COMMUNICATIONS ON PRACTICE

Challenges and Considerations of Linked Data Editors

A Comparison of Sinopia and Marva

Greta Heng, Patricia Lampron, and Myung-Ja Han

With the growing recognition of the advantages offered by linked data within the library community, libraries have made a lot of effort to support cataloging and metadata professionals in transitioning to linked data, which has led to the development of linked data editors. Although the available editors facilitate linked data-based input templates and output formats, these tools nonetheless have room for improvement. In this Communication on Practice, the authors compare two notable linked data editors based on their supported features and functions. They then delve into considerations when designing user-friendly and ontology-agnostic linked data editors. Finally, the authors address the challenges encountered by libraries during the transition to linked data production and examine the broader implications of this transition for information organization professionals.

As an integral member of cultural heritage institutions, the library boasts a rich tradition and history of organizing and stewarding valuable collections. These collections and their catalog records have historically operated in relative isolation however, disconnected from other cultural heritage institutions as well as resources available on the web. To bridge this gap and expand their reach to a broader audience while building connections across the internet, libraries have been experimenting with and implementing linked data and associated technologies since the early 2000s.

Recent efforts in transitioning to linked data have been undertaken by multiple stakeholders on various fronts, mostly focusing on the creation and production of linked data as well as discovery services. These efforts aim to meet the evolving needs of resource description in the linked data environment and facilitate data sharing.

As libraries embrace linked data creation, metadata practitioners are shifting from document-centric bibliographic records to entity descriptions. Consequently, metadata experts are experimenting with restructuring bibliographic data into Resource Description Framework (RDF) data models and defining entities using Uniform Resource Identifiers (URIs) as part of the transition to linked data creation.

BIBFRAME, an ontology for bibliographic description, was created to transform semi-structured string-based library data into structured, relationship based linked data represented with URIs.[1] This transformation would allow the wider web to effectively leverage library data. Simultaneously, other initiatives and grant projects related to linked data, such as SHARE Virtual Discovery Environment (ShareVDE) and Linked Data for Production (LD4P), are gaining traction.[2] Library system vendors

Greta Heng (gheng@sdsu.edu), Cataloging and Metadata Strategies Librarian, San Diego State University, https://orcid.org/0000-0002-3606-6357. **Patricia Lampron** (plampron@uci.edu), Cataloging and Metadata Librarian, University of California, Irvine, https://orcid.org/0000-0003-1070-5998. **Myung-Ja Han** (mhan3@illinois.edu), Metadata Librarian, University of Illinois at Urbana-Champaign, https://orcid.org/0000-0001-5891-6466.

Library Resources & Technical Services | July 2024
https://doi.org/10.5860/lrts.68n3.8226

are also actively involved in developing linked data functions and have announced their plans for supporting linked data features within their systems in recent years.

One of the notable efforts in this area has been the development of linked data editors, namely Marva and Sinopia.[3] This paper examined functionalities of those two linked data editors, including ontologies used, supported output formats, templates and associated functions to understand the current state of linked data editors, and how metadata creators can use them to move toward a future of library linked data.[4] Although the development of linked data editors is a significant step toward expanding the creation of linked data, the authors would like to propose further enhancements in the system design to amplify the flexibility and user-friendliness of linked data editors. The paper also suggests key functionalities to consider for a "true" linked data editor that supports the creation of library data as linked data. Finally, the paper identifies challenges for cataloging and metadata practitioners transitioning to linked data creation.

Two Current Linked Data Editors

The discussion of creating catalog data as linked data has rapidly progressed into the development of applications such as Sinopia, a linked data editor from the LD4 project, and Marva, a BIBFRAME editor from the Library of Congress (LC), both designed from their inception to create library metadata as linked data. This section compares these two editors, Sinopia (in its test environment, Sinopia Stage) and Marva, based on key functionalities, including the ontologies used to organize the metadata, their output and structure of the data.[5] It is important to note that these two editors were developed for very distinct purposes. While Marva is available for everyone, its primary user group is the catalogers of LC for their bibliographic description. In contrast, Sinopia is designed for a wider user group. It is not limited to institutions involved in the Linked Data for Libraries (LD4L)[6] and LD4P, rather, its customizable functionality accommodates various use cases across organizations interested in creating linked data.

Ontologies and Data Export Formats

Both editors enable the creation of library bibliographic data in BIBFRAME. Marva is currently limited to BIBFRAME creation; however, according to LC's presentation at the 2023 LD4 Conference on Linked Data, it has the potential to support additional linked data ontologies.[7] On the other hand, Sinopia accommodates properties from a wide range of linked data ontologies, allowing users to select their preferred linked data ontology. Users can generate data in Resource Description and Access (RDA) and schema.org among others. Although Marva produces output in Extensible Markup Language (XML) format, Sinopia exports data in multiple representations, such as JSON-LD (JavaScript Object Notation for Linked Data), N-Triples, and Turtle.

