



國家圖書館
NATIONAL CENTRAL LIBRARY

雲端時代下資訊組織與鏈結資源的趨勢與展望

Linked Data in Libraries: Trends, Challenges, and Impact

圖書館鏈結資源的發展趨勢以及對資訊組織的衝擊

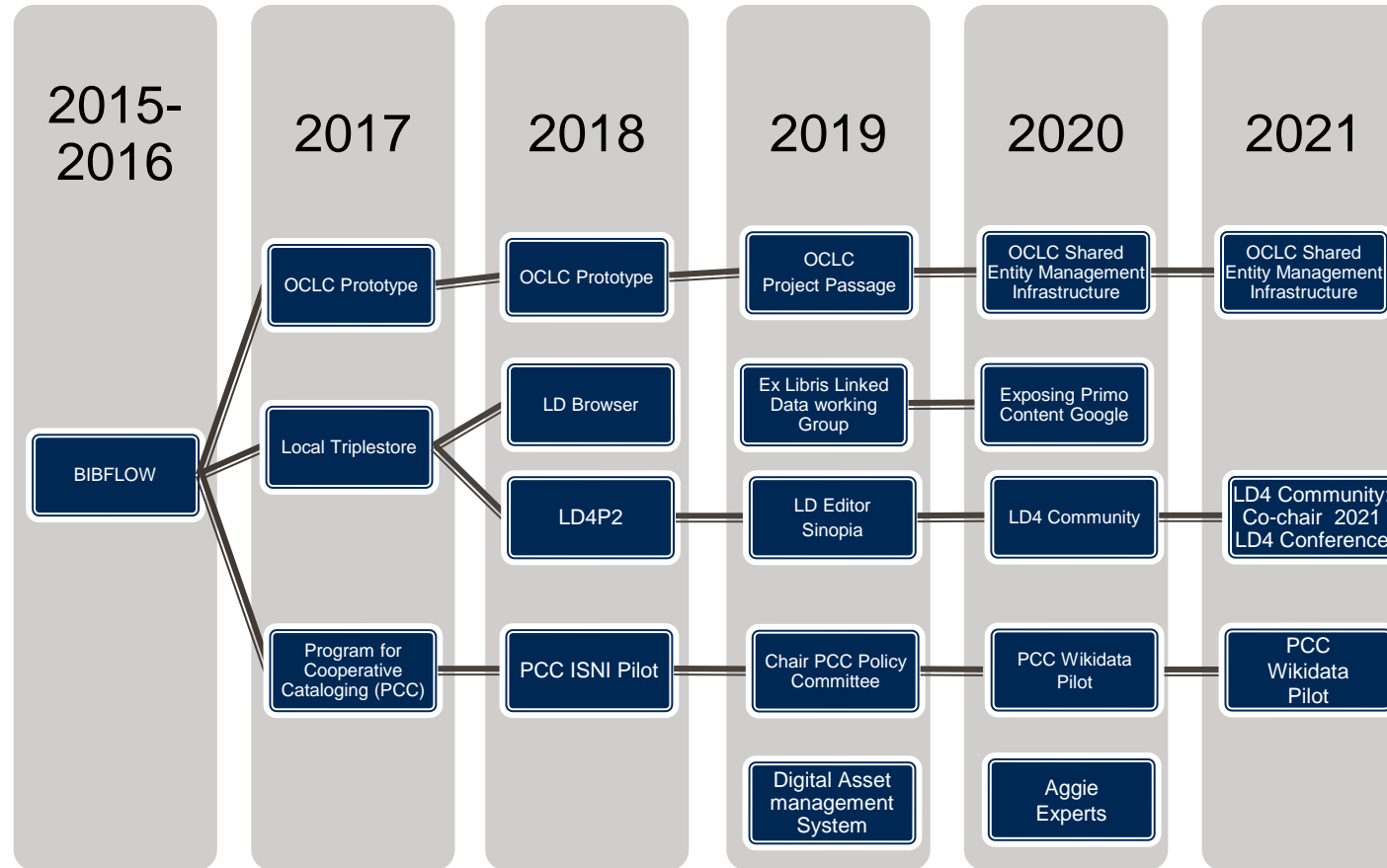
xli@ucdavis.edu

October 8, 2021

Topics

- Introduction
 - What is linked data?
 - Why does it matter to libraries?
- Linked Data adoption
- Current Development
 - Library of Congress BIBFRAME
 - OCLC Shared Entity Management Infrastructure
 - Share-VDE
 - Linked Data for Production (LD4P) Initiative
- Trends and Challenges
- Impact on Cataloging

Linked Data at UC Davis



Introduction

What is Linked Data?



Tim Berners-Lee: The next Web of open, linked data
Mar 13, 2009

Three rules:

- Use **HTTP URIs** as names for things;
- Provide useful information, using the (web) **standards** (RDF, SPARQL etc.);
- Linked data is about **relationships**.

URI and RDF are core concepts for linked data!

What Is a URI?

URI stands for Uniform Resource Identifier. It is “a string of characters that **unambiguously** identifies a particular resource.”

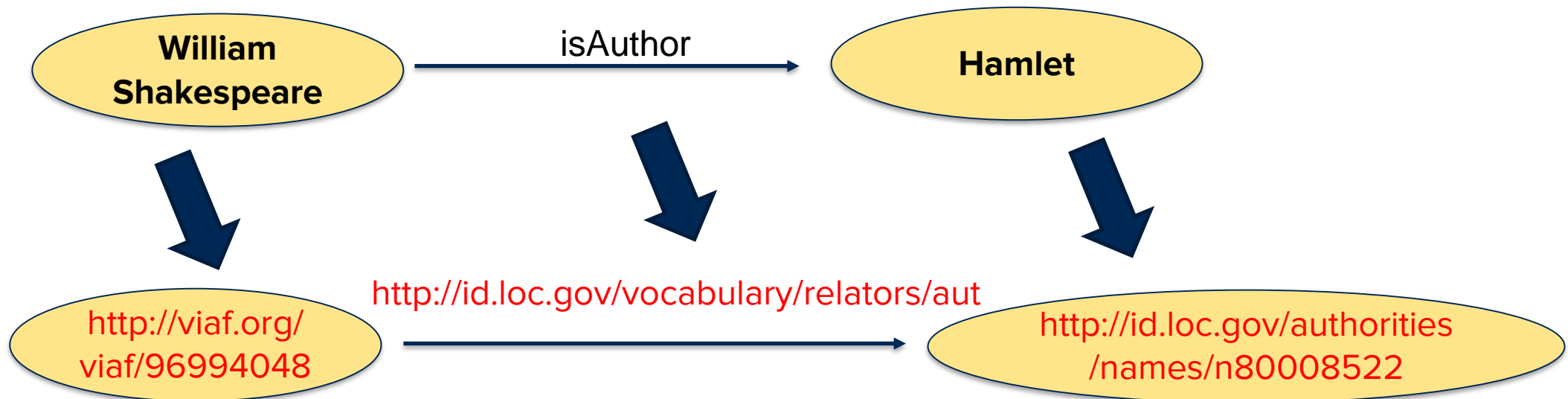
A URI constructed with the HTTP protocol is referred to as an HTTP URI.

-- *URI FAQs: PCC URI Task Group on URIs in MARC*

www.loc.gov/aba/pcc/bibframe/TaskGroups/URI%20FAQs.pdf

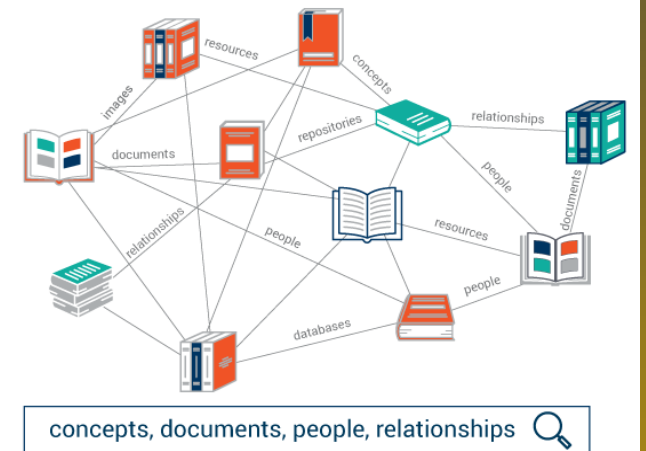
What is RDF/Triple?

RDF stands for Resource Description Framework. It is “a standard model for data interchange on the Web.” It is based upon the idea of creating metadata about resources in the form of *subject–predicate–object* expressions, known as *triples*.



Why Linked Data?

