LD4PE Exploring Linked Data

Linked Data Competency Index

DEVELOPMENT & IMPLEMENTING *LINKED DATA COMPETENCY INDEX (LDCI)* IN TEACHING AND TRAINING

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[Webinar] Knowledge Organization Competencies and Skills

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LD4PE Exploring Linked Data

- **Funded by the Institute of Museum and Library Services (IMLS)**
  - December 1, 2014 - November 30, 2017
- **Led by:**
  - University of Washington, Information School
  - Kent State University, School Information
  - Dublin Core Metadata Initiative (DCMI)
- **Content Partners:**
  - OCLC
  - Elsevier
  - Access Innovations
  - Synaptica
  - Sungkyunkwan University (Korea)

INSTITUTE of Museum and Library SERVICES

Lead Project Personnel:

- Project P.I.: Michael Crandall
- Technical Infrastructure Team: Stuart Sutton
- Learning Resource Collection Team: Marcia Zeng
- Competency Index Editorial Board: Tom Baker
- Community Building and Outreach: Michael Lauruhn

https://ld4pe.dublincore.org/about/project-participants/

I. Introduction

"Competency Index"

A **thematic set of competencies** organized by

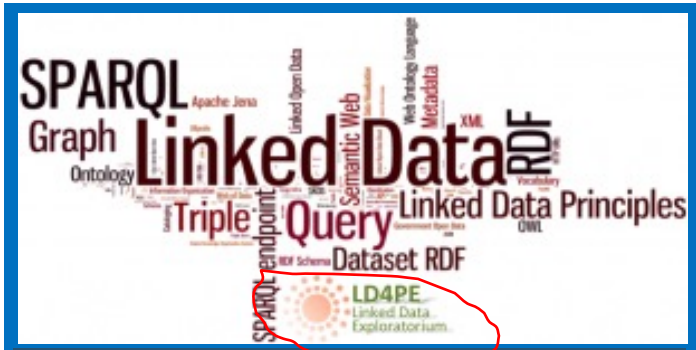
- **Topic**
  - **Competency**: a tweet-length phrase about knowledge or skills that can be learned
    - **Benchmark**: an action that demonstrates accomplishment in a given competency

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.
- …

Competency-based education and training



Understanding linked data standards and practices has become a key requirement for information professionals

The challenge of acquiring new competencies extends to

- educators &
- trainers

A competency index can be used for:

- Descriptions for what a learner can learn
- Descriptions of skills that demonstrate understanding
- Basis for:
  - job descriptions
  - course syllabi
  - university degrees
  - micro-credentials
  - digital badges
- Tags descriptions of learning resources
- … …

Competency-based education and training

The ***ASN Description Language*** **(ASN-DL)** can be used for describing formally promulgated **competencies** and **benchmarks**.

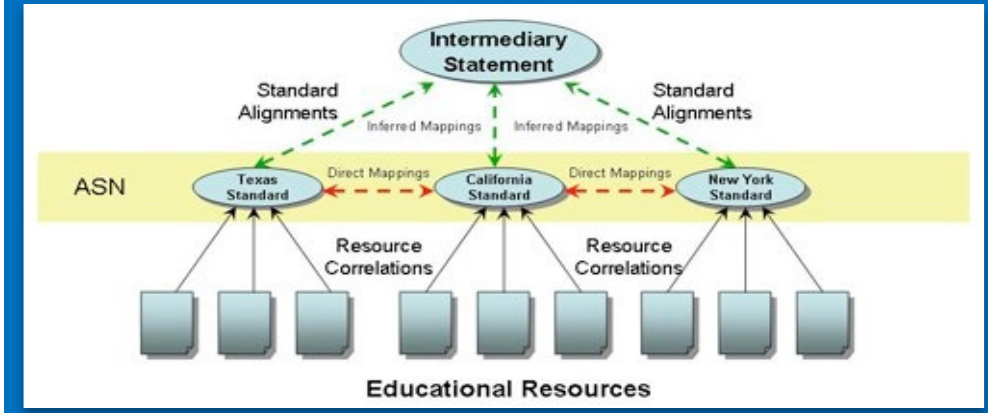
ACHIEVEMENT STANDARDS NETWORK powered by D2L

