A Linked Data Competency Framework for Educators and Learners

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On behalf of
LD4PE (Linked Data for Professional Education) Project Team

Outline

- Part I. Background
  - Linked Data for Professional Education (LD4PE) project
  - LD4PE Major Products

- **Part II. The *Competency Index for Linked Data* (*a.k.a.* Linked Data Competency Index, LDCI)**

- Part III. Learning Resources Connected with the Competencies

- Part IV. Using the *Competency Index for Linked Data* in Self-Learning, Teaching, and Training

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Part I. Background

Linked Data for Professional Education (LD4PE) project

http://explore.dublincore.net/

(a.k.a. Linked Data Competency Index, LDCI)

Linked Data for Professional Education (LD4PE) Project

- Funded by the Institute of Museum and Library Services (IMLS)
  - LD4PE. December 2014 - November 2017
  - [Planning project "Learning Linked Data": October 2011 - September 2012]

- A project under the jurisdiction of the DCMI Education & Outreach Committee

- Led by:
  - University of Washington, Information School. **Michael Crandall**, P.I.
  - Kent State University, School of Information.
  - Dublin Core Metadata Initiative (DCMI).

- Content Partners:
  - Sungkyunkwan University (Korea)
  - Access Innovations
  - Synaptica
  - Elsevier
  - OCLC

- **Technical development:**
  - DCMI. Joseph Chapman
  - Univ. Washington. David Talley

M. Zeng @ LD4PE Team

LD4PE Major Products

Competency Index for Linked Data
-- defines a set of assertions of the knowledge, skills, and habits of mind required for professional practice in the area of Linked Data.

Learning Resource Descriptions
-- A set of learning resources
- open sources
- described in metadata
- mapped to competencies

http://explore.dublincore.net/

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Explore online

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Explore Learning Resources by Competency

Search ...

Browse by Competency
⌄ How does this work?

+ New Comp Index (620)

Number of learning resources

+ Fundamentals of Resource Description Framework (218)

+ Fundamentals of Linked Data (135)

+ RDF vocabularies and application profiles (181)

+ Creating and transforming Linked Data (82)

+ Interacting with RDF data (367)

+ Creating Linked Data applications (0)

Topic Clusters

View the full Competency Index

Saved Sets of Learning Resources

Competency-based Learning Maps

Competency Index Development Process

To Explore Linked Data learning resources, select a competency assertion or topic statement in the adjacent panel to view a listing of associated learning resources.

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

This structure is illustrated in the adjacent panel. CI development is expected to openly crowd-source expertise in the development processes under the guidance of the project's CI Editorial Board (CIEB). Learn more about the Competency Index.

IMPORTANT NOTES:

1. The CI development work is being partially funded through an IMLS *National Leadership Grant for Libraries*.
2. Those interested in more detail on the Competency Index development and maintenance process, or who would like to contribute to future development can see more here. A fully translated Chinese version of the CI and associated documentation is also available here.

Related Materials

View the full Competency Index
Saved Sets of Learning Resources
Competency-based Learning Maps
Competency Index Development Process

http://explore.dublincore.net/ -> Explore

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LD4PE Exploring **Linked Data**

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Explore Learning Resources by Competency

Search ...

Browse by Competency

⌄ How does this work?

+ New Comp Index (621)

   + Fundamentals of Resource Description Framework (218)

   − Fundamentals of Linked Data (135)

      + Web technology (93)

      − Linked Data principles (66)

         Knows Tim Berners-Lee's principles of Linked Data: use URIs to name things, use HTTP URIs that can be resolved to useful information, and create links to URIs of other things. (0)

         Knows the "five stars" of Open Data: put data on the Web, preferably in a structured and preferably non-proprietary format, using URIs to name things, and link to other data. (66)

      + Linked Data policies and best practices (16)

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Related Materials

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Saved Sets of Learning Resources ⧉
Competency-based Learning Maps ⧉
Competency Index Development Process ⧉

http://explore.dublincore.net/explore-learning-resources-by-competency/

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LD4PE Exploring **Linked Data**

Explore   Tech Talk   About   Related   Join

Explore Learning Resources by Competency

Search ...

Browse by Competency

How does this work?

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    + Linked Data policies and best practices (16)

Competency: Knows The "Five Stars" Of Open Data: Put Data On The Web, Preferably In A Structured And Preferably Non-proprietary Format, Using URIs To Name Things, And Link To Other Data.

An Introduction To Linked Open Data

An extensive slide presentation covering the key components that support RDF: the graph model, the triple statement, and URIs. Also discusses the Web of Data [...]

★★★★★ (1 user rating)

Introduction To Linked Data

This slide presentation was used as part of a training module aiming to answer the following questions: What is Linked Data; What is Open Data; [...]

★★★★★ (1 user rating)

Introduction To Linked Data

This slide presentation explains how Linked Data can help us publish our raw data in a way that makes it easier to find and reuse, [...]

