Rights Expression Languages: Overview

Grace Agnew

Rutgers University

Sept. 9, 2002

REL Overview

Rights Expression Language:

- Documents offers & agreements between rights holders and end users, providing rights to license, distribute, access and use resources.

- Communicates rights, conditions on the exercise of rights, and other context relevant to the rights transactions.

REL Overview

- Defines the parties and concepts engaged in offers or agreements for the exercise of rights that are exercised against content.

- Expresses the underlying business model(s) of the community sharing the DRM.

- Employs data dictionary and a standard syntax to provide interoperable, logically consistent, semantically precise documentation for rights transactions

- Should be human and machine interpretable

REL Overview

A REL should be:

Scalable

Standardized

Unambiguous

Effective

Integrated

Flexible design supports expanding needs, changing needs, new content; new technologies.

Community extensibility
Shareable by other users, repositories
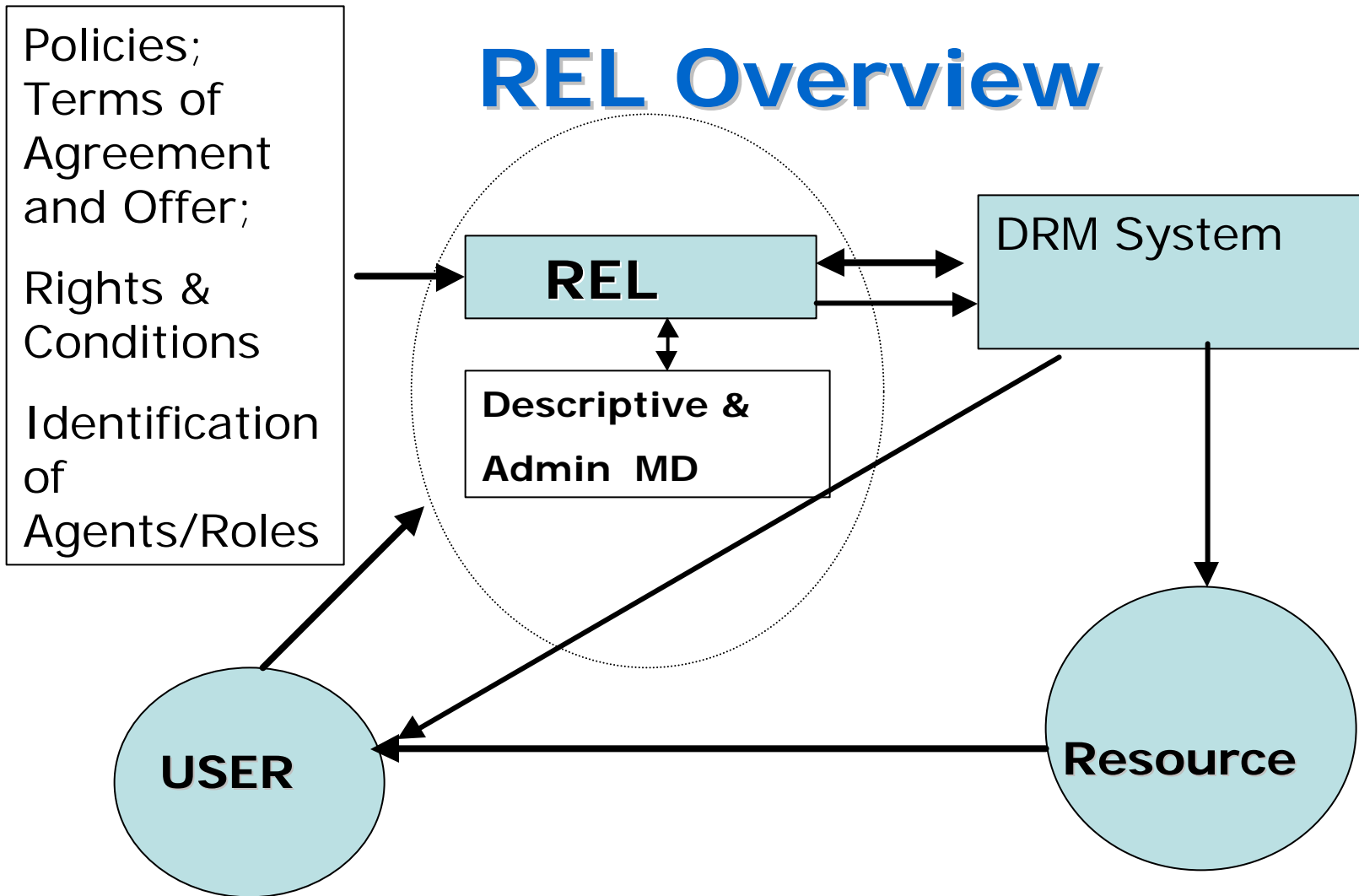
Consistent, unique interpretation by human & machine users