ASN Description Framework Schema

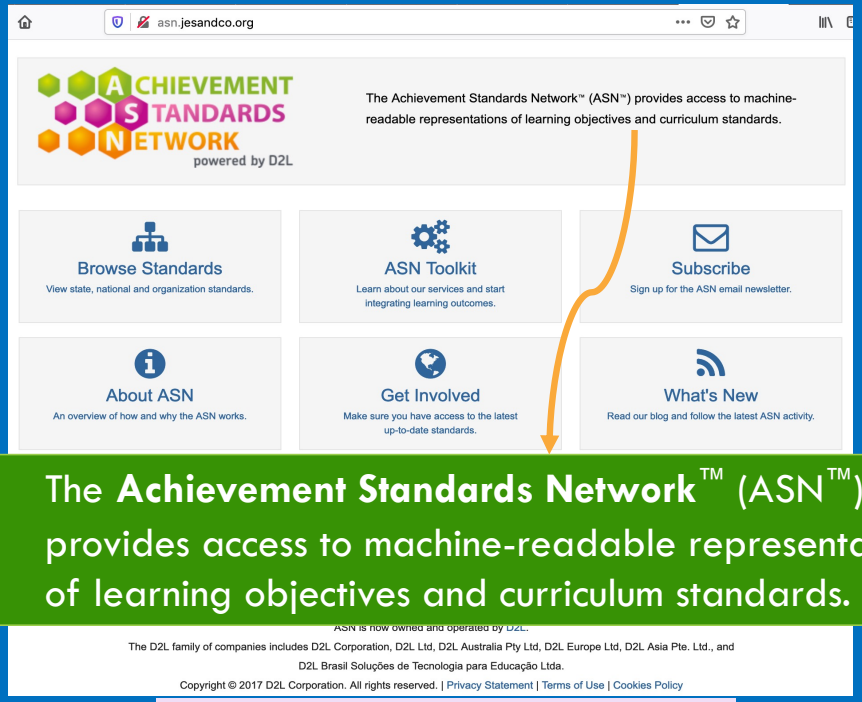
Last update:
2019-11-17

Editors:
Joseph Chapman (D2L)
Stuart A. Sutton (Information School, University of Washington)

