A Conversation on the Semantic Web and Legal Information

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Annual Meeting Pre-Conference Workshop
CALL/ACBD Conference, May 24, 2014
Overview

• Introduction to what people mean when they talk about the semantic web*
• What it could mean for libraries and legal information
• Overview of some main topics
• Breakout discussion
• The future?

*Different people mean slightly different things
Disclaimers (1 of 2)

Depth and breadth, in three hours:

• we can’t cover everything
• we can’t cover anything too deeply
Definitions:

• What we will be talking about today may not always be strictly considered a part of the “semantic web”

(but we think it’s all related and important)
But hopefully . . .

We will all:

• Be conversant on different technologies and opportunities in this area
• Understand possibilities for the future and how we can start exploring them
• Know a group of people who are also interested in exploring potential opportunities
Introductions
The Potential
A data centric way to navigate information

• Allows computers to navigate information more effectively:
  – By finding information without explicit links
  – Updating from remotely maintained services
  – Finding new patterns and meanings from diverse datasets
The opportunities

• Better and more reliable discovery tools (because they are based on controlled vocabularies, explicit links, and crosswalks)

• Better ability to create tools without having to maintain full datasets for each instance
The opportunities, cont.

Better leverage of the high value metadata libraries and publishers already create through:

- Linkages among vocabularies and standards
- Open availability for other uses
The Trend:

• Movement from record-centric view to data-centric view

• Breaking up silos of data into parts allows them to better interact with each other, within and across platforms

• Opening of data services for other applications
But what does it mean?

• Ability to aggregate data from multiple sources
  – new applications (web and otherwise)
  – mashups
  – analytics

• Ability to use data without having to maintain it
  – this has the potential to remove the requirement that an organization be a certain size before it can do big things
The Semantic Web
Introducing the Semantic Web

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Semantic Web?
Semantic Web?
Nebraska Oddfish. 2013. I could be your light in the dark... <http://www.flickr.com/photos/ditadata/9167721224/>
"Watson uses a triple-store but also ontologies and inference. Watson downloads data from the Web (e.g., from dbpedia) that is curated and added to the triple store. Watson reasons over the data, using Semantic Web technology in a major way."

Arnaud Le Hors, IBM
“The Semantic Web is ... an extension of the current one in which information is given well-defined meaning, better enabling computers and people to work in cooperation.”

“It isn't the cables, it is the computers which are interesting.”

“It isn't the computers, but the documents which are interesting.”

“It's not the documents, it is the things they are about which are important.”

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Get the Idea?
(TOMORROW'S WEB WILL)

PLUS:
Antibiotics' Dim Future
Rorschach: A Waste of Ink
The Oldest Stars
“Mom needs to see a specialist and then has to have a series of physical therapy sessions. Biweekly or something. I’m going to have my agent set up the appointments.”

Semantic Web Agent Scenario

- Retrieves information about her prescribed treatment from the doctor’s agent
- Provides a list of several providers covered by medical insurance rated excellent or very good within 20 miles of home
- Calculates possible appointment times using Peter’s and Lucy’s scheduled availability
- Agent presents a plan
Semantic Web Agent Scenario

- Pete sets agent to redo the searcher with improved parameters
- Lucy’s agent trusts Pete’s agent and assists providing access certificates and data already sorted through
- Calculates new appointment times with warnings
  - Pete needs to reschedule less important meetings
  - Provider not listed under physical therapists but verified by other means
  - Option to view details is provided
“The Semantic Web will bring structure to the meaningful content of Web pages, creating an environment where software agents roaming from page to page can readily carry out sophisticated tasks for users.”

Implications for legal information?
Implications for publishing

• Potential for dual streams for content and platform
• Less of a requirement for minimum size and costly primary legal content before publishers can participate
• Better integration of different publishing streams (print, electronic, and platforms)
Primary law in a semantic environment

- Primary law
  - changes often
  - privacy, e.g. caselaw - the semantic web could end caselaw's status of being public but obscure
  - several projects in this area, especially in US regulatory data
Subject description for legal information

• Subject access
  - no open taxonomy suitable for caselaw level description
  - lack of navigability among publishers' platforms for secondary material
  - Several datasets available, but generally part of bigger, general projects like Library of Congress' classification and subject headings
Intersection with Libraries
Implications for libraries

• Better integration of content from different publishers means better leverage of collection budget through improved discoverability

• Potential separation of acquisition of content and platform
  – Including ability to create local applications using external content
  – And ability to include local content in vendor supplied platforms
A world without print?