Persists over space and time; Documents rights decisions with logical consistency; binds rights tightly to the resource

Integrates with other metadata describing & managing the resource

4

REL Overview

Policies;
Terms of
Agreement
and Offer;

Rights &
Conditions

Identification
of
Agents/Roles

REL

DRM System

Descriptive &

Admin MD

USER

Resource

REL Overview

Other resource metadata:

- **Administrative metadata**:
  - provenance, fixity, context, reference, structure, and management. **Rights MD may be a subset**

- **Descriptive Metadata**: information to discover, identify, select and obtain the resource

- **Structural metadata:** Information a bout the structured relationship between components of a complex object.
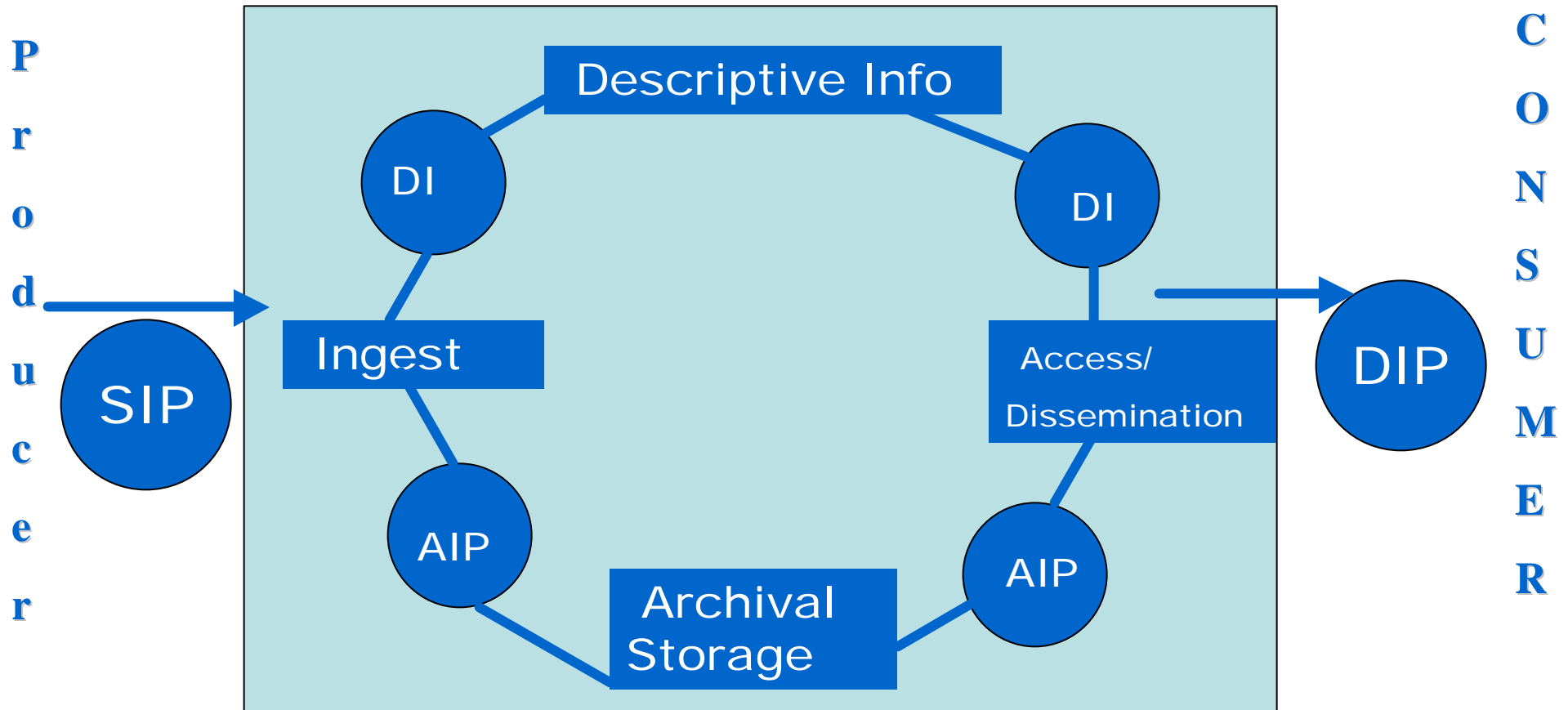
6

