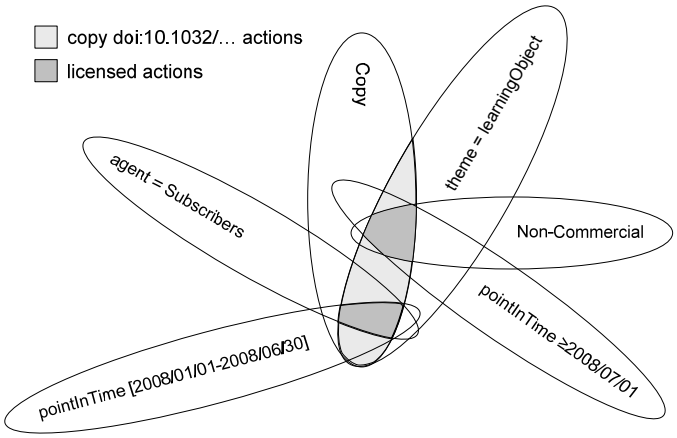

Figure 2. Building an action pattern as an intersection of restrictions

Table 1 shows the DL notation for the class definition that models the commercial copy pattern.

Pattern ≡ Copy ⊓	(1)
∀pointInTime.≥ 2008-01-01, ≤ 2008-06 ⊓	(2)
∃agent.Subscribers ⊓	(3)
∃theme.{learningObject_id}	(4)

Table 1. OWL-DL Class for the commercial copy action pattern

Each intersected restriction reduces the initial set of actions, which corresponds to all the *Copy* actions (1). First, (2) models the time range as a restriction on

the *pointingTime* case role to a custom datatype. The last constraints, (2) and (3), restrict the range of *agent* to one or more instances of the "Subscribers" class and *theme* to just the instance "learningObject_id".

From this point, it is possible to implement pattern matching using DL reasoners, which are specially suited for classifying individuals into classes when the latest are based on necessary and sufficient conditions. They can answer if an individual, considering its relations to other individuals and attribute values, satisfies all the restrictions of a class pattern and, thus, can be classified as an instance of that class.

In the context of the Copyright Ontology implementation, this functionality is used to check if a particular action, modelled as an individual, is considered by an action pattern, modelled as a class. This corresponds to the fact that the action individual is classified into a class pattern.

2.3.2.2 *Permissions*

Permissions are captured by a new action, *Agree*, and the permitted pattern is linked using the *themeClass* case role. Following with the example in Table 1, in order to authorise the pattern that it models, an instance of the Agree action is connected to the class pattern as it is shown in Table 2 in a SPARQL-like notation.

```
:agreement_01
    a       co:Agree;
    co:agent :owner;
    co:theme :Pattern.
```

Table 2. Agreement example

2.3.2.3 *Conditions*

Conditions are patterns that must be satisfied in order to activate the evaluation of another event pattern, thus acting as a precondition. The *condition* case role is used to model them. It is applied to the pattern that is conditioned and it links to the pattern that establishes the condition.

For instance, in Table 3 it is stated that, in order to exercise the copy action, the condition is that the "owner" agent receives a 3 Euros transfer from the "consumer" agent. The condition pattern is linked to the conditioned one using the *condition* case role as shown in (5). The condition pattern is a transfer (6) carried out by an subscriber agent (7) to the "owner" (8) of an amount of 3 Euros (9).

Pattern ≡ …	
$\exists$condition.Condition	(5)
Condition ≡ Transfer ⊓	(6)
$\exists$agent.Subscribers ⊓	(7)
$\exists$recipient.{owner} ⊓#	(8)
$\exists$theme.{3EurosAmount}	(9)

Table 3. Commercial copy action pattern plus economic compensation condition

The limitation of the OWL-DL implementation is that it is not possible to restrict using OWL the agent in the Pattern and the Condition to the same instance because there are not variables in OWL-DL. There are several possibilities to overcome this issue. For instance, by using SWRL. In our case, we have decided to use a SPARQL query, which is also used to check that, for a given action, it is classified into a class pattern that is permitted by an agreement and that the agents for the action pattern and the condition pattern are the same. Table 4 shows and example copy actions *copy_01*.

```
:copy_01
     a       co:Copy ;
     co:agent :consumer ;
     co:theme :LearningObject_Id.
     co:condition :transfer_01 ;
     co:pointInTime "2008-05-19"^^xsd:date ;
:transfer_01
     a       co:Transfer ;
     co:agent :consumer ;
     co:recipient :owner ;
     co:theme :Amount3Euros .
```

Table 4. Instance data examples for a copy action and associated economic transfer

Copy actions are also known as the right to reproduce a given material. This action fits with the usage of LO in our scenarios. The associated economic transfer condition *transfer_01*, that can be checked using the SPARQL query in Table 5.

```
ASK {
     ?agreement rdf:type co:Agree;
          co:theme ?pattern.
     :copy_01 rdf:type ?pattern;
          co:agent ?consumer;
          co:condition ?condition;
          co:agent ?consumer.
     ?condition co:agent ?consumer.
}
```

Table 5. SPARQL query that checks if an action is authorized and that the condition is met by the consumer

In LUISA we have imported the Copyright Ontology in a new ontology called eLearningCopyright Ontology. A version of this ontology can be seen in the appendixes.

3 DRM IMPLEMENTATION

3.1 DRM in the LUISA architecture

The following figure represents a view of the DRM module, service and ontologies in the LUISA architecture.

