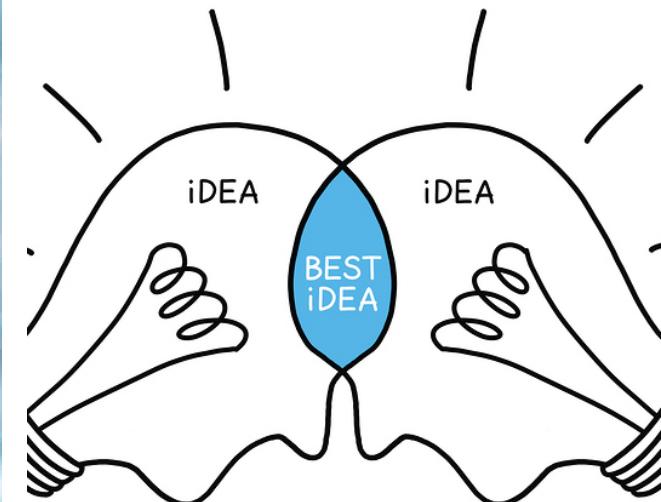




Linked Data Implementation at Ex Libris

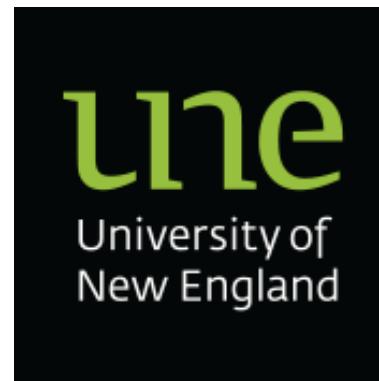
Amy Pemble, Product Manager

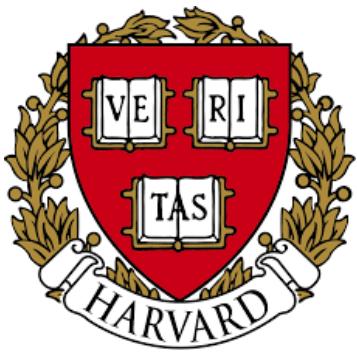


Collaboration

Linked Open Data Working Group

- Founded in **2011**
- Collects use cases & scenarios for LOD features
- Surveyed the community for input (2017)
- Presents ideas & progress at IGeLU and ELUNA conferences
- Advises Ex Libris on LOD features for the Alma platform





2017: BIBFRAME implementation

- Ex Libris worked closely with Harvard University to deliver a first phase of BIBFRAME integration
 - MARC-to-BIBFRAME transformation
 - Publication of MARC record sets in BIBFRAME format
 - Support for BIBFRAME URLs

It's Happening

Immediately after
the December
2017 release,
1000+ Alma
institutions were
able to publish
their entire
collections in
BIBFRAME.



BIBFRAME Publishing

▼<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:bf="http://id.loc.gov/ontologies/bibframe/" xmlns:madsrdf="http://www.loc.gov/rdf/marcxml/v3#">
 ▼<bf:Work rdf:about="https://open...">
 ▼<bf:adminMetadata>
 ►<bf:AdminMetadata>...</bf:Adm
 </bf:adminMetadata>
 <rdf:type rdf:resource="http://...">
 ▼<bf:language>
 <bf:Language rdf:about="http://...">

The screenshot shows a web page from the Library of Congress Linked Data Service. At the top, there is a navigation bar with the Library of Congress logo, links for "ASK A LIBRARIAN", "DIGITAL COLLECTIONS", and "LIBRARY CATALOGS", and a reference number "5903292171". Below the navigation bar, the URL "The Library of Congress > Linked Data Service" is displayed. The main content area features the title "English; Englisch" in large blue font, followed by the text "From [MARC List of Languages](#)". There are two tabs at the top of this section: "Details" (which is selected) and "Visualization". The "Details" tab contains sections for "URI(s)" and "Instance Of", each with a list of links. The "URI(s)" section includes links to "http://id.loc.gov/vocabulary/languages/eng" and "info:lc/vocabulary/languages/eng". The "Instance Of" section includes links to "MADS/RDF Language", "MADS/RDF Authority", "SKOS Concept", "RDF Resource", and "MARC Language".