REL Overview

REL in Context:

Integration of Administrative, Descriptive, Structural & Rights Metadata:

- integrated lifecycle management

- insures consistency of content information across applications

- Supports user decision-making in resource discovery and selection

- Supports complex content management - shared repositories, content versioning; downstream management, multiple manifestations; multipart objects, etc.

7

REL Overview

Producer

CONSUMER

SIP

Descriptive Info

DI

DI

Ingest

Access/
Dissemination

DIP

AIP

Archival
Storage

AIP

OAIS - Reference Model for an Open Archival Information System

From: CCSDS 650.0-R-1: *Reference Model for an Open Archival Information System (OAIS)*. Red Book. Issue 1. May 1999.
PDF.Available at: **http://ssdoo.gsfc.nasa.gov/nost/isoas/overview.html**

8

REL Overview

METS:

Metadata Encoding & Transmission Standard

http://www.loc.gov/standards/mets/

- Provides encoding and transmission of descriptive, administrative and structural metadata using XML

- Provides for transmission of metadata.

- Associates structure map, file types and behaviors with digital objects to provide "intelligent" complex objects

- Can serve as SIP, AIP and DIP in an OAIS-compliant archive.

9

REL Overview

SCORM - Shareable Content Object Reference Model

http://www.adlnet.org

- Standard to create interoperable "learning objects"--can run on any compliant LMS/LCMS.

Model includes:

- Required run time that compliant LMS must support
- required descriptive metadata - IEEE LOM application profile
- Structure map for complex objects ("SCOs")
- Simple sequencing specification

10

REL Overview

Issues for Rights Metadata in R&E

• Many IP models, including: open availability/public domain; educational fair use; e-commerce; archival materials with unclear provenance; government records/collaborations with retention schedules and classification statuses; copyright; patentable ideas, complex collaborations, etc.

• Creators closely bound to IP - want and need active involvement in setting rights; revising rights.

• Many agents with complex creation, publication, distribution roles. Resources are also varied, complex and dynamic

11

REL Overview

- DRM needs cut across departments with different IP management models, methods and technologies:

    - IT; E-Learning/Distance Ed; Univ. Administration; Library/Archives; Museum; Academic Departments.

- Each Dept may implement products with incompatible DRM components:

    - Media Asset Mgt Systems; Portals; knowledge mgt systems, etc.

- "Bundled" DRM may have only "secure content" or "e-commerce" functions.

12

REL Overview

Critical Issue: Interoperability

RIGHTS

Rights, Constraints, Agents and terms of agreement - tied to core IP processes - map readily.

EXPRESSION

Logic for expressing IP offerings and licenses complex and incompatible - requires advanced parsing.

LANGUAGE

XML provides common framework, grammar and syntax. Use of multiple schemas and subschemas adds parsing complexity

13

REL Overview

Two Developed languages: XrML and ODRL

XrML - Extensible Rights Markup Language

www.xrml.org

- Current version - 2.0 (2001-11-20)

- Developed from Xerox PARC's Digital Property Rights Language (1996)

