# Training Course on Designing and Managing Linked Data Projects in Libraries

Professional Development Training Course Outline

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| **Category** | Library Institute | **Duration** | 10 Days |
| **Base Fee** | $3,000 USD | **Delivery Mode** | Online / On-site Hybrid |

## Course Introduction

The landscape of information organization and discovery is rapidly evolving, driven by the emergence of **Linked Data** and **Semantic Web** technologies. Libraries, as custodians of vast and diverse knowledge, are at the forefront of this transformation. Traditional bibliographic data, often confined within siloed systems, limits the discoverability and interconnectedness of library resources. This course addresses the critical need for library professionals to master the principles, tools, and methodologies required to design, implement, and manage **Linked Data projects**, thereby unlocking the full potential of their collections in the global **knowledge graph**. Embracing Linked Data empowers libraries to enhance **resource discoverability**, foster **data interoperability**, and establish themselves as central nodes in the **digital information ecosystem**.

Training Course on Designing and Managing Linked Data Projects in Libraries is designed to equip library and information science professionals with the **practical skills** and **strategic insights** necessary to navigate the complexities of **Linked Data initiatives**. From understanding fundamental concepts like **RDF** and **URIs** to developing robust **ontologies** and implementing **data transformation workflows**, participants will gain hands-on experience in building and sustaining **semantic infrastructure**. The course emphasizes a **project-based learning** approach, integrating **real-world case studies** and **best practices** to ensure that attendees can confidently lead their institutions toward a future of interconnected and intelligent library services.

## Programme Curriculum

### Training Course on Designing and Managing Linked Data Projects in Libraries

**Introduction**

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**Course Duration**

10 days

**Course Objectives**

1. Comprehend core **Linked Data principles**, including **RDF**, **URIs**, and the **Semantic Web architecture**, for enhanced data representation.
2. Develop proficiency in designing and evaluating **domain-specific ontologies** and **vocabulary management** for library data.
3. Gain hands-on experience with tools and techniques for **MARC21 to RDF conversion** and **legacy data migration**.
4. Identify and leverage relevant **Linked Open Data (LOD)** datasets (e.g., Wikidata, VIAF, LC Linked Data) for enriching local collections.
5. Construct and execute complex **SPARQL queries** to retrieve, manipulate, and analyze **linked library data**.
6. Learn the methodologies for building and populating **knowledge graphs** specific to library collections.
7. Design strategies for integrating **Linked Data** into existing **library discovery platforms** and **digital repositories**.
8. Develop skills in assessing **data quality**, **data governance**, and **metadata management** for Linked Data projects.
9. Apply **agile project management** principles to successfully plan, execute, and monitor **Linked Data initiatives** within a library setting.
10. Understand the intersection of **Linked Data** with **Artificial Intelligence (AI)**, **Machine Learning (ML)**, and **Big Data analytics** in libraries.
11. Advocate for and implement **interoperability standards** to foster seamless data exchange across diverse library systems and external platforms.
12. Identify and articulate compelling **use cases** for **Linked Data** that demonstrate tangible value and benefits for library users and operations.
13. Position the library's data as a valuable component of the wider **global knowledge graph**, increasing visibility and impact.

**Organizational Benefits**

- Improve the visibility and accessibility of library collections through integration with the broader **web of data**, leading to increased usage and engagement.

- Facilitate seamless data exchange and integration with other cultural heritage institutions, research platforms, and commercial services, breaking down **data silos**.
- Develop a scalable and flexible **metadata infrastructure** that can adapt to evolving technological landscapes and user expectations, embracing **semantic search** capabilities.
- Position the library as a leader in **digital scholarship** and **open data initiatives**, enhancing its reputation and fostering new collaborations.
- Streamline metadata creation and management processes through automated data linking and enrichment, reducing manual effort and improving data consistency.
- Provide richer, more interconnected data for **digital humanities**, **data science**, and other research endeavors, fostering new avenues of inquiry.
- Leverage **Linked Data principles** to reduce long-term costs associated with siloed systems and fragmented data, promoting **sustainable data practices**.