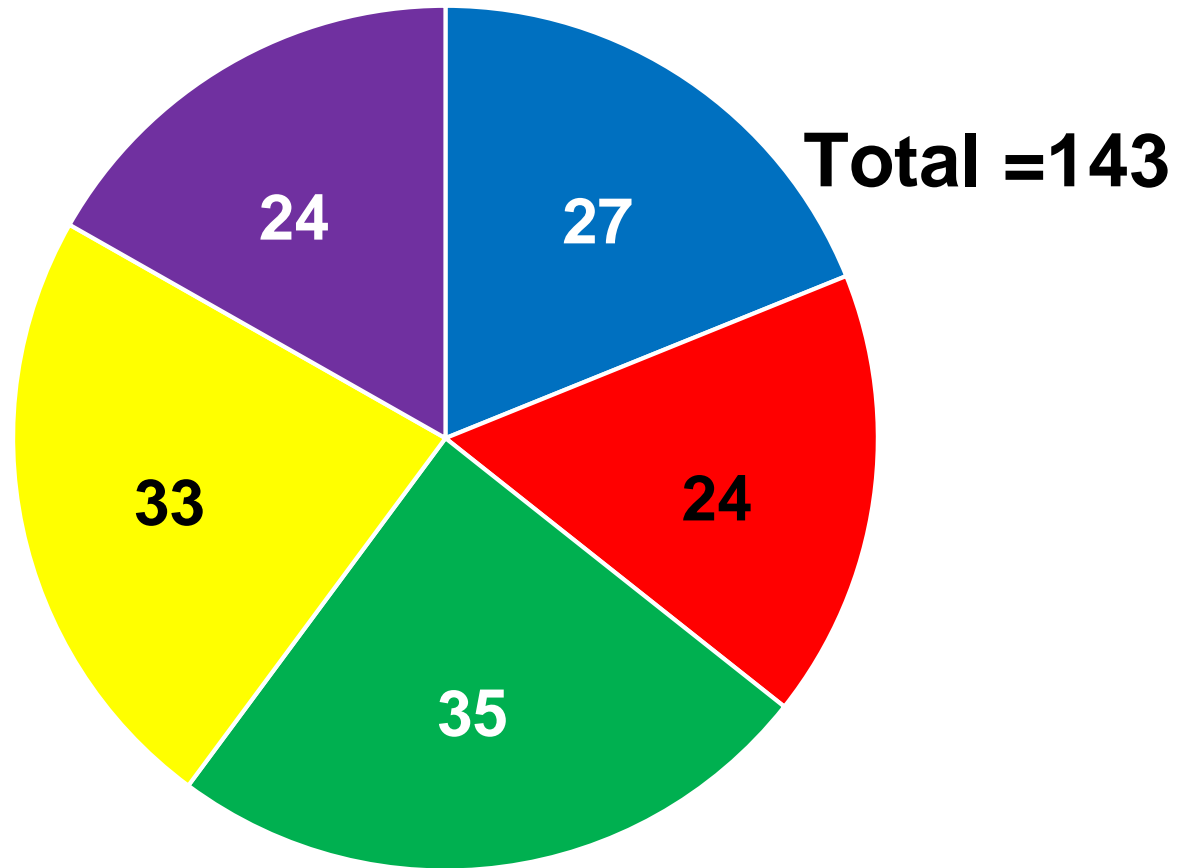
- MARC format was created over 50 years ago
- Linked data promises:
 - Transforms user's experience with discovery;
 - Exposes library collections to the open web;
 - Increases library operational efficiency;
 - Enables intelligent search.



www.ontotext.com/blog/linked-data-libraries/

Linked Data Adoption

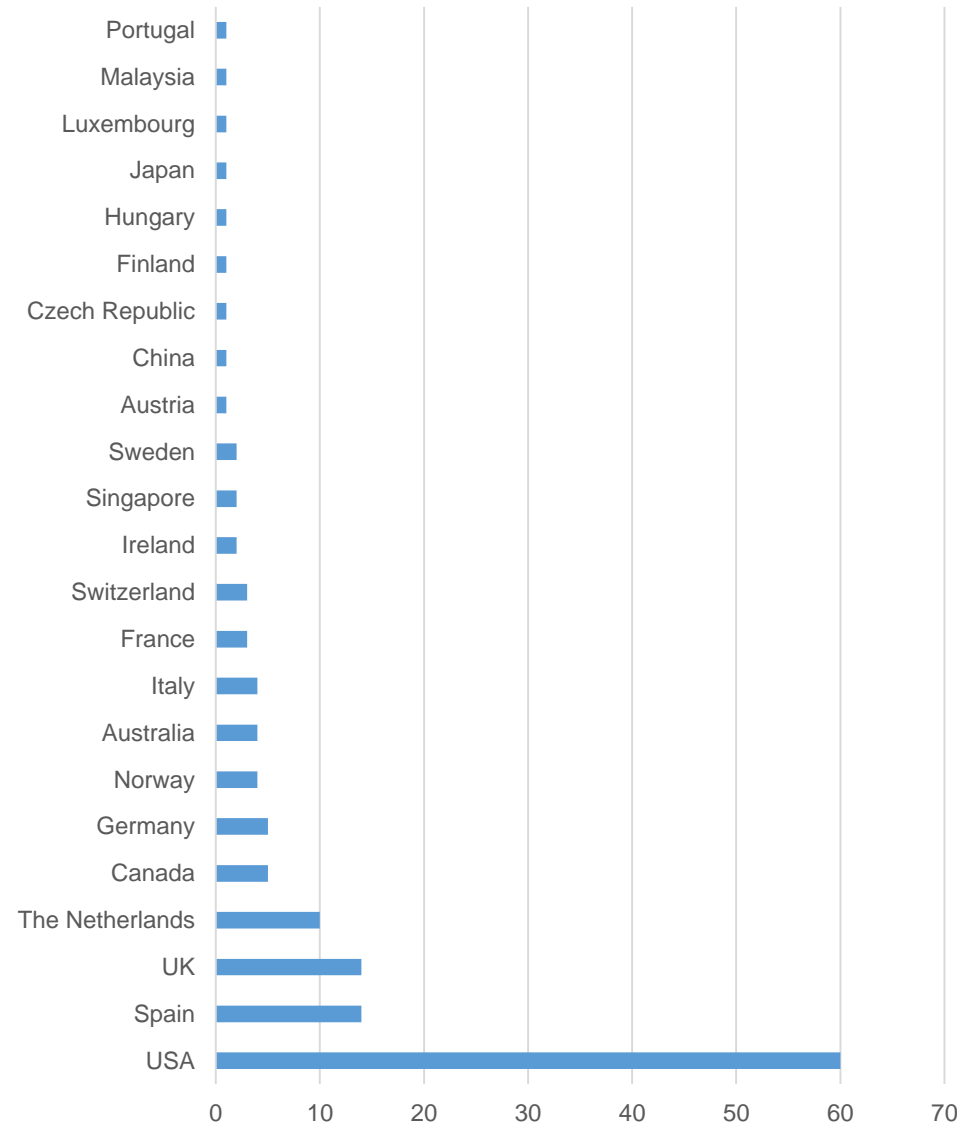
International Linked Data Surveys for Implementers



■ 2014 only ■ 2015 only ■ 2018 only ■ 2 surveys ■ All 3 surveys

Courtesy of Karen Smith-Yoshimura

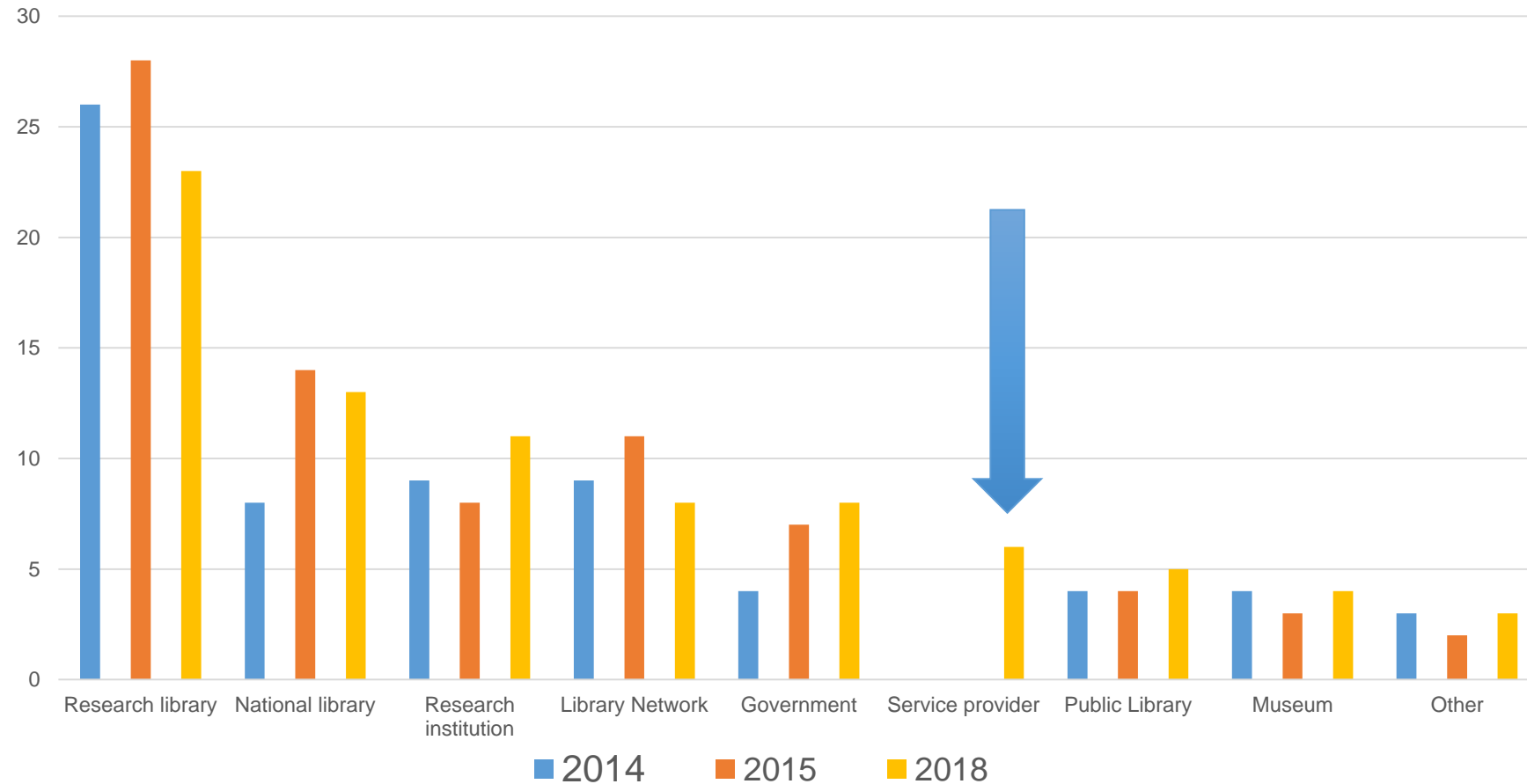
Geographic Breakdown of 143 Responding Institutions



