Library of Congress
BIBFRAME Pilot

NOTSL Fall Meeting
October 30, 2015
THE BIBFRAME EDITOR AND THE LC PILOT

The Semantic Web and Linked Data: a Recap of the Key Concepts
Learning Objectives

• Describe the goals and some key concepts of the Semantic Web and Linked Data
• Explain libraries’ role in a Linked Data environment
• Iterate some of the major aspects of Resource Description Framework (RDF)
• Discuss the basic concepts of BIBFRAME
Semantic Web, Linked Data, and Libraries

• “What are the goals and purposes of applying the principles of Semantic Web and Linked Data to library data?”


Some Answers to the Question

• Increase the visibility and usage of Library data on the Web
• Integrate library data with the large number of structured data sources and links on the web
• Create relations among resources
• Enhance the sharing of library data with a wider audience
• Facilitate a more full implementation of RDA

• “A virtual stack browsing experience”
The Most Practical Goal?

• Linked Data is to replace MARC as the primary carrier of library data
  – a standard machine readable format
  – using common web standards
  – MARC is used chiefly by libraries, and not as well understood by other communities

• Transition: from a static two-dimensional collocated record to decentralized data with links to illuminate relationships
Humans can ‘connect the dots,’ but ...
RDF Graph of a MARC Record
The Four Principles of Linked Data

- Use URIs as names for things – “identifiers”
  - Not data strings, which computers can’t interpret
- Use HTTP URIs so people can look up the names
  - e.g., id.loc.gov
- When someone looks up a URI, provide useful information, using standards
  - e.g., Resource Description Framework (RDF); SPARQL
- Include links to other URIs, so humans and computers can discover more things
Libraries’ Important Role in a Linked Data World

• No other community works with authorities as much -- or as well -- as libraries do

• Libraries are experienced at identifying, structuring, and organizing data in many ways

• But ...
  – We need to translate MARC skills and practices into a Linked Data context

➢ Transition from authorities to identifiers
Linked Data’s Benefits for Libraries

- Wider accessibility of library data
- Cost savings through increased data sharing
- Transition beyond proprietary MARC format
- Reduced duplicative processing
- Less time spent on authority maintenance, through use of identifiers rather than text strings
  - Language neutral
Linked Data 5-star Scheme  
(Tim Berners-Lee)

*  
• Make your stuff available on the Web

**  
• Make it available as structured data

***  
• Use non-proprietary formats

****  
• Use URIs to identify things, so that people can point at your stuff

*****  
• Link your data to other data to provide context

http://www.w3.org/DesignIssues/LinkedData.html
RDF: Resource Description Framework

- Standard model for exchange of data on the Web
- Structures relationships between resources, people, and things on the web
- Uses graph model to represent database relationships
- RDF and related standards maintained by the World Wide Web Consortium (W3C)
Relax!

• You won’t need to know all the details of RDF in order to use the BIBFRAME Editor
  – Certainly not to the extent you needed to learn MARC! (i.e., by endless rote memorization)

• *In the past*, a deep knowledge of the container (MARC 21) was needed for cataloging

• *With BIBFRAME*, cataloger input is needed for the development of profiles for the Editor
BIBFRAME Editor

• Profiles: basis for entering data in the Editor
  – Under development for the Pilot
  – Mapping to RDA elements
  – Mapped by format
    • BIBCO Standard Record (BSR)
    • CONSER Standard Record (CSR)

• Look-up capability for authorities and bibliographic descriptions

• Meaningful RDA captions in the interface
What follows is intended to help you better understand the broader context within which the Editor functions
RDF Tools

- **URIs**: to identify resources and relationships
- **Vocabularies and ontologies**: tools that define relationships between resources
- **Triple statements**: the core means of expressing relationships
- **Standard languages**: to express relationships
- **Query languages**: allow people and machines to interact with RDF data in large data sets

- Common usage of these tools promotes wide use and reuse of Linked Data on the web
RDF Data Model

• Triple statements
• RDF XML
  – or other serialization formats (e.g., Turtle, N-triples)
• URIs
• Namespaces
• Ontologies and vocabularies
Triple Statements

- Two things, and a relationship between them

```
Subject ➔ Predicate ➔ Object

“This work” ➔ “Was written by” ➔ “This author”
```
Triple Statements

- **Subject**: identifies a “Resource of interest”
- **Predicate**: identifies a Property of the “resource of interest” -- a relationship
- **Object**: identifies a Property value -- a resource that has a relationship to the “resource of interest”