Templates/Profiles and Associated Functions

The terms "profile" and "template" are often used interchangeably when discussing metadata editors, although Marva and Sinopia utilize them somewhat differently. Marva employs pre-designed profiles

that capture metadata within the BIBFRAME framework, utilizing the BIBFRAME data model and associated properties. These profiles are categorized based on resource type, such as monographs, notated music, serials, and other formats. Each profile includes specific properties tailored to describe the respective resource type. Some values specific to the resource type are pre-populated, for example, the monograph profile automatically populates the content type as "text," media type as "unmediated," and carrier type as "volume." The Marva profiles encompass metadata for both work and instance as shown in figure 1.

One unique feature of Marva is importing data from LC's BIBFRAME Works and BIBFRAME Instances databases.[8] Users can achieve this by selecting a profile after providing the Uniform Resource Locator (URL) of the resource data from one of the databases (see figure 2). Then, they may create instance level data for the imported work level data. It is unclear how Marva will link the instance data to its work data if one exists in Marva, as the value of <Instance of> in the imported instance data cannot be edited (see figure 3).

Sinopia employs "resource" templates which can either be created by the user or chosen from existing templates created by other Sinopia users. Because Sinopia's templates are independent to one another, relationship models break down into separate templates. For instance, the Program for Cooperative Cataloging (PCC) BIBFRAME templates in Sinopia are separated for work and instance. Users must connect them via elements within the template (see figure 4).

A unified form for populating work and instance data together in Marva proves less cumbersome and more user-friendly than Sinopia's separate templates. It also prompts the question, however, of whether each instance level data creation requires creating new work-level description sets.

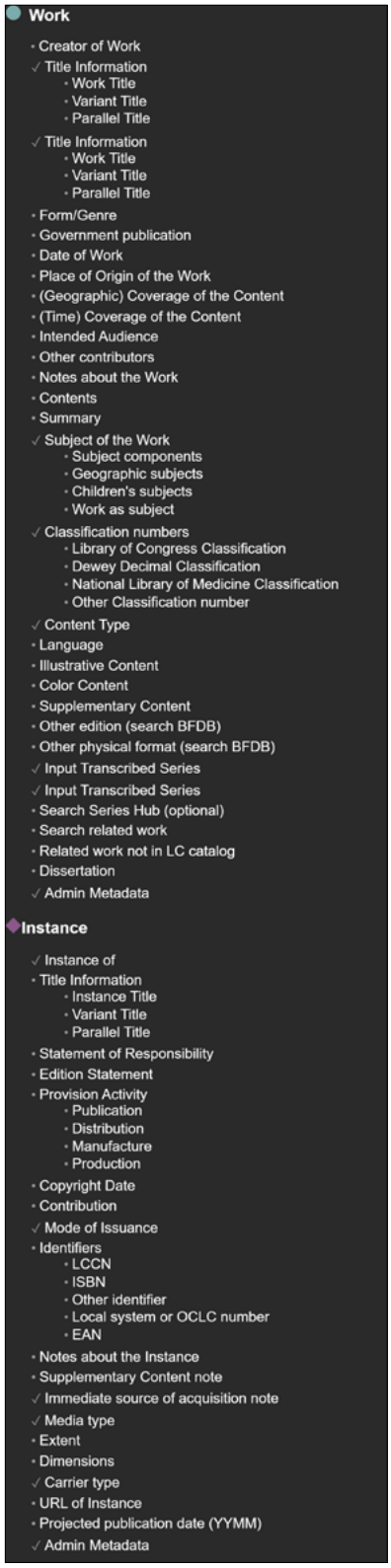

Figure 1. The Marva New Record Editing Page Shows the Properties of Both Work and Instance on the Left Panel.

Labels and Remarks

In addition to BIBFRAME, labels for elements in Marva are sourced from original RDA terms and MARC21. These labels are linked to their corresponding RDA terms. This could pose a challenge to users as some properties from both work and instance levels with similar meanings are presented on a single page. For instance, users need to differentiate between <Preferred Title for Work> in the work-level profile and <Main Title> in the instance-level profile. Similarly, <Other Contributors> in the work-level profile and <Contribution> in the instance-level profile

could be confusing.[9] Additionally, it would further obscure matters when the labels of elements use acronyms and MARC fields. For example, elements used for the provision activity section in the instance include labels: <EDTF Date (to/from 008)>, <Search place of publication (to/from 008)>, <Place (to/from 26X $a)>, <Name (to/from 26X $b)>, and <Date (to/from 26X $c)>.

Sinopia supports customization of labels and remarks (see figure 5). Within their PCC templates, they indicate RDA core elements in remarks. While some original RDA-based labels may still be confusing, users can add remarks to elements that provide helpful guidance.

