Linked Data for Professional Education (LD4PE)
A project of the DCMI Education & Outreach Committee

http://explore.dublincore.net/

Mike Crandall
University of Washington Information School
mikecran@uw.edu
What Is LD4PE Exploring Linked Data?

- Linked Data for Professional Education (LD4PE) is a project under the jurisdiction of the DCMI Education & Outreach Committee, funded by the Institute of Museum and Library Services (IMLS).
  - The intent is that the LD4PE website will continue to be supported by DCMI and its members as part of DCMI's larger education and outreach activities, and be used in other activities as appropriate once the project is completed.
- The project is developing a Web-based Linked Data platform to support the structured discovery of the learning resources available online by open educational resource (OER) and commercial providers.
  - At the heart of the Linked Data website is a competency framework for Linked Data that supports indexing learning resources according to the specific competencies, skills, and knowledge they address.
  - To do this, the LD4PE website itself leverages Linked Data technology by assigning global identifiers (URIs) to statements of competency, then citing those URIs in metadata descriptions of learning resources.
Who Is Involved?
Key Project Personnel

• University of Washington
  • Michael Crandall
  • Stuart Sutton
  • David Talley
  • Abi Evans

• Kent State University
  • Marcia Zeng
  • Sean Dolan

• DCMI
  • Stuart Sutton
  • Tom Baker
  • Joseph Chapman

• Content Partners
  • Elsevier
    • Michael Lauruhn
  • Access Innovations
    • Marjorie Hlava
  • Synaptica
    • David Clarke
  • Sungkyunkwan University
    • Sam Oh
  • OCLC
    • Eric Childress
Architecture
Project Deliverables

• **Competency Framework.** A “Competency Index for Linked Data” based on the Achievement Standards Network Description Language (ASN-DL) for describing formally promulgated competencies and benchmarks.

• **Toolkit.** An openly available, web-based tool set to support the generation of RDF metadata describing: (a) learning resources; and (b) ASN-based competency frameworks and SKOS-based concept schemes.

• **Learning Resource Descriptions.** A set of cataloged learning resources that have been mapped to the competencies and benchmarks of the Competency Index to support competency-based resource discovery by teachers, trainers and learners.

• **LD4PE Website.** A website to be managed by DCMI as part of its educational agenda for open discovery of competency-based learning resources, access to the toolkit, learner trajectory maps, and supporting resources.

• **Best Practices.** Readily accessible best practice documentation for all processes, from community-based competency framework development and LR description through learner trajectory creation.
The Competency Index
The Competency Index

• The Competency Index (CI) for Linked Data is comprised of a set of topically arranged assertions of the knowledge, skills and habits of mind required for professional practice in the area of Linked Data

• Developed by an Editorial Board through extensive consultation

• Arranged hierarchically by Topical Cluster » Topic » Competency » Benchmark
Explore Learning Resources by Competency

Browse by Competency

- New Competency Index (164)
  - Fundamentals of Resource Description Framework (90)
    - Identity in RDF (22)
    - RDF data model (71)
      - Understands the difference between literals and non-literal resources. (12)
      - Knows the subject-predicate-object component structure of a triple. (28)
      - Understands that URIs and literals denote things in the world ("resources") real, imagined, or conceptual. (18)
      - Understands that resources are declared to be members (instances) of classes using the property rdf:type. (19)
      - Understands the use of datatypes and language tags with literals. (10)
      - Understands a named graph as one of the collection of graphs comprising an RDF dataset, with a graph name unique in the context of that dataset. (8)

- Understands The Difference Between Literals And Non-literal Resources.

Module 1: Introduction And Application Scenarios

This module introduces the main principles of Linked Data, the underlying technologies and background standards. It provides basic knowledge for how data can be published [...] (1 user rating)

By Abi Evans | August 13th, 2015 | 0 Comments

Read More >

SPARQL Tutorial: A First SPARQL Query

A brief, text-based tutorial demonstrating a simple first query and showing how to execute it with Apache Jena. Shows how to formulate a simple command [...] (Please share your rating)

By Abi Evans | August 13th, 2015 | 0 Comments

Read More >

RDF 1.1 Primer

This primer is designed to provide the reader with the basic knowledge required to effectively use RDF. It introduces the basic concepts of RDF and [...] (Please share your rating)

RDF-101

In this lesson you will learn: 1) What RDF is and how it fundamentally differs from XML and relational databases; 2) What is meant by [...] (Please share your rating)
The Toolkit (Part 1)
The Editors

• Two lightweight, client-side editors have been developed as part of the LD4PE toolkit
  • Taxonomy editor for competency frameworks (ASN) & concept schemes (SKOS)
  • Learning resource editor (using LRMI concept schemes and vocabularies)
    • Single record editor

• No required backend server
• Work offline and online
• Handle all CRUD operations (create, read, update, delete)
• *By intention and design*, these are NOT enterprise-level editors
The Competency Index editor is designed to create both competency indexes and concept schemes through pre-defined application profiles.