LIBRARY OF CONGRESS | ASK A LIBRARIAN | DIGITAL COLLECTIONS | LIBRARY CATALOGS | 5903292171

The Library of Congress > Linked Data Service

English; Englisch

From [MARC List of Languages](#)

[Details](#) [Visualization](#)

URI(s)

- <http://id.loc.gov/vocabulary/languages/eng>
- <info:lc/vocabulary/languages/eng>

Instance Of

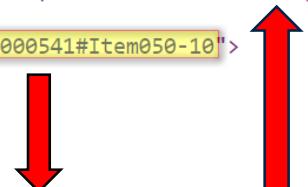
- [MADS/RDF Language](#)
- [MADS/RDF Authority](#)
- [SKOS Concept](#)
- [RDF Resource](#)
- [MARC Language](#)

BIBFRAME Publishing

```
▼<bf:Instance rdf:about="https://open-na.hosted.exlibrisgroup.com/alma/TR_INTEGRATION_INST/bf/entity/instance/99985390000541">
  ▼<bf:issuance>
    <bf:Issuance rdf:about="http://id.loc.gov/vocabulary/issuance/mono"/>
  </bf:issuance>
  ▼<bf:provisionActivity>
    ▼<bf:ProvisionActivity>
      <rdf:type rdf:resource="http://id.loc.gov/ontologies/bibframe/Publication"/>
      <bf:date rdf:datatype="http://id.loc.gov/datatypes/edtf">1967</bf:date>
      ▼<bf:place>
        <bf:Place rdf:about="http://id.loc.gov/vocabulary/countries/nyu"/>
      </bf:place>
    </bf:ProvisionActivity>
  </bf:provisionActivity>
  ▼<bf:illustrativeContent>
    ▼<bf:Illustration rdf:about="http://id.loc.gov/vocabulary/millus/ill">
      <rdfs:label>illustrations</rdfs:label>
    </bf:Illustration>
  </bf:illustrativeContent>
  ▼<bf:identifiedBy>
    ▼<bf:Lccn>
      <rdf:value>67006784</rdf:value>
    </bf:Lccn>
  </bf:identifiedBy>
  ▼<bf:identifiedBy>
    ▼<bf:Local>
      <rdf:value>ocm01093047</rdf:value>
    </bf:Local>
  </bf:identifiedBy>
```

BIBFRAME Publishing

```
<bf:instanceOf rdf:resource="https://open-na.hosted.exlibrisgroup.com/alma/TR_INTEGRATION_INST/bf/entity/work/9059032921716723177"/>
▼<bf:hasItem>
  ▼<bf:Item rdf:about="https://open-na.hosted.exlibrisgroup.com/alma/TR_INTEGRATION_INST/bf/entity/99985390000541#Item050-10">
    ▼<bf:shelfMark>
      ▼<bf:ShelfMarkLcc>
        <rdfs:label>QL676.A9 1967</rdfs:label>
      </bf:ShelfMarkLcc>
    </bf:shelfMark>
    <bf:itemOf rdf:resource="https://open-na.hosted.exlibrisgroup.com/alma/TR_INTEGRATION_INST/bf/entity/instance/99985390000541"/>
  </bf:Item>
</bf:hasItem>
</bf:Instance>
```



RDA/RDF Publishing

Content

Set name *

Filter Records

Publish on: Bibliographic level
 Holdings/Portfolio/Representation level
 Item/Portfolio level