Users must possess some understanding of MARC cataloging to effectively use Sinopia, however. This is reflected in the remarks to some elements in Sinopia PCC templates. For instance, the remark for <Main Title> is "equivalent to MARC 245$a." Nevertheless, the authors acknowledge that this feature helps catalogers with MARC knowledge to understand the new linked data editor easily.

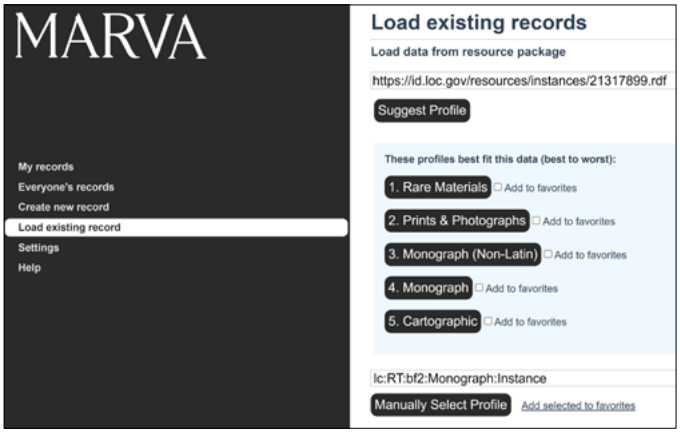

Figure 2. Loading an Instance Data in Marva

Figure 3. Imported Instance Data in Marva

Figure 4. <InstanceOf> Element Connecting Work and Instance in Sinopia

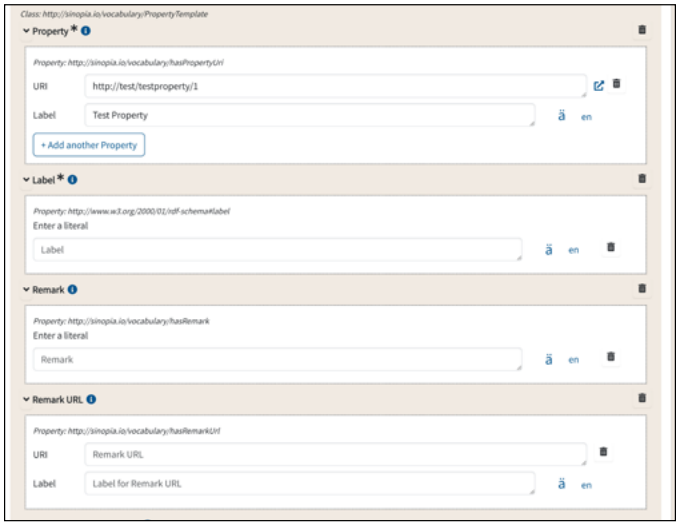

Figure 5. Customizable Labels and Remarks in Sinopia

Search and Auto Completion Functions

Both editors have an auto-completion feature, and the ability to query external linked data services and populate data with strings and URIs directly to the form. These features simplify the use of the editor for catalogers while integrating linked data functionality.

The agent and subject search functionality in both editors, however, have room for improvement. For example, Marva only supports left-anchored search. When searching personal names, one must input the names in "lastname-firstname" order. When searching for agent and subject names, a search interface pops up, enabling users to access detailed entity information. As figure 6 illustrates, additional details provided on the right side of the window aid users in disambiguating names. Although Sinopia supports free text search that largely

enhances search flexibility and efficiency, it only displays the name label for the agent without additional information when searching for agents (see figure 7). This requires users to consult external sources for confirmation.

Both editors incorporate dropdown lists to assist users in selecting controlled vocabularies defined by the original RDA. For instance, according to RDA 7.15, <Illustrative Content> only allows values from a controlled vocabulary list.[10] Sinopia provides a dropdown box for the controlled vocabulary as figure 8 shows. Marva's autocomplete input box requires "activation" to become visible. Simply clicking the input box does not display the vocabulary list; instead, users must begin typing or enter a space to access the controlled vocabularies.

Certain properties in linked data editors should be automatically determined by the system, sparing users from manual input. For instance, in Marva's Work level data, the system can be upgraded to automatically populate the value to the <Non-sort Character Count> property once users provide values for <Preferred Title for Work>.

Validation and Permission Control

Marva allows users to add any new elements from BIBFRAME ontology and new sections on the left panel, even for some elements that should typically only have one value according to RDA, such as, <Preferred Title for Work>.[11]