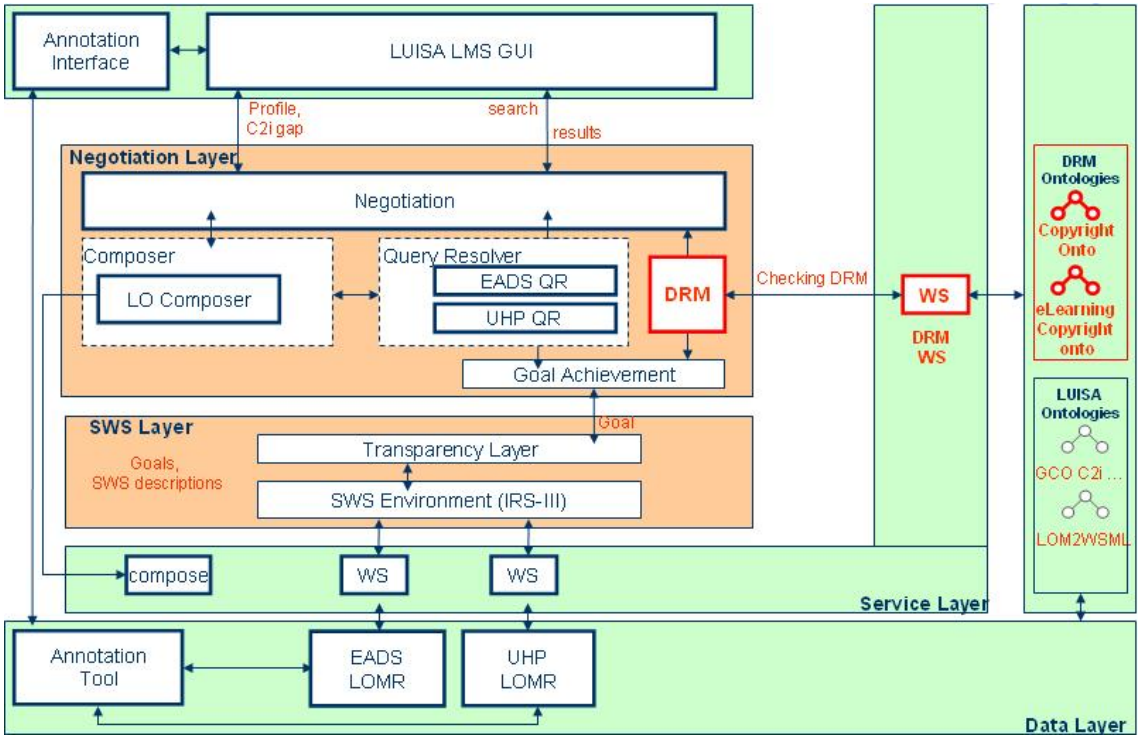

Figure 3. DRM in the LUISA architecture

The implementation of DRM in LUISA presents three main aspects:

- Instance creation: The instance creation encompasses both the annotation Learning Objects with DRM metadata and the creation of the different models necessary to validate and reason over the management of digital rights in the LUISA environment.
- Web service abstraction: As in the rest of the LUISA infrastructure, the DRM ontologies and main functionality to check rights is abstracted using Web services technology.
- Negotiation Layer interaction: The Negotiation Layer is in charge of implementing the rules that govern with the LUISA integration with the DRM module.

The next section explains the details of these implementation blocks.

3.2 DRM implementation blocks

3.2.1 DRM Learning Objects annotation

Learning Object annotation of rights can be a vast task in itself. Only determining the types of digital rights that affects to a given LO, and the access

rights for the different types of users of the LUISA framework could be very time consuming.

However, as it was pointed out in D5.1 and at the beginning of this deliverable, the LUISA case studies do not have special requirements regarding digital rights management. In this sense, the implementation rational of DRM within LUISA has been devised more as a proof of concept rather than a real DRM setting.

We have selected to model the following types of rights:

1) Free access to LOs
2) Right to access (copy) a given object for a given group of users
3) Right to access a given object via an agreement to a given group of users.

In 1) there is no need of modelling access rights in the ontology. On the one hand, as LUISA is based in LOM metadata, certain LOs have been annotated using the eLUISA annotation tool with the LOM righsAndOther field to “yes”, implying that for this specific LO the system should check the digital rights thoroughfuly. These LOs do not need to be checked, thus gaining in performance avoiding to querying the eLearning Copyright Ontology unnecessarily.

We have defined in 2) two different groups of users, namely EADS and UHP users. Instead of annotating whether a single user has the right to access to a given resource, in LUISA we make the assumption that users within EADS hold the same type of rights to access and use the LOS, while UHP users hold their own in the same way. In this way the annotation of rights is considerably reduced, because it is restricted to make organization rights explicit instead of individual rights.

In the same way, in 3) we use the organization rights to define an agreement of about what is necessary in order to use a given resource. In this sense, we are able to model that a specific LO can be used in a given point of time by a UHP user only if the user pays a quantity of money.

These simple cases implemented in LUISA give a clear idea of the openness of the selected solution. More complicated scenarios may be envisaged.

Moreover, the usage of a Copyright Ontology would allow implementing a DRM solution at the repository level. Although this has not been implemented it would be possible to model a different set of rules based on having different DRM metadata and queries for each repository. It is also possible to keep all LUISA DRM metadata in a single ontology and extend the ontology with new classes and instances particularised for every repository.