Output format

Publishing Protocol

MARC21 Bibliographic
Dublin Core (Simple)
BIBFRAME Bibliographic
RDA/RDF


Ex Libris. a ProQuest Company

▼ <rdac:Work rdf:about="https://open-na.hosted.exlibrisgroup.com/alma/TR_INTEGRATION_INST/rda/entity/work/908<rdaw:titleOfTheWork>Rapunzel /</rdaw:titleOfTheWork><rdaw:creator>Zelinsky, Paul O.</rdaw:creator><rdaw:SubjectRelationshipOf>Witches.</rdaw:SubjectRelationshipOf><rdaw:SubjectRelationshipOf>Towers.</rdaw:SubjectRelationshipOf><rdaw:SubjectRelationshipOf>Theft.</rdaw:SubjectRelationshipOf><rdaw:SubjectRelationshipOf>Rapunzel (Tale)</rdaw:SubjectRelationshipOf><rdaw:SubjectRelationshipOf>Princes.</rdaw:SubjectRelationshipOf><rdaw:SubjectRelationshipOf>Pregnancy.</rdaw:SubjectRelationshipOf><rdaw:SubjectRelationshipOf>Parents.</rdaw:SubjectRelationshipOf><rdaw:SubjectRelationshipOf>Magic.</rdaw:SubjectRelationshipOf><rdaw:SubjectRelationshipOf>Jealousy.</rdaw:SubjectRelationshipOf><rdaw:SubjectRelationshipOf>Imprisonment.</rdaw:SubjectRelationshipOf><rdaw:SubjectRelationshipOf>Hair.</rdaw:SubjectRelationshipOf><rdaw:SubjectRelationshipOf>Folklore.</rdaw:SubjectRelationshipOf><rdaw:SubjectRelationshipOf>Feminine beauty (Aesthetics)</rdaw:SubjectRelationshipOf><rdaw:SubjectRelationshipOf>Fairy tales.</rdaw:SubjectRelationshipOf><rdaw:SubjectRelationshipOf>Juvenile works.</rdaw:SubjectRelationshipOf><rdaw:SubjectRelationshipOf>Fiction.</rdaw:SubjectRelationshipOf><rdaw:SubjectRelationshipOf rdf:resource="http://id.loc.gov/authorities/subjects/sh85050104"/><rdaw:SubjectRelationshipOf rdf:resource="http://id.loc.gov/authorities/subjects/sh85046925"/><rdaw:SubjectRelationshipOf rdf:resource="http://id.loc.gov/authorities/subjects/sh2008107181"/><rdaw:SubjectRelationshipOf>Dust jackets (Bindings) 1997.</rdaw:SubjectRelationshipOf><rdaw:SubjectRelationshipOf>Fairy tales 1997.</rdaw:SubjectRelationshipOf><rdaw:SubjectRelationshipOf>Folk tales 1997.</rdaw:SubjectRelationshipOf><rdaw:SubjectRelationshipOf>Caldecott Medal Winner 1998.</rdaw:SubjectRelationshipOf><rdaw:SubjectRelationshipOf rdf:resource="http://id.loc.gov/authorities/subjects/sh85047737"/><rdaw:SubjectRelationshipOf rdf:resource="http://id.loc.gov/authorities/subjects/sh2010108229"/><rdaw:SubjectRelationshipOf rdf:resource="http://id.loc.gov/authorities/subjects/sh85058305"/><rdaw:SubjectRelationshipOf rdf:resource="http://id.loc.gov/authorities/subjects/sh91004673"/><rdaw:creator>Beniker, Amy.</rdaw:creator><rdaw:creator>Dutton Children's Books (Firm)</rdaw:creator><rdaw:creator>Stevens, John, 1954-</rdaw:creator><rdaw:manifestationOfWork rdf:resource="https://open-na.hosted.exlibrisgroup.com/alma/TR_INTEGRATION_INST/></rdac:Work>

► <rdac:Expression>...</rdac:Expression>

► <rdac:Manifestation rdf:about="https://open-na.hosted.exlibrisgroup.com/alma/TR_INTEGRATION_INST/rda/entity