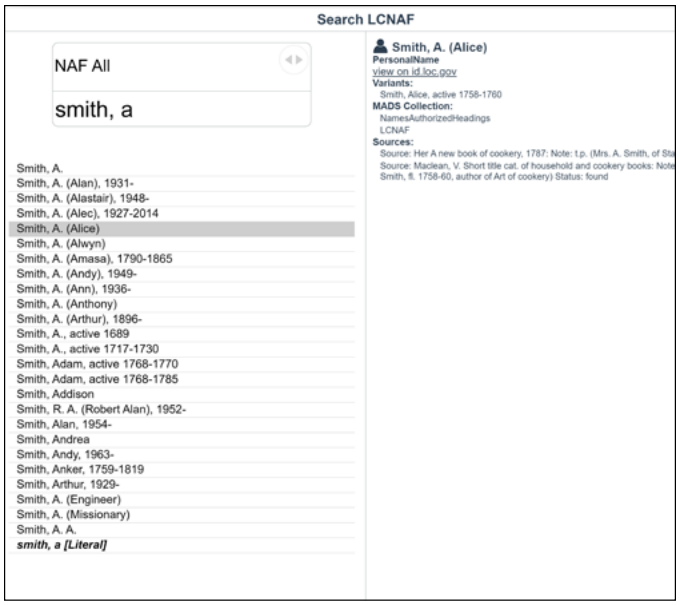

Figure 6. Marva's Name Search Interface

Figure 7. Sinopia's Name Search Box

In figure 10, two title information sections and two <Preferred Title for Work> elements were added in the monograph work template and saved successfully.

For information deletion, a pop-up window appears at the top of Marva to confirm deletion when a clustered set of elements is removed. Interestingly, when a user deletes an element that only contains one instance in the left panel and successfully saves the data, the information is not removed and comes back upon reloading the record. This step helps mitigate unintended data deletion. In addition, Marva

has a red debug button on the top right of each element set. Upon clicking this button, the editor presents users with a JSON-LD file detailing the usage of the elements, as shown in figure 11. Not all users are familiar with reading JSON-LD files, however. Converting the essential information from the JSON-LD file into plain text could enhance the communication of usage notes for elements, including repeatability and mandatory status.

In terms of user permissions, Marva grants every user the ability to load and modify all records without restriction. The editor automatically saves the user's record, making it instantly searchable by all users in the "Everyones' records" section in the left panel. Only the data creator is authorized to delete their own records, however. Sinopia's PCC BIBFRAME templates define the cardinality of vocabularies. For elements intended for singular usage, such as <Primary Contributor> and <Work Title>, the " + add" option is absent, unlike other elements that are repeatable. Sinopia does not ask users to confirm the deletion action before they attempt to delete a field. Once deleted, the data is removed with no re-do option (previous versions can be viewed but not restored).

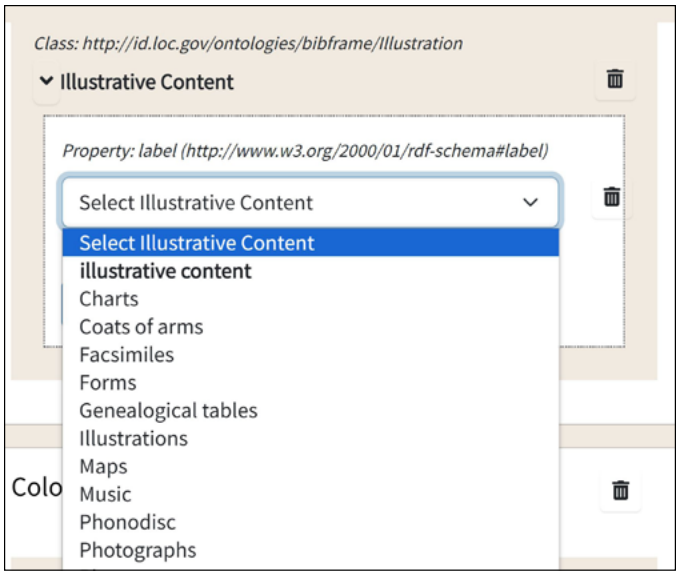

Figure 8. Sinopia's Dropdown Box for Illustrative Content Terms

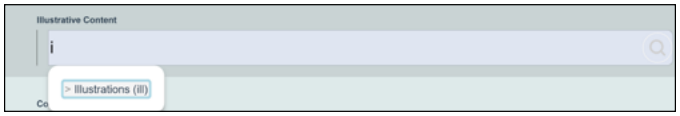

Figure 9. Marva's Autocomplete Input Box for Illustrative Content Terms

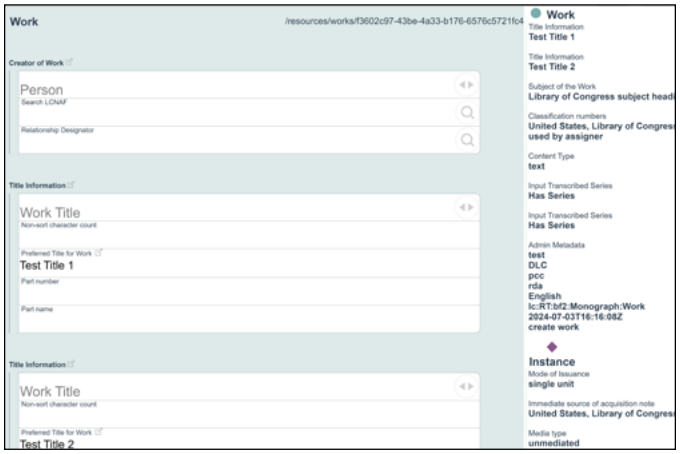

Figure 10. Two <Preferred Title for Work> Added in a Marva Work Data

For user management, Sinopia has a user group setting that is similar to the current institutional-level data management and consortium-level data management approaches. Users can belong to multiple groups within the system. While all data is accessible to all users, the ability to modify data is limited to specific groups. As shown in figure 12, users can select one group to represent the creator institution and grant editing permissions to several groups using a dropdown list. It is important to note that once a resource is created in Sinopia Stage, however, there is no option to delete it.