3.2.2 DRM service

As in the rest of the LUISA infrastructure, the DRM ontologies and main functionality to check rights is abstracted using Web services wrap up. The service exposes the following methods:

- Methods for adding rights: Although it is not the main goal of the LUISA DRM module, a simple interface for adding some type of rights for a given LO (right to be copied) has been implemented as a matter of example. This method adds the necessary classes and instances to the eLearning Copyright Ontology in order to model the right to copy the object for a given institution. This model is easy to be managed as well outside the service using OWL ontology editors, such as Protégé, TopBraid or the NeOn Toolkit. The current version of the prototype is not integrated with the eLUISA Annotation tool.
- Method for checking rights: This method is the main outcome of the services. It uses SPARQL and Jena in order to check the rights in the eLearning Copyright Ontology. Apart from checking the rights, this method extracts some information about the model that affects the resource.

3.2.3 DRM integration in the Negotiation Layer

The Negotiation Layer integration of the DRM module is only an example of what can be achieved using DRM. It is a proof of concept of the integration of DRM within LUISA. The main goal of this integration is the checking of rights for those LOs that have been annotated to the value “yes” of the rightsAndOther LOM metadata.

Once a given LO has been retrieved to satisfy a user query, the Negotiation Layer checks the usage of DRM and sends this information to the GUI to be presented to the user. There is no reasoning in the Negotiation Layer involving this info, although this would be a clear path to follow for future work.

3.2.4 DRM integration in the GUI

Once the Negotiation Layer returns the Learning Objects for a user query, the GUI presents the results to the user. If some of the LOs have been subject of DRM checking, the GUI presents the results of the checking and the comments coming from the Negotiation Layer.

In the following figure, the GUI displaying some LOs annotated with digital rights is displayed.

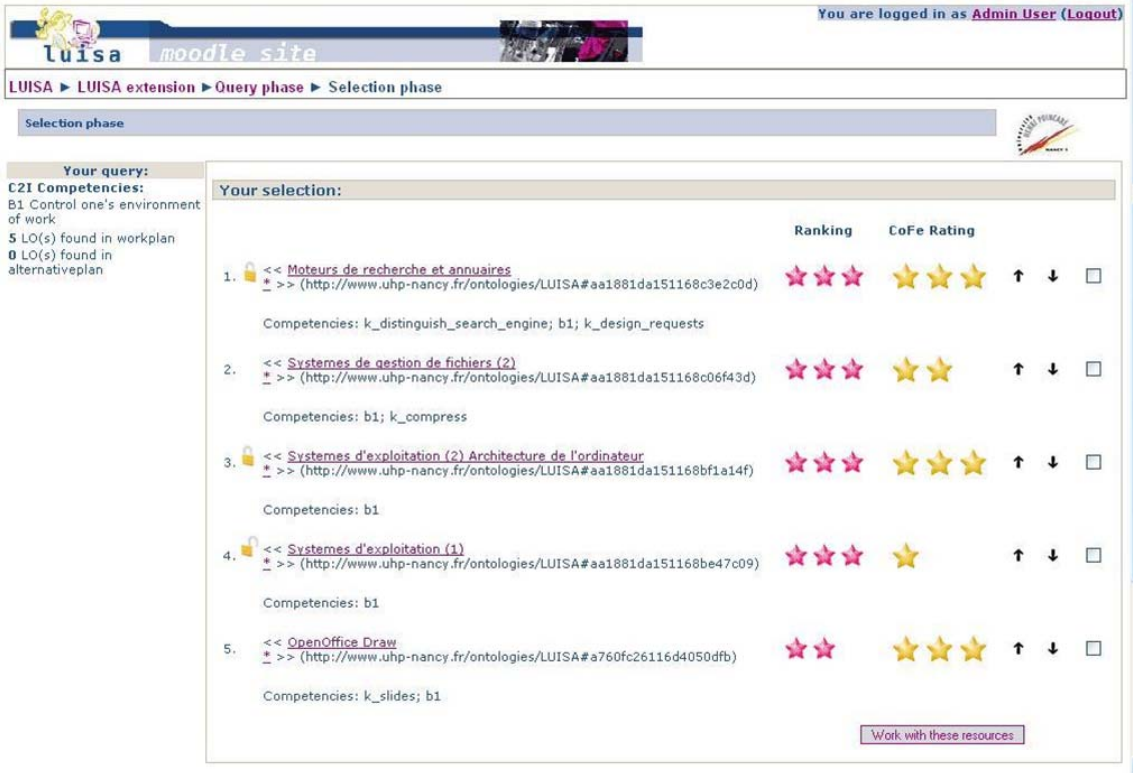

Figure 4. GUI showing DRM information

There are three possible statuses foreseen with respect to the DRM:

1. the LO has no DRM
2. the LO has DRM and checking is not valid for the user
3. the LO has DRM and the check is correct

If the LO has no DRM, there is no special information displayed from the GUI, as for the second and the fifth LO in Figure 3. If the LO has DRM and the user has not the required rights, then a closed lock is shown, as for the first and the third LO reported in the above figure. If the LO has DRM and the user is allowed for that LO, then an open lock is shown as for the fourth LO. In case there are DRM information, the user can have a textual explanation of the kind of DRM that affects the LO by clicking on the lock icon.

4 CONCLUSION

In this deliverable we have discussed the final status of the LUISA DRM prototype. We have described the DRM solution adopted by LUISA and reported on the implementation of the DRM module and the integration with the rest of the LUISA architecture.

The prototype is based in previous work on the Copyright Ontology, which gives solid foundations to the DRM implementation.