Two functions are available—Describe and Build. Describe supports description of a concept scheme or a competency framework as a whole.
The **Build** function allows a user to flesh out the concept scheme or competency index by describing (and displaying) the individual concepts or competencies making up the concept scheme or the competency framework.
The Learning Resource Editor can be configured for different application profiles, but currently defaults to the LD4PE profile for editing. This flexibility will allow the creation of other resource sets for different domains in the future.
### Describe a Resource

**URL:**
http://www.euclid-project.eu/modules/  

**General**

**Name (en-US):** Module 1: Introduction and Application Scenarios

This module introduces the main principles of Linked Data, the underlying technologies and background standards. It provides basic knowledge for how data can be published over the Web, how it can be queried, and what are the possible use cases and applications.

**Description (en-US):**

A short description of the item.

**Topical Index:**

- Fundamentals of Resource Description Framework
- Identity in RDF
- RDF data model
- Related data models

**About (en-US):** Mashup

**In Language:** English

**Competencies**

<table>
<thead>
<tr>
<th>Educational Alignment</th>
<th>Assesses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understands the difference between literals and non-</td>
<td>+</td>
</tr>
<tr>
<td>An alignment to an established educational framework.</td>
<td></td>
</tr>
<tr>
<td>Understands RDF serializations as interchangeable</td>
<td></td>
</tr>
<tr>
<td>Articulates differences between the RDF abstract data</td>
<td></td>
</tr>
<tr>
<td>Knows that anything can be named with URIs, such as</td>
<td></td>
</tr>
<tr>
<td>Understands blank nodes and their uses</td>
<td></td>
</tr>
<tr>
<td>Understands the use of datatypes and language tags</td>
<td></td>
</tr>
<tr>
<td>Knows the subject-predicate-object component structure</td>
<td></td>
</tr>
<tr>
<td>Differentiates hierarchical document models (e.g., XMI)</td>
<td></td>
</tr>
<tr>
<td>Understands the difference between SQL query languages and</td>
<td></td>
</tr>
<tr>
<td>Correctly uses sub-property relationships in support</td>
<td></td>
</tr>
</tbody>
</table>
# Rights

**Author**

The author of this content. Please note that author is special in that HTML5 provides a special mechanism for indicating authorship via the rel tag. That is equivalent to this and may be used interchangeably.

**Publisher**

EUCLID Project

The publisher of the creative work.

**License**

http://creativecommons.org/licenses/by/4.0/

A license document that applies to this content, typically indicated by URL.

**Date Created**

(click to add)

The date on which the creative work was created.

**Based on URL**

A resource that was used in the creation of this resource. This term can be repeated for multiple sources.

---

# Accessibility

**Accessibility API:**  
- Android Accessibility  
- ARIA  
- ATK  
- AT-SPI  
- Blackberry Accessibility  
- iAccessible2  
- iOS Accessibility  
- Java Accessibility  
- Mac OS X Accessibility  
- MSAA  
- UI Automation  

Indicates that the resource is compatible with the referenced accessibility API.

**Accessibility Control:**  
- Full Keyboard Control  
- Full Mouse Control  
- Full Switch Control  
- Full Touch Control  
- Full Video Control  
- Full Voice Control  

Identifies input methods that are sufficient to fully control the described resource.

**Accessibility Feature:**  
- Alternative Text  
- Annotations  
- Audio Description  
- Book Marks  
- Braille  
- Captions  
- Chemical Markup Language  
- Described Math  
- Display Transformability  
- High Contrast Audio  
- High Contrast Display  
- Index  
- Large Print  
- Latex  
- Long Description  
- Math ML  
- None  
- Print Page Number  
- Reading Order  
- Sign Language  
- Structural Navigation  
- Table of Contents  
- Tactile Graphic  
- Tactile Object  
- Tagged PDF  
- Timing Control  
- Transcript  
- TTS Markup  
- Unlocked  

Content features of the resource, such as accessible media, alternatives and supported enhancements for accessibility.

**Accessibility Hazard:**  
- Flashing  
- No Flashing Hazard  
- Motion Simulation  
- No Motion Simulation Hazard  
- Sound  
- No Sound Hazard  

A characteristic of the described resource that is physiologically dangerous to some users.
Module 1: Introduction And Application Scenarios

This module introduces the main principles of Linked Data, the underlying technologies and background standards. It provides basic knowledge for how data can be published over the Web, how it can be queried, and what are the possible use cases and benefits. The module also includes some multiple choice questions in the form of a quiz, screen casts of popular tools, and embedded videos.