23 countries
represented

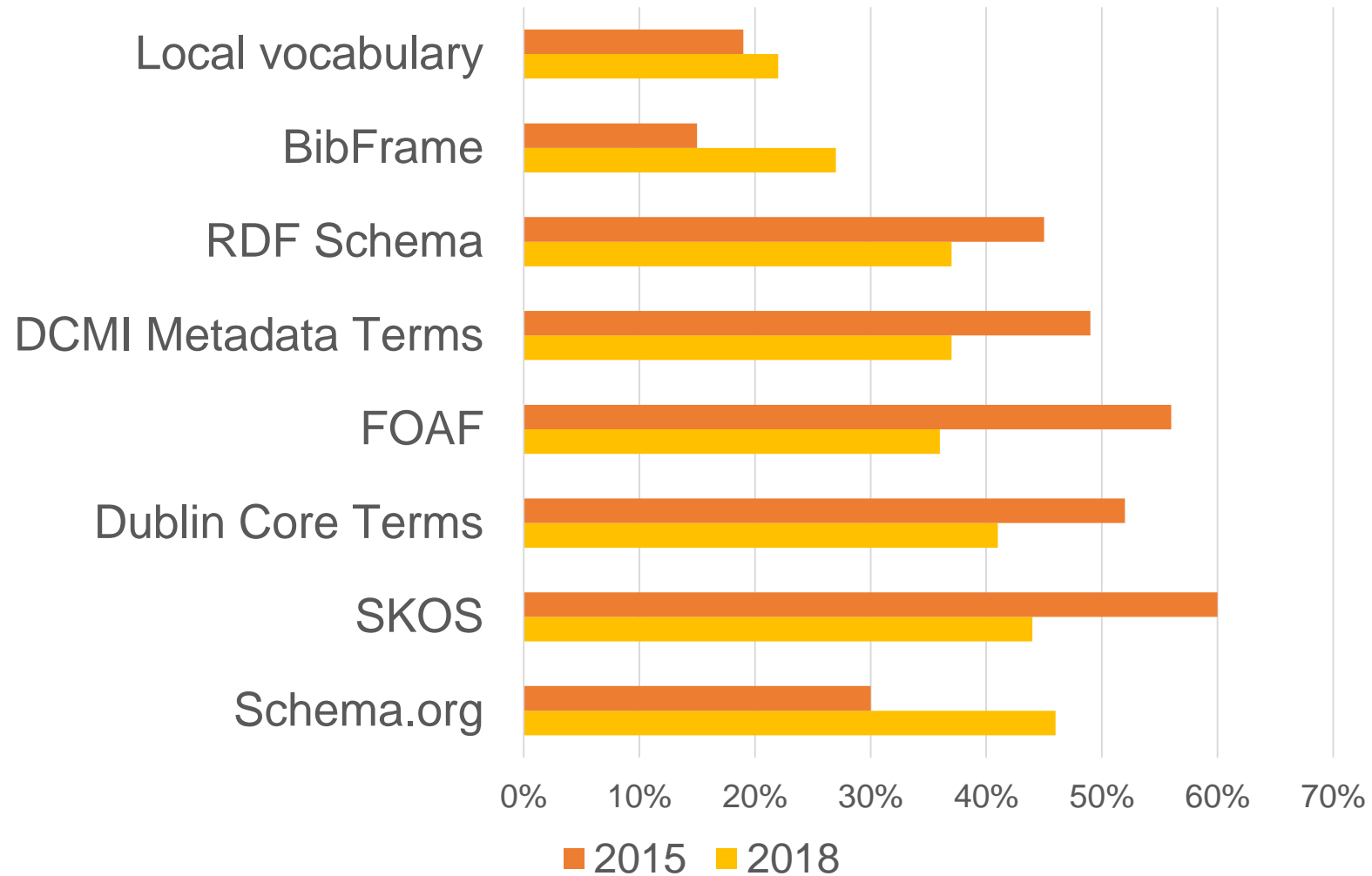
Courtesy of Karen Smith-Yoshimura

Responding Institutions by Type



Courtesy of Karen Smith-Yoshimura

RDF Vocabularies/Ontologies Used



Courtesy of Karen Smith-Yoshimura

Current Development

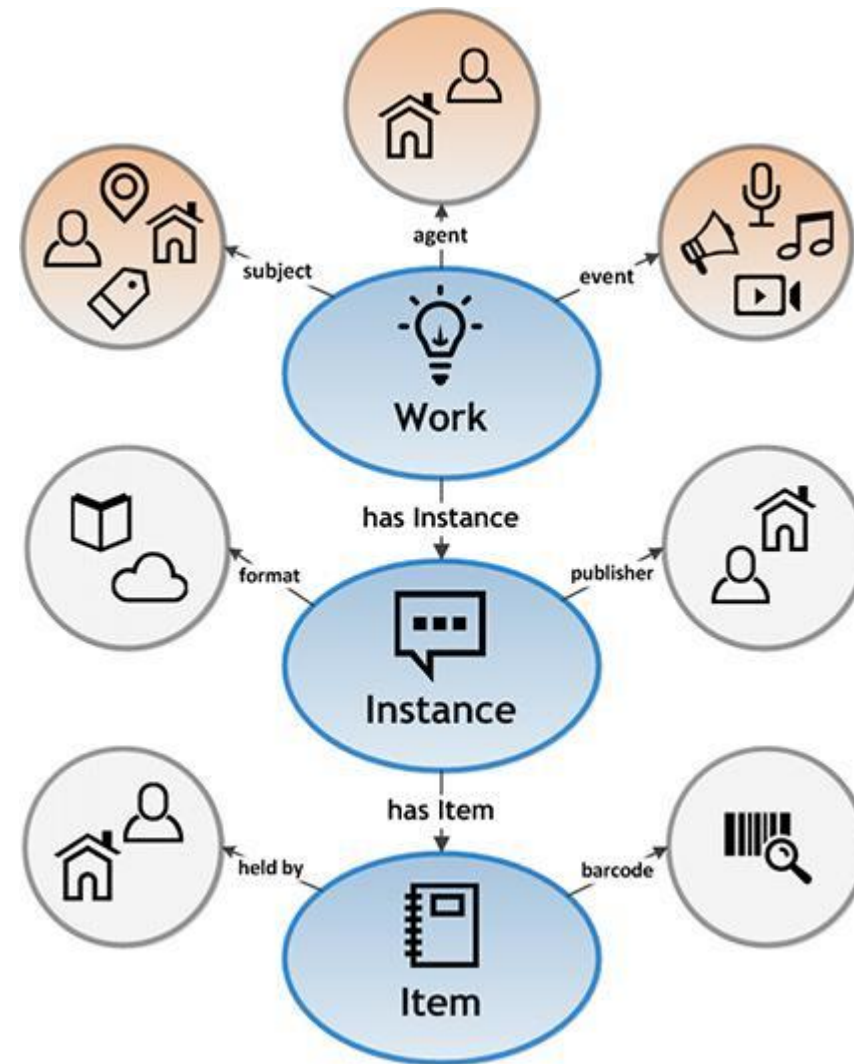
Library of Congress: BIBFRAME

BIBFRAME stands for BIBliographic FRAMEwork

- It's a Library of Congress' project started in 2011;
- It's the replacement for MARC and can be used as encoding standard for RDA and other cataloging standards;
- But it is not only a replacement of MARC and it is a linked data model and ontology primarily focusing on bibliographic data;