It is important to point out that there were no special requirements coming from the LUISA case studies regarding DRM. In this sense, the DRM module has been implemented only as a proof of concept.

On the other hand, the usage of the Copyright Ontology provides the opportunity of future improvements, both in the side of the interoperability with DRM standards and products, and in the enhancement of the functionality.

As a demonstrator deliverable, this document is accompanied by the software delivered by the partners specifically for this prototype.

REFERENCES

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[3] A Web Ontologies Framework for Digital Rights Management. García, R.; Gil, R. and Delgado, J. Journal of Artificial Intelligence and Law, Vol. 15, No. 2, pp. 137-154. Springer-Verlag, 2007. ISSN 0924-8463

[4] de Walle, R.V.; Burnett, I.: "The MPEG-21 Book". John Wiley & Sons, UK, 2005

[5] ODRL, at http://odrl.net

APPENDIX 1 – COPYRIGHT ONTOLOGIES

The copyright ontology can be found at:

http://rhizomik.net/ontologies/2008/05/copyrightonto.owl

The customization of the eLearning Copyright Ontology made for LUISA is listed below:

```
<?xml version="1.0"?>
<rdf:RDF

xmlns:co="http://rhizomik.net/ontologies/2008/05/copyrightonto.owl#"
    xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
    xmlns:xsd="http://www.w3.org/2001/XMLSchema#"
    xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
    xmlns:owl="http://www.w3.org/2002/07/owl#"

xmlns="http://localhost:8080/ontologies/drm/eLearningCopyrightManageme
nt.owl#"
    xmlns:p1="http://www.owl-ontologies.com/assert.owl#"
    xmlns:dc="http://purl.org/dc/elements/1.1/"
    xmlns:cc="http://web.resource.org/cc/"

xmlns:co_el="http://localhost:8080/ontologies/drm/eLearningCopyrightMa
nagement.owll#"

xml:base="http://localhost:8080/ontologies/drm/eLearningCopyrightManag
ement.owl">
  <owl:Ontology rdf:about="">
    <cc:license  rdf:resource="http://creativecommons.org/licenses/by-
nc-sa/3.0/"/>
    <dc:date rdf:datatype="http://www.w3.org/2001/XMLSchema#date"
    >2008-05-19</dc:date>
    <dc:creator rdf:resource="http://rhizomik.net/~roberto"/>
    <rdfs:label    xml:lang="en">eLearning    and    the    Copyright
Ontology</rdfs:label>
    <rdfs:comment xml:lang="en">Copyright Ontology application example
in the eLearning environment</rdfs:comment>
    <owl:imports
rdf:resource="http://rhizomik.net/ontologies/2008/05/copyrightonto.owl
"/>
  </owl:Ontology>
  <owl:Class
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#UhpCopyPattern">
    <rdfs:subClassOf
rdf:resource="http://rhizomik.net/ontologies/2008/05/copyrightonto.owl
```

```
#Copy"/>
    <owl:equivalentClass>
      <owl:Class>
        <owl:intersectionOf rdf:parseType="Collection">
          <owl:Restriction>
            <owl:someValuesFrom>
              <owl:Class
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#UhpSubscribers"/>
            </owl:someValuesFrom>
            <owl:onProperty
rdf:resource="http://rhizomik.net/ontologies/2008/05/copyrightonto.owl
#agent"/>
          </owl:Restriction>
          <owl:Restriction>
            <owl:someValuesFrom>
              <owl:Class
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#UhpManifestation"/>
            </owl:someValuesFrom>
            <owl:onProperty
rdf:resource="http://rhizomik.net/ontologies/2008/05/copyrightonto.owl
#theme"/>
          </owl:Restriction>
          <owl:Restriction>
            <owl:onProperty
rdf:resource="http://rhizomik.net/ontologies/2008/05/copyrightonto.owl
#condition"/>
            <owl:someValuesFrom>
              <owl:Class
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Condition"/>
            </owl:someValuesFrom>
          </owl:Restriction>
        </owl:intersectionOf>
      </owl:Class>
    </owl:equivalentClass>
    <rdfs:comment
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Rights to access to the UHP LOs</rdfs:comment>
  </owl:Class>
  <owl:Class
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#UhpManifestation">
    <rdfs:subClassOf
```

```
rdf:resource="http://rhizomik.net/ontologies/2008/05/copyrightonto.owl
#Manifestation"/>
  </owl:Class>
  <owl:Class
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Condition">
    <owl:equivalentClass>
      <owl:Class>
        <owl:intersectionOf rdf:parseType="Collection">
          <owl:Restriction>
            <owl:someValuesFrom>
              <owl:Class
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#EadsSubscribers"/>
            </owl:someValuesFrom>
            <owl:onProperty
rdf:resource="http://rhizomik.net/ontologies/2008/05/copyrightonto.owl
#agent"/>
          </owl:Restriction>
          <owl:Restriction>
            <owl:onProperty
rdf:resource="http://rhizomik.net/ontologies/2008/05/copyrightonto.owl
#recipient"/>
            <owl:hasValue>
              <co:LegalPerson
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#owner"/>
            </owl:hasValue>
          </owl:Restriction>
          <owl:Restriction>
            <owl:hasValue>
              <owl:Thing
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Amount3Euros"/>
            </owl:hasValue>
            <owl:onProperty
rdf:resource="http://rhizomik.net/ontologies/2008/05/copyrightonto.owl
#theme"/>
          </owl:Restriction>
        </owl:intersectionOf>
      </owl:Class>
    </owl:equivalentClass>
    <rdfs:subClassOf
rdf:resource="http://rhizomik.net/ontologies/2008/05/copyrightonto.owl
#Transfer"/>
```

```
  </owl:Class>

  <owl:Class
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#UhpSubscribers">

    <rdfs:subClassOf
rdf:resource="http://rhizomik.net/ontologies/2008/05/copyrightonto.owl
#Person"/>

  </owl:Class>

  <owl:Class
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#EadsManifestation">

    <rdfs:subClassOf
rdf:resource="http://rhizomik.net/ontologies/2008/05/copyrightonto.owl
#Manifestation"/>

  </owl:Class>

  <owl:Class
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Subscribers">

    <rdfs:subClassOf
rdf:resource="http://rhizomik.net/ontologies/2008/05/copyrightonto.owl
#Person"/>

  </owl:Class>

  <owl:Class
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#EadsCopyPattern">

    <rdfs:subClassOf
rdf:resource="http://rhizomik.net/ontologies/2008/05/copyrightonto.owl
#Copy"/>

    <owl:equivalentClass>

      <owl:Class>

        <owl:intersectionOf rdf:parseType="Collection">

          <owl:Restriction>

            <owl:someValuesFrom>

              <owl:Class
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#EadsSubscribers"/>

            </owl:someValuesFrom>

            <owl:onProperty
rdf:resource="http://rhizomik.net/ontologies/2008/05/copyrightonto.owl
#agent"/>

          </owl:Restriction>

          <owl:Restriction>

            <owl:onProperty
rdf:resource="http://rhizomik.net/ontologies/2008/05/copyrightonto.owl
#theme"/>

            <owl:someValuesFrom
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#EadsManifestation"/>
```

```
          </owl:Restriction>
          <owl:Restriction>
            <owl:someValuesFrom>
              <owl:Class