Not the future I foresee -- (maybe for some libraries)

• The semantic web handles the description of physical objects as well as digital entities
  – so no conceptual gap between physical and digital items

• Better tools to navigate the digital don't negate the usefulness of the analog
Semantic Web: Intersection With Libraries

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What is RDA?

- Successor to the Anglo-American Cataloguing Rules (AACR2)
- Aligned with the Statement of International Cataloguing Principles (2009)

“Several principles direct the construction of cataloguing codes. The highest is the convenience of the user.”

What is RDA?

- A 'content standard' that describes resources
- Based on these conceptual models
  - Functional Requirements for Bibliographic Records (FRBR)
  - Functional Requirements for Authority Data (FRAD)
Introduction to FRBR

- In 1998 **International Federation of Library Associations** (IFLA) released Final report
- In 2007 **RDA** adopted this conceptual model and reorganized draft text
Introduction to FRBR

The aim of FRBR was to,

“... produce a framework that would provide a clear, precisely stated, and commonly shared understanding of what it is that the bibliographic record aims to provide information about, and what it is that we expect the record to achieve in terms of answering user needs.”
To Support Resource Discovery

- RDA is a set of guidelines and instructions on formulating data to support resource discovery. -- RDA 0.0

- “The purpose of recording data is to support the user tasks.” -- Chris Oliver, Introducing RDA
The FRBR User Tasks

- **Find** – to find entities corresponding to the users search criteria
- **Identify** – to confirm that the entity sought is the same as the entity described
- **Select** – to select an entity appropriate to the needs of the user
- **Obtain** – to acquire or gain access to the entity
The Entity-Relationship Model

- The three components of an entity-relationship data model
  - **Entities** – the things that users are interested in: resources; people; subjects
  - **Attributes** – the characteristics of these things
  - **Relationships** – relationships between these things
The FRBR Entities

- **Group 1** – entities that are the results of intellectual or artistic effort:
  - Work; Expression; Manifestation; Item

- **Group 2** – entities responsible for intellectual or artistic work:
  - Person; Corporate Body; Family

- **Group 3** – entities that are subjects of intellectual or artistic work:
  - Concept; Object; Event; Place
FRBR Group 1 Entities

- **Work** is realized through **Expression**
- **Expression** is embodied in **Manifestation**
  - Recursive: 1, many
  - Manifestation is exemplified by **Item**

Image credit: Barbara Tillett, Library of Congress
RDA and FRBR

“The RDA and FRBR efforts have been one of the key contributions in re-focusing cataloging efforts from ‘strings to things’ and in providing a set of base line functional requirements for supporting the future of cataloging. The holistic approach to retrieval and access as defined by the FRBR work has been a guiding principal to the model proposed in this document.”

Our Friend MARC

LC Control No.: 78005880
LCCN Permalink: http://lccn.loc.gov/78005880

000 00914pam a2200277 i 450
001 3681622
005 19781228000000.0
008 780322s1978 nyu b 001 0 eng
035 ___ |s (DLC) 78005880
906 ___ |a 7 |b cbc |c orignew |d 1 |e ocip |f 19 |g y-gencatlg
010 ___ |a 78005880
020 ___ |a 0698307011
040 ___ |a DLC |c DLC |d DLC
043 ___ |a n-us---
050 00 |a KF9725 |b .S74
082 00 |a 345/.73/077
100 1__ |a Stevens, Leonard A.
245 10 |a Death penalty : |b the case of life vs. death in the United States / |c by Leonard A. Stevens ; foreword by Michael Meltsner.
260 ___ |a New York : |b Coward, McCann & Geoghegan, |c c1978.
300 ___ |a 159 p. ; |c 24 cm.
490 0__ |a Great constitutional issues
504 ___ |a Bibliography: p. 154-155.
500 ___ |a Includes index.
650 _0 |a Capital punishment |z United States.
600 10 |a Furman, William Henry.
991 ___ |b c-LL |h KF9725 |i .S74 |t Copy 1 |w BOOKS

CALL NUMBER: KF9725_S74
Copy 1
Our Friend MARC

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New Wine in an Old Bottle
The BIBFRAME Initiative

“[BIBFRAME] is the foundation for the future of bibliographic description that happens on, in, and as part of the web and the networked world we live in. It is designed to integrate with and engage in the wider information community while also serving the very specific needs of ... libraries and similar memory organizations.”
“It isn't the records, it is the networks that connect them which are interesting.”
The BIBFRAME Initiative

“The BIBFRAME model is intentionally designed to coordinate the cataloging and metadata that libraries create with these efforts, and connect with them. In short, the BIBFRAME model is the library community’s formal entry point for becoming part of a much larger web of data.”
BIBFRAME Approach

- Work
- Instance
- Authority
- Annotation

Figure 1: A graphical representation of the BIBFRAME Linked Data model defining the relation between Work and Instance resources and their contextualization to Web addressable Authority resources.