AND

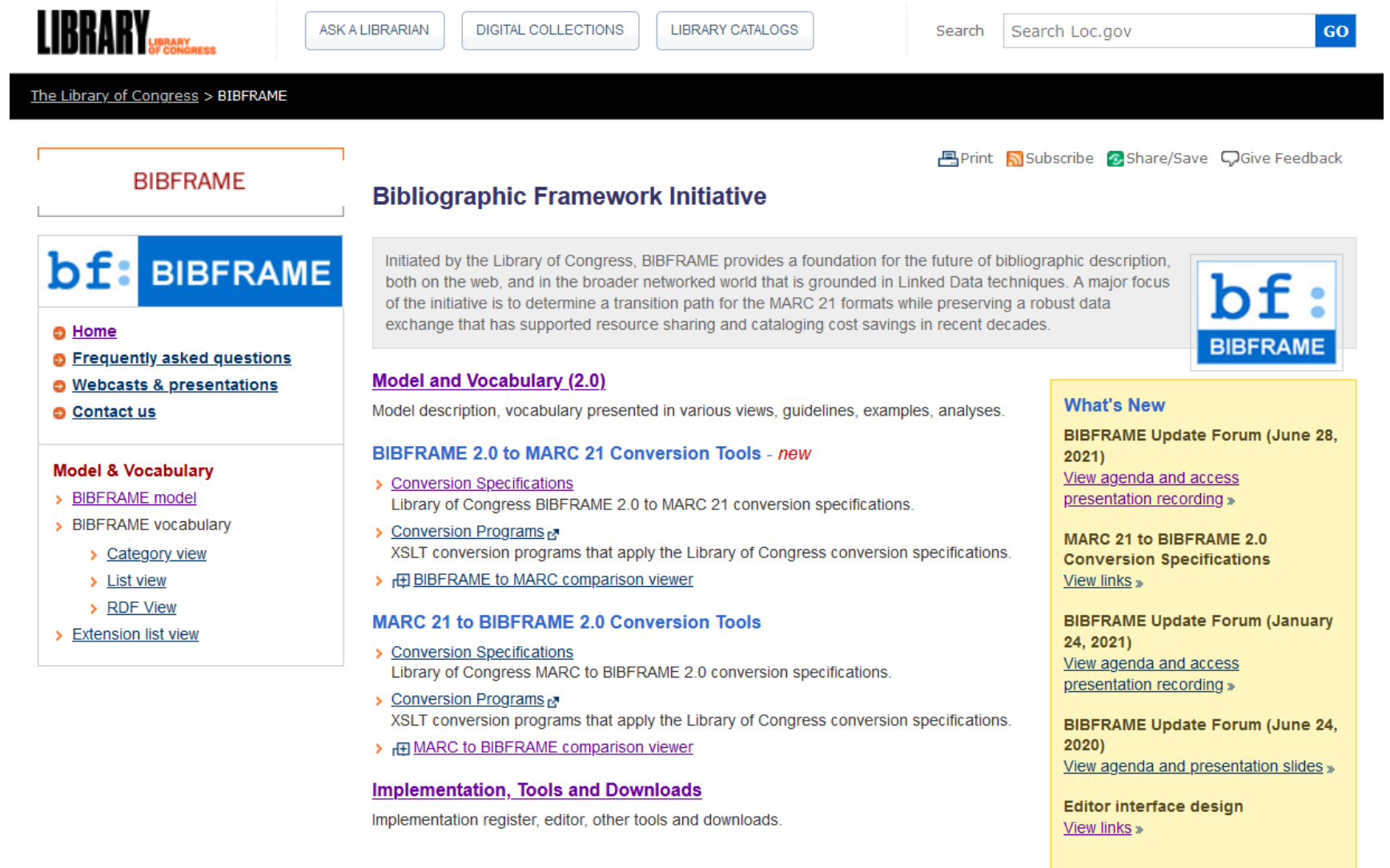
- It leverages the current web technology (semantic web/linked data) and uses RDF modeling practice.



Main BIBFRAME Project Site

Three linked data tools:

- BIBFRAME to MARC since 2020 (current version 1.0)
- MARC to BIBFRAME since 2012 (current version 1.6)
- New editor was released in April 2021



The screenshot shows the top navigation bar of the Library of Congress website, including the logo, search bar, and navigation buttons. Below the navigation bar is a breadcrumb trail: "The Library of Congress > BIBFRAME". The main content area is divided into a left sidebar and a main content area. The sidebar contains a "BIBFRAME" header, a "bf: BIBFRAME" logo, and a list of links: Home, Frequently asked questions, Webcasts & presentations, Contact us, and a "Model & Vocabulary" section with sub-links for BIBFRAME model, BIBFRAME vocabulary (Category view, List view, RDF View), and Extension list view. The main content area features a "Bibliographic Framework Initiative" section with a descriptive paragraph, a "Model and Vocabulary (2.0)" section, a "BIBFRAME 2.0 to MARC 21 Conversion Tools - new" section with sub-links for Conversion Specifications, Conversion Programs, and a comparison viewer, a "MARC 21 to BIBFRAME 2.0 Conversion Tools" section with sub-links for Conversion Specifications, Conversion Programs, and a comparison viewer, and an "Implementation, Tools and Downloads" section. On the right side, there are utility links (Print, Subscribe, Share/Save, Give Feedback) and a "What's New" section with three forum announcements and an "Editor interface design" link.

LIBRARY LIBRARY OF CONGRESS

ASK A LIBRARIAN DIGITAL COLLECTIONS LIBRARY CATALOGS

Search Search Loc.gov GO

The Library of Congress > BIBFRAME

Print Subscribe Share/Save Give Feedback

BIBFRAME

bf: BIBFRAME


- [Home](#)
- [Frequently asked questions](#)
- [Webcasts & presentations](#)
- [Contact us](#)

Model & Vocabulary

- [BIBFRAME model](#)
- BIBFRAME vocabulary
 - [Category view](#)
 - [List view](#)
 - [RDF View](#)
- [Extension list view](#)

Bibliographic Framework Initiative

Initiated by the Library of Congress, BIBFRAME provides a foundation for the future of bibliographic description, both on the web, and in the broader networked world that is grounded in Linked Data techniques. A major focus of the initiative is to determine a transition path for the MARC 21 formats while preserving a robust data exchange that has supported resource sharing and cataloging cost savings in recent decades.



Model and Vocabulary (2.0)

Model description, vocabulary presented in various views, guidelines, examples, analyses.

BIBFRAME 2.0 to MARC 21 Conversion Tools - new

- [Conversion Specifications](#)
Library of Congress BIBFRAME 2.0 to MARC 21 conversion specifications.
- [Conversion Programs](#) ↗
XSLT conversion programs that apply the Library of Congress conversion specifications.
- [BIBFRAME to MARC comparison viewer](#)

MARC 21 to BIBFRAME 2.0 Conversion Tools

- [Conversion Specifications](#)
Library of Congress MARC to BIBFRAME 2.0 conversion specifications.
- [Conversion Programs](#) ↗
XSLT conversion programs that apply the Library of Congress conversion specifications.
- [MARC to BIBFRAME comparison viewer](#)

Implementation, Tools and Downloads

Implementation register, editor, other tools and downloads.

What's New

- BIBFRAME Update Forum (June 28, 2021)**
[View agenda and access presentation recording](#) »
- MARC 21 to BIBFRAME 2.0 Conversion Specifications**
[View links](#) »
- BIBFRAME Update Forum (January 24, 2021)**
[View agenda and access presentation recording](#) »
- BIBFRAME Update Forum (June 24, 2020)**
[View agenda and presentation slides](#) »

Editor interface design
[View links](#) »

LC BIBFRAME 100

- *“BIBFRAME 100 means going from 100 catalogers working 2 days a week to approximately 350 catalogers working 5 days a week”*

--Sally McCallum, Library of Congress BIBFRAME Update, June 28, 2021:
www.loc.gov/bibframe/news/source/mccallum-ala-bf-update-an2021.pptx

- *“All catalogers keying into BIBFRAME system and not double keying to MARC”*

--Sally McCallum, BIBFRAME Workshop in Europe, September 21, 2021:
www.casalini.it/bfwe2021/web_content/2021/presentations/mccallum.pdf

OCLC Shared Entity Management Infrastructure

- It's a 2-year grant project (2020-2021);
- The purpose is to build a production shared entity management infrastructure that enables catalogers to create, maintain, use and reuse entity descriptions for **persons** and **creative works**;
- Initially the infrastructure will include millions of person and creative work entities from WorldCat, VIAF, and Wikidata.



“Reliable identifiers...”

“For linked data to move into common use, libraries need reliable and persistent identifiers and metadata for the critical entities they rely on. This project begins to build that infrastructure and advances the whole field.”