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#EadsAccessCondition"/>
            </owl:someValuesFrom>
            <owl:onProperty
rdf:resource="http://rhizomik.net/ontologies/2008/05/copyrightonto.owl
#condition"/>
          </owl:Restriction>
        </owl:intersectionOf>
      </owl:Class>
    </owl:equivalentClass>
    <rdfs:comment
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Rights to access to the EADS LOs</rdfs:comment>
  </owl:Class>
  <owl:Class
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#EadsSubscribers">
    <rdfs:subClassOf
rdf:resource="http://rhizomik.net/ontologies/2008/05/copyrightonto.owl
#Person"/>
  </owl:Class>
  <owl:Class
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#EadsAccessCondition">
    <rdfs:subClassOf
rdf:resource="http://rhizomik.net/ontologies/2008/05/copyrightonto.owl
#Access"/>
    <owl:equivalentClass>
      <owl:Class>
        <owl:intersectionOf rdf:parseType="Collection">
          <owl:Restriction>
            <owl:onProperty
rdf:resource="http://rhizomik.net/ontologies/2008/05/copyrightonto.owl
#agent"/>
            <owl:someValuesFrom
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#EadsSubscribers"/>
          </owl:Restriction>
          <owl:Restriction>
            <owl:hasValue
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#owner"/>
```

```
            <owl:onProperty
rdf:resource="http://rhizomik.net/ontologies/2008/05/copyrightonto.owl
#recipient"/>
          </owl:Restriction>
          <owl:Restriction>
            <owl:onProperty
rdf:resource="http://rhizomik.net/ontologies/2008/05/copyrightonto.owl
#theme"/>
            <owl:hasValue
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#Amount3Euros"/>
          </owl:Restriction>
        </owl:intersectionOf>
      </owl:Class>
    </owl:equivalentClass>
  </owl:Class>
  <owl:Class
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Pattern">
    <owl:equivalentClass>
      <owl:Class>
        <owl:intersectionOf rdf:parseType="Collection">
          <owl:Restriction>
            <owl:someValuesFrom
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#Subscribers"/>
            <owl:onProperty
rdf:resource="http://rhizomik.net/ontologies/2008/05/copyrightonto.owl
#agent"/>
          </owl:Restriction>
          <owl:Restriction>
            <owl:hasValue>
              <co:Manifestation
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#learningObject"/>
            </owl:hasValue>
            <owl:onProperty
rdf:resource="http://rhizomik.net/ontologies/2008/05/copyrightonto.owl
#theme"/>
          </owl:Restriction>
          <owl:Restriction>
            <owl:onProperty
rdf:resource="http://rhizomik.net/ontologies/2008/05/copyrightonto.owl
#condition"/>
            <owl:someValuesFrom
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
```

```
anagement.owll#Condition"/>
          </owl:Restriction>
        </owl:intersectionOf>
      </owl:Class>
    </owl:equivalentClass>
    <rdfs:subClassOf
rdf:resource="http://rhizomik.net/ontologies/2008/05/copyrightonto.owl
#Copy"/>
  </owl:Class>
  <co_el:EadsSubscribers
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Eads_14"/>
  <co:NaturalPerson
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Uhp_19">
    <rdf:type
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#UhpSubscribers"/>
  </co:NaturalPerson>
  <co_el:EadsSubscribers
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Eads_20"/>
  <co:NaturalPerson
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Uhp_70">
    <rdf:type
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#UhpSubscribers"/>
  </co:NaturalPerson>
  <co:NaturalPerson
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Uhp_20">
    <rdf:type
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#UhpSubscribers"/>
  </co:NaturalPerson>
  <co:NaturalPerson
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Uhp_400">
    <rdf:type
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#UhpSubscribers"/>
  </co:NaturalPerson>
  <co_el:EadsSubscribers
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Eads_2"/>
  <co:NaturalPerson
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
```

```
gement.owll#Uhp_6">
    <rdf:type
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#UhpSubscribers"/>
  </co:NaturalPerson>
  <co_el:UhpManifestation
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#aa72f1e9c8116ca1105a3">
    <rdfs:comment
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >SPREADSHEET IN OPEN OFFICE (I)</rdfs:comment>
  </co_el:UhpManifestation>
  <rdf:Description
rdf:about="http://rhizomik.net/ontologies/2008/05/copyrightonto.owl#po
intInTime">
    <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#date"/>
  </rdf:Description>
  <co:NaturalPerson
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Uhp_3">
    <rdf:type
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#UhpSubscribers"/>
  </co:NaturalPerson>
  <co:NaturalPerson
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Uhp_4">
    <rdf:type
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#UhpSubscribers"/>
  </co:NaturalPerson>
  <co:NaturalPerson
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Uhp_15">
    <rdf:type
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#UhpSubscribers"/>
  </co:NaturalPerson>
  <co:Copy
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#copy_01">
    <co:condition>
      <co:Transfer
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#transfer_01">
        <co:recipient
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#owner"/>
```

```
        <co:theme
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#Amount3Euros"/>

        <co:agent>

          <co:NaturalPerson
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#consumer">

            <rdf:type
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#Subscribers"/>

          </co:NaturalPerson>

        </co:agent>

      </co:Transfer>

    </co:condition>

    <co:agent
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#consumer"/>

    <co:pointInTime
rdf:datatype="http://www.w3.org/2001/XMLSchema#date"

    >2008-05-19</co:pointInTime>

    <co:theme
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#learningObject"/>

  </co:Copy>

  <co:NaturalPerson
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Uhp_75">

    <rdf:type
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#UhpSubscribers"/>

  </co:NaturalPerson>

  <co_el:EadsSubscribers
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Eads_4"/>

  <co:NaturalPerson
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Uhp_8">

    <rdf:type
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#UhpSubscribers"/>

  </co:NaturalPerson>

  <co_el:EadsManifestation
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#lo1"/>

  <co:NaturalPerson
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Uhp_7">

    <rdf:type
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
```

```
anagement.owll#UhpSubscribers"/>
  </co:NaturalPerson>
  <co:NaturalPerson
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Uhp_11">
    <rdf:type
