Embedding ODRL statements in Dublin Core

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Abstract— **Dublin Core is a standard for creating metadata records about resources. Over these resources we can define policies of usage. ODRL is an initiative to express the rights statements over the resources, with the idea of developing tools to enforce the policies defined. The normative way to express ODRL statements is in XML syntax, which is rather difficult for a person to read and understand. The easiest way to relate the license to the Dublin Core metadata set is to include a link to the license into the metadata record. This can be useful for the automatic processing of the license but, however, doesn't give descriptive information to the user. In this paper we propose a mechanism to obtain this descriptive information, by converting the ODRL statements into textual information, and embed it in Dublin Core metadata records, in order to ease its human comprehension.**

Index Terms—**Metadata, digital rights management.**

I. INTRODUCTION

ODRL (Open Digital Rights Language) [1] is a key tool for the digital rights management of electronic publications. It consists of a language for expressing the rights and a data dictionary that establishes the semantics of every entity defined in the ODRL Foundation Model. The normative way to express ODRL is in schema-valid XML syntax, in order to be easily processed by DRM tools.

On the other hand, Dublin Core is a standard for creating descriptive metadata records about resources. The ODRL community has realised the need of combining the ODRL rights expressions with descriptive metadata records. With this goal in mind, a joint working group between ODRL and DCMI (Dublin Core Metadata Initiative) [2] has been established to study the possibility of creating an ODRL profile that enables this combination.

Dublin Core and ODRL serve different purposes. While a metadata record following the Dublin Core standard aims to describe different characteristics about a resource, an ODRL statement is meant to provide the mechanisms to enforce a usage policy over a resource.

In this paper, we propose a mechanism to embed the rights statements expressed in ODRL beneath a metadata record associated to a resource, to which the rights statements apply, focusing on the Dublin Core Metadata standard.

The remainder of this paper is structured as follows. In section 2 we give an overview of the Dublin Core Metadata Element Set, focusing on the elements related to the rights description. Section 3 describes our proposal for embedding ODRL in Dublin Core, analyses the different ODRL models and discusses which of them are to be considered and which not. Then, section 4 concludes the paper.

II. THE DUBLIN CORE STANDARD

A. Dublin Core Metadata Element Set

The Dublin Core metadata element set is a standard for information resource description. Simple Dublin Core consists of 15 descriptive semantic definitions and represents a core set of elements likely to be useful across a broad range of applications, whereas Qualified Dublin Core includes additional elements, as well as a group of element refinements (also called qualifiers) that refine the semantics of the core elements in ways that may be useful in resource discovery. Also, the usage of controlled vocabularies for some elements is encouraged, thus avoiding misspellings and confusions, and increasing interoperability.

The DCMI (Dublin Core Metadata Initiative) is the organisation who is in charge of the maintenance of the standard, the promotion of its usage and the proposal of new elements, qualifiers and encoding schemes. In this moment, it is an ISO standard (ISO 15836:2003), a NISO standard (ANSI/NISO Z39.85-2001), a CEN recommendation (CWA 13874) and an IETF RFC (RFC 2413).

The 15 core elements defined in Dublin Core are *contributor*, *coverage*, *creator*, *date*, *description*, *format*, *identifier*, *language*, *publisher*, *relation*, *rights*, *source*, *subject*, *title* and *type*.

The proposed new elements after the establishment of the core are *audience*, *provenance* and *rightsHolder*, whereas examples of qualifiers are *abstract*, which is a refinement of *description*; *created*, *dateCopyrighted* or *dateAccepted*, which are refinements of *date*; *hasPart* or *isPartOf*, which are refinements of *relation*; or *license*, which is a refinement of *rights*.

Examples of controlled vocabularies are the DDC (Dewey Decimal Classification), or LCC (Library of Congress Classification) to be used in *subject*; the RFC1766 for languages; the IMT (Internet Media Type) for *format*, etc.

Also, the DCMI has defined some controlled vocabularies, for example, the DCMI Type classification for the element *type*, or DCMI Period, that specifies the limits of a time

interval and is useful for the element *date*.

Dublin Core can be used in many ways. The DCMI emits usage guides to assist users in creating descriptive records using Dublin Core in these different ways, from the simplest one (using only some or all the 15 core elements) to a more sophisticated one (choosing some of the qualifiers already defined).

Dublin Core is intended to be used primarily for human consumption, so the values of the elements tend to be human-readable. Nevertheless, it is also possible to use Dublin Core for automatic machine processing. In fact, we have developed a system that includes automatic access and processing of Dublin Core metadata records [3].

rights, but in a human-readable way. So we propose to translate (or perhaps more precisely, to parse) from the XML binding of the statements to natural language, so as they can be easily understood by a human consumer. This parsing can be done automatically, without human intervention, and a key aspect is that only the terms that appear in the Rights Expression Language and in the Data Dictionary should be used.