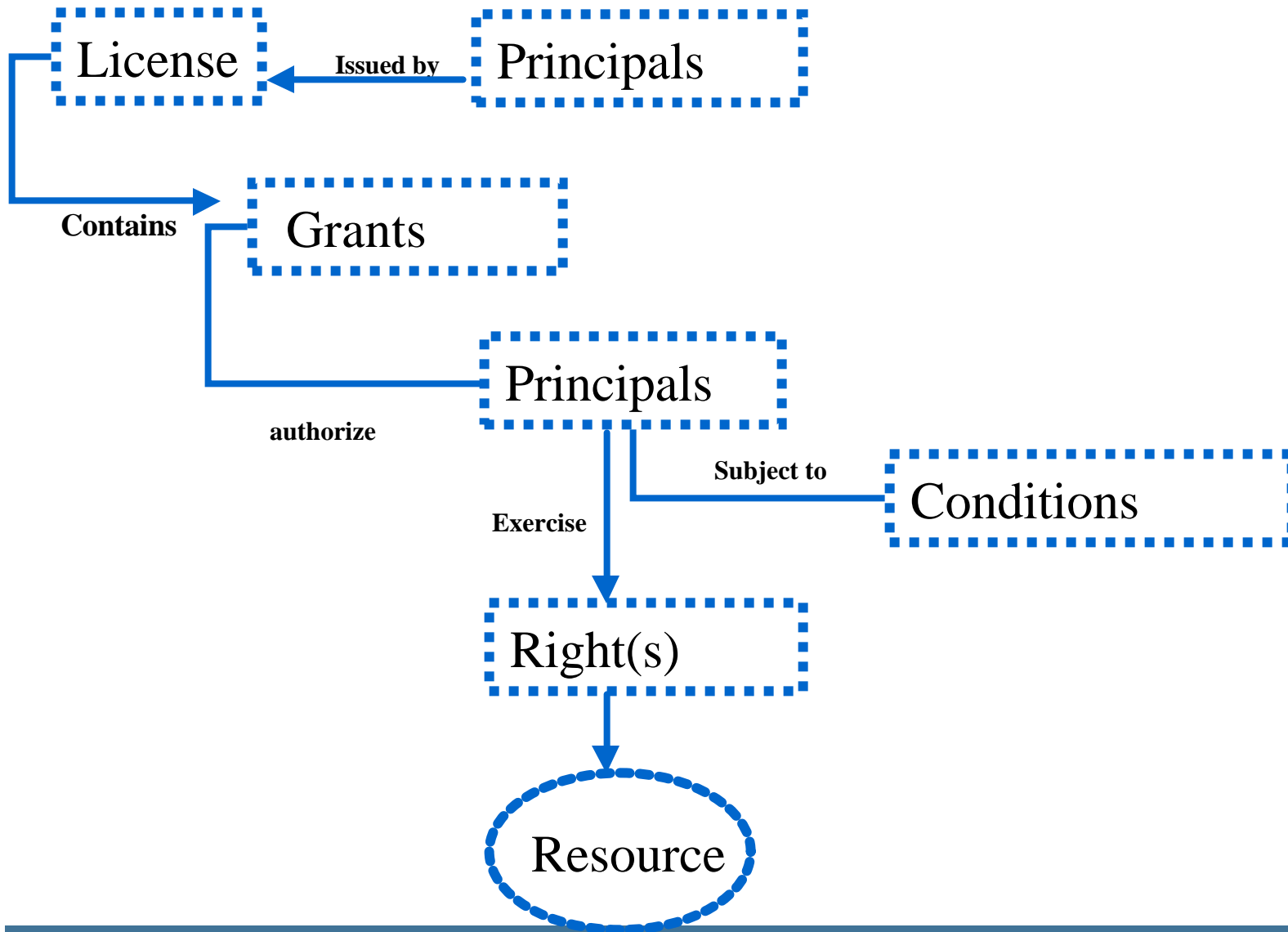- ContentGuard - Patent/License owner; language developer

14

REL Overview

XrML Core Concepts:

License - container of grants or grantgroups.

- **Grant -** bestows authorization to exercise right

- **Principal -** actors to whom rights are granted

- **Right -** action that a principal can exercise on a resource

- **Resource -** object for which rights are granted

- **Condition - "**terms, conditions or obligations" that affect the exercising of a right.