Integration of linked data sources

Both editors integrate various linked data sources that are used for agents, subjects, and genres. Sinopia boasts a broader integration of linked data sources, such as Homosaurus, Medical Subject Headings (MeSH), and Faceted Application of Subject Terminology (FAST), in addition to Library of Congress Name Authority File (LCNAF) for agents, Library of Congress Subject Headings (LCSH) for subjects, and Library of Congress Genre/Form Terms (LCGFT) for genres.

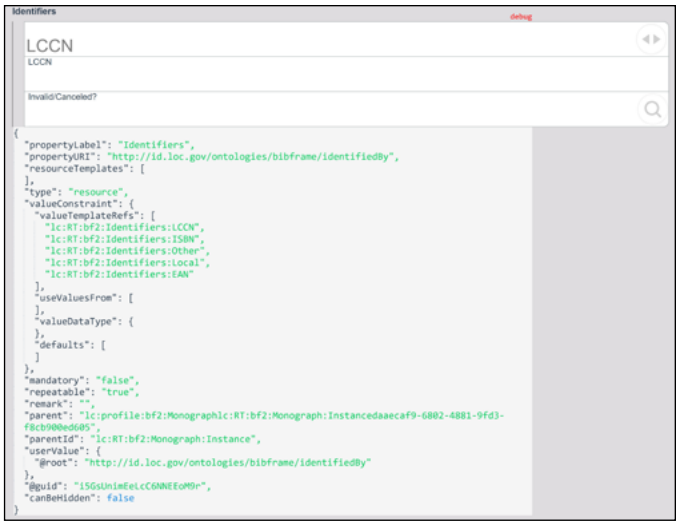

Figure 11. Debug Button in Marva

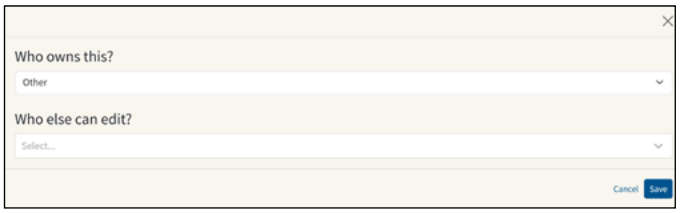

Figure 12. Permission Setting in Sinopia

Regarding BIBFRAME data as the linked data source, both editors have limited compatibility in integrating external BIBFRAME data or URIs. In Marva, user created work or instance data cannot be linked to imported BIBFRAME data. Marva also does not allow linking an imported instance to an imported or existing work within the platform, as previously discussed. Additionally, if a BIBFRAME Hub is applicable, Marva restricts entities as values solely from the LC BIBFRAME Hubs database.[12] Similarly, Sinopia only allows Sinopia's URIs as values of the <InstanceOf> element created in its platform as of now. If a BIBFRAME Hub is applicable, however, Sinopia provides flexibility by enabling linkage with both BIBFRAME Hubs and ShareVDE Opus for Works created within its platform.[13]

Duplication Detection

Neither of the editors includes duplication detection for duplicated works, nor do they detect duplicated elements. It would greatly enhance user experience if the system could implement real-time validation, allowing users to receive immediate alerts when an incorrect value is provided, or a duplicated work or instance is created. This function should auto-detect errors and differ from the validation process in OCLC Connexion, which requires users to click the validation button at the end of the cataloging process and scroll through the interface for modifications. By integrating real-time validation into the linked data editors, the system could significantly improve efficiency and accuracy for the linked data production process.

Both Marva and Sinopia have undergone significant improvements over the last few years, showcasing what the future of library linked data editors looks like with new features and functionalities. Table 1 summarizes how each linked data editor is similar to and different from the other.