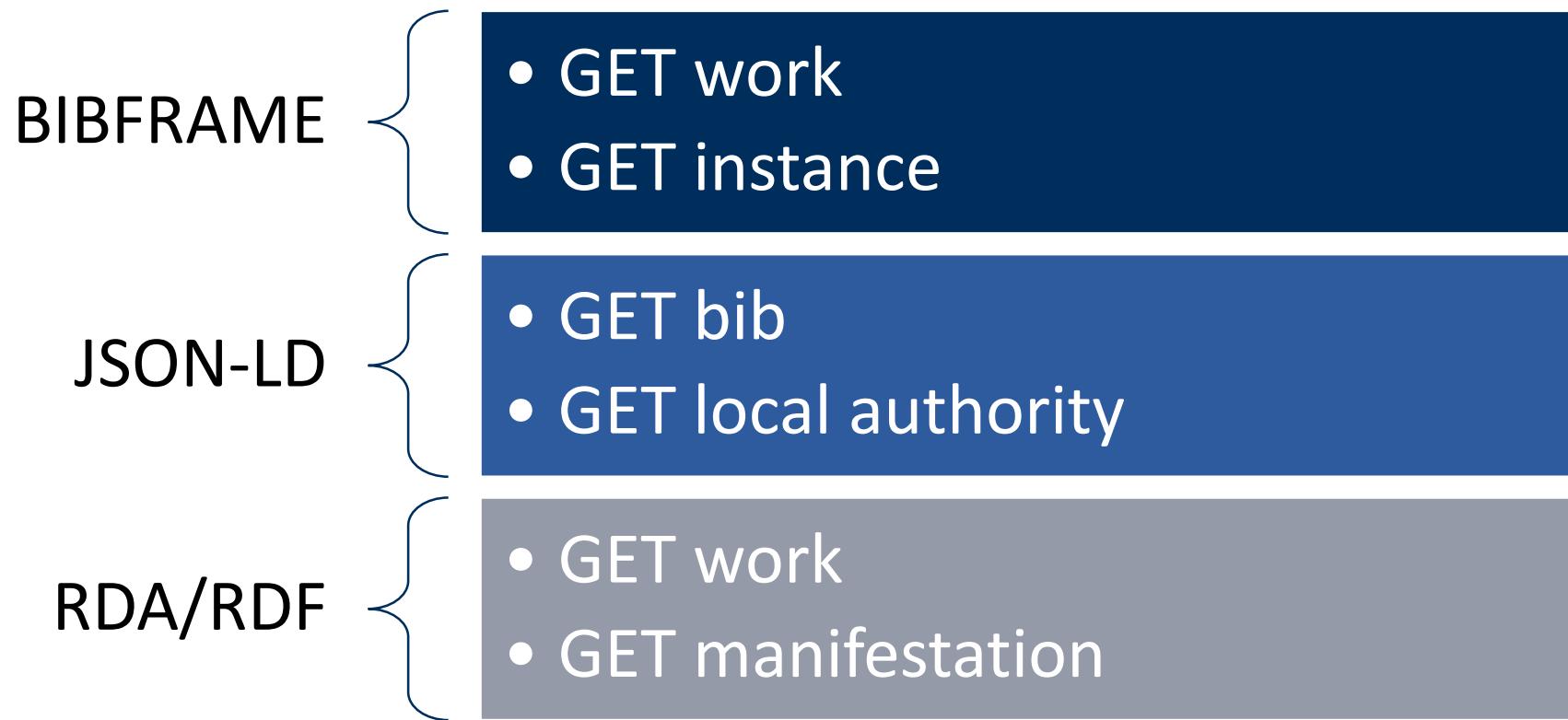
Linked Data: APIs

Alma provides API endpoints for these linked data formats

- JSON-LD
- RDA/RDF
- BIBFRAME

Once activated the APIs are open and available to everyone (no keys required!)

Records are automatically enriched with URIs for language, identifiers, names, and subjects



<http://bit.ly/2EtJrJh>

Alma Linked Data Views

1



Linked data and user interaction : the road ahead / edited on behalf of IFLA by H. Frank Cervone and Lars G. Svensson.