Creative Work
Authority
Annotatons

Figure 2: A graphical representation of the BIBFRAME Linked Data model in the context of a flexible annotation framework.
Linked Classification

Library of Congress Classification: Class K

From Library of Congress Classification

Library of Congress Classification: Class K

K -- LAW

URI(s)
  > http://ld.loc.gov/authority/classification/K

Instance Of
  > MARC8/RDF MARC8 Collection
  > SKOS Collection

Scheme Membership(s)
  > Library of Congress Classification

Collection Members
  > America, North America
  > History of canon law
  > Islamic law, Shari'ah, Fiqh
  > Jewish law, Halakhah
  > Law in general, Comparative and uniform law, Jurisprudence
  > Law of the Roman Catholic Church, The Holy See
  > Religious law in general, Comparative religious law, Jurisprudence
  > Law of the United Kingdom and Ireland
  > Law of Canada
  > Law of the United States
  > Latin America, Mexico, Central America, West Indies
  > South America
Linked Classification

Law--United States (General)--Courts. Procedure--Civil procedure--Trial. Evidence

General

From Library of Congress Classification

Details Visualization

Law
United States (General)
Courts, Procedure
Civil procedure
Trial
Evidence

General

URI(s)
http://id.loc.gov/authorities/classification/KF8531-KF8535

Instance Of
LCG Classification
LCR Range

Components
Law
United States (General)
Courts, Procedure
Civil procedure
Trial
Evidence
General

Scheme Membership(s)
Library of Congress Classification

Collection Membership(s)
http://id.loc.gov/authorities/classification/K

Codes
KF8531-KF8535
Linked Classification
Some Main Topics
The idea that data should be:
• Freely available
• Free to use
• License / copyright free

Often scientific and government data, used for **analysis**, **visualization**, **better communication**, and other purposes.
Sources of open data

Government data portals:
- Data.gc.ca (Federal gov’t data)
- Municipal (Vancouver / Toronto)
- Provincial (British Columbia / Alberta)

Other government:
- Queen’s Printer, BC (Open legislation)
- National Institute of Health Repository
- Universities
Example of data source:

Consolidated Acts and regulations in XML

The Consolidated Acts and Regulations in XML is a list of federal Acts and regulations with information on each legislative instrument's consolidation date and a link to its full text in XML and HTML formats.

Licence:
Open Government Licence - Canada

Dataset Resources

<table>
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<th>Resource Name</th>
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<td>Consolidated Statutes and regulations in XML</td>
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<td>Download</td>
</tr>
<tr>
<td>Data dictionary</td>
<td>HTML</td>
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<td>Download</td>
</tr>
<tr>
<td>Data dictionary</td>
<td>HTML</td>
<td>French</td>
<td>Download</td>
</tr>
</tbody>
</table>

Developer Tools

The information on this page (the dataset metadata) is also available in JSON format.

Link to JSON format
But there are issues:
Some more datasets:

• Revenue Canada - Corporate tax information (the CSV file)
• Elections Canada - Poll Results
• Corrections Canada - Offender Profiles
• And . . . ?
Formats

- CSV
- XML
- JSON
- Other

• Static formats like PDF are not considered open data.

• Proprietary formats like Excel are also not best practices for publishing open data.

• Different data formats are better for different use cases.
Regular expressions

- Give the ability to edit large datasets in aggregate, so unusable formats can be converted into usable formats.

Example of a MARCXML catalogue export.
So what can we do with it?

- In depth data analysis of government data
- Build applications leveraging a taxpayer funded resource
- Compile data from multiple sources to make something new
  - Visualizations to convey meaning
  - Novel ways to navigate patterns
  - What do you want to do with it?
An Introduction to Linked Data

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Outline:

Review of linked data theory and principles

Growth of the linked data cloud

Linked data and legal resources

Role for organizations like CANLII
Linked data?
Subject
Triple
Triple

Case has a Citation
Case has a Citation

Court has a Name
Case has a Citation

Court has a Name

Resource has a Format
COURT OF APPEAL FOR ONTARIO

DATE: 20130822
DOCKET: C57108

Blair, Watt and Pepall JJ.A.

BETWEEN

Royal Bank of Canada

Plaintiff (Respondent)

and

Leslie King

Defendant (Appellant)

Leslie King in person
Amanda Jackson for the respondent

Heard: August 19, 2013

On appeal from the judgment of Justice J.A. Ramsay of the Superior Court of Justice, dated May 23, 2013.