★★★★★ (1 user rating)

Multi-Agent And Semantic Web Systems: Linked Open Data

This slide presentation of lecture material was used as part of a course given at The University of Edinburgh School of Informatics. This lecture looked [...]
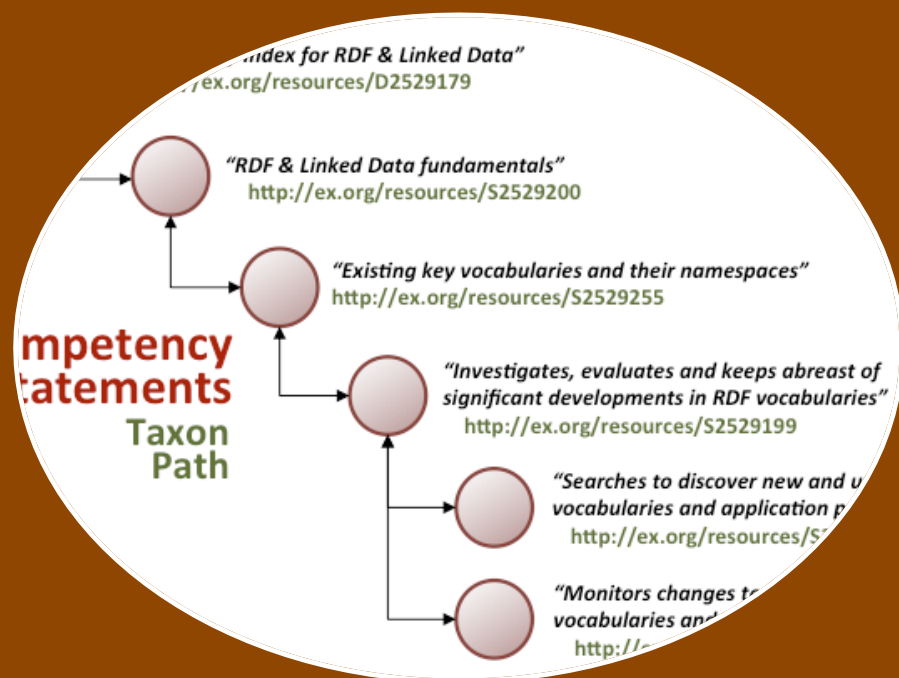
★★★★☆ (1 user rating)

Providing Linked Data

Linked Data At The National Library Of Sweden

Part II. Introducing
the *Competency Index for Linked Data*

...ndex for RDF & Linked Data"
http://ex.org/resources/D2529179

"RDF & Linked Data fundamentals"
http://ex.org/resources/S2529200

"Existing key vocabularies and their namespaces"
http://ex.org/resources/S2529255

mpetency tatements

Taxon Path

"Investigates, evaluates and keeps abreast of significant developments in RDF vocabularies"
http://ex.org/resources/S2529199

"Searches to discover new and u... vocabularies and application p...
http://ex.org/resources/S...

"Monitors changes t... vocabularies an...
http://...

The *Competency Index* provides:

➢ a concise and readable map of concepts and skills

  ➢ related to practices and technologies of Linked Data

  ➢ for the benefit of interested learners and teachers.

"Competency Index"

- A **thematic set of competencies** organized by:

"Competency Index for RDF & Linked Data"
http://ex.org/resources/D2529179

"RDF & Linked Data fundamentals"
http://ex.org/resources/S2529200

"Existing key vocabularies and their namespaces"
http://ex.org/resources/S2529255

mpetency tatements

"Investigates, evaluates and keeps abreast of significant developments in RDF vocabularies"
http://ex.org/resources/S2529199

Taxon Path

"Searches to discover new and useful vocabularies and application profiles"
http://ex.org/resources/S2529200

"Monitors changes to existing RDF vocabularies and application profiles"
http://ex.org/resources/S2529202

•Topic

- • **Competency** *understanding*
  - ❖ *a tweet-length phrase about knowledge or skills that can be learned*
- • **Benchmark**
  - ❖ *an action that demonstrates accomplishment in a given competency* *doing*

Topical Cluster » Topic » Competency » Benchmark

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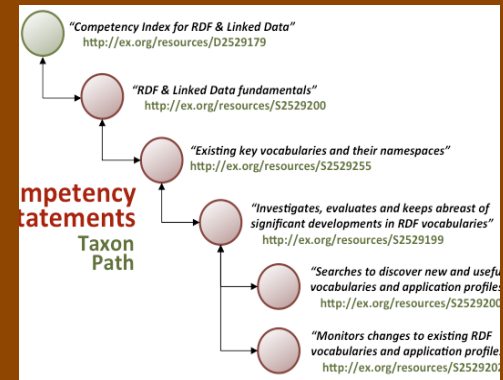
Example

Topic cluster: Interacting with RDF Data

understanding

- **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.

doing

SPARQL query example

```
Query Text
PREFIX dataset: <http://dbpedia.org/ontology/>

SELECT ?uri ?influencedBy
WHERE
{
  ?uri a dataset:Artist    .
  ?uri dataset:influencedBy ?influencedBy    .
  filter regex(?influencedBy, 'Pablo Picasso', 'i')    .
}
```

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Understanding / Doing

Followed guidelines for stylistic consistency when competencies were developed.

Competencies

- Understands
- Knows
- Recognizes
- Differentiates …

understanding (learning)

Benchmarks

- Uses
- Expresses
- Demonstrates
- Distills
- Converts …

doing (exam questions, homework assignments)

The development of the *Competency Index for Linked Data*

Editorial Board met monthly over a period of approximately 18 months.

Tom Baker, chair

- Expert input
- User testing

Tries to cover:
- **Enough topics** to convey a map of the domain
- **Enough detail** on domain competency

Does NOT cover:
- NOT: Levels of difficulty
  - "Basic" for a library scientist may be "difficult" for a computer scientist (and vice versa)
- NOT: Ranking or ordering topics
  - for the same reasons

LD4PE · Exploring Linked Data

6 clusters

30 topics

95 competencies

Browse by Competency

⌄ How does this work?