[Edit Record](#)[Portfolio List](#)

Book {Book - Electronic} text; computer; online resource
By Cervone, H. Frank. (Berlin, [Germany] ; Walter de Gruyter GmbH, 2015)

Subject: Linked data. Semantic Web. User interfaces (Computer systems) and others

Series: IFLA Publications

Language: English

ISBN: 3-11-039616-5 and others

Record number:
(CKB)3360000000515034

Update Date: 12/04/2017

[Physical](#)[Electronic \(1\)](#)[Digital](#)[Other details](#)

Linked Data



Context	https://open-na.hosted.exlibrisgroup.com/alma/contexts/bib	
bibo:oclcnum	(PQKBManifestationID)11892389	
bibo:oclcnum	https://open-na.hosted.exlibrisgroup.com/resolver/wikidata/oclc/(PQKBManifestationID)11892389	(PQKBManifestationID)11892389
bibo:isbn10	http://www.isbnsearch.org/isbn/3110316927	3-11-031692-7
bibo:isbn10	https://open-na.hosted.exlibrisgroup.com/resolver/wikidata/isbn10/3110316927	3-11-031692-7
dct:language	http://id.loc.gov/vocabulary/iso639-2/eng	--
JSONLD version	https://open-na.hosted.exlibrisgroup.com/alma/EXLDEV1_INST/bibs/99109800800121	--

Alma BIBFRAME Preview

Linked data and user interaction : the road ahead / edited on behalf of IFLA by H. Frank Cervone and Lars G....

MMS ID	99109800800121	Suppress from publishing	No	Export to WorldCat	Don't publish
Brief level	-	Record format	marc21		
Originating system	PQNKB	Originating system ID	(CKB)3360000000515034	Originating system version	20160803134623.0

MARC

BIBFRAME

```
<?xml version="1.0" encoding="UTF-8" standalone="no"?><rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:bf="http://id.loc.gov/ontologies/bibframe/" xmlns:bflc="http://id.loc.gov/ontologies/bflc/" xmlns:madsrdf="http://www.loc.gov/mads/rdf/v1#"
  xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#">
<bf:Work rdf:about="https://open-na.hosted.exlibrisgroup.com/alma/EXLDEV1_INST/bf/entity/work/9037292348598534584">
  <bf:adminMetadata>
    <bf:AdminMetadata>
      <bf:generationProcess>
        <bf:GenerationProcess>
          <rdfs:label>DLC marc2bibframe2 v1.3.0-SNAPSHOT: 2018-01-29T19:42:07Z</rdfs:label>
        </bf:GenerationProcess>
      </bf:generationProcess>
      <bf:status>
        <bf:Status>
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        </bf:Status>
      </bf:status>
      <bflc:encodingLevel>
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        </bflc:EncodingLevel>
      </bflc:encodingLevel>
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        <bf:DescriptionConventions>
          <bf:code>isbd</bf:code>
        </bf:DescriptionConventions>
      </bf:descriptionConventions>
      <bf:identifiedBy>
        <bf:Local>9037292348598534584</bf:Local>
      </bf:identifiedBy>
```

Knowledge Card

[Experimental, source from Wikidata]



WIKIPEDIA

Judy Garland 朱迪·加兰

actress, singer and vaudevillian from the United States

LCCN: [n50015080](#) VIAF: [49233610](#) Wikidata: [Q11637](#)



WIKIPEDIA

L. Frank Baum 李曼·法蘭克·鮑姆

Children's writer, editor, journalist, screenwriter

LCCN: [n80110912](#) VIAF: [4926394](#) Wikidata: [Q207544](#)



WIKIPEDIA

Cedric Gibbons 塞德里克·吉本森

Art director, set decorator

LCCN: [n85342791](#) VIAF: [42042359](#) Wikidata: [Q727904](#)



WIKIPEDIA

Mervyn LeRoy 茂文·李洛埃

American film director, film producer and sometime actor

LCCN: [n85342783](#) VIAF: [17407979](#) Wikidata: [Q103788](#)

Discovery

Works	Show 10 entries
Title	Sources
200 of the best songs from ragtime & early jazz, 1997:	
A star is born	
Annie get your gun original motion picture soundtrack.	
Babes on Broadway	
Best of yesterday	
Bing Crosby show (Radio program).	
Catch me if you can	
Duets	
Easter Parade	
El reloj = The clock	