An example of this translation is shown in Example 1.

Of course, if the element *rights* is used with this purpose, it has only informative value. It can not be reliable for a machine-driven process of analysis of the Rights statements.

Original XML binding of a permission:

```
<permission>
   <display/>
   <print>
      <constraint>
         <count>5</count>
      </constraint>
   </print>
</permission>
```

Equivalent human-readable metadata record:

Rights	permission to display; permission to print with constraint 5 times

Example 1. Translation of a simple permission

B. *Rights in Dublin Core*

There is one element in the core thought to be used in the specification of the rights over the resource. It is the element called *rights*, and, according to the usage guide of this element, "typically, *rights* will contain a rights management statement for the resource, or reference a service providing such information. Rights information often encompasses Intellectual Property Rights (IPR), Copyright, and various Property Rights. If the *rights* element is absent, no assumptions may be made about any rights held in or over the resource".

Later, two refinements to this element and a new element have been proposed. The refinements are *accessRights* and *license*, and the element is *rightsHolder*. The qualifier *accessRights* is defined as "information about who can access the resource or an indication of its security status", whereas *license* is "a legal document giving official permission to do something with the resource and recommended best practice is to identify the license using a URI". The new proposed element *rightsHolder* is "a person or organisation owning or managing rights over the resource".

III. EMBEDDING MECHANISM

Keeping in mind that Dublin Core is primarily for human consumption, although machine-processable, we propose to embed the ODRL statements about a resource in the element

Then, the *license* refinement can be used, including in it the URI of the XML version of the ODRL statement, so as to point to the original ODRL license and be able to process it.

The ODRL Foundation Model consists of the following three core entities:
–   Assets
–   Rights
–   Parties

The Rights include Permissions, which can then contain Constraints, Requirements and Conditions. There can be also Offers and Agreements, which can be accepted or revoked. Most entities can support a specific Context.

As the purpose is to inform about the rights over a resource, we only have to deal with permissions. We don't need to parse neither offers nor agreements. So, we only need to focus on the models related to Permissions, which are:
–   ODRL Permission Model
–   ODRL Constraint Model
–   ODRL Requirement Model
–   ODRL Condition Model
–   ODRL Rights Holder Model
–   ODRL Context Model

All these models include different terms, which are defined in the ODRL Data Dictionary. So the XML-to-natural-language parser must create human-readable sentences following the semantics included in the Data Dictionary.

We propose a specific syntax for the phrases generated:

sentence; sentence; ...

where sentence consists of a permission with all the constraints, requirements and conditions that apply to it. So in the textual phrase, there will be so many sentences as permissions expressed in the whole license, separated by semicolons.

Another example is shown in Example 2, and yet another one, more complex, is shown in Example 3.

For the sake of simplicity and ease of reading, we don't need to be exhaustive. So, the parser can be tailored to translate in different levels, from the most exhaustive one (translating all the statements literally) to a lighter one (translating only the most relevant statements).

IV. CONCLUSION

In this paper we have presented a mechanism to embed ODRL statements about digital rights over a resource beneath a descriptive metadata record. The idea is to give information to the users about the rights over a resource but in a human-

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Original XML binding of a permission with a requirement:

```
<permission>
  <play>
    <requirement>
      <peruse>
        <payment>
          <amount currency="AUD">
            20.00
          </amount>
          <taxpercent code="GST">
            10.0
          </taxpercent>
        </payment>
      </peruse>
    </requirement>
  </play>
</permission>
```

Equivalent human-readable metadata record:

Rights	permission to play paying AUD $20 plus 10% tax

Example 2. Translation of a permission with a requirement

Original XML binding of two permissions, one with a specific condition, and both with another condition:

```
<permission>
  <sell/>
  <play>
    <condition>
      <constraint>
        <software>X</software>
      </constraint>
    </condition>
  </play>
</permission>
<condition>
  <constraint>
    <spatial>
      <context>
        <uid>iso3166:AU</uid>
      </context>
    </spatial>
  </constraint>
</condition>
```

Equivalent human-readable metadata record:

Rights	permission to sell valid until exercised in Australia; permission to play valid until software X is used or until exercised in Australia

Example 3. Translation of a double permission, with conditions

readable way, so we propose to translate from the XML binding to natural language, using the semantics expressed in the Data Dictionary. This translation, or parsing, can be done automatically and the level of exhaustiveness can be previously defined.

We have focused our proposal in the Dublin Core Metadata standard, but the same process can be applied to any other metadata scheme that has terms intended to carry descriptive information about rights, such as LOM (Learning Objects Metadata) [4] or SMPTE 335M [5], a metadata standard for television material.

REFERENCES

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