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#UhpSubscribers"/>
  </co:NaturalPerson>
  <co:NaturalPerson
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Uhp_140">
    <rdf:type
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#UhpSubscribers"/>
  </co:NaturalPerson>
  <co:NaturalPerson
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Uhp_72">
    <rdf:type
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#UhpSubscribers"/>
  </co:NaturalPerson>
  <co_el:EadsSubscribers
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Uhp_12">
    <rdf:type
rdf:resource="http://rhizomik.net/ontologies/2008/05/copyrightonto.owl
#NaturalPerson"/>
    <rdf:type
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#UhpSubscribers"/>
  </co_el:EadsSubscribers>
  <co_el:UhpManifestation
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#aa1881da151168be47c09">
    <rdfs:comment
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Operating Systems (1)</rdfs:comment>
  </co_el:UhpManifestation>
  <co_el:UhpSubscribers
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Uhp_2200"/>
  <co_el:EadsSubscribers
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Eads_3881"/>
  <co:Copy
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#copy_eads_lo_to_uhp">
```

```
      <co:condition>
      <co:Transfer
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#transfer_01">
        <co:recipient
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#owner"/>
        <co:theme
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#Amount3Euros"/>
        <co:agent>
          <co:NaturalPerson
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#consumer">
            <rdf:type
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#Subscribers"/>
          </co:NaturalPerson>
        </co:agent>
      </co:Transfer>
    </co:condition>


    <co:agent>
      <co_el:EadsSubscribers
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Uhp_14">
        <rdf:type
rdf:resource="http://rhizomik.net/ontologies/2008/05/copyrightonto.owl
#NaturalPerson"/>
        <rdf:type
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#UhpSubscribers"/>
      </co_el:EadsSubscribers>
    </co:agent>
    <co:agent>
      <co_el:EadsSubscribers
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Uhp_18">
        <rdf:type
rdf:resource="http://rhizomik.net/ontologies/2008/05/copyrightonto.owl
#NaturalPerson"/>
        <rdf:type
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#UhpSubscribers"/>
      </co_el:EadsSubscribers>
    </co:agent>
    <co:agent
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
```

```
anagement.owll#Uhp_12"/>
    <rdfs:comment
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >EADS LO that can becopied by all UHP users</rdfs:comment>
    <co:pointInTime
rdf:datatype="http://www.w3.org/2001/XMLSchema#date"
    >2008-06-16</co:pointInTime>
    <co:theme
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#lo1"/>
  </co:Copy>
  <co_el:EadsSubscribers
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Eads_3931"/>
  <co:NaturalPerson
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Uhp_46">
    <rdf:type
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#UhpSubscribers"/>
  </co:NaturalPerson>
  <co_el:EadsSubscribers
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Eads_9"/>
  <co:NaturalPerson
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Uhp_9">
    <rdf:type
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#UhpSubscribers"/>
  </co:NaturalPerson>
  <co:NaturalPerson
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Uhp_77">
    <rdf:type
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#UhpSubscribers"/>
  </co:NaturalPerson>
  <co_el:EadsSubscribers
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Eads_512"/>
  <co:NaturalPerson
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Uhp_24">
    <rdf:type
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#UhpSubscribers"/>
  </co:NaturalPerson>
  <co:NaturalPerson
```

```
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Uhp_2">

    <rdf:type
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#UhpSubscribers"/>

  </co:NaturalPerson>

  <co:NaturalPerson
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Uhp_74">

    <rdf:type
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#UhpSubscribers"/>

  </co:NaturalPerson>

  <co_el:EadsSubscribers
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Eads_6"/>

  <co:NaturalPerson
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Uhp_1">

    <rdf:type
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#UhpSubscribers"/>

  </co:NaturalPerson>

  <co:NaturalPerson
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Uhp_10">

    <rdf:type
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#UhpSubscribers"/>

  </co:NaturalPerson>

  <co:NaturalPerson
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Uhp_142">

    <rdf:type
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#UhpSubscribers"/>

  </co:NaturalPerson>

  <co_el:EadsSubscribers
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Eads_3888"/>

  <co:Agree
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#agreement_01">

    <co:theme
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#Pattern"/>

    <co:agent
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#owner"/>
```

```
  </co:Agree>

  <co_el:EadsSubscribers
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Eads_4000"/>

  <co_el:EadsSubscribers
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Eads_38"/>

  <co_el:UhpManifestation
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#aa1881da151168c3e2c0d">

    <rdfs:comment
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"

    >Search engines and directories</rdfs:comment>

  </co_el:UhpManifestation>

  <co:NaturalPerson
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Uhp_143">

    <rdf:type
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#UhpSubscribers"/>

  </co:NaturalPerson>

  <co:NaturalPerson
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Uhp_73">

    <rdf:type
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#UhpSubscribers"/>

  </co:NaturalPerson>

  <co:NaturalPerson
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Uhp_5">

    <rdf:type
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#UhpSubscribers"/>

  </co:NaturalPerson>

  <co:NaturalPerson
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Uhp_220">

    <rdf:type
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#UhpSubscribers"/>

  </co:NaturalPerson>

  <co:NaturalPerson
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Uhp_22">

    <rdf:type
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#UhpSubscribers"/>

  </co:NaturalPerson>
```

```
  <co:NaturalPerson
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Eads_1">
    <rdf:type
rdf:resource="http://localhost:8080/ontologies/drm/eLearningCopyrightM
anagement.owll#EadsSubscribers"/>
  </co:NaturalPerson>
  <co_el:EadsSubscribers
rdf:about="http://localhost:8080/ontologies/drm/eLearningCopyrightMana
gement.owll#Eads_3"/>
</rdf:RDF>
```