URL: http://www.euclid-project.eu/modules/ecourse.pdf
Keywords: Linked Data, Linked Data Principles, Semantic Web, Web of Data, XML, RDF, HTTP URLs, Triple, Graph, SPARQL, Mashup
Publisher: EUCLID Project
Language: http://id.loc.gov/vocabulary/iso639-2/eng
Time required: 90min
Educational use: instruction
Educational audience: professional
Interactivity type: mixed

Competencies

- Articulates differences between the RDF abstract data model and the XML and relational models.
- Knows the subject-predicate-object component structure of a triple.
- Understands blank nodes and their uses.
- Understands the difference between literals and non-literal resources.
- Understands the use of datatypes and language tags with literals.
- Correctly uses sub-property relationships in support of inference.
- Demonstrates a working knowledge of the forms and uses of SPARQL result sets (SELECT, CONSTRUCT, DESCRIBE, and ASK).
- Understands that a SPARQL query matches an RDF graph against a pattern of triples with fixed and variable values.
- Understands the basic syntax of a SPARQL query.
- Differentiates hierarchical document models (e.g., XML) and graph models (RDF).
- Knows that anything can be named with Uniform Resource Identifiers (URIs), such as agents, places, events, artifacts, and concepts.
- Knows the primary organizations related to Linked Data standardization.
- Knows the SPARQL 1.1 Update language for updating, creating, and removing RDF graphs in a Graph Store.
- Understands the difference between SQL query language (which operates on database tables) and SPARQL (which operates on RDF graphs).
- Understands RDF serializations as interchangeable encodings of a given set of triples (RDF graph).
- Understands the role of formally declared domains and ranges for referencing.
- Uses the SELECT clause to identify the variables to appear in a table of query results.
Learning Resource Descriptions
Explore Learning Resources by Competency

Browse by Competency

- New Comp Index (164)
  - Fundamentals of Resource Description Framework (90)
    - Identity in RDF (22)
    - RDF data model (71)
    - Understands the difference between literals and non-literal resources. (12)
    - Knows the subject-predicate-object component structure of a triple. (28)
    - Understands that URLs and literals denote things in the world ("resources") real, imagined, or conceptual. (18)
    - Understands that resources are declared to be members (instances) of classes using the property rdf:type. (19)
    - Understands the use of datatypes and language tags with literals. (10)
    - Understands a named graph as one of the collection of graphs comprising an RDF dataset, with a graph name unique in the context of that dataset. (8)

- SPIRIT (180)
  - RDF 1.1 Primer
    - This primer is designed to provide the reader with the basic knowledge required to effectively use RDF. It introduces the basic concepts of RDF and [...] (5)

- Today's Learning (174)
  - RDF-101
    - In this lesson you will learn: 1) What RDF is and how it fundamentally differs from XML and relational databases; 2) What is meant by [...] (4)

Competency: Understands the Difference Between Literals And Non-literal Resources.

Module 1: Introduction And Application Scenarios

This module introduces the main principles of Linked Data, the underlying technologies and background standards. It provides basic knowledge for how data can be published [...] (5)

Rating: ★★★★★ (1 user rating)

SPARQL Tutorial: A First SPARQL Query

A brief, text-based tutorial demonstrating a simple first query and showing how to execute it with Apache Jena. Shows how to formulate a simple command [...] (4)

Rating: ★★★★★ (Please share your rating)
Module 1: Introduction And Application Scenarios

This module introduces the main principles of Linked Data, the underlying technologies and background standards. It provides basic knowledge for how data can be published over the Web, how it can be queried, and what are the possible use cases and benefits. The module also includes some multiple choice questions in the form of a quiz, screencasts of popular tools, and embedded videos.

URL: http://www.euclid-project.eu/modules/course1
Keywords: Linked Data, Linked Data Principles, Semantic Web, Web of Data, XML, RDF, HTTP URLs, Triple, Graph, SPARQL, Mashup
Publisher: EUCLID Project
Language: http://id.loc.gov/vocabulary/iso639-2/eng
Time required: P2H
Educational use: instruction
Educational audience: professional
Interactivity type: mixed
New Learning Resources

• Gap analysis on existing learning resources (over 400 cataloged)
  • Pinpointed areas where content was lacking or weak against the competencies identified in the Competency Index

• New learning resources currently being created
  • Four content partners (Synaptica, Access Innovations, Sungkyunkwan University, and Elsevier) are creating new learning resources (assessments, video tutorials, etc) to partially fill the gaps
  • OCLC also contributed a static set of triples derived from their records as a stable environment to develop repeatable examples for assessment and demonstration purposes in creating new learning resources

• Ultimate goal is for the community to continue adding resources over time, enhancing and extending the utility of the service
Toolkit (Part 2)
Module 1: Introduction and Application Scenarios

This module introduces the main principles of Linked Data, the underlying technologies and background standards. It provides basic knowledge for how data can be published over the Web, how it can be queried, and what are the possible use cases and benefits. The module also includes some multiple choice questions in the form of a quiz, screencasts of popular tools, and embedded videos.