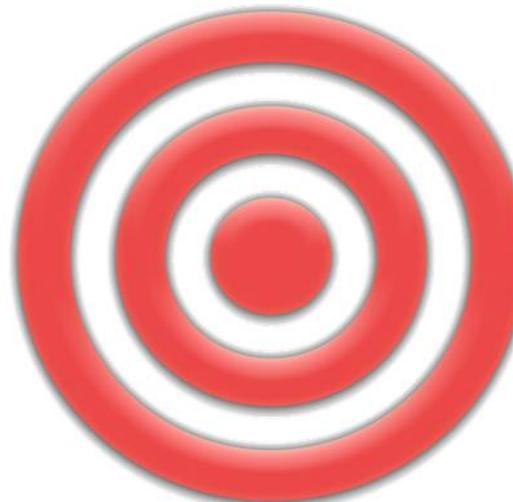
Selected Co-authors

1. Crosby, Bing, 1903-1977. (65)
2. Astaire, Fred (59)
3. MGM Studio Orchestra. (40)
4. Fleming, Victor (40)
5. Minnelli, Vincente 1903-1986 (37)
6. Sinatra, Frank, 1915-1998. (35)
7. Kelly, Gene, 1912-1996. (34)
8. Morgan, Frank (29)
9. Rooney, Mickey (26)
10. Horne, Lena. (23)

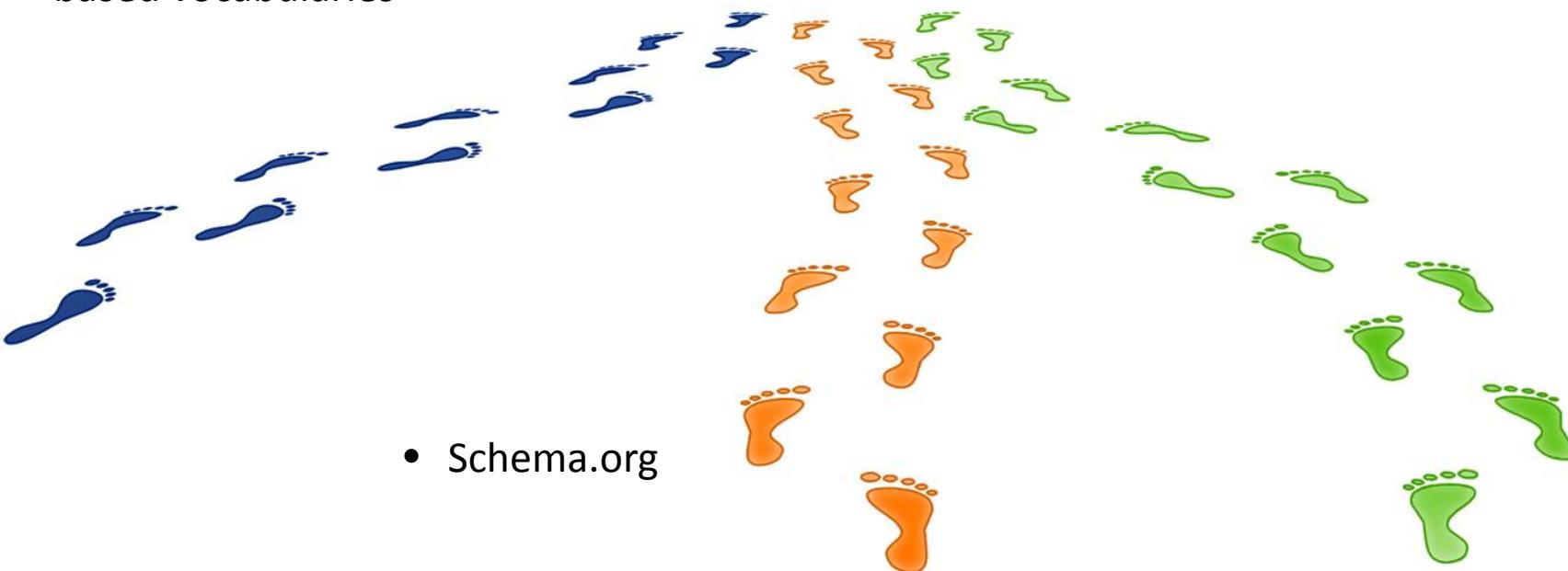
Discovery

Roadmap: Multiple Paths of Exploration

- Search linked data endpoints from within the Alma editor
- Select controlled vocabulary term, even from non-MARC based vocabularies