Table 1. Summary of Two Linked Data Editors' Features and Functions

Functionality	Sinopia	Marva
Ontologies	BIBFRAME, RDA, etc.	BIBFRAME
Export data formats	Multiple representations, such as JSON-LD, N-Triples, and Turtle	XML
Templates / Profiles	Fully customizable	Customizable for resource types
Work / Instance	Separate Work and Instance records	Unified form for new Work and Instance together; separate Work and Instance for imported records
Labels	Customizable labels	Not customizable
Include 'Remarks'	Customizable remarks	No remarks
Search and Auto Completion Functions	Free text search; only labels displayed when searching	Left-anchored search; search interface to provide details to help with name disambiguation
Validation	No data deletion confirmation; data cardinality can be defined	Data deletion confirmation; cardinality is not defined.
Permission Control	Has editing permission control; records cannot be deleted	No editing permission control; users can remove their own records
Integration of Linked Data Sources	Yes	Yes
Duplication Detection	No duplication detection	No duplication detection

Views from the Field

The authors conducted two unofficial and informal surveys involving catalogers for each of these two editors. The survey responses will not be quoted or presented in a manner that would require review and approval by an institutional review board. Although the surveys were not conducted according to rigorous research protocols and are not the focus of this article, they nonetheless hold value in reflecting the perspectives of cataloging professionals. It is, however, important to acknowledge and consider potential biases when making comparisons.

Seven participants (two graduate students and five original catalogers) attended the overview session, "Hands on with Marva," provided by LC at the 2023 LD4 Conference, and were asked to provide their thoughts on the editor.[14] For Sinopia, eleven people (five original catalogers, two graduate students, two non-catalogers, and two cataloging and metadata librarians) were surveyed about their experience with Sinopia Stage without any prior training (see appendix for survey questions).[15]

The majority of the participants did not encounter issues in navigating and using the two editors to describe resources. They stated, however, that both editors were not intuitive enough in their design and terminology. Commonly mentioned issues included excessive clicks, verbosity, and difficulty understanding new terms. Respondents acknowledged that there are some knowledge barriers in working with the editors, including knowledge of RDA/FRBR and Library Reference Model (LRM) as entity relationships.[16] Although they can understand the hierarchical data models (such as BIBFRAME's work and instance), some said that they were confused about the templates in the editors. As an

example, some expressed confusion about why work-level data must be created whenever they create instance-level data in Marva. In addition, respondents expressed the need to gain a deeper understanding of how their contributions within the editors generate linked data, rather than a catalog record, and what happens to that data after the creation. These concerns stemmed from practical considerations. Participants compared the BIBFRAME data creation with their current workflow of exporting data from a shared database, such as OCLC, to a local integrated library system (ILS). Given the absence of a library system supporting the ingestion of BIBFRAME (or linked) data, they were uncertain about how the linked data they created would be connected to the semantic web for wider discovery and how it would be ingested into their local system.

The survey responses underscore the necessity of conducting usability testing for the new linked data editors—emphasized in the Bibliographic Conceptual Models Interest Group Core IG week presentation—and highlight the need to address the entire metadata life cycle for linked data, from production to discovery.[17] Linked data creation encompasses more than just the development of a linked data editor; catalogers are grappling with understanding the entirety of the linked data creation process and workflows. To foster greater acceptance of linked data adoption among cataloging and metadata practitioners, it is crucial to provide practical workflows and present robust infrastructure and systems that support linked data.

Discussion

The authors' comparison of the two linked data editors and feedback gathered from the field have prompted questions regarding the roles and expectations of linked data editors in the cataloging community, as well as additional considerations for the community to work together to become linked data producers and consumers.

Building a True Linked Data Editor

The library community has made great progress in developing linked data editors. There is nonetheless room for improvement to facilitate easier data creation and use.

- Linked data editors need to be ontology-agnostic: The information landscape is evolving, and no single ontology can adequately support various types of resource descriptions. Although BIBFRAME is being adopted by the library community as the next bibliographic data ontology, some institutions are opting for alternative ontologies. For example, the German National Library developed its own ontology for authority data and the University of Washington Libraries presented research on RDA mappings to and from MARC.[18] Additionally, some institutions are exploring combining BIBFRAME with other ontologies, such as schema.org.[19] Linked data editors should support these diverse institutional needs to foster broader adoption of linked data production. This also entails using simple labels for the editor that are understandable by everyone, not just professional data creators, as the goal of moving forward with linked data is to make the library's rich data accessible to a broader audience on the web.

- Linked data editors should utilize built-in mappings, such as BIBFRAME, schema.org, and/or even MARC, in different representation formats, to support wider use of library data. Data created from the editor with simple labels should be transformable into many different ontologies and formats, all within the editor. This will enable linked data consumers to utilize library data more effectively and ensure data interoperability and consistency.
- Linked data editors should serve as a repository for a collection of templates/profiles that are easy to find, use, and modify to support the creation of library data in diverse formats as linked data. These profiles and templates could be shared with the community to encourage reuse.
- Linked data editors should offer flexibility, allowing the addition or modification of templates/profiles to suit local practices, specific needs, and additional linked data sources. This flexibility will ensure that resources are described to the best of their ability to serve information discovery and access.