- Ideally, all three are identified by URIs
Triple Statements

This land is your land

Was written by

URI for work

URI for author

URI for Dublin Core term: Creator
[read: has creator]
The triple statement:

This land is your land   has creator   Woody Guthrie

Can be expressed in a way machines can interpret using URIs for name authorities and for Dublin Core terms:

<http://id.loc.gov/authorities/names/n2013032388>
<http://purl.org/dc/terms/creator>
<http://id.loc.gov/authorities/names/n79111488>
Triple Statements -- The Next Step
The Graph View

Subject | Predicate | Object
--------|-----------|--------

This land is your land | has creator | Guthrie, Woody, 1912-1967

* http://validator.w3.org/*
Triple Statements – The Crux

• Triple statements make it possible to make meaningful statements about resources on the semantic web
• Can be processed by computers and serve meaningful results to users
RDF XML

- Uses XML structure to help computers read statements about resources
- Format for expressing triples
  - Identifies the syntaxes and vocabularies used to express triple statements
  - URIs used to identify resources and namespaces
  - Namespaces identify the vocabularies and syntaxes used to make semantic statements about resources
RDF XML – ‘Under The Hood’

<?xml version="1.0" encoding="UTF-8"?>
<rdf:RDF
xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
xmlns:dc="http://purl.org/dc/elements/1.1/"
xmlns:lcnaf="http://id.loc.gov/authorities/names">
<rdf:Description
rdf:about="http://id.loc.gov/authorities/names/n201303238">
<dc:creator>http://id.loc.gov/authorities/names/n79111488</dc:creator>
</rdf:Description>
</rdf:RDF>
RDF XML – ‘Under The Hood’: Interpreting the File

<?xml version="1.0" encoding="UTF-8"?>
Document is XML

<rdf:RDF and /> The Root, or “wrapper”, of all the contents of the file

xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#“ Namespace: identifies RDF as the syntax used

xmlns:dc="http://purl.org/dc/elements/1.1/“
Namespace: identifies Dublin Core as source (of the term used in predicate)

xmlns:lcnaf="http://id.loc.gov/authorities/names”>
Namespace: identifies the LC NAF as ID (of subject and object)
RDF XML – ‘Under The Hood’: Interpreting the File

<rdf:Description and </rdf:Description>
Beginning of triple End of triple

rdf:about="http://id.loc.gov/authorities/names/n2013032388"
Subject

<dc:creator>http://id.loc.gov/authorities/names/n79111488
</dc:creator>
Predicate and Object

(this presentation is a valid RDF XML shortcut)
URIs in RDF XML

• Used to retrieve content to be read by both humans and machines

• Two forms:
  – Humans get an HTML page to read
  – Machines retrieve an RDF XML format (or another format) that it can interpret and act on
The Two Forms
URIs in RDF XML

- URIs identify web resources
  - Book or author
  - Namespaces of standards that have been used to encode triple statements
  - Vocabulary and ontology terms
  - Triple components
    - Subject
    - Predicate
    - Object
Namespaces

• Declared in the root of an XML file
• Identified by URIs
• Declare:
  – Vocabularies
  – Syntaxes
  – Sources of terms used to describe and identify the resource
Namespaces – Examples

- `xmlns:rdf=http://www.w3.org/1999/02/22-rdf-syntax-ns#`
- `xmlns:dc=http://purl.org/dc/elements/1.1/`
- `xmlns:lcnaf=http://id.loc.gov/authorities/names`
Vocabularies and Ontologies

• Used to define concepts within a particular field of study (domain)
• Define classes of objects
• Define properties of resources
• Define relationships between objects
• Can be expressed using RDF, so computers may interpret them
• Help retrieve meaningful search results
Vocabularies and Ontologies – Example of Discovering Relationships

• Data set says “Flipper is a dolphin”
• Ontology says “all dolphins are mammals”
• A semantic web program that understands that $X = Y$ ...
• Can discover a new relationship: “Flipper is a mammal”
BIBFRAME is Only One RDF Vocabulary

- Others
  - Dublin Core
  - FOAF (‘Friend of a Friend’)
  - Library of Congress authorities and vocabularies at http://id.loc.gov
  - RDA vocabularies and registry: http://www.rdaregistry.info/
  - Schema.org

- All have namespaces
- All define classes, elements, and values
BIBFRAME Vocabulary

• Work - reflects a conceptual essence of the resource

• Instance - reflects an individual, material embodiment of the Work

• Authority - defined relationships reflected in the Work and Instance
  – People, Places, Topics, Organizations, etc.