+ New Comp Index (564)

    + Fundamentals of Resource Description Framework (208)

    + Fundamentals of Linked Data (112)

    + RDF vocabularies and application profiles (163)

    + Creating and transforming Linked Data (65)

    + Interacting with RDF data (346)

    + Creating Linked Data applications (0)

View the full Competency Index ⬈

Saved Sets of Learning Resources ⬈

Competency-based Learning Maps ⬈

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Competency Index for Linked Data

6 clusters

30 topics

95 competencies

1. Fundamentals of Resource Description Framework

- Identity in RDF
- RDF data model
- Related data models
- RDF serialization

Fundamentals of Resource Description Framework (218)

+ Identity in RDF (38)

+ RDF data model (148)

+ Related data models (52)

- RDF serialization (66)

  - Understands RDF serializations as interchangeable encodings of a given set of triples (RDF graph). (30)

    Uses tools to convert RDF data between different serializations. (7)

  - Distinguishes the RDF abstract data model and concrete serializations of RDF data. (41)

    Expresses data in serializations such as RDF/XML, N-Triples, Turtle, N3, Trig, JSON-LD, and RDFa. (33)

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Competency Index for Linked Data

6 clusters

30 topics

95 competencies

1. Fundamentals of Resource Description Framework

2. Fundamentals of Linked Data

- Web technology
- Linked data principles
- Linked Data policies and best practices
- Non-RDF Linked Data

Fundamentals of Linked Data (135)

+ Web technology (93)

- Linked Data principles (66)

↳ Knows Tim Berners-Lee's principles of Linked Data: use URIs to name things, use HTTP URIs that can be resolved to useful information, and create links to URIs of other things. (0)

↳ Knows the "five stars" of Open Data: put data on the Web, preferably in a structured and preferably non-proprietary format, using URIs to name things, and link to other data. (66)

+ Linked Data policies and best practices (16)

Non-RDF linked data (0)

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Competency Index for Linked Data

3. **RDF vocabularies and application profiles**
   - Finding RDF-based vocabularies
   - Maintaining RDF vocabularies
   - Versioning RDF vocabularies
   - Publishing RDF vocabularies
   - Mapping RDF vocabularies
   - RDF application profiles
   - Designing RDF-based vocabularies

- Designing RDF-based vocabularies (142)
  + Uses RDF Schema to express semantic relationships within vocabulary. (53)

  Knows the naming conventions for RDF properties and classes. (9)

  Reuses published properties and classes where available. (32)

  + Coins namespace URIs, as needed, for any new properties and

Designing RDF-based vocabularies (142)
- Uses RDF Schema to express semantic relationships within a vocabulary. (53)
  Correctly uses sub-class relationships in support of inference. (22)
  Correctly uses sub-property relationships in support of inference. (25)

  Knows the naming conventions for RDF properties and classes. (9)

  Reuses published properties and classes where available. (32)

  Coins namespace URIs, as needed, for any new properties and classes required. (14)
  Drafts a policy for coining URIs for properties and classes. (1)
  Chooses "hash"- or "slash"-based URI patterns based on requirements. (9)

...hierarchies
...ve chains
...tomatically because this is not how humans think or organize
...mation (5)

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Competency Index for Linked Data

6 clusters

30 topics

95 competencies

1. Fundamentals of Resource Description Framework
2. Fundamentals of Linked Data
3. RDF vocabularies and application profiles

4. Creating and transforming RDF Data
- Managing identifiers (URIs)
- Creating RDF data
- Versioning RDF data
- RDF data provenance
- Cleaning and reconciling RDF data
- Mapping and enriching RDF data

- Creating and transforming Linked Data (82)
  + Managing identifiers (URI) (19)

  - Creating RDF data (44)
    ↳ Generates RDF data from non-RDF sources. (13)
    ↳ Knows methods for generating RDF data from tabular data in formats such as Comma-Separated Values (CSV). (14)
    ↳ Knows methods such as Direct Mapping of Relational Data to RDF (2012) for transforming data from the relational model (keys, values, rows, columns, tables) into RDF graphs. (23)

  Versioning RDF data (0)

  RDF data provenance (0)

  + Cleaning and reconciling RDF data (17)

  Mapping and enriching RDF data (32)

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Competency Index for Linked Data

1. **Fundamentals of Resource Description Framework**
2. **Fundamentals of Linked Data**
3. **RDF vocabularies and application profiles**
4. **Creating and transforming RDF Data**

5. Interacting with RDF Data
- Processing RDF data using programming l
- Querying RDF Data
- Visualizing RDF Data
- Reasoning over RDF data
- Assessing RDF data quality
- RDF Data analytics
- Finding RDF Data
- Manipulating RDF Data

- Querying RDF data (190)

  + Understands the basic syntax of a SPARQL query. (24)

  Understands that a SPARQL query matches an RDF graph against a pattern of triples with fixed and variable values. (53)

  + Demonstrates a working knowledge of the forms and uses of SPARQL result sets (SELECT, CONSTRUCT, DESCRIBE, and ASK). (63)

  + Understands how to combine and filter graph patterns using operators such as UNION, OPTIONAL, FILTER, and MINUS. (58)

  + Understands the major SPARQL result set modifiers, e.g., to limit or sort results, or to return distinct results only once. (28)

  + Understands the use of SPARQL functions and operators. (23)

  + Differentiates between a Default Graph and a Named Graph, and formulates queries using the GRAPH clause. (30)

  Uses a temporary variable to extend a query. (3)

  Understands the role of Property Paths and how they are formed by combining predicates with regular expression-like operators. (11)

  + Understands the concept of Federated Searches. (14)

  Converts/manipulates SPARQL query outputs (RDF-XML, JSON) to the exact format required by a third party tools and APIs. (10)

  Reads and understands high-level descriptions of the classes and properties of a dataset in order to write queries. (19)

  + Uses available tools, servers, and endpoints to issue queries against a dataset. (69)