APPEAL BOOK ENDORSEMENT

[1] Mr. King owed the Royal Bank approximately $275,000 on a mortgage loan, a line of credit and various credit card accounts. He does not dispute this. He defaulted. The Bank took steps to collect and obtained summary judgment.

[2] Mr. King appeals, arguing there are genuine issues for trial. We do not agree. His principal argument is that he paid the Bank. He did not. What he did was present an instrument to the Bank purporting to be payable to Royal Bank of Canada in the amount of $275,000 and drawn on an account with Bank of Montreal in which he admits he had no funds. The fact that Royal Bank mistakenly credited his loan accounts with the monies — including the account containing the $777.56 credit upon which Mr. King relies — before it learned that the instrument had been dishonoured is not material. Nor do the various provisions of the Canadian Payments Association Rule, which apply as between banks, assist him.

[3] He has not paid. There is no genuine issue for trial and the motion judge properly granted summary judgment, in our view.

[4] The appeal is therefore dismissed. The respondent is entitled to its costs of the appeal and of the stay motion fixed in the total amount of $10,000 including disbursements and GST.
COURT OF APPEAL FOR ONTARIO

DATE: 20130822
DOCKET: C57108

Blair, Watt and Pepall JJ.A.

Case A has docket number C57108

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Plaintiff (Respondent)

and

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Defendant (Appellant)

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BETWEEN

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and

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Defendant (Appellant)

Case A has defendant Leslie King

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Case A was heard in Court of Appeal for Ontario

BETWEEN

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Case A has docket number C57108

Case A has plaintiff Royal Bank of Canada

Case A has defendant Leslie King

Case A was heard in Court of Appeal for Ontario
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Case A has defendant Leslie King

Case A was heard in Court of Appeal for Ontario

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“... associative indexing, the basic idea of which is a provision whereby any resource may be caused at will to select immediately and automatically another. This is the essential feature of linked data. The process of tying two items together is the important thing.”
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</rdf:Description>
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<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
    xmlns:dc="http://purl.org/dc/elements/1.1/"
    xmlns:lex="http://example.org/legal-terms/1.0/">
  <rdf:Description
    rdf:about="http://canlii.ca/t/g0656"
    dc:title="Royal Bank of Canada v. King"
    lex:docket="C57108"
    lex:plaintiff="Royal Bank of Canada"
    lex:defendant="Leslie King"
    lex:court="Court of Appeal for Ontario"
    dc:date="2013-08-22"/>
</rdf:Description>
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      dc:date="2013-08-22"/>
</rdf:Description>
</rdf:RDF>
Case A has docket number C57108

Case A has plaintiff Royal Bank of Canada

Case A has defendant Leslie King

Case A was heard in Court of Appeal for Ontario
http://canlii.ca/t/g0656  has docket number  C57108

http://canlii.ca/t/g0656  has plaintiff  Royal Bank of Canada

http://canlii.ca/t/g0656  has defendant  Leslie King

http://canlii.ca/t/g0656  was heard in  Court of Appeal for Ontario
has docket number  C57108
has plaintiff  Royal Bank of Canada
has defendant  Leslie King
was heard in  Court of Appeal for Ontario
has title  Royal Bank of Canada vs. King
has date  2013-08-22
Principles of Linked Data

1. Use URIs as names for things
2. Use HTTP URIs so that people can look up those names
3. When someone looks up a URI, provide useful information, using the standards (RDF*, SPARQL)
4. Include links to other URIs, so that they can discover more things

http://www.w3.org/DesignIssues/LinkedData.html
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* RDF = Resource Description Framework
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Linking Open Data cloud diagram / by Richard Cyganiak and Anja Jentzsch <http://lod-cloud.net> > Creative Commons
Based on data provided for the LOD Cloud diagram at <http://richard.cyganiak.de/2007/10/lod/>
Fig. 1. A possible interconnection of relevant Legal Datasets in a “Legal Data Cloud”.

“Law is chaos with an index.”
“Publishing and using juridical information is challenging in many ways. It is produced by different parties, such as governmental bureaus, ministries, different levels of courts, research organizations, and media. The content is heterogeneous and produced using differing tools, data formats, and practices. The links between documents are often informal and/or not made explicit. The law in general is a dynamic, changing entity: for example, it is important to be able to refer to different versions of a law at different points of time. These challenges can be addressed through the use of linked data techniques.”