15

License

Issued by

Principals

Contains

Grants

Principals

authorize

Subject to

Conditions

Exercise

Right(s)

Resource

16

REL Overview

XrML: Three Schemas

Core schema - Specifies semantics and rules for licenses, grants, core resource types and core rights related to licenses and grants

• Standard Extension Schema - types and extensions for multiple scenarios ("sx"), particularly payment, conditions, and names.

• Content extension schema - types and elements for describing rights, conditions and metadata specific to digital works. (cx)

17

REL Overview

XrML Highlights and Issues:

• Integrates XML core technologies in a "hybrid" language/middleware implementation.

  • Xpath, UDDI, Dsig, Enc integrated into the rules of expression and syntax- requires careful versioning across developing technologies.

• Emphasis on end-to-end "trusted systems" from digital signatures for licenses to direct payment to bank accounts.

  • Requires stateful conditions to point to location where state is maintained.

REL Overview

XrML Highlights and Issues:

• Patent issues for XrML license.

• Core concept of "trusted issuer" - digital signature for license integrity.

> • Digital signature valid only if signed content not changed

>> • Complex IP layers - mobile creators

>> • Dynamic resource lifecycles - dynamic rights assignment

19

REL Overview

XrML Highlights and Issues:

• "Hybrid language" is dense, not always eye-readable or hand-codable.

• Can be intentionally opaque - rights and conditions can be referenced by directory pointers rather than explicit.

• Rich payment options provide strong e-commerce support, including "bestpriceunder" for special offers and "callforprice." Explicit support for direct payment to bank accounts.

20

•

REL Overview

XrML Highlights and Issues:

•Very functional and extensible -strong data integrity support; usage tracking; nested rights and conditions, downstream rights; preconditions, such as acceptance of terms and conditions and license revocation status calls;

• Can imbed other MD schemas via namespaces; community extension schemas supported;

• Copyright, attribution and watermarking supported.

REL Overview

ODRL - Open Digital Rights Language

http://odrl.net

• Developed and Managed by IPR Systems (Renato Iannella)

• Current version: 1.1 (2002-08-08)

• Open source - freely available

REL Overview

ODRL Core Concepts:

• **Asset -** uniquely-identified content

• **Rights** - include permissions to interact with assets, which can include constraints (limits), conditions (exceptions that expire permissions) and requirements (obligations that must be met before permissions can be exercised.

• **Parties -** end users who exercise permissions and rights holders who grant permissions (subject to constraints and conditions)

23

REL Overview

ODRL Schemas:

- Expression language ("ex")

- Data Dictionary language ("dd")