**Target Audience**

1. Metadata Librarians and Catalogers.
2. Digital Initiatives Librarians.
3. Systems Librarians and IT Staff
4. Library Administrators and Managers
5. Archivists and Museum Professionals.
6. Researchers in Library and Information Science.
7. Data Curators and Data Scientists.
8. Anyone interested in the future of information organization and discoverability in libraries.

**Course Outline**

**Module 1: Introduction to Linked Data and the Semantic Web**

- What is Linked Data? Principles, history, and its role in the evolving web.
- The Semantic Web Vision: Beyond the web of documents to the web of data.
- Key Components: URIs, RDF (Resource Description Framework), and triples.
- Linked Data vs. Traditional Databases: Understanding the paradigm shift.
- Case Study: The British National Bibliography (BNB) as Linked Data: How a national bibliography transformed its data for wider web consumption.

**Module 2: Core Technologies: RDF, RDFS, and OWL**

- RDF Syntax and Serializations: Turtle, JSON-LD, RDF/XML.
- RDF Schema (RDFS): Defining classes and properties.
- Web Ontology Language (OWL): Expressing richer semantics and relationships.
- Modeling Library Entities with RDF: Works, persons, places, events.
- Case Study: BIBFRAME 2.0: Analyzing how the new bibliographic framework utilizes RDF to describe resources.

**Module 3: URIs and Identifier Management**

- The Importance of Global Identifiers: Unique identification of entities.
- Persistent vs. Dereferenceable URIs: Best practices for web identifiers.
- Minting and Managing URIs: Strategies for creating and maintaining stable URIs for library resources.
- Resolving URIs: Understanding HTTP redirection and content negotiation.
- Case Study: VIAF (Virtual International Authority File): How VIAF creates and links URIs for names, enabling global authority control.

**Module 4: Linked Open Data (LOD) Cloud and its Ecosystem**

- Exploring the LOD Cloud: Key datasets and their interconnections.
- Common LOD Datasets for Libraries: Wikidata, GeoNames, ISNI, DBPedia.
- Leveraging External LOD for Enrichment: Enhancing local data with external knowledge.
- Challenges and Opportunities of LOD Integration: Data quality, licensing, and maintenance.
- Case Study: Using Wikidata to enrich author and subject data in an academic library catalog.

**Module 5: Data Modeling for Linked Data Projects**

- From MARC to RDF: Conceptual mapping and transformation challenges.
- Entity-Relationship Modeling for Linked Data: Identifying entities, attributes, and relationships.
- Choosing the Right Ontology/Vocabulary: Schema.org, BIBFRAME, RDA, Dublin Core.
- Designing Custom Vocabularies: When and how to create institution-specific terms.
- Case Study: The Harvard Library's transition to BIBFRAME for descriptive metadata, demonstrating a large-scale data modeling effort.

**Module 6: Data Transformation and ETL Workflows**

- Extracting Data from Legacy Systems: MARC, XML, relational databases.
- Transformation Techniques: Scripting (Python, XSLT), mapping tools.
- Loading Data into Triplestores: Choosing and configuring a triple store.
- Validation and Quality Control: Ensuring data integrity and consistency.
- Case Study: A public library's project to convert its local history collection records into Linked Data using custom Python scripts and OpenRefine.

**Module 7: Querying Linked Data with SPARQL**

- SPARQL Basics: SELECT, WHERE, GRAPH patterns.
- Advanced SPARQL: FILTER, OPTIONAL, UNION, AGGREGATE queries.
- SPARQL Endpoints and Tools: Accessing and querying Linked Data.
- Federated Queries: Querying across multiple Linked Data sources.
- Case Study: Using SPARQL to analyze research output metadata from institutional repositories to identify interdisciplinary connections.

