



NRC-CNRC

*Institute for
Information
Technology*

Managing Digital Rights Using JSON

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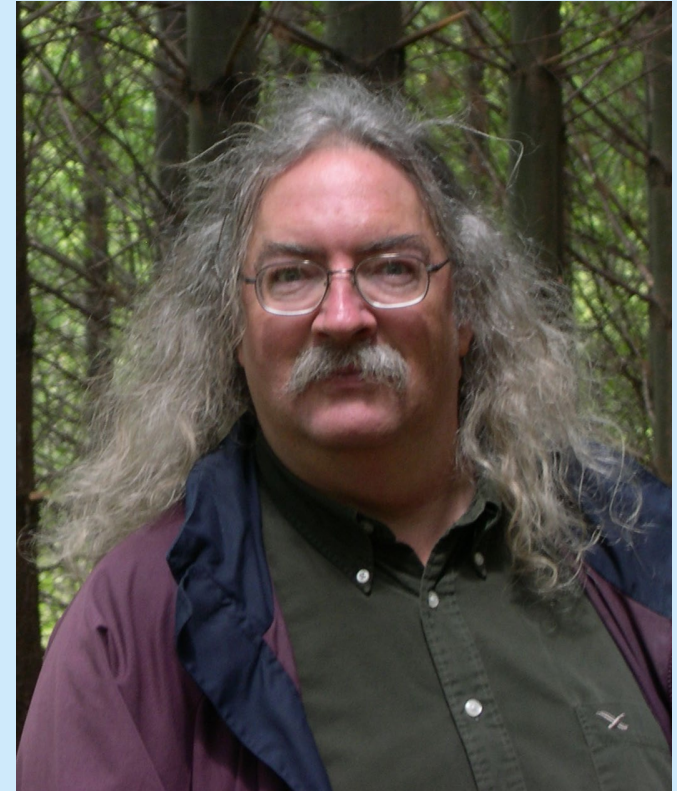
National Research
Council Canada

Conseil national
de recherches Canada

Canada

Who I am

- **Senior Researcher, NRC-IIT LCT**
- **Specialist in:**
 - online learning
 - new media
 - resource metadata
- **Website:** <http://www.downes.ca>
- **Major Projects:**
 - Synergic3 – <http://www.synergic3.ca>
 - PLE – <http://ple.elg.ca>
 - OLDaily – <http://www.downes.ca/news/OLDaily.htm>



LCT Research


Learning and Collaborative Technologies
Research Group

- **Located in Moncton**
 - U de Moncton campus
- **Created in 2007 because of ...**
 - Stakeholder interest
 - Existing expertise
 - Changing market pressures
- **Expertise**
 - Cognitive psychology,
Cognitive models, Philosophy,
Social networks, Learning
Communities, Broadband
Communications, IA



Broad R&D areas

Two main research foci



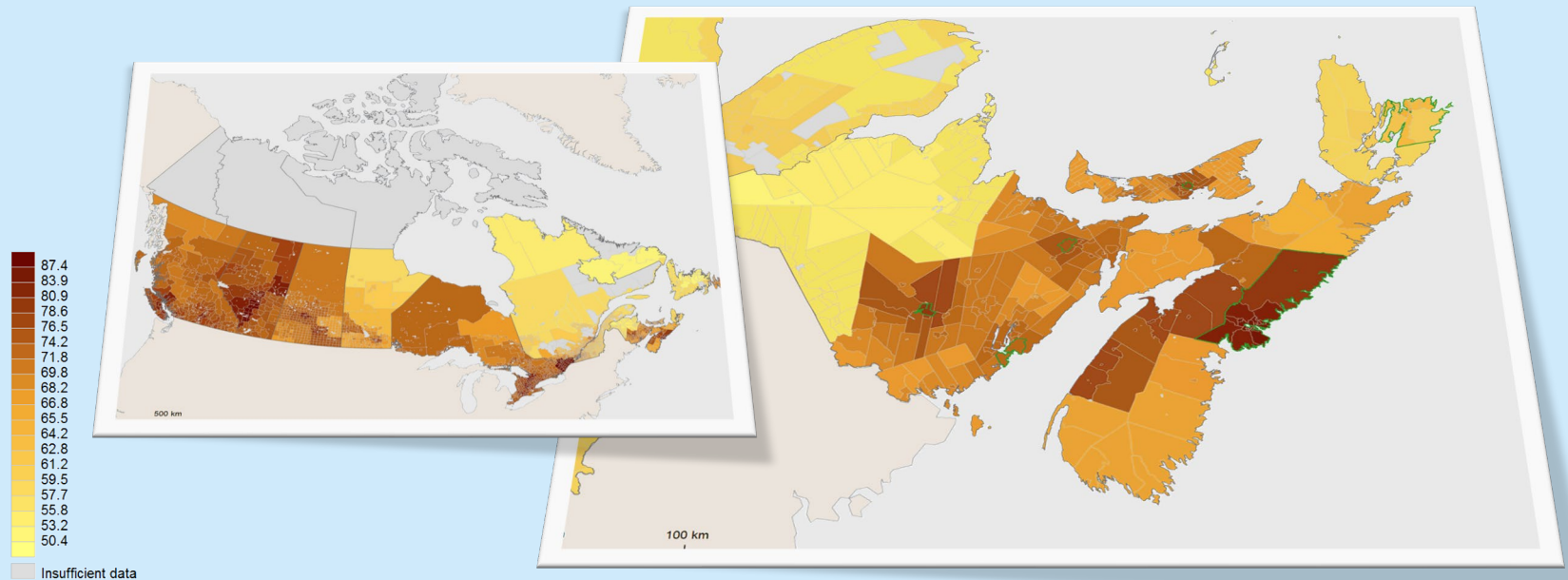
- **Technologies to reduce development time for creating “learning resources”**
 - How do we create better learning resources more efficiently?
 - i.e. development process improvements
- **Technologies (and resources) to enhance learning outcomes**
 - What is needed to make learning more efficient?
 - i.e. making content clear, usable and engaging