"ODRL supports the expression of Permissions for both Offers and Agreements" [1]
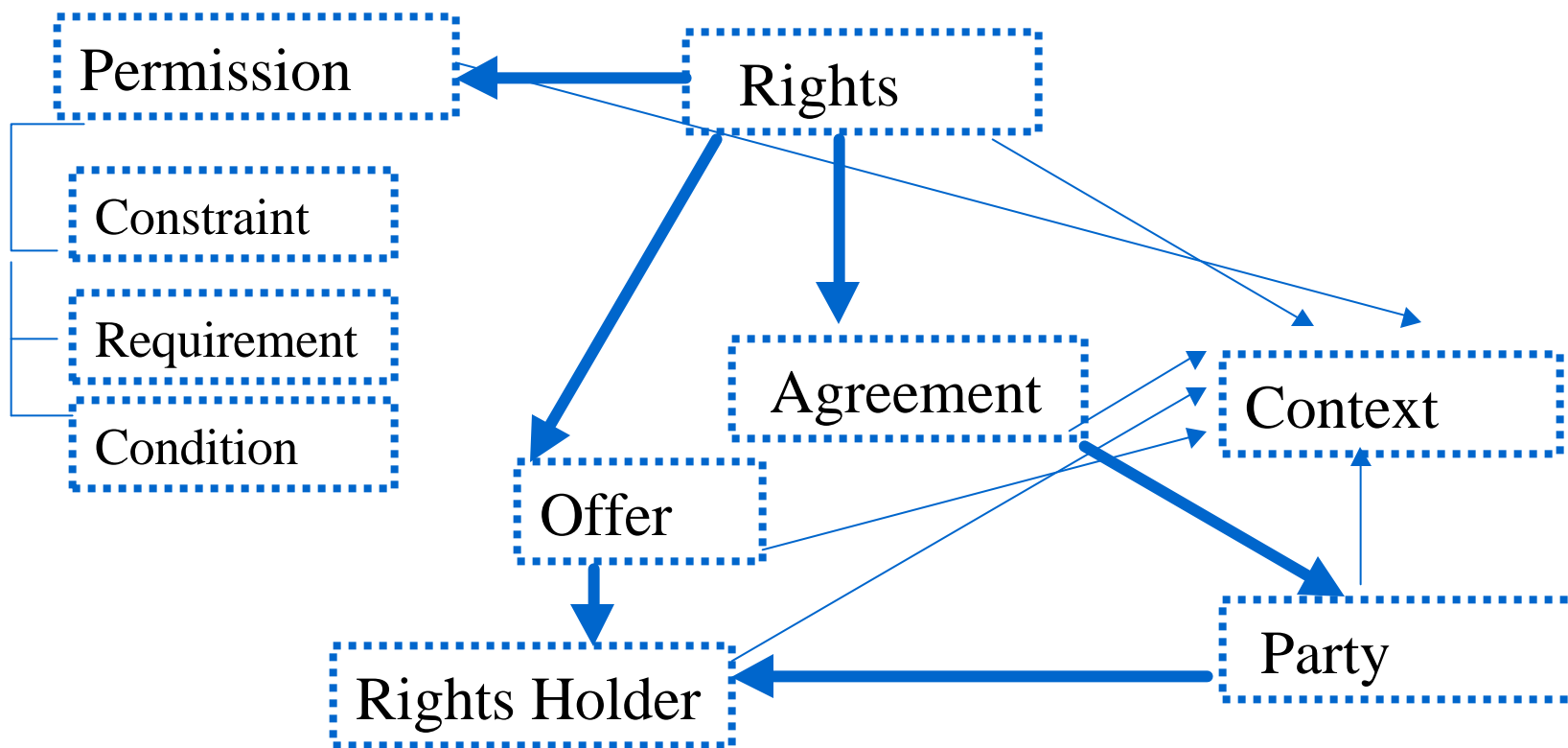
[1] Ianella, R. Open Digital Rights Language (ODRL) v. 1.1 2002-08-08.
http://odrl.net/1.1/ODRL-11.pdf. p. 5

REL Overview

ODRL - Adaptation of "ODRL Foundation Model"

Open Digital Rights Language (ODRL) v. 1.1 2002-08-08. http://odrl.net/1.1/ODRL-11.pdf. p. 4

25

REL Overview

ODRL Highlights and Issues

• Concept of "context" adds unique identifiers and relevant information about any entity or the relationship between entities. "Roles" are an explicit attribute of parties (rights holders and end users). Rights for a single asset can be layered by party role.

• Rights holders have explicit royalty attributes

• Requirements and conditions can have boolean ("and" "or") logic

26

REL Overview

ODRL Highlights and Issues

• Rights can be assigned to assets based on physical format (support for rights layered by physical or digital "manifestation,") or subparts. "Quality" and "Format" are explicit attributes.

• Language is very functional but lightweight and eye-readable. Technologies and protocols ("middleware") to accomplish rights transactions is not specified.

• Can imbed other MD schemas via namespaces

27

REL Overview

ODRL Highlights and Issues

• "Transfer" permission explicitly embeds permissions to be passed on for downstream asset use, together with attributes "equal," "less," and "notgreater."

• Explicit taxation codes ("markup" in XrML) and post-pay requirement for "after the fact" payment

•Very functional and extensible - data integrity and encryption, usage tracking; nested rights and conditions, preconditions, such as acceptance of terms and conditions

28

• Industry constraint can be specified (e.g. "Education")

REL Overview

Illustrations from a Scenario:

Rutgers University offers an online video lecture by a noted history professor, Peter Allan, with transcript of the lecture, at no cost. to students registered in "History 101." These students may print the first 10 pages of the transcript at no cost. The entire transcript may be printed for a flat fee of $10.