**Module 8: Triplestores and Linked Data Infrastructure**

- Types of Triplestores: Native triplestores, RDF stores over relational databases.
- Key Features and Capabilities: Scalability, performance, querying.
- Deployment Options: On-premise, cloud-based solutions.
- Integrating Triplestores with Existing Systems: APIs and connectors.
- Case Study: The National Library of France's use of a large-scale triplestore to manage and expose its national bibliography as Linked Data.

**Module 9: Publishing and Consuming Linked Data**

- Linked Data Principles for Publishing: HTTP URIs, RDF dereferencing.
- Linked Data Platforms and Tools: Publishing frameworks.
- Consuming Linked Data: Data clients and integration into applications.
- Licensing and Rights for Linked Data: Open data principles.
- Case Study: Publishing a university's special collections metadata as Linked Data for wider visibility and reuse by researchers.

**Module 10: Project Management for Linked Data Initiatives**

- Scoping Linked Data Projects: Defining objectives, deliverables, and timelines.
- Stakeholder Identification and Engagement: Building consensus and buy-in.
- Team Roles and Responsibilities: Data architects, metadata specialists, developers.
- Risk Management and Mitigation: Addressing technical, organizational, and data quality challenges.
- Case Study: Managing the "Linked Data for Libraries (LD4L)" project, highlighting collaborative efforts and phased implementation.

**Module 11: Data Governance and Quality Control in Linked Data Projects**

- Establishing Data Governance Frameworks: Policies, procedures, roles.
- Metadata Quality Metrics: Accuracy, consistency, completeness, timeliness.
- Data Validation and Reconciliation: Tools and techniques for ensuring data quality.
- Versioning and Persistence of Linked Data: Managing changes over time.
- Case Study: A consortium's efforts to establish shared data quality guidelines and reconciliation processes for their linked authority data.

**Module 12: Linked Data in Discovery and User Experience**

- Enhancing Discovery with Linked Data: Semantic search, faceted Browse.
- Knowledge Panels and Contextual Information: Enriching search results.
- Personalization and Recommendation Systems: Leveraging linked relationships.
- Visualizing Linked Data: Graph visualizations, network analysis.
- Case Study: Implementing a new discovery layer that leverages Linked Data to provide richer contextual information and serendipitous discovery for users.

**Module 13: Emerging Trends and Future Directions**

- Linked Data and AI/Machine Learning: Applications in metadata generation, entity recognition.
- Blockchain and Decentralized Linked Data: Exploring new paradigms for data sharing.
- Knowledge Graphs as Core Library Infrastructure: Shifting from ILS to semantic platforms.
- Ethical Considerations in Linked Data: Bias, privacy, responsible data use.
- Case Study: Research on using AI to automatically generate Linked Data triples from unstructured text in library archival finding aids.

**Module 14: Practical Implementation Strategies & Tools**

- Open-Source Tools for Linked Data: OpenRefine, Protégé, Apache Jena, Fuseki.
- Commercial Solutions and Services: Vendor offerings for Linked Data management.
- Scripting for Linked Data: Practical exercises with Python libraries (e.g., RDFLib).
- Developing a Pilot Project Plan: From concept to initial implementation.
- Case Study: A small academic library successfully implementing a pilot Linked Data project for its institutional repository using open-source tools.

**Module 15: Building a Linked Data Roadmap for Your Institution**

- Assessing Institutional Readiness: Infrastructure, expertise, resources.
- Developing a Strategic Roadmap: Phased approach, short-term and long-term goals.
- Upcoming Scheduled Sessions

| Start Date | End Date | Location | Price |
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| **23 Nov 2026** | 04 Dec 2026 | Online | $2,000 |
| **23 Nov 2026** | 04 Dec 2026 | Physical | $3,000 |
| **23 Nov 2026** | 04 Dec 2026 | Physical | $6,000 |
| **23 Nov 2026** | 04 Dec 2026 | Physical | $6,000 |
| **23 Nov 2026** | 04 Dec 2026 | Physical | $12,000 |
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