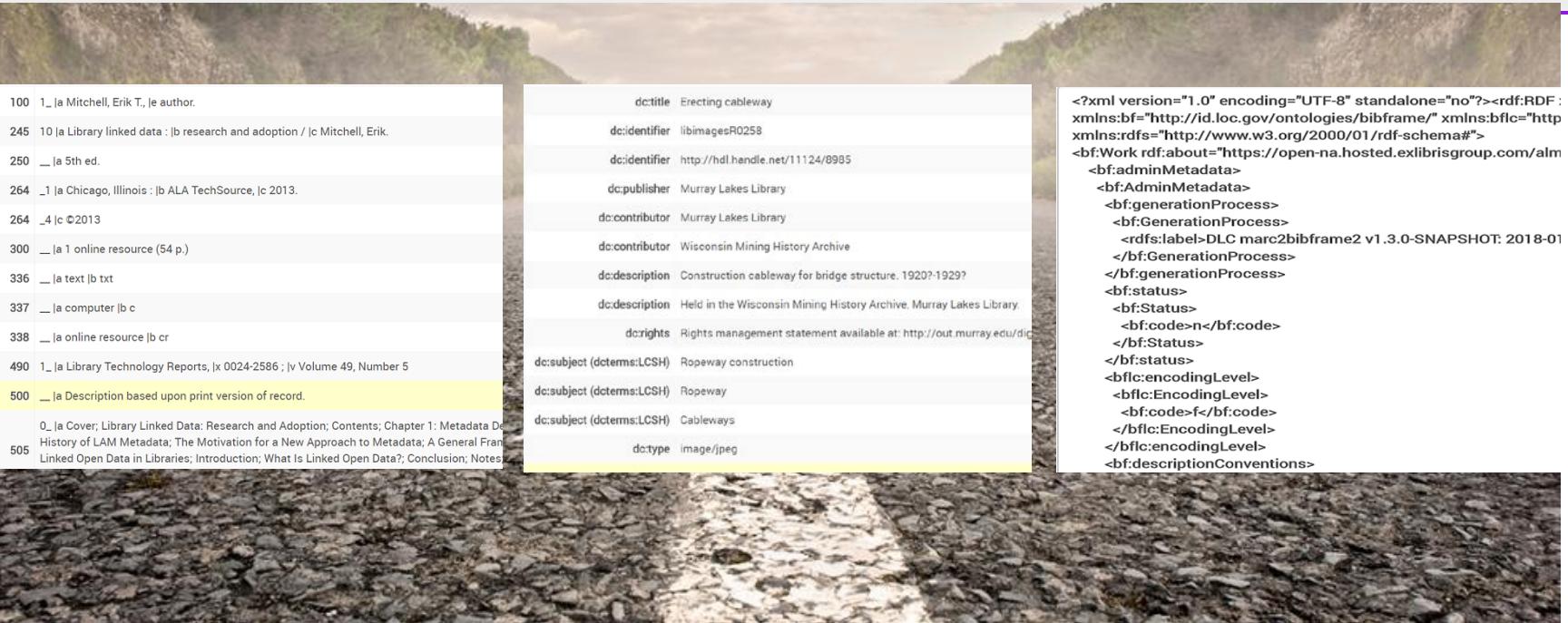
- Catalog in BIBFRAME
- Import BIBFRAME records



- Schema.org

Challenges

- We've issued an open call for input on our Linked Data roadmap
- Linked Data at scale
- Web relevancy
- Reconciliation beyond the institution's catalog



Evolutionary



Amy.Pemble@exlibrisgroup.com