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

http://explore.dublincore.net/

DC-2016 Special Session
14 October, 2016
Copenhagen, Denmark
Agenda

• 1:30-1:40: Introductions (Mike Crandall)
• 1:40-2:10: Overview of LD4PE (Mike Crandall)
• 2:10-2:30: Competency Index discussion (Tom Baker)
• 2:30-2:55: General discussion of LD4PE future
• 2:55-3:00: Wrapup and next steps (All)
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

 ASN=Achievement Standards Network
 LRMI=Learning Resource Metadata Initiative
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 (164)
- Fundamentals of Resource Description Framework (20)
  - 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 rdfs:domain. (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. (6)

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 [...]

⭐⭐⭐⭐⭐ (1 user 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)

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 [...]
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 the 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.
Existing description found. Modify it below.

Describe a Resource

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

URL of the item.

General

Name en-US: Module 1: Introduction and Application Scenarios

The name of the item.

Description en-US: 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.

A short description of the item.

Topical Index:

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

The topic of the resource.

About en-US: Mashup

The subject matter of the content.

Competencies

Educational Alignment Assesses: Understands the difference between literals and non-
An alignment to an established educational framework.

Educational Alignment Assesses: Understands RDF serializations as interchangeable er

Educational Alignment Assesses: Articulates differences between the RDF abstract dat

Educational Alignment Assesses: Knows that anything can be named with URIs, such i

Educational Alignment Assesses: Understands blank nodes and their uses

Educational Alignment Assesses: Understands the use of datatypes and language tags

Educational Alignment Assesses: Knows the subject-predicate-object component struct

Educational Alignment Assesses: Differentiates hierarchical document models (eg, XM

Educational Alignment Assesses: Understands the difference between SQL query langu.

Educational Alignment Assesses: Correctly uses sub-property relationships in support i
### 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 OSX 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, screencasts of popular tools, and embedded videos.

URL: http://www.euclid-project.eu/modules/counsel.pdf
Keywords: Linked Data, Linked Data Principles, Semantic Web, Web of Data, XML, RDF, HTTP URIs, Triple, Graph, SPARQL, Mashup
Publisher: EUCLID Project
Language: http://id.loc.gov/vocabulary/iso639-2/eng
Time required: P3H
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 (eg. 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 serialization as interchangeable encodings of a given set of triples (RDF graph).
- Understands the role of formally declared domains and ranges for inferencing.
- Uses the SELECT clause to identify the variables to appear in a table of query results.
Learning Resource Descriptions
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 URIs, 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/coursel
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

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

Save

Delete Set
Edit Description

Brand new private map
The Website
The LD4PE Website

http://explore.dublincore.net/

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

- **Tech Talk**
- **Competency Index Overview**
- **Briefing Papers**

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**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/

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**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/

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**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/

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**ASN Briefing #4: LD4PE Overview**
High-level overview of the Linked Data for Professional Education (LD4PE) project.
http://explore.dublincore.net/briefing-papers/ld4peoverview/
Indexing “by competency”

Thomas Baker
Dublin Core Metadata Initiative

LD4PE Project
DC-2016, Copenhagen, Denmark
14-15 October 2016
“Competency Index”

• **Topic**: a thematic set of competencies
  – **Competency**: a tweet-length phrase about knowledge or skills that can be learned
• **Benchmark**: an action that demonstrates accomplishment in a given competency
LD4PE Competency Index

Example

• **Topic**: Querying RDF Data
  
  – **Competency**: Understands that a SPARQL query matches an RDF graph against a pattern of triples with fixed and variable values
  
  – **Competency**: Understands the basic syntax of a SPARQL query
    
    • **Benchmark**: Uses angle brackets for delimiting URIs.
    
    • **Benchmark**: Uses question marks for indicating variables.
    
    • **Benchmark**: Uses PREFIX for base URIs.
LD4PE Competency Index

Audience

• *Independent learners* wanting to learn Linked Data technology
• *Professors and trainers* wanting to design and teach courses
LD4PE Competency Index

Organizing principles

• **Follows a domain map** brainstormed by a workshop of experts in an earlier project

• **Avoids specifying levels of difficulty** because learners come from different backgrounds (computer versus library science)

• **Avoids implying ranking or ordering topics** for the same reasons

Competencies are building blocks that can be assembled into different courses or curricula.
LD4PE Competency Index

Granularity

• **Enough topics** to convey a map of the domain to be learned
• **Enough detail** to characterize the nature of competency in the domain
• **Not so much detail** that it reads like a manual or is likely to go out of date

Other competency indexes make other design choices, e.g., to support exams or certification.
Sources of competencies

• **Expert warrant:** competencies are proposed and formulated by experts

• **Literature:** competencies are described in the literature

• **Available learning resources:** competencies are the topic of tutorials, YouTube videos, books, or courses
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
Discussion

• Does the idea of framing learning through a competency index resonate with your work?
• Do you see immediate applications of the LD4PE resources in your own activities?
• What additional features might you suggest for the LD4PE toolset or website?
• Would you be willing to participate in further development of the LD4PE resources?
• Do you see other domains relevant to DCMI’s mission that might use this infrastructure?
Saturday hands-on workshop

• Tools for exploring learning resources indexed “by competency”

• Tools for shaping a set of competencies into the trajectory for a course of learning
Questions?

http://explore.dublincore.net/

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