http://www.achievementstandards.org/content/technical-documentation



https://ld4pe.dublincore.org/theory/briefing-papers/asn-briefing-1/



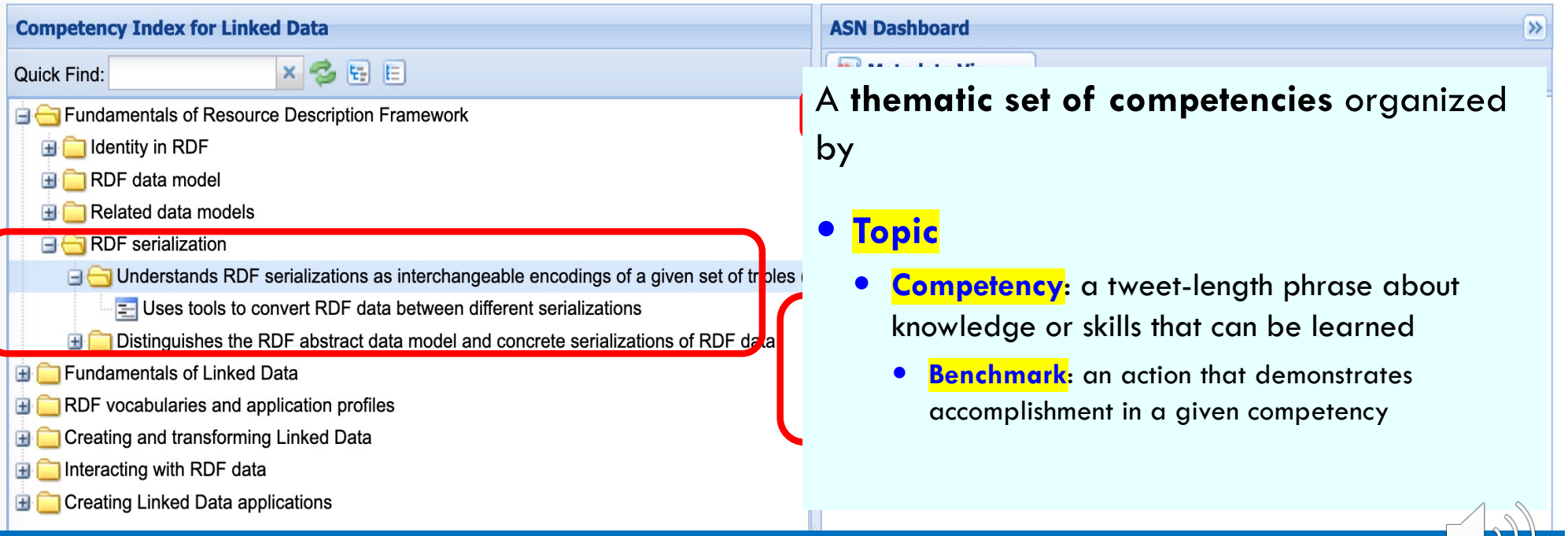
The **Achievement Standards Network**™ (ASN™) provides access to machine-readable representations of learning objectives and curriculum standards.

http://asn.jesandco.org/

A Linked Data competency index is built based on ASN model for competency index construction.