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Competency Index for Linked Data

6 clusters

30 topics

95 competencies

1. Fundamentals of Resource Description Framework
2. Fundamentals of Linked Data
3. RDF vocabularies and application profiles
4. Creating and transforming RDF Data
5. Interacting with RDF Data
6. **Creating Linked Data applications**
   - Storing RDF data

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Competency Index for Linked Data

Overview

1 - Fundamentals of Resource Description Framework (208)
+ Identity in RDF (35)
+ RDF data model (142)
+ Related data models (52)
+ RDF serialization (60)

2 - Fundamentals of Linked Data (112)
+ Web technology (76)
+ Linked Data principles (53)
+ Linked Data policies and best prac
Non-RDF linked data (0)

3 - RDF vocabularies and application profiles (163)
+ Finding RDF-based vocabularies (14)
+ Maintaining RDF vocabularies (0)
+ Versioning RDF vocabularies (1)
+ Publishing RDF vocabularies (32)
+ Mapping RDF vocabularies (18)
+ RDF application profiles (17)
+ Designing RDF-based vocabularies (1

4 - Creating and transforming Lin
+ Managing identifiers (U
+ Creating RDF data (36)
Versioning RDF data (0)
RDF data provenance (0)
+ Cleaning and reconciling RDF data (12)
+ Mapping and enriching RDF data (25)

5 - Interacting with RDF data (346)
+ Processing RDF data using programming languages. (80)
+ Querying RDF data (181)
+ Visualizing RDF data (25)
+ Reasoning over RDF data (81)
Assessing RDF data quality (0)
+ RDF data analytics (15)
+ Finding RDF data (36)
+ Manipulating RDF data (64)

6 - Creating Linked Data applications (0)
Storing RDF data (0)

6 clusters

30 topics

Competency Index full version available from http://explore.dublincore.net
→ Explore
→ View the full CI

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LD4PE Exploring **Linked Data**

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Competency Index for Linked Data

Search ...

The *Competency Index for Linked Data* (CI) is a set of topically arranged assertions of the knowledge, skills and habits of mind required for professional practice in the area of Linked Data. Its primary goal is to provide a means for mapping learning resource descriptions to the competencies those resources address to assist in finding, identifying, and selecting resources appropriate to specific learning needs.

Download the Full Competency Index in English (using your browser's Print function) or in Chinese (PDF)

Achievement Standards Network Competency Definitions

❤ Learn More

New Comp Index (621)

    Fundamentals of Resource Description Framework (218)

        Identity in RDF (38)

           Knows that Uniform Resource Identifiers, or URIs (1994), include Uniform Resource Locators (URLs, which locate web pages) as well as location-independent identifiers for physical, conceptual, or web r (18)

           Knows that anything can be named with Uniform Resource Identifiers (URIs), such as agents, places, events, artifacts, and concepts. (17)

           Understands that a "real-world" thing may need to be named with a URI distinct from the URI for information about that thing. (8)

           Recognizes that URIs are "owned" by the owners of their respective Internet domains. (3)

        RDF data model (148)

           Understands the difference between literals and non-literal resources. (14)

           Knows the subject-predicate-object component structure of a triple. (46)

           Understands that URIs and literals denote things in the world ("resources") real, imagined, or conceptual. (28)

           Understands that resources are declared to be members (instances) of classes using the property rdf:type. (26)

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Topic Cluster

Topic

Competency

Benchmark

Benchmark

Competency

Competency

Competency

Benchmark

RDF vocabularies and application profiles (163)

Designing RDF-based vocabularies (127)

- Uses RDF Schema to express semantic relationships within a vocabulary. (51)

Correctly uses sub-class relationships in support of inference. (20)

Correctly uses sub-property relationships in support of inference. (23)

Knows the naming conventions for RDF properties and classes. (8)

Reuses published properties and classes where available. (23)

- Coins namespace URIs, as needed, for any new properties and classes required. (14)

Drafts a policy for coining URIs for properties and classes. (1)

Competency Index for Linked Data

Structure

6 clusters

30 topics

95 competencies

75 benchmarks

Topical Cluster » Topic » Competency » Benchmark

Part III. Learning Resources Connected with the Competencies

- Demo: Finding related learning resources
- Explanation: How a learning resource is described and mapped to CI

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Where should I start?

http://explore.dublincore.net/

explore.dublincore.net/explore-learning-resources-by-comp

LD4PE

LD4PE · Exploring Linked Data

Explore   T   Join

Search for Resources
By Competency
By Keyword

Explore   by Competency

Browse Competency Index

1

Browse by Competency

˅ How does this work?

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View the full Competency Index ↗

Saved Sets of Learning Resources ↗

Competency-based Learning Maps ↗

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IMPORTANT NOTES:

Related Materials

View the full Competency Index ↗
Saved Sets of Learning Resources ↗
Competency-based Learning Maps ↗
Competency Index Development Process ↗

• **Start at the top of the hierarchy and drill down.**
• **Select a topic cluster and expand the menu to look through the sub-options.**

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Browse by Competency

ˇ How does this work?

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        + Web technology (93)

        - Linked Data principles (66)

            Knows Tim Berners-Lee's principles of Linked Data: use URIs to name things, use HTTP URIs that can be resolved to useful information, and create links to URIs of other things. (0)

            Knows the "five stars" of Open Data: put data on the Web, preferably in a structured and preferably non-proprietary format, using URIs to name things, and link to other data. (66)

    + Linked Data policies and best practices (16)

    Non-RDF linked data (0)

Competency: Knows The "Five Stars" Of Open Data: Put Data On The Web, Preferably In A Structured And Preferably Non-proprietary Format, Using URIs To Name Things, And Link To Other Data.