Lorcan Dempsey

Vice President

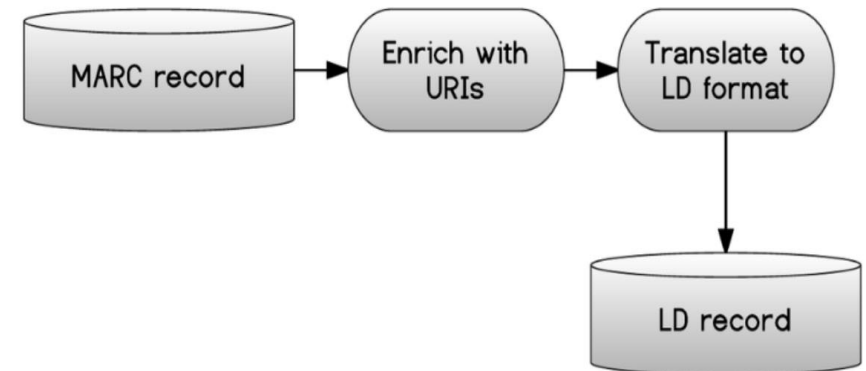
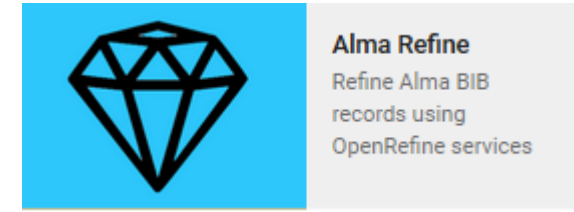
Membership and Research, and Chief Strategist

OCLC

To learn more about the project, watch the presentation: *Building a Shared Entity Management Infrastructure: Moving from Promise to Production*: www.youtube.com/embed/Z_MDPpzVRI4?start=11152&end=12611

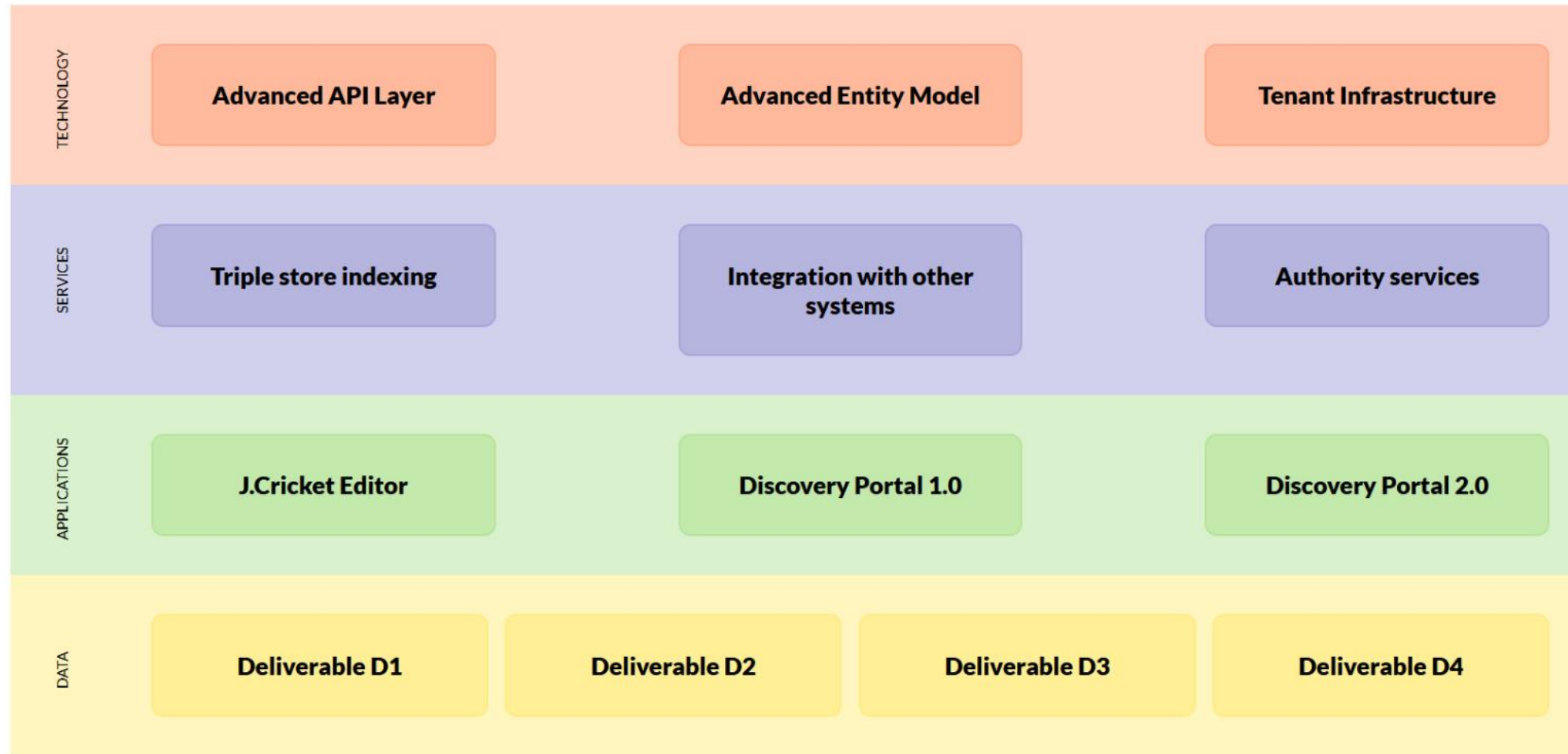
Ex Libris Linked Data Features

- SEO Sitemap
- Alma Refine Cloud App
- Author Card
- Publishing/Exposing records in following formats:
 - BIBFRAME
 - JSON_LD
 - RDA/RDF
- Provision of URIs



Share-VDE Initiative

- A **library-driven initiative** which brings together the bibliographic catalogs and authority files of libraries in the US, Canada and Europe **in a shared discovery environment** based on linked data. Share-VDE linked data platform consists of four major components:



Share-VDE Enables Linked Data Workflows

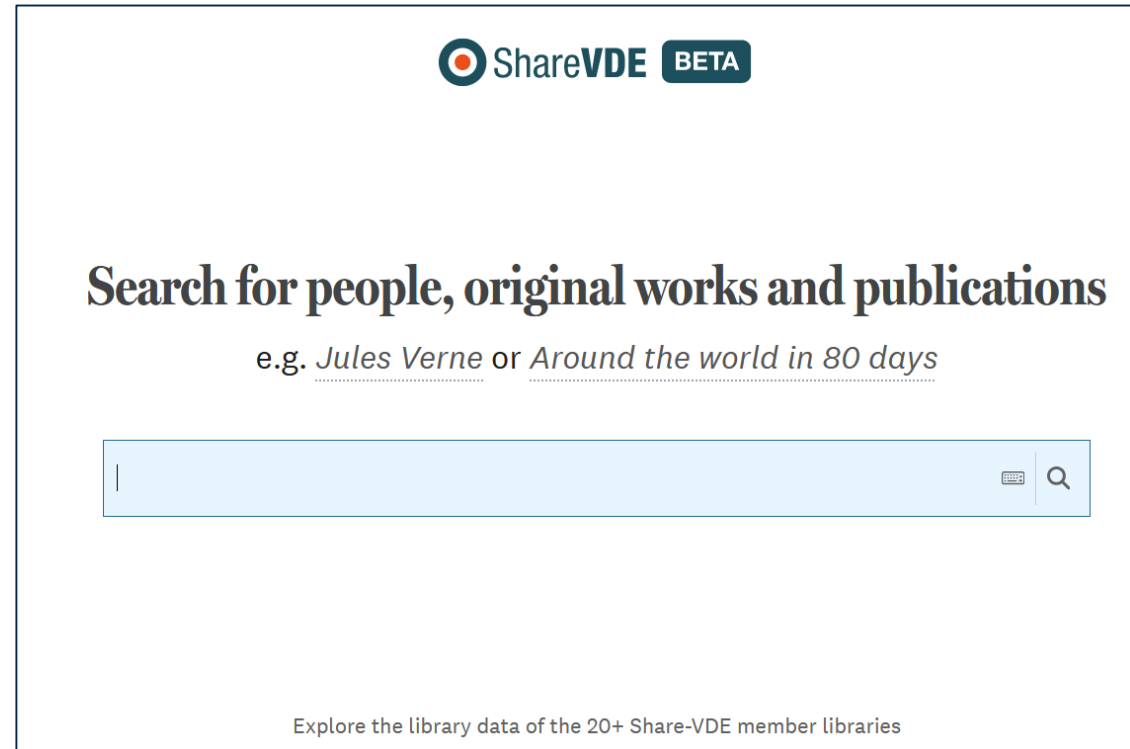
Share-VDE enables its member libraries to establish linked data based workflows by offering the following services:

- Enrich library MARC records with identifiers from external sources (e.g. ISNI, VIAF) and with original Share-VDE identifiers;
- Convert library's records from MARC to linked data (primarily BIBFRAME);
- Reconcile and cluster entities created through library data conversion;
- Deliver converted and enriched data to libraries for reuse in their systems;
- Publish converted records on Share-VDE discovery platform.