• Annotation - enhances our knowledge about another resource
  – Library Holdings, Cover Art, Reviews, etc.
BIBFRAME/RDA -- Terminology

BIBFRAME
- Work
- Instance
- Annotation

RDA
- Work
- Expression
- Manifestation
- Item
BIBFRAME Classes

Source: [http://www.loc.gov/bibframe/](http://www.loc.gov/bibframe/)
BIBFRAME Properties

### Complete List of Properties

Select a property name below and jump to a panel describing that property and its usage below:

<table>
<thead>
<tr>
<th>Property</th>
<th>Property</th>
<th>Property</th>
</tr>
</thead>
<tbody>
<tr>
<td>abbreviatedTitle</td>
<td>creationDate</td>
<td>isbn</td>
</tr>
<tr>
<td>absorbed</td>
<td>creator</td>
<td>isbn</td>
</tr>
<tr>
<td>absorbedBy</td>
<td>creditsNote</td>
<td>isbn10</td>
</tr>
<tr>
<td>absorbedInPart</td>
<td>custodialHistory</td>
<td>isbn13</td>
</tr>
<tr>
<td>absorbedInPartBy</td>
<td>dataSource</td>
<td>ismn</td>
</tr>
<tr>
<td>accessCondition</td>
<td>derivativeOf</td>
<td>iso</td>
</tr>
<tr>
<td>accompaniedBy</td>
<td>derivedFrom</td>
<td>issn</td>
</tr>
<tr>
<td>accompanies</td>
<td>descriptionAuthentication</td>
<td>issnL</td>
</tr>
<tr>
<td>agent</td>
<td>descriptionConventions</td>
<td>issueNumber</td>
</tr>
</tbody>
</table>

And this is only some of them ... !
Now you’re conceptually ready to start working with the BIBFRAME Editor

• Remember that you are participating in a “pilot”
• Remember that the Editor is a work-in-progress
• Remember that this is an entirely new way of displaying and looking at bibliographic data
  – It is not necessary that BIBFRAME do all that MARC did
• During the Pilot, we want you to ...
  – identify what works and what doesn’t
  – suggest enhancements
  – provide constructive feedback
  – be flexible and not stress over what is ‘uncomfortable’
Create Resource

Monograph

Notated Music

Serial

Cartographic

BluRay DVD

Audio CD
Create Resource

Monograph
- Instance
- Work
- Work, Instance

Cartographic

BluRay DVD

Audio CD
<table>
<thead>
<tr>
<th>RDA Work Elements - Monographs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Creator of Work (RDA 19.2)</strong></td>
</tr>
<tr>
<td><strong>Preferred Title for the Work (RDA 6.2.2)</strong></td>
</tr>
<tr>
<td><strong>Variant Title for the Work (RDA 6.2.3)</strong></td>
</tr>
<tr>
<td><strong>Form of Work (RDA 6.3)</strong></td>
</tr>
<tr>
<td><strong>Date of Work (RDA 6.4)</strong></td>
</tr>
<tr>
<td><strong>Place of Origin of the Work (RDA 6.5)</strong></td>
</tr>
<tr>
<td><strong>Other Distinguishing Characteristic of the Work (RDA 6.6)</strong></td>
</tr>
<tr>
<td><strong>Nature of the Content (RDA 7.2)</strong></td>
</tr>
<tr>
<td><strong>Coverage of the Content (RDA 7.3)</strong></td>
</tr>
<tr>
<td><strong>Intended Audience (RDA 7.7)</strong></td>
</tr>
<tr>
<td><strong>Dissertation or Thesis Information (RDA 7.9)</strong></td>
</tr>
<tr>
<td><strong>Other Person, Family, or Corporate Body Associated With a Work (RDA 19.3)</strong></td>
</tr>
<tr>
<td><strong>Subject of the Work (RDA Chapter 23)</strong></td>
</tr>
<tr>
<td><strong>DDC Classification (RDA Chapter 23)</strong></td>
</tr>
<tr>
<td><strong>Related Works (RDA Chapter 26 and Appendix J)</strong></td>
</tr>
</tbody>
</table>
### RDA Expression Elements - Monograph

**Expression of**

RDA Work Elements - Monographs

http://bibframe.org/resources/work/sNU1...  
http://bibframe.org/resources/work/sNU1...