An Introduction To Linked Open Data

An extensive slide presentation covering the key components that support RDF: the graph model, the triple statement, and URIs. Also discuss the Web of Data [...]

★★★★★ (1 user rating)

Introduction To Linked Data

This slide presentation explains how Linked Data can help us publish our raw data in a way that makes it easier to find and reuse, [...]

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This video presentation c[...]

Introduction To Linked Data

This slide presentation was used as part of a training module aiming to answer the following questions: What is Linked Data; What is Open Data; [...]

★★★★★ (1 user rating)

Multi-Agent And Semantic Web Systems: Linked Open Data

This slide presentation of lecture material was used as part of a course given at The University of Edinburgh School of Informatics. This lecture looked [...]

★★★★☆ (1 user rating)

Linked Data At The National Library Of Sweden

Description Page

Explore   Tech Ta

The resource description page contains additional metadata and full text of the description.

An Introduction To Linked Open Data

An extensive slide presentation covering the key components that support RDF: the graph model, the triple statement, and URIs. Also discusses the Web of Data and the principles behind Linked Data (including Open Data). The SPARQL query language is given a high-level overview, as is how inferencing can be achieved using RDF Schema and Web Ontology Language (OWL) or Simple Knowledge Organization System (SKOS). At key points the presentation stops so that the audience can engage in group exercises (prompts included).

URL: http://swib.org/swib14/slides/ostrowski_swib14_45.pdf ⬀
Keywords: Simple Knowledge Organization System (SKOS), Graph, Triple, HTTP URIs, Web Ontology Language (OWL), RDF Schema, Linked Open Data, Web of Data, Linked Data Principles
Author: Ostrowski, Felix
Publisher: Hbz
Date created: 2014-12-01 07:00:00.000
Language: http://id.loc.gov/vocabulary/iso639-2/eng
Time required: P90M
Interactivity type: mixed ⬀

From this page, you can access the resource itself through the URL.

- Competencies

    Knows Simple Knowledge Organization System, or SKOS (2009), an RDF vocabulary for expressing concepts that are labeled in natural languages, organized into informal hierarchies, and aggregated into co

    Knows that anything can be named with Uniform Resource Identifiers (URIs), such as agents, places, events, artifacts, and concepts.

    Knows the "five stars" of Open Data: put data on the Web, preferably in a structured and preferably non-proprietary format, using URIs to name things, and link to other data.

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Another example →

600+ openly available learning resources [webinars, podcasts, lectures, web pages, readings ...]

Publishing Data From The Smithsonian American Art Museum As Linked Open Data

This video discusses the challenges faced when publishing museum data as Linked Data: the databases are large and complex; the information is richly structured and varies from museum to museum; it is difficult to link the data to other datasets. The speaker demonstrates the end-to-end process of starting with the original source data, modeling the data with respect to an ontology of cultural heritage data, linking the data to DBpedia, and then publishing the information as Linked Open Data.

URL: https://www.youtube.com/watch?v=1Vaytr09H1w ⬀
Keywords: Ontology, Karma, R2RML, DBpedia
Author: Szekely, Pedro
Date created: 2013-07-24 07:00:00.000
Language: http://id.loc.gov/vocabulary/iso639-2/eng
Time required: P10M
Educational use: instruction ⬀
Educational audience: student ⬀
Interactivity type: expositive ⬀

• Competencies

Knows methods for generating RDF data from tabular data in formats such as Comma-Separated Values (CSV).

Uses available resources for named entity recognition, extraction, reconciliation.

• Resources are indexed at the topic and competency Level

• Mover mouse over the competency to see its location in the index.

○ Creating and transforming Linked Data
  ▪ Mapping and enriching RDF data
    ▪ **Uses available resources for named entity recognition, extraction, and reconciliation.**

Uses available resources for named entity recognition, extraction, and reconciliation.

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Try it! Go to: http://explore.dublincore.net/ Choose "Explore"

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Part IV. Using the
Competency Index for Linked Data
in
self-learning, teaching, and training

1. **Learning maps** -- competencies
2. **Saved sets** – resources
3. **The OCLC Dataset**

Part IV # 1. Learning Maps -- competencies

- Lay out a path to follow

- List competencies targeted to specific audience or theme

- Link each competency to a list of resources which teach the competency

Examples of Learning Maps

Competencies for Catalogers
Created: 8/29/2017

Considers the paradigm shift necessary to catalog to an expa

Set Creator: Sean Dolan

Competencies for Data Scientists
Created: 8/11/2017

Recognizing Linked Data as a valuable resource and dealing

Set Creator: Sean Dolan

Competencies for Web Developers
Created: 7/24/2017

Topics include RDF serializations, microdata for HTML marku

Set Creator: Sean Dolan

Competencies for Librarians
Created: 7/22/2017

Deals with the challenges of transitioning from traditional bib

Set Creator: Sean Dolan

Competencies for Archivists
Created: 7/15/2017

For quickly getting archivists up-to-speed with Linked Data so

Set Creator: Sean Dolan

See a list of the learning maps at
http://explore.dublincore.net/explore-learning-resources-by-competency/learning-maps/

Learning Map

E.g., for Catalogers, what are the key competencies?

Learning Map: Competencies for Catalogers
⌄ What's This?

Considers the paradigm shift necessary to catalog to an expanded audience (the Web) as well as technical details involved.