REL Overview

Identifying the User as an authorized registrant in the course, "History 101"

REL Overview

XrML

```
<grant>
    <keyholder licensePartId="History101Registrant">
     <info>
      <dsig:KeyValue>
        <dsig:RSAKeyValue>
          <dsig:Modulus>n4rtmxz5/2x1uioP598tyu89olk />
          <dsig:Exponent>AQABAA</dsig:Exponent>
        </dsig:RSAKeyValue>
      </dsig:KeyValue>
     </info>
    </cx:keyholder>
```

31

REL Overview

XrML

```
<possessProperty />
 <library:identification>
    <library:scheme>http://www.history.rutgers.edu/History101/registration
    </library:scheme>
    <library:value>student</library:value>
 </library:identification>
</grant>
```

REL Overview

ODRL

```
<o-ex:constraint id="history101Registrant">
        <o-ex:group>
        <o-ex:context>
            <o-dd:uid>
                http://www.history.rutgers.edu/History101/registration
            </o-dd:uid>
        </o-ex:context>
        </o-ex:group>
</o-ex:constraint>
```

REL Overview

Offer to registrant:

permission to print the first 10 pages of the transcript at no cost or the entire transcript for a $10 fee.

REL Overview

```
<grant>
  <forAll varName="History101Registrant">
    <everyone>
      <library:identification>
        <library:scheme>
            http://www.history.rutgers.edu/History101/registration
        </library:scheme>
        <library:value>student</library:value>
      </library:identification>
      <trustedIssuer>
          <keyHolder licensePartIdRef="trustedissuer />
       </trustedIssuer
    </everyone>
  </forAll>
<keyHolder varRef="History101Registrant>
```

35

```
<cx:print />
    <cx:digitalWork licensePartIdRef="AllanLectureTranscript" />
      <sx:fee>
        <sx:paymentFlat>
          <sx:rate currency="USD">10.00</sx:rate>
        <sx:paymentRecord>
          <sx:stateReference>
            <uddi>
              <serviceKey>
                <uuid>DO12345F3-223C-4567-B298D-P675623445</uuid>
              </serviceKey>
            </uddi>
          </sx:stateReference>
        </sx:paymentRecord>
        </sx:paymentFlat>
      </sx:fee>
```

36

REL Overview

```
<grant>
  <for all varName="History 101 registrant">
    <everyone>
        <library:identification>
          <library:scheme>
              http://www.history.rutgers.edu/History101/registration
          </library:scheme>
          <library:value>student</library:value>
        </library:identification>
        <trustedIssuer>
            <keyHolder licensePartIdRef="trustedissuer />
         </trustedIssuer
      </everyone>
  </forAll>
<keyHolder varRef="History101Registrant>
```

REL Overview

```
<cx:print />
  <cx:digitalWork licensePartIdRef="AllanLectureTranscript" />
    <school:content>
        <school:unit type="onix:NumberOfPages" />
        <school:from>1</school:from>
        <school:to>10</school:to>
    </school:content>
</grant>
```

REL Overview

ODRL

```
<o-ex:permission>
  <o-ex:asset idref="AllanLectureTranscript" />
    <o-dd:print>
        <o-ex:constraint idref="history101Registrant"
          type="http://odrl.net1.1#forEachMember">
            <o-dd:unit o-ex type="onix:NumberOfPages">
              <o-ex:constraint>
                  <o-dd:range>
                      <o-dd:min>1</o-dd:min>
                      <o-dd:max>10</o-dd:max>
                  </o-dd:range>
              </o-ex:constraint>
            </o-dd:unit>
        </o-ex:constraint>
    </o-dd:print>
</o-ex:permission>
```

REL Overview

ODRL

```
<o-ex:permission>
    <o-ex:asset idref="AllanLectureTranscript" />
    <o-dd:print>
        <o-ex:constraint idref="history101Registrant"
        type="http://odrl.net1.1#forEachMember" >
            <o-ex-requirement>
            <o-dd:peruse>
                <o-dd:payment>
                    <o-dd:amount currency="USD">10.00</o-dd:amount>
                </o-dd:payment>
            </o-dd:peruse>
        </o-ex:constraint>
    </o-dd:print>
</o-ex:permission>
```