APPENDIX 2 – DRM SERVICE

```
<?xml version="1.0" encoding="UTF-8"?>
<wsdl:definitions
targetNamespace="http://service.drm.luisa.atosorigin.eu"
      xmlns:impl="http://service.drm.luisa.atosorigin.eu"
      xmlns:tns2="http://types.drm.luisa.atosorigin.eu"
      xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/"
      xmlns:apachesoap="http://xml.apache.org/xml-soap"
      xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
      xmlns:wsdlsoap="http://schemas.xmlsoap.org/wsdl/soap/"
      xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<!--WSDL created by Apache Axis version: 1.4
Built on Apr 22, 2006 (06:55:48 PDT)-->
 <wsdl:types>
  <schema targetNamespace="http://service.drm.luisa.atosorigin.eu"
xmlns="http://www.w3.org/2001/XMLSchema">
   <import namespace="http://types.drm.luisa.atosorigin.eu"/>
   <import namespace="http://schemas.xmlsoap.org/soap/encoding/"/>
  </schema>
  <schema targetNamespace="http://types.drm.luisa.atosorigin.eu"
xmlns="http://www.w3.org/2001/XMLSchema">
   <import namespace="http://service.drm.luisa.atosorigin.eu"/>
   <import namespace="http://schemas.xmlsoap.org/soap/encoding/"/>
   <complexType name="requestInfo">
    <sequence>
     <element name="loId" nillable="true" type="soapenc:string"/>
     <element name="userId" nillable="true" type="soapenc:string"/>
     <element name="organization" nillable="true"
type="soapenc:string"/>
    </sequence>
   </complexType>
   <complexType name="getAndCheckReturn">
    <sequence>
     <element name="result" nillable="true" type="xsd:int"/>
     <element name="action" nillable="true" type="soapenc:string"/>
     <element name="agreement" nillable="true" type="soapenc:string"/>
     <element name="condition" nillable="true" type="soapenc:string"/>
     <element name="precondition" nillable="true"
type="soapenc:string"/>
     <element name="pointInTime" nillable="true"
type="soapenc:string"/>
    </sequence>
   </complexType>
   <complexType name="addRightInfo">
    <sequence>
     <element name="loId" nillable="true" type="soapenc:string"/>
     <element name="userId" nillable="true" type="soapenc:string"/>
     <element name="organization" nillable="true"
type="soapenc:string"/>
     <element name="action" nillable="true" type="soapenc:string"/>
     <element name="agreement" nillable="true" type="soapenc:string"/>
     <element name="condition" nillable="true" type="soapenc:string"/>
     <element name="precondition" nillable="true"
type="soapenc:string"/>
     <element name="pointInTime" nillable="true"
type="soapenc:string"/>
    </sequence>
```

```
    </complexType>
   </schema>
 </wsdl:types>
 <wsdl:message name="getAndCheckRightsRequest">
      <wsdl:part name="requestInfo" type="tns2:requestInfo"/>
 </wsdl:message>
 <wsdl:message name="getAndCheckRightsResponse">
      <wsdl:part name="getAndCheckRightsReturn"
type="tns2:getAndCheckReturn"/>
 </wsdl:message>
 <wsdl:message name="checkRightsRequest">
      <wsdl:part name="requestInfo" type="tns2:requestInfo"/>
 </wsdl:message>
 <wsdl:message name="checkRightsResponse">
      <wsdl:part name="result" type="xsd:int"/>
 </wsdl:message>
 <wsdl:message name="addRightRequest">
      <wsdl:part name="add" type="tns2:addRightInfo"/>
 </wsdl:message>
 <wsdl:message name="addRightResponse">
      <wsdl:part name="result" type="xsd:int"/>
 </wsdl:message>
 <wsdl:message name="deleteRightRequest">
      <wsdl:part name="requestInfo" type="tns2:requestInfo"/>
 </wsdl:message>
 <wsdl:message name="deleteRightResponse">
      <wsdl:part name="result" type="xsd:int"/>
 </wsdl:message>
 <wsdl:portType name="DRMLuisaWS">
      <wsdl:operation name="getAndCheckRights">