Understands that Linked Data (2006) extended the notion of a web of documents (the Web) to a notion of a web of finer-grained data (the Linked Data cloud).
69 resources

Knows Tim B
use HTTP UR
URIs of other
0 resources

Knows that U
Resource Loc
independent
18 resources

Understands
distinct from
0 resources

Knows the su
46 resources

Understands

Understands the use of datatypes and language tags with literals.
15 resources

Knows graphic conventions for depicting RDF-based models.
10 resources

Distinguishes the RDF abstract data model and concrete serializations of RDF data.
41 resources

Recognizes that owl:sar
formal semantics that c
13 resources

Identifies resource attr
candidates for RDF pro
9 resources

Uses RDF Schema to ex
53 resources

Coins namespace URIs
required.
14 resources

Knows Simple Knowled
vocabulary for expressi
organized into informa
24 resources

Knows SKOS eXtension for Labels, or SKOS-XL (2009), a small set of additional properties for describing and linking lexical labels as instances of the class Label.
4 resources

Managing identifiers (URI)
19 resources

Creating RDF data
44 resources

Cleaning and reconciling RDF data
17 resources

Mapping and enriching RDF data
32 resources

Knows the SPARQL 1.1 Update language for updating, creating, and removing RDF graphs in a Graph Store
32 resources

Understands the difference between SQL query language (which operates on database tables) and SPARQL (which operates on RDF graphs).
43 resources

- Below each competency, the number of tagged resources are listed.

- Clicking this link will take you to these resources.

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Part IV

2. Saved Sets — resources

- Curated collection of <u>learning resources</u>

- Targeted to a specific audience or theme

- Each item links to a resource's description page

http://explore.dublincore.net/explore-learning-resources-by-competency/all-saved-sets

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Resources for Catalogers
Created: 8/31/2017

Set Creator: Sean Dolan

Resources for Data Scientists
Created: 8/11/2017

Recognizing Linked Data as a valuable resource and dealing with unfamiliar d[...]

Set Creator: Sean Dolan

Resources for Web Developers
Created: 7/24/2017

Emphasizing how Linked Data effects page markup and search engine optimize[...]

Set Creator: Sean Dolan

Resources for Librarians
Created: 7/22/2017

These resources focus on transitioning from traditional bibliographic records to[...]

Set Creator: Sean Dolan

Resources for Archivists
Created: 7/15/2017

Some of these resources present Linked Data in the context of library and arch[...]
that are invaluable to this audience.

Set Creator: Sean Dolan

SKOS
Created: 3/11/2017

Learning SKOS for transferring thesauri into LOD

Set Creator: sophy

PCC Standing Committee on Training Recommended
Created: 10/25/2016

Set Creator: mw2064

Learning Resources in Saved Set: Resources for Catalogers (13 resources)

The Academy Unbound Linked Data as Revolution
Much has been said about Linked Data, its ties to the Semantic Web, and its application for libraries, but what is it exactly and how[...]

Linked Data Patterns
This resource is a pattern catalogue for modelling, publishing, and consuming Linked Data which adopts a tried and tested means of communicating knowledge and experience[...]

Metadata Crosswalks
This slide presentation focuses on search interoperability, which the author defines as the "ability to perform a search over diverse sets of metadata records to[...]

BIBFRAME Training at the Library of Congress: Introduction to the Semantic Web and Linked Data
This resource was developed by the Library of Congress as one part of a pilot training project which tested the use of BIBFRAME for bibliographic[...]

Linked Data at the National Library of Sweden
This talk explains how LIBRIS, the National Library of Sweden's union catalog, has been linked via an interface to RDF datasets. The first speaker discusses[...]

An Introduction to RDF Schema
This slide presentation discusses RDF Schema, including classes, sub-classes, and instances. Concepts such as domain and range, datatypes and literals, labels and comments are also[...]

Free Your Metadata: Clean up your metadata
A brief tutorial containing both a screencast and text instructions for cleaning an example dataset (from the Powerhouse Museum) using Open Refine (formerly Google Refine).[...]

Joining the Linked Data Cloud in a Cost-Effective Manner
Linked Data holds the promise to derive additional value from existing data throughout different sectors, but practitioners currently lack a straightforward methodology and the tools[...]

The Vocabulary Mapping Framework (VMF): An Introduction v1.0
This document provides an introduction to the structure and development of the Vocabulary Mapping Framework (VMF) up to the end of the first stage of[...]

Publishing Relational Databases as Linked Data
These slides appear to have been used for a course in Database Management Systems at the University of Toronto, but contain material which the creator[...]

http://explore.dublincore.net/explore-learning-resources-by-competency/all-saved-sets

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3. The OCLC Dataset

WorldCat Linked Data (Library Science Subset)

Extracted from the original MARC records based on:
- FAST headings
- DDC classes
- LCC subclasses

Why provide a dataset?

- You have static data to test skills on or to use in creating new learning resources

- Ensures that consistent results can be obtained from queries and that access will not suddenly disappear

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OCLC Dataset

Search ...

The Online Computer Library Center ⌕ (OCLC) has published a dataset, WorldCat Linked Data (Library Science Subset), so that those who visit the LD4PE site will have static data to test their skills on or to use in creating their own learning resources. Using the WorldCat dataset for these pursuits ensures that consistent results can be obtained from queries and that access to the dataset will not suddenly disappear.

Access the static dataset at: http://purl.org/dataset/WorldCat/LibraryScienceSubset ⌕

A tutorial and some example queries ⌕ are available for those interested in getting started in using this resource.

This dataset identifies and describes bibliographic resources gleaned from library, archives, and museum data from around the world. This subset is focused on bibliographic resources broadly related to the theme of library science. Specifically, resource descriptions were extracted from the original MARC records if they met at least one of the following criteria:

- FAST headings "library", "libraries", "librarian", or "librarianship" in field 650
- DDC classes "Library & information sciences" (020 through 028) in field 082
- LCC subclasses for "Libraries" (Z662 through Z1000.6)
- "Information resources (General)" (ZA 3038 through ZA 5190) in field 050.