Share-VDE Discovery Platform

Discovery Portal 2.0

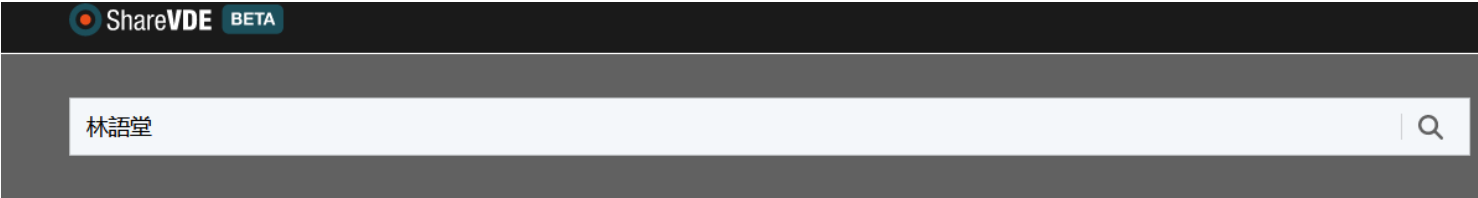
- Advanced entity discovery system based on BIBFRAME
- Customised UI (skin)
- Integration with local APIs
- Site mapping with additional meta-tagging
- Data conversion to Schema.org



The screenshot shows the ShareVDE Discovery Platform search interface. At the top right, there is a logo for ShareVDE with a 'BETA' badge. The main heading is 'Search for people, original works and publications', followed by an example search query: 'e.g. Jules Verne or Around the world in 80 days'. Below this is a search input field with a search icon on the right. At the bottom, there is a tagline: 'Explore the library data of the 20+ Share-VDE member libraries'.

www.svde.org/

Share-VDE Basic Search: 林語堂



All results (20875)

Agents (14182)

Original works (6693)

Results for 林語堂

14182 results found

Person

Yutang Lin

Chinese writer. Born in 1895. Died in 1976.

Also known as: 林語堂

Person

Yutang Lin

Writer. Born in 1895. Died in 1976.

Also known as: 林語堂



Person

Yutang Lin

Chinese writer. Born in 1895. Died in 1976.

Lin Yutang was a Chinese inventor, linguist, novelist, philosopher, and translator. His informal but polished style in both Chinese and English made him one of the most influential writers of his generation, and his compilations and translations of classic Chinese texts into English were bestsellers in the West. – Wikipedia

More options

Original works by

Publications by

Share-VDE Advanced Search: any author named Lin who was born in 1890s

Search for a person for whom Simple search ^

name contains the word and

birth year is in a range and

Clear all Search

Person results

Birth year Death year Occupation

51 results

Name	Birth year	Death year	Birth place	Death place	Occupation
 Sun Lin	1891	1940			
 Jiyong Lin	1896				
 Youdi Lin	1893	1984			
 Gengbai Lin	1897	1941			

Linked Data for Production (LD4P) Initiative

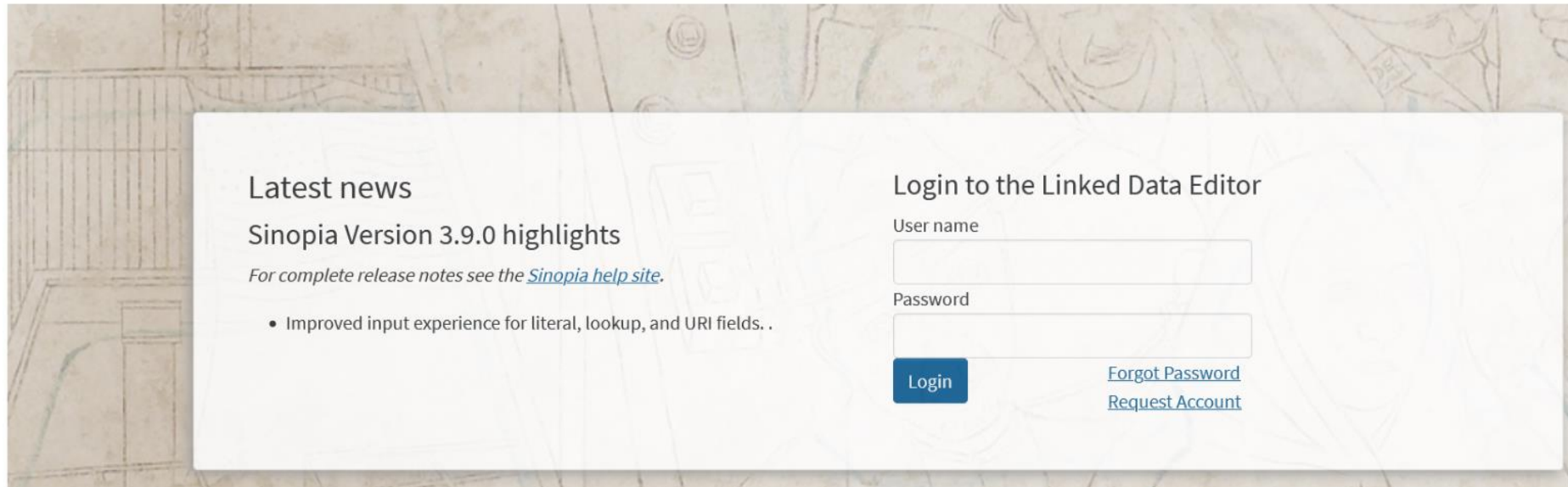
- A group of research libraries have worked together to implement linked data;
- Work began in 2016;
- Currently in phase 3 - *Linked Data for Production: Closing the Loop (LD4P3)*: wiki.lyrasis.org/pages/viewpage.action?pageId=187176106.



Linked Data for Production: Closing the Loop (LD4P3)

SINOPIA

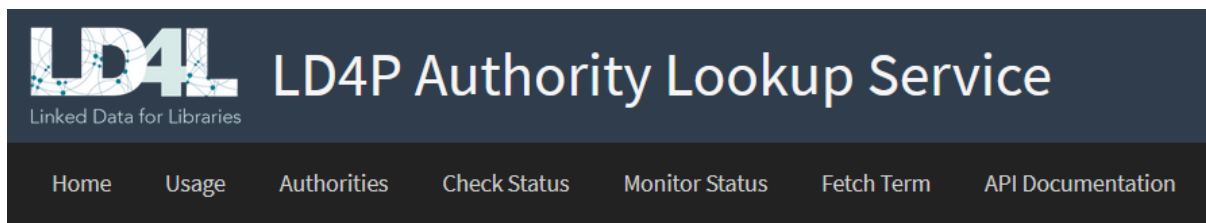
A cloud-based linked data editor



The screenshot shows the Sinopia website interface. On the left, there is a 'Latest news' section with the heading 'Sinopia Version 3.9.0 highlights' and a link to the 'Sinopia help site'. Below this is a bullet point: 'Improved input experience for literal, lookup, and URI fields.' On the right, there is a 'Login to the Linked Data Editor' section with input fields for 'User name' and 'Password', a blue 'Login' button, and links for 'Forgot Password' and 'Request Account'.

stage.sinopia.io

Linked Data for Production: Closing the Loop (LD4P3)



Contribution (Creator/Contributor) 🗑️

Primary Contribution + Add another

▼ Primary Contributor 🗑️

Person

▼ Name of Person 🗑️

🗑️ Lookup

Add new literal: lin, yutang x

LOC all names (QA) (6)

Lin, Yutang@en
Type: <http://www.w3.org/2004/02/skos/core#Concept>, <http://www.loc.gov/mads/rdf/v1#PersonalName>, <http://www.loc.gov/mads/rdf/v1#Authority>
Variant label: Lin, Yü-t'ang@en, 林语堂@en, 林煜堂@en, 林鈺堂@en, 林語堂@en
Editorial note: [THIS 1XX FIELD CANNOT BE USED UNDER RDA UNTIL THIS UNDIFFERENTIATED RECORD HAS BEEN HANDLED FOLLOWING THE GUIDELINES IN DCM Z1 008/32], [Non-Latin script references not evaluated.], [Machine-derived non-Latin script reference project.]

To learn more about this service, watch this presentation:

“Building a linked-data platform: Sinopia and Questioning Authority Server lessons learned and a look ahead”

-- shorturl.at/ixLT5

Linked Data for Production: Closing the Loop (LD4P3)

Stanford LIBRARIES Login My Account Feedback

SearchWorks articles+ All fields hummingbird × Q

Help 2021 Access Connection problem? Selections (0)

ARTICLES+ START hummingbird × Settings Direct access to full text ×

Search settings

- Scholarly & peer-reviewed only
- Direct access to full text

Refine your results


- Date ➤
- Source type ➤
- Language ➤

48,471 articles+ results

1 - 20 Next ➔ View Sort by relevance 20 per page Select all

TOPIC OVERVIEW ×

[Hummingbirds.](#)




Over four hundred species of hummingbirds have been identified in North and South America, forming the Western Hemisphere's second largest family of birds. These exceptionally small birds have the greatest comparative energy output of any...

Salem Press Encyclopedia of Science, 2020. 2p.

Linked Data for Production: Closing the Loop (LD4P3)

LD4 Community Site


[Home](#) [Affinity and Working Groups](#) [Communication Channels](#) [Conferences](#) 

LD4 Community

[LD4 2021 Conference](#)

The 2021 LD4 Conference will be held online July 12 to 23.

The Call for Proposals closed April 12. Proposal decisions will be communicated by May 14th.