         <wsdl:input message="impl:getAndCheckRightsRequest"
name="getAndCheckRightsRequest"/>
         <wsdl:output message="impl:getAndCheckRightsResponse"
name="getAndCheckRightsResponse"/>
      </wsdl:operation>
      <wsdl:operation name="checkRights">
         <wsdl:input message="impl:checkRightsRequest"
name="checkRightsRequest"/>
         <wsdl:output message="impl:checkRightsResponse"
name="checkRightsResponse"/>
      </wsdl:operation>
      <wsdl:operation name="addRight">
         <wsdl:input message="impl:addRightRequest"
name="addRightRequest"/>
         <wsdl:output message="impl:addRightResponse"
name="addRightResponse"/>
      </wsdl:operation>
      <wsdl:operation name="deleteRight">
         <wsdl:input message="impl:deleteRightRequest"
name="deleteRightRequest"/>
         <wsdl:output message="impl:deleteRightResponse"
name="deleteRightResponse"/>
      </wsdl:operation>
 </wsdl:portType>
 <wsdl:binding name="DRMLuisaWSBinding" type="impl:DRMLuisaWS">
      <wsdlsoap:binding style="rpc"
transport="http://schemas.xmlsoap.org/soap/http"/>
      <wsdl:operation name="getAndCheckRights">
         <wsdlsoap:operation soapAction=""/>
         <wsdl:input name="getAndCheckRightsRequest">
```

```
            <wsdlsoap:body
encodingStyle="http://schemas.xmlsoap.org/soap/encoding/"
namespace="http://service.eadsws.luisa.atosorigin.eu" use="encoded"/>
         </wsdl:input>
         <wsdl:output name="getAndCheckRightsResponse">
            <wsdlsoap:body
encodingStyle="http://schemas.xmlsoap.org/soap/encoding/"
namespace="http://service.eadsws.luisa.atosorigin.eu" use="encoded"/>
         </wsdl:output>
      </wsdl:operation>
      <wsdl:operation name="checkRights">
         <wsdlsoap:operation soapAction=""/>
         <wsdl:input name="checkRightsRequest">
            <wsdlsoap:body
encodingStyle="http://schemas.xmlsoap.org/soap/encoding/"
namespace="http://service.eadsws.luisa.atosorigin.eu" use="encoded"/>
         </wsdl:input>
         <wsdl:output name="checkRightsResponse">
            <wsdlsoap:body
encodingStyle="http://schemas.xmlsoap.org/soap/encoding/"
namespace="http://service.eadsws.luisa.atosorigin.eu" use="encoded"/>
         </wsdl:output>
      </wsdl:operation>
      <wsdl:operation name="addRight">
         <wsdlsoap:operation soapAction=""/>
         <wsdl:input name="addRightRequest">
            <wsdlsoap:body
encodingStyle="http://schemas.xmlsoap.org/soap/encoding/"
namespace="http://service.eadsws.luisa.atosorigin.eu" use="encoded"/>
         </wsdl:input>
         <wsdl:output name="addRightResponse">
            <wsdlsoap:body
encodingStyle="http://schemas.xmlsoap.org/soap/encoding/"
namespace="http://service.eadsws.luisa.atosorigin.eu" use="encoded"/>
         </wsdl:output>
      </wsdl:operation>
      <wsdl:operation name="deleteRight">
         <wsdlsoap:operation soapAction=""/>
         <wsdl:input name="deleteRightRequest">
            <wsdlsoap:body
encodingStyle="http://schemas.xmlsoap.org/soap/encoding/"
namespace="http://service.eadsws.luisa.atosorigin.eu" use="encoded"/>
         </wsdl:input>
         <wsdl:output name="deleteRightResponse">
            <wsdlsoap:body
encodingStyle="http://schemas.xmlsoap.org/soap/encoding/"
namespace="http://service.eadsws.luisa.atosorigin.eu" use="encoded"/>
         </wsdl:output>
      </wsdl:operation>
   </wsdl:binding>
   <wsdl:service name="DRMLuisaWSService">
      <wsdl:port binding="impl:DRMLuisaWSBinding" name="DRMLuisaWS">
        <wsdlsoap:address location="http://localhost:8080/UHP-EADS-
P2/services/DRMLuisaWS"/>
      </wsdl:port>
   </wsdl:service>
</wsdl:definitions>
```