**Content Type (RDA 6.9)**

Content Type (RDA 6.9)

text

**Language of Expression (RDA 6.11)**

Language of Expression (RDA 6.11)

**Other Distinguishing Characteristic of the Expression (RDA 6.12)**

Other Distinguishing Characteristic of the Expression (RDA 6.12)

**Summary of Content (RDA 7.10)**

Summary of Content (RDA 7.10)

**Language of the Content (RDA 7.12)**

Language of the Content (RDA 7.12)

**Script (RDA 7.13.2)**

Script (RDA 7.13.2)
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<td>Issue, Part, or Iteration Note (RDA 2.17.13)</td>
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</table>
RDA Work Elements - Monographs

Creator of Work (RDA 19.2)
Principal Creator  Other Creators

19

PERSONS, FAMILIES, AND CORPORATE BODIES ASSOCIATED WITH A WORK

19.0 Purpose and Scope
This chapter provides general guidelines and instructions on recording relationships to persons, families, and corporate bodies associated with a work (i.e., creators and others).

19.1 General Guidelines on Recording Persons, Families, and Corporate Bodies Associated with a Work

19.1.1 Sources of Information
Take information on persons, families, and corporate bodies associated with a work from statements appearing on the preferred sources of information (see 2.2.2 RDA) in resources embodying the work. If those statements are ambiguous or insufficient, use the following sources of information, in order of preference:
   a) other statements appearing prominently in the resources
   b) Information appearing only in the content of the resources (e.g., the text of a book, the sound content of an audio recording)
   c) other sources.
For instructions on recording changes in responsibility for multipart monographs, serials, and integrating resources, see 18.4.2 RDA.

19.1.2 Recording Persons, Families, and Corporate Bodies Associated with a Work
Record the persons, families, and corporate bodies associated with the work by applying the following instructions, as applicable:
Principal Creator

- Search LCNAF for Creator:
  - Person
  - Family (NAR)
  - Jurisdiction
  - Corporate Body
  - Meeting

- Search Relationship Designator (RDA Appendix I)...

- OR...

- Record Relationship Designator (if Relationship Designator does not appear in Search)

[Buttons: Cancel, Save changes]
Person

Search LCNAF in id.loc.gov for Authorized Access Point ... OR ...

Record Authorized Access Point (if added to LCNAF but does not yet appear in id.loc.gov)

[Buttons: Cancel, Save changes]
Person

Search LCNAF in id.loc.gov for Authorized Access Point

Record Authorized Access Point (if added to LCNAF but does not yet appear in id.loc.gov)

[Search button]

[Record button]

Cancel  Save changes
ID: http://id.loc.gov/vocabulary/relators/ive
  bf:label
    Interviewee

ID: _:bnodeuYx1445981630
  Type(s)
    http://bibframe.org/vocab/Person
    bf:authorizedAccessPoint
      Panchyshyn, Roman
Title

Title

Semantic Web technologies in bibliograph...
ID: http://id.loc.gov/vocabulary/relators/ive
  bf:label
    Interviewee

ID: _:bnodeuYx1445981630
  Type(s)
    http://bibframe.org/vocab/Person
    bf:authorizedAccessPoint
    Panchyshyn, Roman

ID: _:bnodexad1445982129
  Type(s)
    http://bibframe.org/vocab>Title
    bf:titleValue
    Semantic Web technologies in bibliographic
Form of Work

Search Authorized LCGFT Heading...
   OR...

Record Authorized LCGFT Heading
   (LCGFT form is being proposed)... OR...

Record Form of Work (if an LCGFT term is not being used)

LCGFT

Comedies of humours
Comedies of manners
Comedy films
Comedy plays
Comedy sketches

Heading (LCGFT form is being proposed)

Cancel   Save changes
Place

Search Authorized Access Point

Record Authorized Access Point

LCNAF

[No suggestions found for kent ohio.]

LCSH

[No suggestions found for kent ohio.]

Save changes
Place

Search Authorized Access Point

Record Authorized Access Point

LCNAF
Kent (Ohio)

LCSH
[No suggestions found for kent (ohio).]