The Finnish Law as a Linked Data Service / Matias Frosterus, Jouni Tuominen, Mika Wahroos, and Eero Hyvonen
“The traditional fields and practices of law are changing fast. Legal drafting, private contracting, judicial sentencing and administrative management have been enlarged with online dispute resolution initiatives and new forms of self-regulation and access to justice. Citizens, customers and consumers require a greater participation and faster and more effective ways of facing their legal activities.”
**URN:Lex**
A Uniform Resource Name (URN) Namespace for Sources of Law (LEX)

“The purpose of the "lex" namespace is to assign an unequivocal identifier, in standard format, to documents that are sources of law. The identifier is conceived so that its construction depends only on the characteristics of the document itself and is, therefore, independent from the document's on-line availability, its physical location, and access mode.”
Metadata for Legal Resources

CEN MetaLex: Open XML Interchange Format for Legal and Legislative Resources
<http://www.metalex.eu/>

CitationStylist: For the Laws and Languages of the World
<http://citationstylist.org/>

Legal XML
<http://www.legalxml.org/>

LII Modeling Legislative Information
<http://blog.law.cornell.edu/metasausage/downloads-and-related-information/>

OAI4Courts
<http://oai4courts.wikispaces.com/>

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Metadata Resources: Legal (Selected)
<http://www.personal.psu.edu/rcr5122/Metadata.html>
Types and Roles of Legal Ontologies

- Organize and structure information
- Reasoning and problem solving
- Semantic indexing and search
- Semantics integration and interoperation
- Understanding the domain
Ontologies for Legal Resources

LEX Ontology
<https://code.google.com/p/lex-ontology/>

LKIF Core Ontology
<http://www.estrellaproject.org/?page_id=3>

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Valente, Andre. Types and Roles of Legal Ontologies
<http://www.legalxml.org/>
“The important thing about data is the more things you have to connect together the more powerful it is.”—Tim Berners-Lee

The Next Web / Tim Berners-Lee <http://www.ted.com/talks/tim_berners_lee_on_the_next_web.html> (8:05)
Raw Data Now!
Application Programming Interface

The working definition I use to explain it:

A way for computers to search a database instead of the user interface / search bar, which allows humans to search the database.
APIs

• Allow a remote service to make a call and get formatted data back
• Used to integrate data into an application or website
• Use HTTP protocols to call information, which is often returned in XML or JSON format
• This can be used to integrate dynamic content
APIs

- Generally require a user key to access
- Often have limits on use, with different licenses for different access
What do you get, what can you build?

It depends:
CanLII returns content in JSON format (http://developer.canlii.org/io-docs)

And many different things:
We built CanLII Connects
What APIs are already available in law?

- Canlii
- Clio
- European Patent Office
- Martindale Hubbell directory

Here’s a larger list of legal API’s
What kinds of data are good to get from APIs?

Anything that can use data to convey meaning that should be updated in real time: Twitter, Facebook, Amazon, Google, Foursquare all make their information available this way.
Some disadvantages with a web API:

- Data is enclosed in a proprietary database perpetuating data silos
- Developers must know an API exists and decide what to access based on available parameters
- Links between different data sources must be explicitly created
- Data is not included in the global database, i.e. “on the web” but not “of the web”

How to Publish Linked Data on the Web / Chris Bizer and others <http://videolectures.net/iswc08_heath_hpldw/>
API advantages

● Generally directly plugged directly into the live information source
● Requiring keys and accounts allows control of access
● There is generally commitment on part of API supplier to keep service stable
● Designed to support development (or at least the best ones are)
Open data / Linked data / APIs compared

- Linked data is openly available on the web and requires no knowledge of the particular source to find
  (*once the user knows how to find linked data)

- Open data is more often published in static files that require the user to go to the source and download a new version if they are updated at all
Open data / Linked data / APIs compared, cont.

- APIs are generally updated regularly, but they require the applications built on them to actively update their content from the source

(There is “open linked data” which resolves some of these issues)
Copyright and licensing issues

- In order to be “open” data is supposed to be free of licensing and copyright restrictions
- Many developers refrain from using many linked datasets and APIs for intellectual property / licensing reasons
Questions?
Discussion / breakout sessions
What interests you?
What's unresolved?
In case of emergency break glass . . .
Suggested topics for breakout groups

- Push toward openness of new technologies and tension with need for confidentiality
- New cataloguing standards and implications over time of not adhering to them
- Uses for APIs
- Implications for resource discovery
- Open (and other) data and how to integrate it into practice
- Should we all learn to code? - what skills do we need to make use of new technologies and what would we want to do with them?
- Linked data projects – why would we want to do them and what would we want to do next.
Coming Back Together
Moving forward --

Where do we go from here?