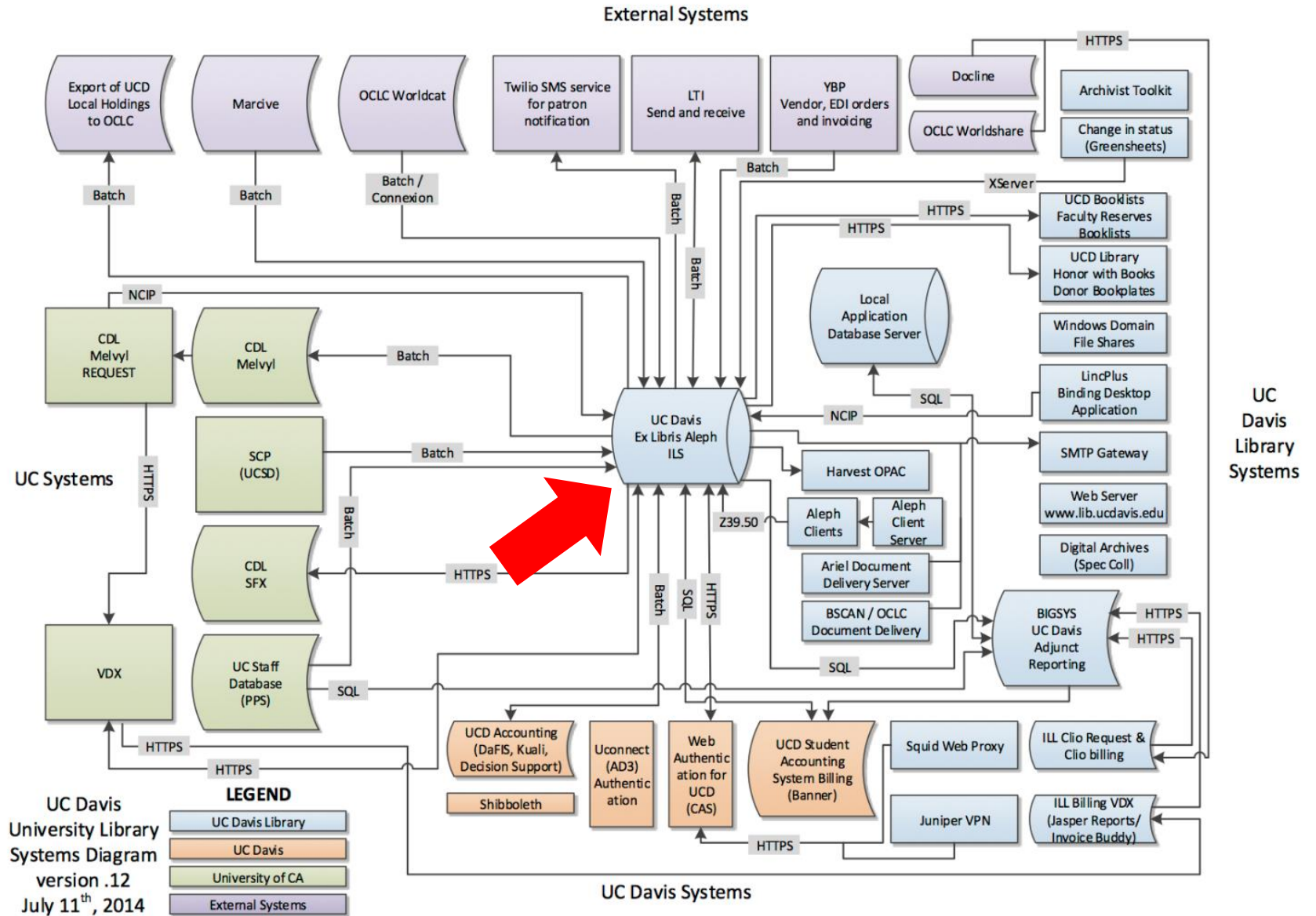
[Community Charter](#)

LD4 is a community that works together to advance library practice. We focus on linking and using data on the Web to advance the mission, goals and objectives of libraries.

Participation in the LD4 Community is open to anyone--individual or institution; non-profit, government or commercial. Through direct participation, and through its various channels, projects and events, LD4 brings together thousands of individuals worldwide.

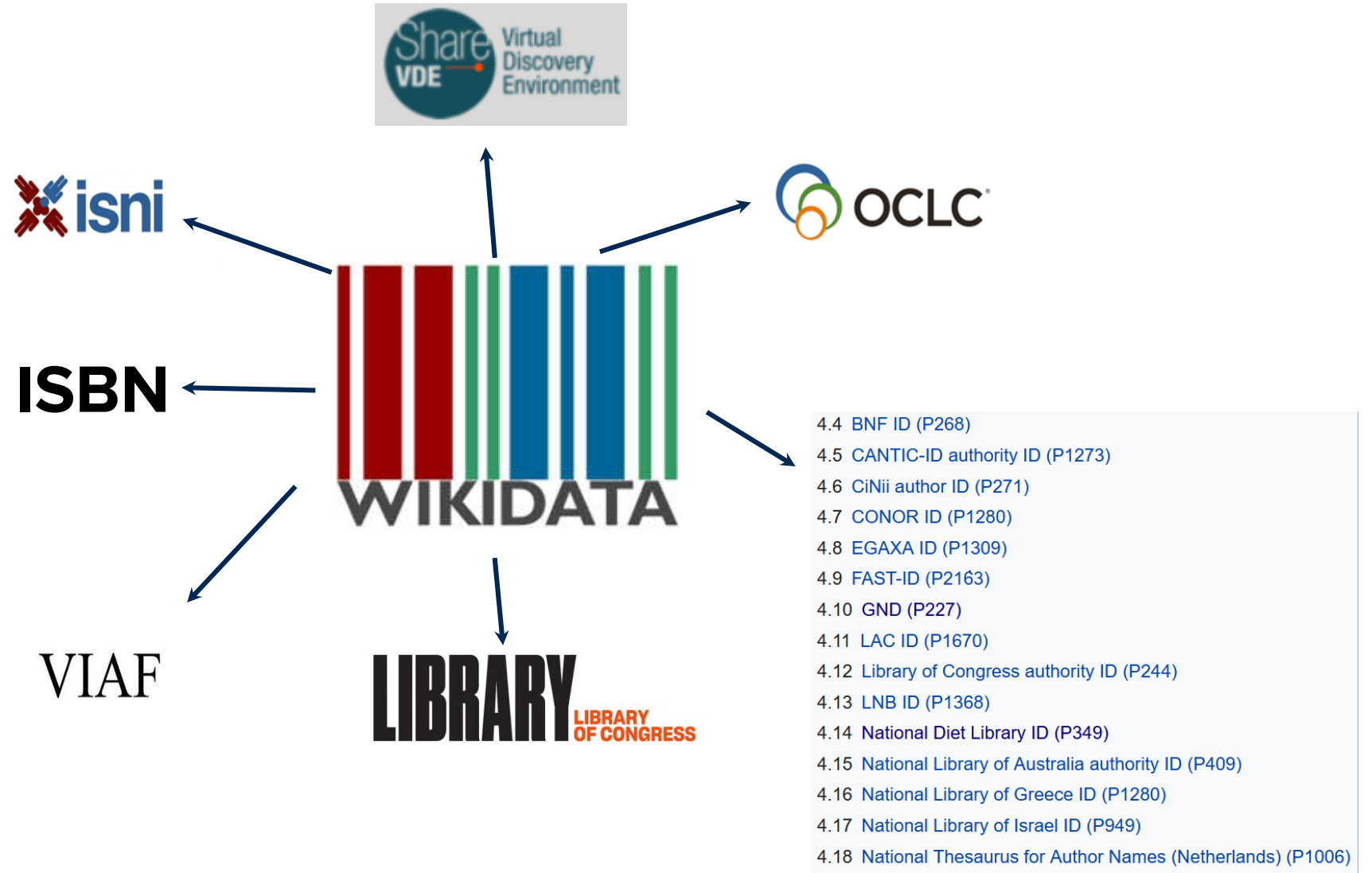
Trends and Challenges

Trend #1:
 BIBFRAME is
 gaining
 momentum, but
 MARC is NOT
 dead (yet)