Why LCT?

An example: learning conditions in rural regions as compared to those in urban regions

- **CCL's Composite Learning Index (2008)**

- Canadian Council on Learning: “*The Composite Learning Index (CLI) ... provides an annual measure of Canada's performance in a number of areas related to lifelong learning*” (<http://www.ccl-cca.ca/ccl/reports/cli>).



SynergiC³

A collaborative effort with industry and academia

- **A software framework**
 - “eLearning productivity enhancement framework” to allow collaboration and consistent development
- **A collaborative effort**
 - D2L: Expertise in LCMS, LMS, Commercialization
 - U de M: Expertise in “learning content” creation process
 - NRC: Several R&D areas
 - DDRM, MD extraction, Learning Design, Weak Workflows, ...
 - ACOA: AIF financing(\$3M for a \$5.5M project)
- **Some drivers**
 - D2L: Market demands, commercialisation channels
 - Compatible expertise → Common goal, Varied objectives

- **Scope**
 - DDRM
 - Distributed Digital Rights Management
 - MDX
 - Automated Metadata eXtraction
 - LD | ID Accelerators
 - Learning | Instructional Design Accelerators
 - WWF | PA
 - Weak WorkFlows | Product Accelerators
- **Out of Scope (examples)**
 - Distributed LOR Network (DLORN)
 - Work Opportunity Billboard

- **RDWG participants**

- Chair

- Stephen Downes (NRC, Researcher)

- **NRC | Primary Research**

- Luc Belliveau (Software Developer), Bob Kennedy (Researcher), Sandy Liu (Researcher), Patricia Oakley (Researcher), Md. Abdur Rahman (Student), Saeed Samet (Student), Rod Savoie (Researcher), Bruce Spencer (Researcher), [Guillaume Durand (Researcher)]

- **U de M | CC expertise liaison**

- Dawn McCabe (Project Manager), Danny Cormier (ID, LD Expert), Robert Grégoire (MD Expert), Léna Fournier (Project Assistant)

- **D2L | Product development liaison**

- Norm Daoust (Product Designer), Khaled Hammouda (Developer), Dimitrije Jankovic (Platform Architect), Rose Kocher (D2L Project Manager)

- **DDRM**

- Distributed Digital Rights Management

- Purpose

- Facilitate rights management
 - e.g. alleviate rights canvassing overhead
 - Not just about access control, copy protection and enforcement
 - Focus on easier handling of usage rights
 - http://en.wikipedia.org/wiki/Digital_Rights_Management

- **DDRM – Mechanism for Managing Copyrights**
 - DDRM – Distributed Digital Rights Management
 - Purpose
 - Low-cost and distributed mechanism
 - Novel solution, advantage over existing mechanisms
 - Takes advantage of existing browser capacity

JSON

Overview

- **JSON – Javascript Object Notation**
 - Javascript
 - Object oriented programming language
 - Located on web page, processed in browser
 - Direct access to document object model (DOM)
 - JSON
 - Notation used to store data in Javascript
 - Method used to access to DOM
 - May be accessed directly or imported

- **JSON Syntax**

- Basic Syntax

- Connects labels to data

- eg: **name : Stephen**

- Note that this is not processed or evaluated; it is the subject of processing or evaluation

- Complex Syntax

- Sets, list created using brackets and quotation marks

JSON

Overview

- **JSON Example**

```
{ "menu":  
  { "id": "file",  
    "value": "File",  
    "popup":  
      { "menuitem":  
        [ { "value": "new",  
          "onclick": "create()" },  
          { "value": "edit",  
            "onclick": "edit()" } ]  
      }  
  }
```

- **JSON Properties**
 - Brackets and Quotation marks
 - Delimit values
 - Serve no processing function
 - Create a nested, hierarchical structure
 - Not Parsed or Interpreted in any Way
 - It is a part of the web page
 - It is included in the DOM

Rights Expressions

Overview

- **Rights Expressions**

- Statement of permissions and duties associated with the use of a resource
- May vary from fully restrictive to fully permissive
- Not *required* – rights exist automatically
- Not *fully stipulative*
 - Rights may expire according to copyright law
 - Rights subject to provisions of fair use, etc.