Save changes
Subject of the Work (RDA Chapter 23)

RDA Work Elements - Monographs

Topic

Search LCSH

Enter LCSH

Authority Information (Literal)

LCSH

[No suggestions found for Linked data]

Save changes
Subject of the Work (RDA Chapter 23)

<table>
<thead>
<tr>
<th>Topic</th>
<th>Place</th>
<th>Person</th>
<th>Corporate Body</th>
<th>Family (LCSH)</th>
<th>Meeting</th>
</tr>
</thead>
<tbody>
<tr>
<td>RDA Work Elements - Monographs</td>
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<td>Semantic Web</td>
<td>Linked data</td>
<td>Linked data--Ohio--Case studies</td>
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</table>
Related Works (RDA Chapter 25 and Appendix J)  RDA Work Elements - Monographs

Contents Note (LC-PCC PS 25.1)  Contents Note (LC-PCC PS 25.1)

Related Expressions (RDA Chapter 25 and Appendix J)  Related Expression

Authorized Access Point Representing the Work (RDA 6.27.1)  Authorized Access Point Representing the Work (RDA 6.27.1)

LC Control Number for the Work (RDA 6.8)  LCCN
Available Datasets

The Linked Data Service provides access to commonly found standards and vocabularies promulgated by the Library of Congress. This includes data values and the controlled vocabularies that house them. The following are currently offered as part of this service:

- LC Subject Headings
- LC Name Authority File
- LC Classification
- LC Children's Subject Headings
- LC Genre/Form Terms
- LC Medium of Performance Thesaurus for Music
- LC Demographic Group Terms
- Thesaurus for Graphic Materials
- AFS Ethnographic Thesaurus
- Cultural Heritage Organizations

Preservation Vocabularies
- Preservation Vocab (all)

BIBFRAME Resources
- BIBFRAME Resources
- BIBFRAME Works
- BIBFRAME Instances
- BIBFRAME Annotations

Schemes and smaller codelists
- Identifiers
- Carriers
- Content Types
- Media Types
- Resource Types
- Description Convention
- Publication Frequencies
- Resource Components
- MARC Genre/Form Schemes
- MARC Subject Schemes
- Classification Schemes
- ...more

RDA Vocabularies
Library of Congress BIBFRAME Resources

URI(s)
› http://id.loc.gov/resources

Instance Of
› MADS/RDF MADSScheme
› SKOS ConceptScheme

Scheme Members
› http://id.loc.gov/resources/collection_BIBFRAMEWorks
› http://id.loc.gov/resources/collection_BIBFRAMEInstances
› http://id.loc.gov/resources/collection_BIBFRAMEAnnotations

Change Notes
› 2015-07-13: modified

Alternate Formats
› RDF/XML
› N-Triples
› JSON
<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>Bibframe Works</th>
<th>Bibframe Work</th>
<th>ID</th>
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</thead>
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<td>8.</td>
<td>Priebe, Torsten. Building interactive enterprise knowledge portals with Semantic Web technologies</td>
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<td>Work</td>
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<td>12.</td>
<td>Synthesis lectures on the semantic web, theory and technology</td>
<td>bibframe</td>
<td>Work</td>
<td>c016972142</td>
</tr>
</tbody>
</table>
Geroimenko, Vladimir, 1955- Dictionary of XML technologies

RDF Type
› Work
› bibframe Text

Work Title
› Title
› Dictionary of XML technologies and the semantic Web

Creator(s)
› Creator
› Geroimenko, Vladimir, 1955-

Authorized access point
› Geroimenko, Vladimir, 1955- Dictionary of XML technologies and the semantic Web

Language
› http://id.loc.gov/vocabulary/languages/eng

LC Classification
› http://id.loc.gov/authorities/classification/ QA76.78.H34

URI(s)
› http://id.loc.gov/resources/works/c013311782

Subject(s)
› Semantic Web--Dictionaries
› XML (Document markup language)--Dictionaries

Instance(s)
› http://id.loc.gov/resources/instances/c013317820001

Annotation(s)
› Table of contents
› Publisher description
› http://id.loc.gov/resources/annotations/c013317820001

Alternate Formats
› RDF/XML
› N-Triples
› JSON
Dictionary of XML technologies and the semantic Web

RDF Type
- Instance
- bibframe Monograph

Instance Title
- Title
  - Dictionary of XML technologies and the semantic Web

LCCN
- Identifier scheme
  - http://id.loc.gov/vocabulary/identifiers/lccn

- Identifier value
  - 2003061883

Publication
- Provider place
  - London

- Provider name
  - Springer

- Copyright date

Held Item
- LCC call number
  - QA76.75.H94 G47 2004

Transcribed title
- Dictionary of XML technologies and the semantic Web

Dimensions
- 24 cm. +
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Media type (RDA 3.2) - unmediated
Carrier Type (RDA 3.3) - volume