URL: http://www.euclid-project.eu/modules/course1
Keywords: Linked Data, Linked Data Principles, Semantic Web, Web of Data, XML, RDF, HTTP URLs, Triple, Graph, SPARQL, Mashup
Publisher: EUCLID Project
Language: http://id.loc.gov/vocabulary/iso639-2/eng
Time required: P2H
Educational use: instruction
Educational audience: professional
Interactivity type: mixed
Individual Set Listing

Learning Resources in Saved Set: New Version (3 resources)

Module 1: Introduction and Application Scenarios
This module introduces the main principles of Linked Data, the underlying technologies and background standards. It provides basic knowledge for how data can be published[...]
Remove from set 

Deciphering the Semantic Web
What is the Semantic Web? Technology Voice recently interviewed some leading Semantic Web researchers with both academic and industrial experience to find out what it[...]
Remove from set 

SPARQL 1.1
An overview of SPARQL including its history, and examples of queries with operators. Also includes brief discussion of Apache Jena (a Java Framework for Linked[...]
Remove from set 

Saved Sets
Saved Sets

List Sets Saved By
- All users

Create a New Saved Set
- Enter new set name
- Enter new set description
- Set is public

Create New Set

Duplicated Set
- Created: 8/8/2016
- Testing creation of a new set by saving an existing one with a new name.
- Set Creator: dtalley

New Version DWT
- Created: 7/24/2016
- Testing creation of a new set by saving an existing one with a new name.
- Set Creator: dtalley

Create a Set then Add Resources
- Created: 7/24/2016
- Testing for new set creation from the All Saved Sets Listing page.
- Set Creator: dtalley

Empty New Set
- Created: 7/23/2016
- This set is empty!
- Set Creator: Abi Evans
Learner trajectory maps express curricular structures or personal learning journeys superimposed over the competency framework by users.
Learning Map Builder

- New Comp Index Add to map
- Fundamentals of Resource Description Framework Add to map
- Fundamentals of Linked Data Add to map
- RDF vocabularies and application profiles Add to map
- Creating and transforming Linked Data Add to map
- Interacting with RDF data Add to map
- Creating Linked Data applications Add to map

Learning Map: Brand new private map

- What's This?
  - Public (anyone can view)
  - Private (only I can see)

Identity in RDF
22 resources | Remove from learning map

RDF data model
71 resources | Remove from learning map

RDF serialization
31 resources | Remove from learning map

Related data models
18 resources | Remove from learning map

Interacting with RDF data
116 resources | Remove from learning map
The Website
The LD4PE Website

http://explore.dublincore.net/

LD4PE made possible by the following organizations...
Best Practices
Briefing Papers

ASN Briefing #1: ASN-DL Overview
Overview of the ASN Description Language (ASN-DL) including the model, extension, and description of select mapping properties.
http://explore.dublincore.net/asn-briefing-1/

ASN Briefing #2: ASN Ontology
Definition of the Achievement Standards Network ontology including full description of all classes and properties.
http://explore.dublincore.net/asn-briefing-2/

ASN Briefing #3: Introduction and specification of ASN “Profiles”
Description of mechanisms for extension and refinement of the ASN-DL to meet national or organizational needs.
http://explore.dublincore.net/asn-briefing-3/

ASN Briefing #4: LD4PE Overview
High-level overview of the Linked Data for Professional Education (LD4PE) project.
http://explore.dublincore.net/briefing-papers/l4dpeoverview/
Final Thoughts

• LD4PE has been designed as a lightweight, replicable, community-driven resource, which can be extended into other domains with minimal overhead

• The editors for the Competency Index and the Learning Resources interact directly with the triple store, allowing easy development of new collections for different purposes

• The community-based services implemented on top of the triple store (ratings, saved sets, learning maps) allow users to share knowledge and drive quality control

• Our hope is that LD4PE will be the first of many instances developed to assist in the teaching and learning of metadata and knowledge organization concepts, adding to the long-term mission of DCMI
Questions?

http://explore.dublincore.net/

mikecran@uw.edu