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Managing Digital Rights Using JSON

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Canada

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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

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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

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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

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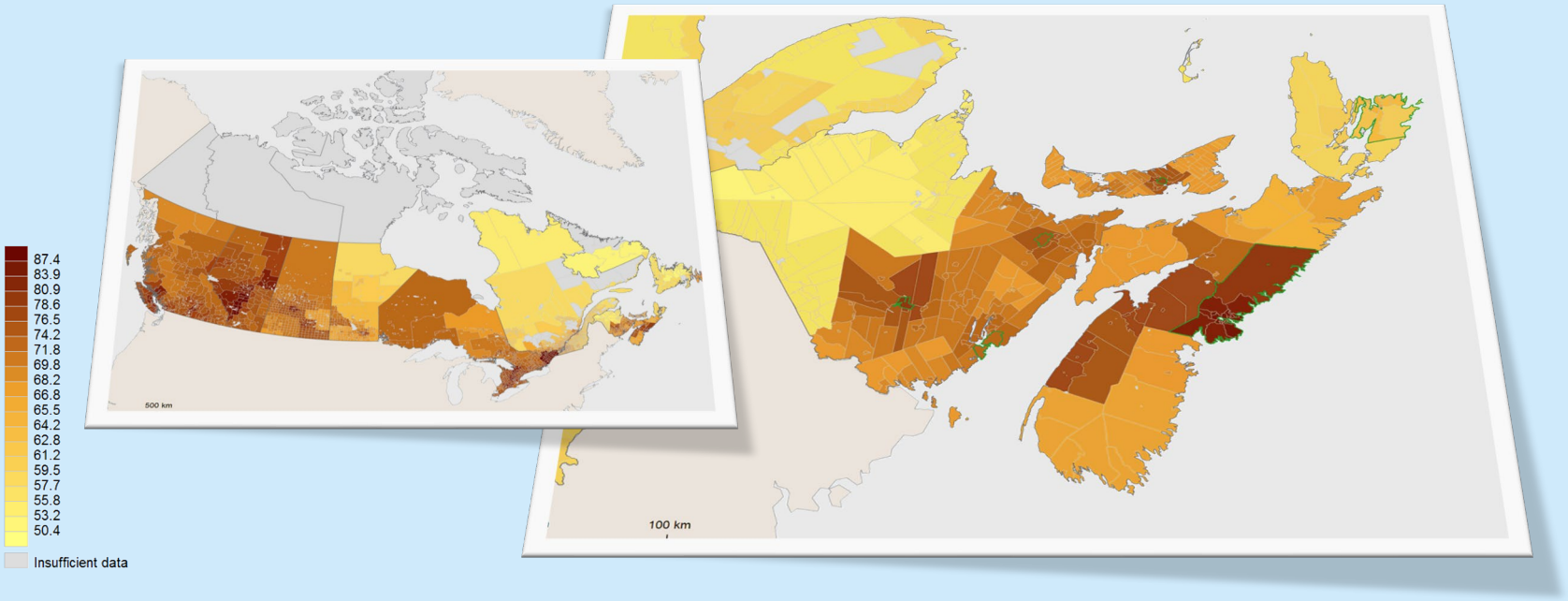
Why LCT?

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).



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SynergiC^3

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

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SynergiC^3

Research scope and elements

- **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

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SynergiC³
Research roles

- **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)

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SynergiC³
R&D components

- **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

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DDRM

Overview

- **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
Overview

- **JSON Syntax**
  - Basic Syntax
    - Connects lables 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
Overview

- **JSON Properties**
  - Brackets and Quotation marks
    - Delimit values
    - Serve no processing function
    - Create a nested, hoerarchal 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.

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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

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Rights Expressions

Examples

- **Open Digital Rights Language (ODRL)**
  - Open source, not limited
  - Statements of ownership
- **MPEG Rights Expression Language**
  - Formerly XrML
  - Ownerd 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)

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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 arser
    - 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
  - Similarily, 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 respurce metadata
  - In our implementation, the rights model is expressed in JSON and included in the resource using the tag hack

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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

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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 }]
```

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Using JSON

Rights Expressions

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

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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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