Rights Expressions

Overview

- **Instances of Rights Expressions**
 - Licenses
 - Statements of ownership
- **Elements of rights expressions**
 - Rights holder – owner or licensee
 - Resource – eg. resource identity
 - Action – specific use to be put, eg. copy
 - Condition – requirement, duty or limitation

Rights Expressions

Examples

- **Open Digital Rights Language (ODRL)**
 - Open source, not limited
 - Statements of ownership
- **MPEG Rights Expression Language**
 - Formerly XrML
 - Owned by ContentGuard, patented
- **Creative Commons**
 - Expressed in ccREL, a W3C submission

Prior Art

Patents

- **Lucent**
 - System that checks for content rights
- **IBM**
 - Use of Java Virtual Machine to govern access
- **ContentGuard**
 - Licensing systems and access controls
 - Module to govern access to a resource
 - Rights expression in a language (REL)

Prior Art

Patents

- **ContentGuard's REL Patent**
 - No extant legal action from ContentGuard
 - Use by Open Mobile Alliance (OMA) of ODRL note challenged
 - Use of ccREL not challenged
 - Appears to be specific to “grammar-based languages where the rights *expression* is used to govern access”

Prior Art

Rights Expressions

- **Using XML Rights Expressions**
 - Translation:
 - Use of XSLT to translate directly
 - Parsing:
 - Data is indirectly parsed using a parser
 - This makes the data available in a data table
 - Eg. Python Universal XML Parser (Mark Pilgrim)
 - Server side parsing, client side parsing

Prior Art

Rights Expressions

- **Parsing XML Rights Expressions**
 - Browser Limitations:
 - Web pages may not alter the state of the client computer (ie., no file storage)
 - Web applications apply origin restrictions on network requests (ie., can use only data from a single domain)
 - These constitute the ‘Cross-domain scripting problem’ – there is no way to process XML from multiple domains using only a web browser

The Tag Hack

Javascript Expressions

- **The ‘Tag Hack’**
 - A mechanism for placing data from one domain onto a web page from another domain
 - Javascript is embedded into a web page using the `<script>` tag
 - This enables the direct writing of web pages, eg. with the `document.write()` function
 - Specifically, web page data encoded in JSON may be written using the tag hack

The Tag Hack

Javascript Expressions

- **History of the Tag Hack**
 - First used in my 'Referrer System' (2003)
 - Now widely used by advertisers
- **Security concerns**
 - May enable data to be shared to hostile websites
 - Requires, therefore, that the source identified in the `<script>` tag be trusted
 - May require additional mechanisms to ensure trust

Rights Models

Rights Expressions

- **Associating Rights With Resources**
 - Either place rights expression inside resource
 - Express rights in a separate file and refer
- **Types of Rights Expression**
 - An *offer* to allow access
 - A *license* that grants access
 - In an offer, certain parts of the license are blank
 - Similarly, in a rights model, certain parts are blank

Rights Models

Rights Expressions

- **Examples of Rights Models**
 - Identifies the owner of an undesignated resource and specifies one or more sets of one or more licenses (statements of actions and conditions)
 - May be associated with a specific resource by *reference* to the rights model from resource metadata
 - In our implementation, the rights model is expressed in JSON and included in the resource using the tag hack

Using JSON

Rights Expressions

- **Expressing Rights Models Using JSON**
 - When resource metadata is being created, the set of previously created rights models is available as a drop-down selection
 - An additional function supports the creation of new rights models
 - The URI of the selected rights model is stored in the 'rights' metadata element of the resource metadata

Using JSON

Rights Expressions

- **Rights Models in LOM**

```
<rights>
```

```
  <cost/>
```

```
  <copyrightAndOtherRestrictions/>
```

```
    <description><string>
```

```
      http://sundergic3.com/model1.js
```

```
    </string></description>
```

```
</rights>
```

Using JSON

Rights Expressions

- **Rights Models in JSON**

```
drm ( { "ODRL" : {  
      "Rights":
```

```
{ "uid": "http://.../model.js",
```

```
"rightsModelName": "Stephen",
```

```
"type": "offer",
```

```
"Permission":
```

```
[ { "Action": ... etc } ]
```

Using JSON

Rights Expressions

- **Workflow**

- Client selects a resource and finds rights expression URI in metadata
- Client imports rights expression metadata
- *Without parsing or interpretation* rights expression in JSON manages rights access

JSON: A Novel Approach

- **Why is this a novel approach?**
 - It is not a language (it has no semantics *per se*) but is nothing more than a data structure
 - It is not *used* as a language - no translation or parsing required – the ‘art’ in the prior art is the use and parsing of XML as a language
 - It offers a simple solution to the cross-domain scripting problem, which is not solved by any prior art

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