Records with "N@F" in the 040 field (name of the organization that created the original record) were excluded. Download more detailed information ⌕ (PDF, 432KB)

The OCLC Dataset

DOWNLOAD as:

    N-TRIPLES

    MARC/XML

LICENSE:

    ODC-BY

AVAILABILITY:

    through December 2027

WorldCat Linked Data (Library Science Subset)

VoID Dataset Description

<http://purl.org/dataset/WorldCat/LibraryScienceSubset>

cc:attributionName	"WorldCat Linked Data (Library Science Subset)"	
cc:attributionURL	<http://purl.org/dataset/WorldCat/LibraryScienceSubset>	
cc:morePermissions	<mailto:data@oclc.org>	
cc:useGuidelines	rdf:value	**Attribution** The preferred form of attribution is: "Contains OCLC WorldCat Linked Data (Library Science Subset) information made available under the ODC Attribution license. The OCLC cooperative requests that uses of WorldCat derived data contained in this work conform with the WorldCat Community Norms." Special cases: In circumstances where providing the full attribution statement above is not technically feasible, the use of canonical WorldCat Work URIs is adequate to satisfy Section 4.3 of the ODC Attribution license.
schema:description	"WorldCat Linked Data (Library Science Subset) is a dataset that identifies and describes bibliographic resources that are gleaned from library, archives, and museum data from around the world. This subset is focused on bibliographic resources broadly related to the theme of library science. WorldCat is a registered trademark of OCLC Online Computer Library Center, Inc."	
dcterms:license	<http://opendatacommons.org/licenses/by/1.0/>	
schema:publisher	<http://viaf.org/viaf/156508705>	
	foaf:homepage	<http://www.oclc.org/>
	foaf:page	<http://worldcat.org/identities/lccn-n78-15294>
	schema:sameAs	<http://dbpedia.org/resource/Online_Computer_Library_Center>

ACCESS THE DATASET AT:
http://purl.org/dataset/WorldCat/LibraryScienceSubset

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A tutorial and some example queries are available for those interested in getting started in using this resource.

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The Online Computer Library Center ⍈ (OCLC) has published a dataset, WorldCat Linked Data (Library Science Subset), so that those who visit the LD4PE site will have static data to test their skills on or to use in creating their own learning resources. Using the WorldCat dataset for these pursuits ensures that consistent results can be obtained from queries and that access to the dataset will not suddenly disappear.

Access the static dataset at: http://purl.org/dataset/WorldCat/LibraryScienceSubset ⍈

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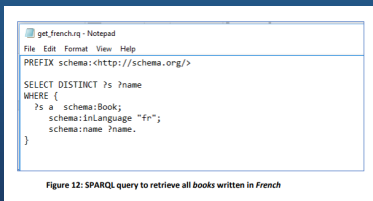
- FAST headings "library", "libraries", "librarian", or "librarianship" in field 650
- DDC classes "Library & information sciences" (020 through 028) in field 082
- LCC subclasses for "Libraries" (Z662 through Z1000.6)
- "Information resources (General)" (ZA 3038 through ZA 5190) in field 050.

Records with "N@F" in the 040 field (name of the organization that created the original record) were excluded. Download more detailed information ⍈ (PDF, 432KB).

The OCLC Dataset

TUTORIAL :

- **DOWNLOAD DATASET**
  - N-Triples

- **STORE PERSISTENTLY**
  - Apache Jena's TDB (Triple Store)

- Query using SPARQL
  - Command Line using TDBQUERY (similar to ARQ)
  - Interpreting and storing results

```
get_french.rq - Notepad
File  Edit  Format  View  Help
PREFIX schema:<http://schema.org/>

SELECT DISTINCT ?s ?name
WHERE {
    ?s a  schema:Book;
       schema:inLanguage "fr";
       schema:name ?name.
}
```

Figure 12: SPARQL query to retrieve all *books* written in *French*

Introduction

This tutorial was created both to highlight the potential u...
Competency Index. Early sections address topics related to ...
SPARQL queries introduce the broad topic of "Querying RDF...
sets. Finally, a series of exercises prompt the user to write ta...
advanced uses of SPARQL functions and operators that mak...

There are a great number of SPARQL tutorials on the Web, b...
which do not always hold true in real-life cases:

1. That the dataset the user wants to query is relatively sm...
2. That if the user is querying a massive database (e.g., DB...

What does the user do when he or she discovers that their da...
contains over twenty million triples? The WorldCat Dataset is ...

There are many different tools available for storing and query...
ultimately be used. This tutorial represents only one possible ...
Dataset and start exploring it as quickly as possible and, hop...

Accessing the Dataset

Let's say that a colleague has given you a link to a dataset: h...

Download detailed introductory information ⤤ (PDF, 274KB)

Storing the Data

Before you can start querying the data, we need to load it int...
Apache Jena's TDB.

Download instructions for storing the dataset ⤤ (PDF, 115KB)

Querying the Data

When faced with a new and unfamiliar dataset, it is helpful to...
describe the data. Without this knowledge, writing queries is ...
...d can quickly give you an idea what a dataset is all about. ...

...d exercises for exploratory queries ⤤ (PDF, 174KB)

PDFs AVAILABLE:

Simple Queries

The following sections contain walkthroughs of some si...
for users new to the SPARQL query language.

Simple Query 1: Union and Shared Subjects
Start with this query: *What languages are represented in t...*

To write this query, you need to determine one vital piece ...
Fortunately, you already know all the classes and propertie...
you skim through the result set you saved, you see that the ...
"http://schema.org/inLanguage".