Additionally, there are other aspects that the community needs to investigate, particularly how the linked data editor and the system can work better, such as generating work-level data with instance data, duplication detection, autocomplete, and lookup capabilities for linked data sources. Although the current creation of BIBFRAME work and instance data is created separately, leveraging instance-level data could serve as a starting point for creating work-level data. It is also worth exploring the potential of generating work-level data automatically, akin to some discovery systems' ability to offer FRBRization services. Although the structure and vocabularies can be complicated, there is a certain division of work between front-end users and back-end users, and it is time to explore what systems can do better and what cataloging and metadata professionals do better.

Challenges of Transition to Linked Data Production

Having a functional linked data editor is the first step toward producing linked data for library bibliographic description. Transitioning into the linked data era requires collaborative efforts from vendors, cataloging professionals, information experts, and libraries.

Infrastructure for Linked Data Production

Linked data needs to be stored, utilized, and published. The resource description infrastructure comprises a wide range of components, including linked data hubs, data management systems, data models for linked data, and linked data editors. In the absence of an ILS that utilizes and supports linked data, and a publicly available data repository or hub integrated with linked data editors, along with a well-defined data management strategy, it becomes challenging to assess the value and cataloging efficiency of linked data editors. Although major ILS vendors have been experimenting with integrating linked data into cataloging workflows, full integration of linked data into operations requires more time. Currently, only a few institutions have established the entire infrastructure. The resource description experience for the broader library community, with access to part of the infrastructure, remains a significant challenge.

Training

The transition to linked data requires an understanding of different data models, as well as the shift from record to data and entities, and subsequently, new ontologies, for example, BIBFRAME, RDA, and others. Additionally, creating new bibliographic data will not be the same as it involves using a new interface and new concepts on relationships. This means that catalogers need to learn a new ontology, a new system, and a new content standard, different from current practices. Planning for training will also be challenging as there is no system to test and use for training of the life cycle management of linked data. Furthermore, it would impact the qualifications of future professionals, requiring discussions and collaborations between practitioners and library and information science educators so students can be prepared for their future profession.

Workflow Design and Documentation

Workflow design and documentation have become a priority for information organization professionals to consider. As the ontology changes over time, so too does the system we use. To adapt to these foreseen changes, our profession needs best practices guidance and documentation that ensure consistency in data creation, supporting smooth data sharing and management not only within the library domain but also across cultural heritage institutions. While numerous initiatives by LC, PCC, and other institutions exist, the successful development and ongoing maintenance of such workflows and documentation can only be achieved through community-wide discussion and support.

Known Unknowns

As BIBFRAME is still an evolving target, it poses complexities for developers to adapt its changes into the platforms, as these changes may necessitate ongoing alterations to the platforms.[20] Moreover, the distinctive features of BIBFRAME, such as its alignment with linked data principles and its multilayer hierarchical structure, further complicate development work.

Changing Landscape of Information Organization

In light of the changing landscape of information organization caused by linked data, the roles of information professionals in technical services have expanded beyond the traditional realm of data creation. Their scope now extends to a broader array of resource management and library services, including coordinating data management, facilitating data publishing, providing training, and more. Simultaneously, they find themselves collaborating with more diverse stakeholders, such as library information technology professionals, ILS vendors, users, public service colleagues, and scholars seeking specialized data profiles. Additionally, the skill sets expected of library metadata professionals within the linked data environment have significantly expanded. Skills include understanding systems that generate and utilize library data, grasping multiple ontologies, and staying current with emerging trends to lead these changes. As the roles and additional skill sets required in the information organization environment continue to evolve, it poses challenges in the recruitment, retention, and professional development of individuals in these roles.

Conclusion

The assessment of the two linked data editors confirms that the library has made significant progress in laying the foundation for library linked data production. It also confirmed, however, that there are still areas to consider for growth and further developments to meet the ever-evolving linked data landscape. Although libraries have a standard ontology within the community, library data needs to be available in other ontologies and various formats to make it usable for service providers outside of the library and interoperable with abundant resources available on the web.

When developing current or new library linked data editors, it would be worthwhile to revisit Coyle's 2000 blog post: "No single record format is going to serve all of our data processing needs or all of the information communities that we will interface with," and "we must turn our attention to system design."[21] Transitioning to linked data production is not a simple process, as it involves changes in the data management life cycle plan with system development, and we need to develop a linked data editor in tandem with developing a system that can utilize linked data.