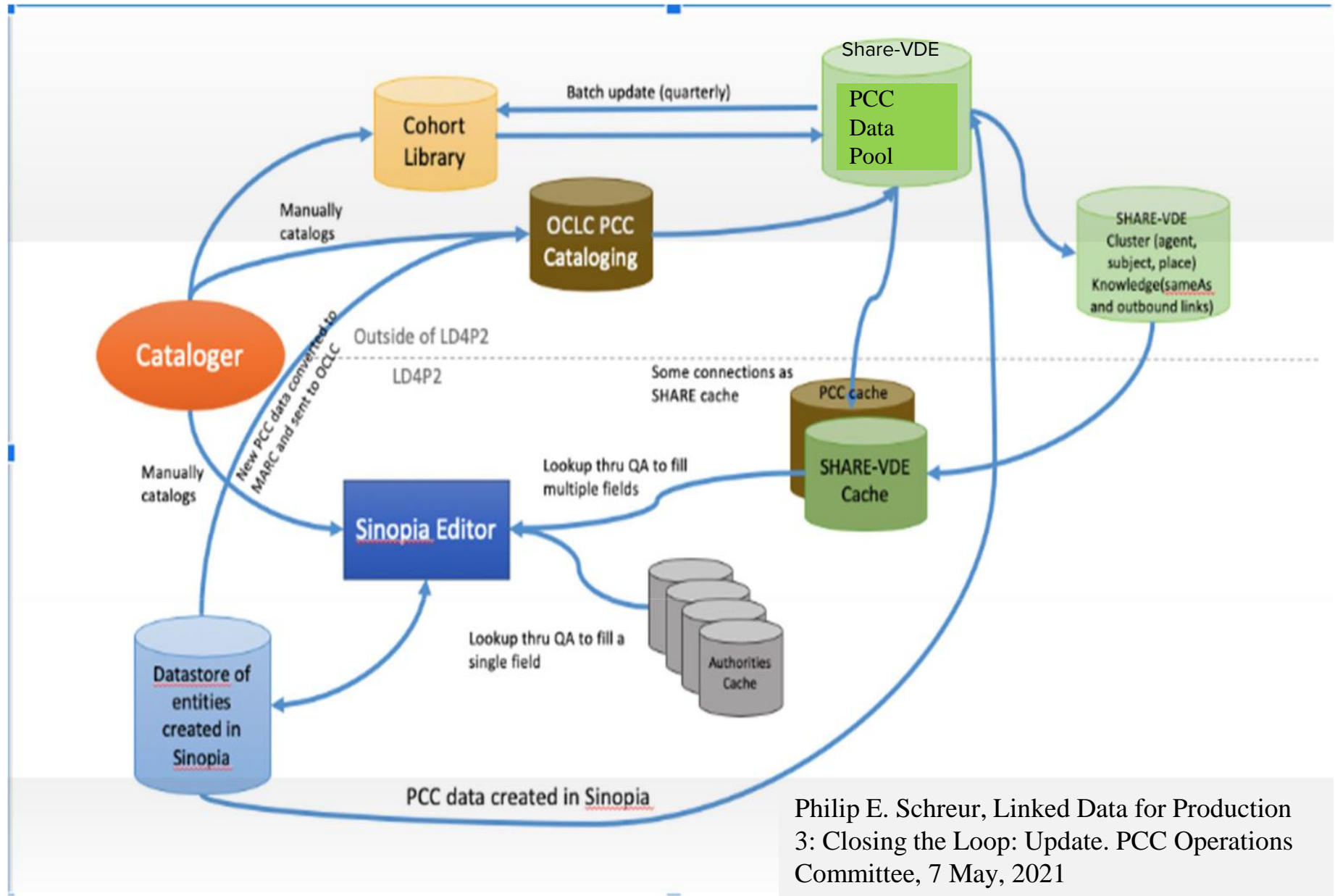


Trend #2:

Wikidata is part of library linked data landscape

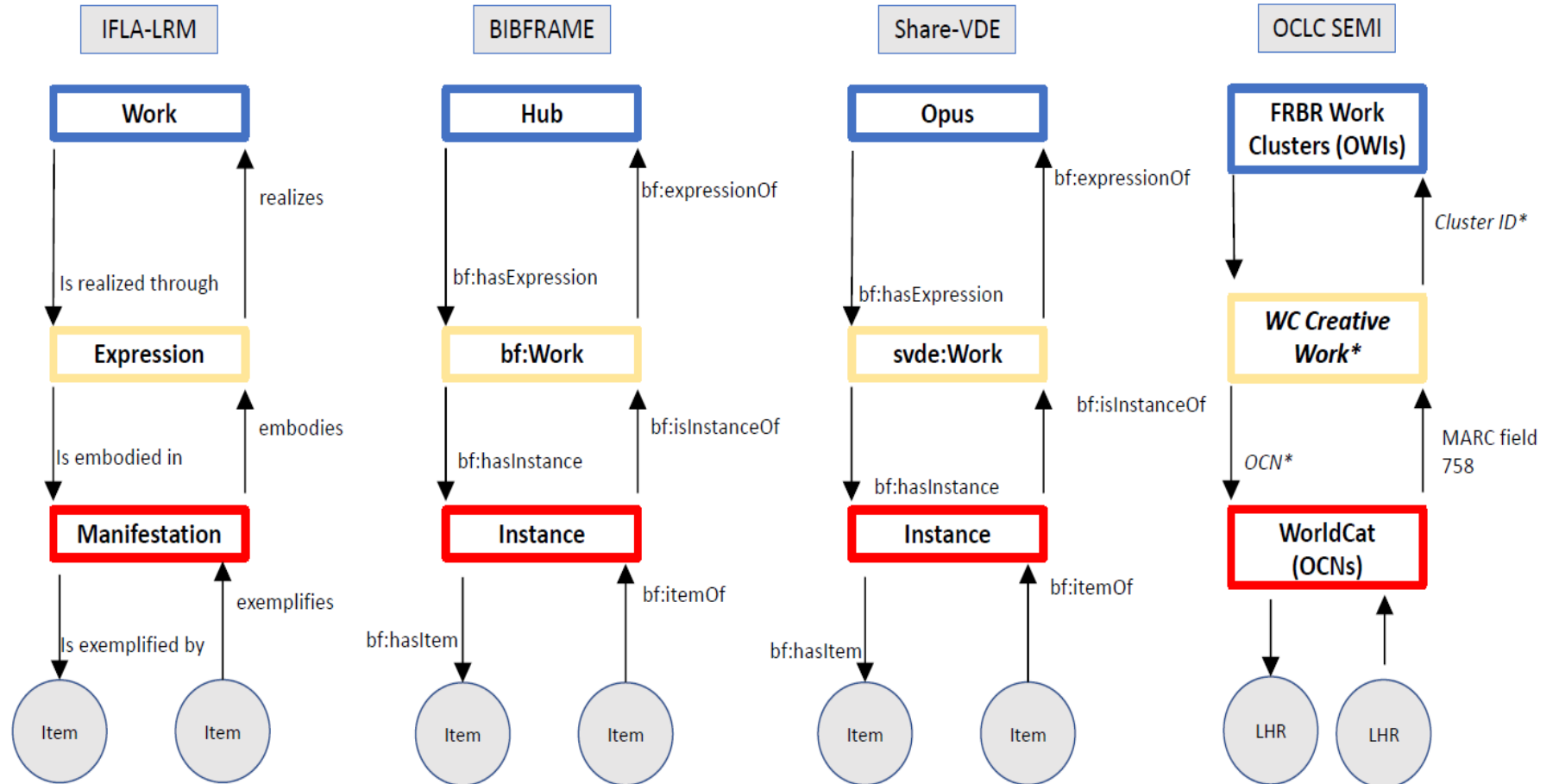



Trend #3:
 Focus not only
 linked data
 creation but
 workflows and
 data exchange



Philip E. Schreur, Linked Data for Production 3: Closing the Loop: Update. PCC Operations Committee, 7 May, 2021

Trend #4:
Stronger partnership - mapping between different data models



*not the final name/mechanism 

Courtesy of Nathan Putnam, OCLC

Trend #5:

Increased buy-in
from library
technology
vendors and library
professionals



gg118757453 GoGraph.com

Challenges

- There is no one data model or ontology that the library community has agreed upon;
- Lack of tools, especially systems that can efficiently support library linked data creation, maintenance, use and reuse as well as other library operations;
- It's difficult to convert MARC records to/from linked data;
- Lack of resources (money, time, etc.);
- Shift in mindset of the cataloging community has been slow.

Impact on Cataloging

Impact

Paradigm shift:

- Record based cataloging --- >> Entity based cataloging
Users seek info about names or titles and won't have to find that info buried in records; catalogers won't have to worry about consistently citing the entities from one record to the next.
- Describing --- >> Linking
It's not that description lacks importance. The attributes associated with an entity in essence serve to describe the entity. Catalogers just need to point to the entities.
- Authority control --- >> Identity management
In a linked data world the prime need is for identifiers for entities; the text string is now of secondary importance.
- Record creator --->> Knowledge manager
Managing the relationships among entities is the service that users need.

Exciting opportunity to reimagine and reengineer our own future!

Skills Needed for the Linked Data Future

- Familiarity with cataloging rules & best practices from a number of communities;
- Ability to analyze relationships and to make connections (links);
- Basic understanding of linked data and Resource Description Framework (RDF) terms, such as triples, URIs, etc.;
- Sufficient knowledge of linked data technology and its applications in libraries, for example, data modeling, ontology development, SPARQL, and API;

An ability to develop essential skills for managing change is applicable: be flexible and positive, able to deal with ambiguity, patient and resilient, and able to think outside the box.

Learning by Doing

- Practice linked data cataloging using Sinopia
 - Anyone can create an account in the Sinopia stage environment: stage.sinopia.io
- Use Wikidata to generate URIs for entities important to you and/or your organization
 - Create a Wikidata account:
www.wikidata.org/w/index.php?title=Special:CreateAccount&returnto=Wikidata%3AMain+Page
 - Smithsonian Wikidata Project presentation:
bit.ly/DISC2021Forum0623
 - WikiProject Chinese Culture and Heritage
www.wikidata.org/wiki/Wikidata:WikiProject_Chinese_Culture_and_Heritage



Be Involved

- Share your knowledge by attending and presenting at library linked data webinars, conferences, and workshops
- Join the LD4 Community
 - Sign up email lists and/or join slack channel
 - Become a member of 8 affinity groups or form your own group
- IGeLU/ELUNA Linked Open Data Community of Practice Group
 - Subscribe to email list
 - Volunteer for the working group
 - Attend the group's events, such as town hall meeting



Thank you!