To determine which property you should use in future quer...
give you an idea how the dataset's creators used these pro...

Download exercises for Simple Query 1 ⤤ (PDF, 149KB)

Simple Query 2: Optional and Turning an Object into a...
Now that we know which properties are used to describe lo...
Let's limit the type of Creative Works we are looking for to...
string together a few triple statements.

Download exercises for Simple Query 2 ⤤ (PDF, 203KB)

Simple Query 3: Negation Using Not Exists and Minus
What if, on the hand, we had wanted to write a query spe...
in other languages (i.e., works originally written in French)?...
topic of NEGATION.

Download exercises for Simple Query 3 ⤤ (PDF, 118KB)

Additional SPARQL Exercises
You are now ready to try writing some queries on your ow...
which accomplish each task (answers).

Download SPARQL exercises ⤤ (PDF, 128KB)

...ad exercise answer walkthrough ⤤ (PDF, 169KB)

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Summary (1)
Competency Index for Linked Data

What is a competency index used for?

- Describes what a learner can learn.

- Describes skills that demonstrate understanding.

- Basis for:
  - job descriptions
  - course syllabi
  - university degrees
  - micro-credentials
  - digital badges

- Tags descriptions of learning resources.

- …

Summary (2)
Competency Index for Linked Data

Who can benefit from it?

- **Students**: help choose courses that cover what you want to learn.

- **Instructors**: design a course, syllabus, homework, quizzes, exams.

- **Self-learners**: explore technologies and methods related to Linked Data.

- **Employers**: write a job description.

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Competency Index for Linked Data is a work in progress!

Follow us on Github!

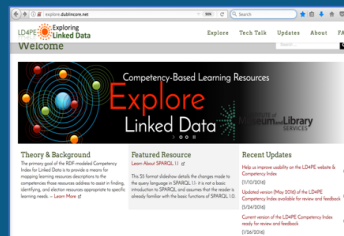https://dcmi.github.io/ldci/D2695955/

Editoral Board
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  <u>Stuart Sutton</u>

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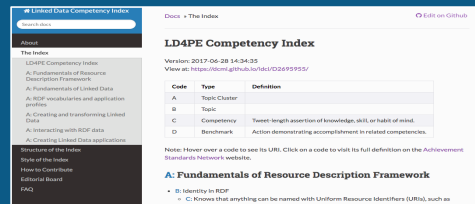# *Competency Index for Linked Data*
Websites

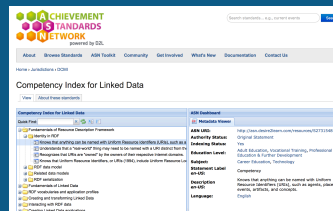| Available at:	Contents
LD4PE Project site: http://explore.dublincore.net/	• Competencies • Learning resources (aligned with competencies) • Roadmaps • Practice dataset and instruction
Maintenance at GitHub: https://dcmi.github.io/ldci/	• Competencies • Updates from the editorial board • Contribution by anyone is welcome
Registered at: Achievement Standards Network (ASN) http://asn.desire2learn.com/resources/D2695955	• Competencies • Definition, URI of each competency • Specification

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References

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- Linked Data Competency Index https://dcmi.github.io/ldci/D2695955/

- Baker, Thomas. 2017. Linked Data Competency Index: Mapping the field for teachers and learners. FAO AIMS Webinar, 11 October 2017. http://aims.fao.org/capacity-development/webinars/webinaraimslinked-data-competency-index-mapping-field-teachers-and

- Crandall, Michael D., Stuart A. Sutton, Marcia Zeng, Thomas Baker, Abigail Evans, Sean Dolan, Joseph Chapman, David Talley, Michael Lauruhn. 2017. LD4PE: A Competency-based Guide to Linked Data Principles and Practices. 2017 International Conference on Dublin Core and Metadata Applications (DC-2017), Washington, D.C. http://dcevents.dublincore.org/IntConf/dc-2017/paper/view/513

Key Project Personnel

- University of Washington
  - **Michael Crandall**
  - Stuart Sutton
  - David Talley
  - Abi Evans

- Kent State University
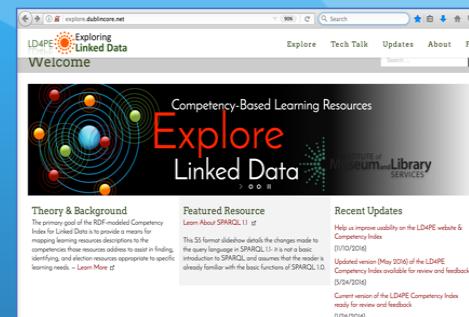 - Marcia Zeng
  - Sean Dolan

- DCMI
  - Tom Baker
  - Stuart Sutton
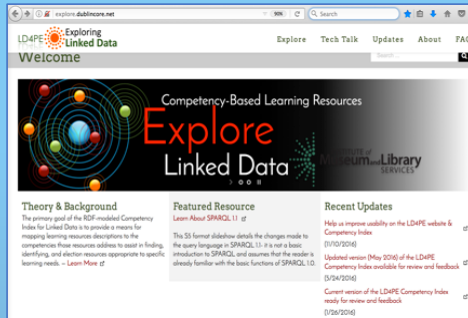 - Joseph Chapman

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http://explore.dublincore.net/

https://dcmi.github.io/ldci/

Thank you!

A Linked Data Competency Framework for Educators and Learners

Marcia Lei Zeng
Kent State University, USA
On behalf of
LD4PE (Linked Data for Professional Education) Project Team