References and Notes

1. Library of Congress, "LC's Bibliographic Framework Initiative: An Update" (presentation, Semantic Web in Libraries 2012, Cologne, Germany, November 28, 2012).
2. SHARE Virtual Discovery Environment, "Share-VDE: linked data for libraries," accessed April 15, 2024, https://wiki.share-vde.org/wiki/Main_Page; Linked Data for Production, "Linked Data for Production (LD4P)," accessed April 15, 2024, https://wiki.lyrasis.org/pages/viewpage.action?pageId=74515029.
3. Library of Congress, "Marva Editor," version 0.13.15, accessed March 25 2024, https://bibframe.org/Marva/editor; Linked Data for Production: Pathway to Implementation (LD4P2), Sinopia, version 3.17.81, accessed March 31, 2024, https://sinopia.io.
4. Myung-Ja Han, Patricia Lampron, Greta Heng, "Considerations of Designing a User Friendly BIBFRAME Editor: Challenges and Future of Information Organization Professionals" (presentation, BIBFRAME Workshop in Europe 2023, online and Brussels, Belgium, September 19, 2023).
5. Linked Data for Production: Pathway to Implementation (LD4P2), Sinopia Stage, version 3.17.81, accessed on March 25, 2024, https://stage.sinopia.io.
6. Linked Data for Libraries, "Linked Data for Libraries (LD4L)," accessed April 15, 2024, https://wiki.lyrasis.org/pages/viewpage.action?pageId=41354028.
7. Keven Ford and Paul Frank, "Hands-on with Marva" (presentation, 2023 LD4 Conference on Linked Data, online, July 10, 2023).
8. Library of Congress, "BIBFRAME Works," accessed April 1, 2024, https://id.loc.gov/resources/Works.html; Library of Congress, "BIBFRAME Instances," accessed April 1, 2024, https://id.loc.gov/resources/Instances.html. While Marva has Hub templates and it is theoretically possible to import a Hub record from LC's BIBFRAME Hub database, Hub template is not listed in the suggested templates.

9. "Contributors" in Works refer to the agents associated with a Work but "contribution" in Instances mean agents associated with a manifestation, which could be producer of an unpublished manifestation, publisher, distributor, or manufacturer, according to the RDA terms.
10. RDA Toolkit, "7.15: Illustrative Content," accessed April 1, 2024, https://original.rdatoolkit.org/7.15.html.
11. RDA Toolkit, "Preferred Title: A Title or Form of Title Chosen to Identify a Work," accessed April 2, 2024, https://original.rdatoolkit.org/rdachp6_rda6-2036.html.
12. Library of Congress, "BIBFRAME Hubs," accessed April 1, 2024, https://id.loc.gov/resources/hubs.html.
13. Share-VDE Opus is a type of bf:Work, which is similar to bf:hub that serves as a cluster to gather works with certain features; Tiziana Possemato, "Share-VDE: Interoperability in Practice" (panel discussion, Dublin Core Metadata Initiative (DCMI) 2024 Conference, online, October 5, 2021).
14. Ford and Frank, "Hands-on with Marva."
15. Greta Heng, Myung-Ja Han, "Revamping Metadata Maker for 'Linked Data Editor': Thinking Out Loud," *Code4Lib Journal* 55 (2023), https://journal.code4lib.org/articles/16925.
16. IFLA Functional Requirements for Bibliographic Records (FRBR) Review Group, "IFLA Library Reference Model: A Conceptual Model for Bibliographic Information," 2017, https://repository.ifla.org/handle/123456789/40.
17. Rob Sanderson, "BIBFRAME Needs a Usability Makeover (and It's as Easy as ABC)" (presentation, Bibliographic Conceptual Models Interest Group Core IG Week session, online, March 7, 2024).
18. German National Library, "GND Ontology," accessed March 25, 2024, https://d-nb.info/standards/elementset/gnd; Crystal Clements et al., "RDA/RDF at the University of Washington Libraries" (presentation, Semantic Web in Libraries 2021, December 3, 2021, Online).
19. Richard Wallis, "From Ambition to Go Live: The National Library Board of Singapore's Journey to an Operational Linked Data Management & Discovery System" (presentation, BIBFRAME Workshop in Europe 2023, Brussels, Belgium, September 19, 2023).
20. BIBFRAME changlog can be viewed at https://github.com/lcnetdev/bibframe-ontology/blob/main/CHANGELOG.md.
21. Karen Coyle, "Is MARC Dead?" (panel, American Library Association Annual Conference, Chicago, July 6–12, 2000), http://www.kcoyle.net/marcdead.html.

Appendix. Survey Questions

Survey Questions for Sinopia Stage

- Multiple choice: Sinopia-Easiness to use
  - Extremely hard
  - Hard, but can follow through it
  - Easy
  - Very easy
- Checkboxes: Sinopia-Knowledge and skill sets required to use (Select all that apply.)
  - RDA
  - Bibframe
  - MARC
  - FRBR
  - LCSH and other controlled vocabularies
  - Name authority
  - Linked data
  - None
- Have you heard about Sinopia or used it?
  - Yes
  - No
- Do you create name authority records as a part of your job?
  - Yes
  - No
- Do you create original cataloging records as a part of your job?
  - Yes
  - No

Survey Questions for Marva

After attending "Hands-on with Marva," please share your thoughts on following questions:

1. How easy is it for you to use?
2. What kind of things would you like to know more about in order to use the editor easily?
3. What kind of training would be needed?
4. What overall impressions do you have of the editor?