Competency Index for Linked Data

http://asn.desire2learn.com/resources/D2695955



A **thematic set of competencies** organized by

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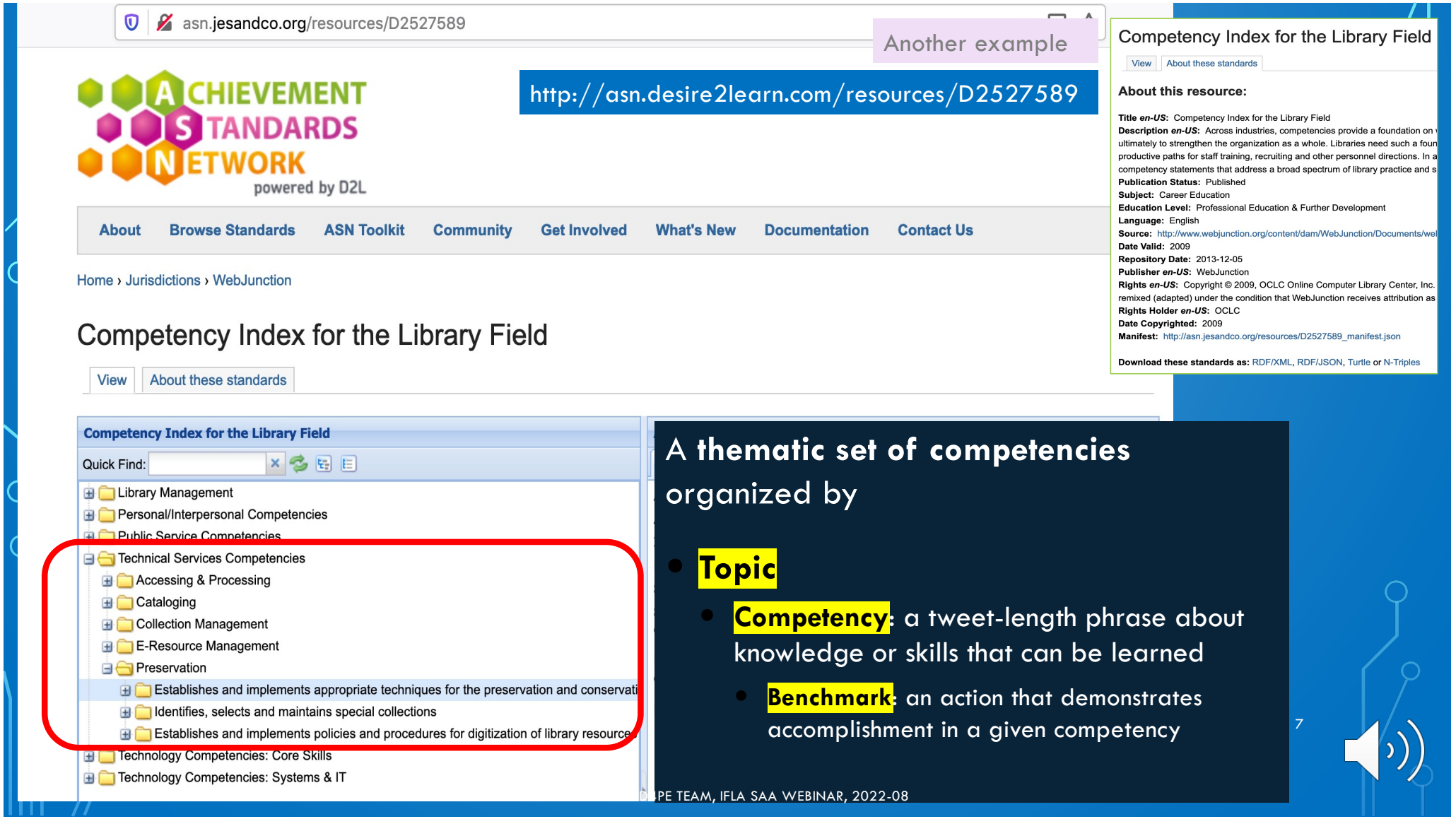

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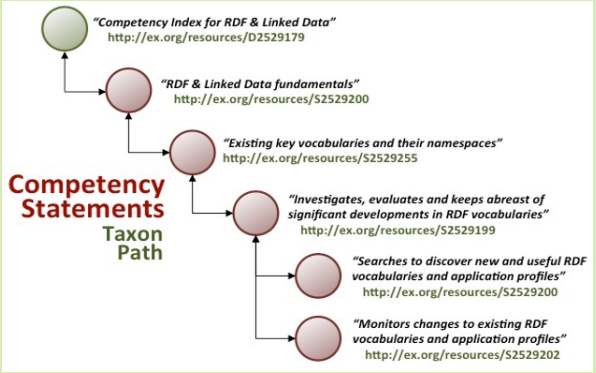
II. *LINKED DATA COMPETENCY INDEX* (LDCI)

LD4PE Exploring Linked Data

Linked Data Competency Index

- a set of topically arranged assertions of the knowledge, skills, and habits of mind required for professional practice in the area of Linked Data
- an overview, or map, of the Linked Data field both
  - for independent learners who want to learn Linked Data methods and technology, and
  - for professors or trainers who want to design and teach courses on the subject



Content

Competencies were proposed based on:

- Literary Warrant
- Resource Warrant
- Expert Warrant

6 topic clusters
30 topics

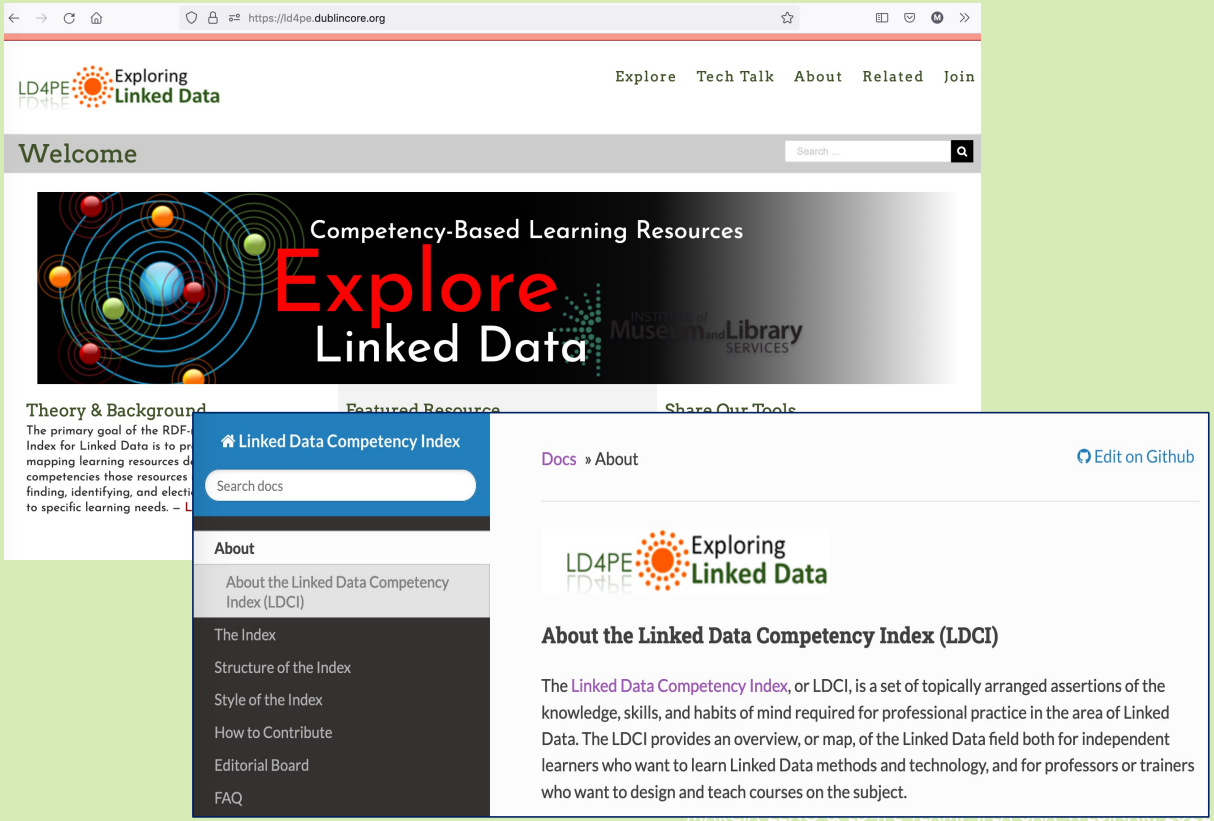
LD Competency Index (LDCI)

Overview of topics

- **Fundamentals of Resource Description Framework**
  - Identity in RDF
  - RDF data model
  - Related data models
  - RDF serialization
- **Fundamentals of Linked Data**
  - Web technology
  - Linked data principles
  - Linked Data policies and best practices
  - Non-RDF Linked Data
- **RDF vocabularies and application profiles**
  - Finding RDF-based vocabularies
  - Designing RDF-based vocabularies
  - Maintaining RDF vocabularies
  - Versioning RDF vocabularies
  - Publishing RDF vocabularies
  - Mapping RDF vocabularies
  - RDF application profiles
- **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
- **Interacting with RDF Data**
  - Finding RDF Data
  - Processing RDF data using programming languages
  - Querying RDF Data
  - Visualizing RDF Data
  - Reasoning over RDF data
  - Assessing RDF data quality
  - RDF Data analytics
  - Manipulating RDF Data
- **Creating Linked Data applications**
  - Storing RDF data

Linked Data Competency Index (LDCI)

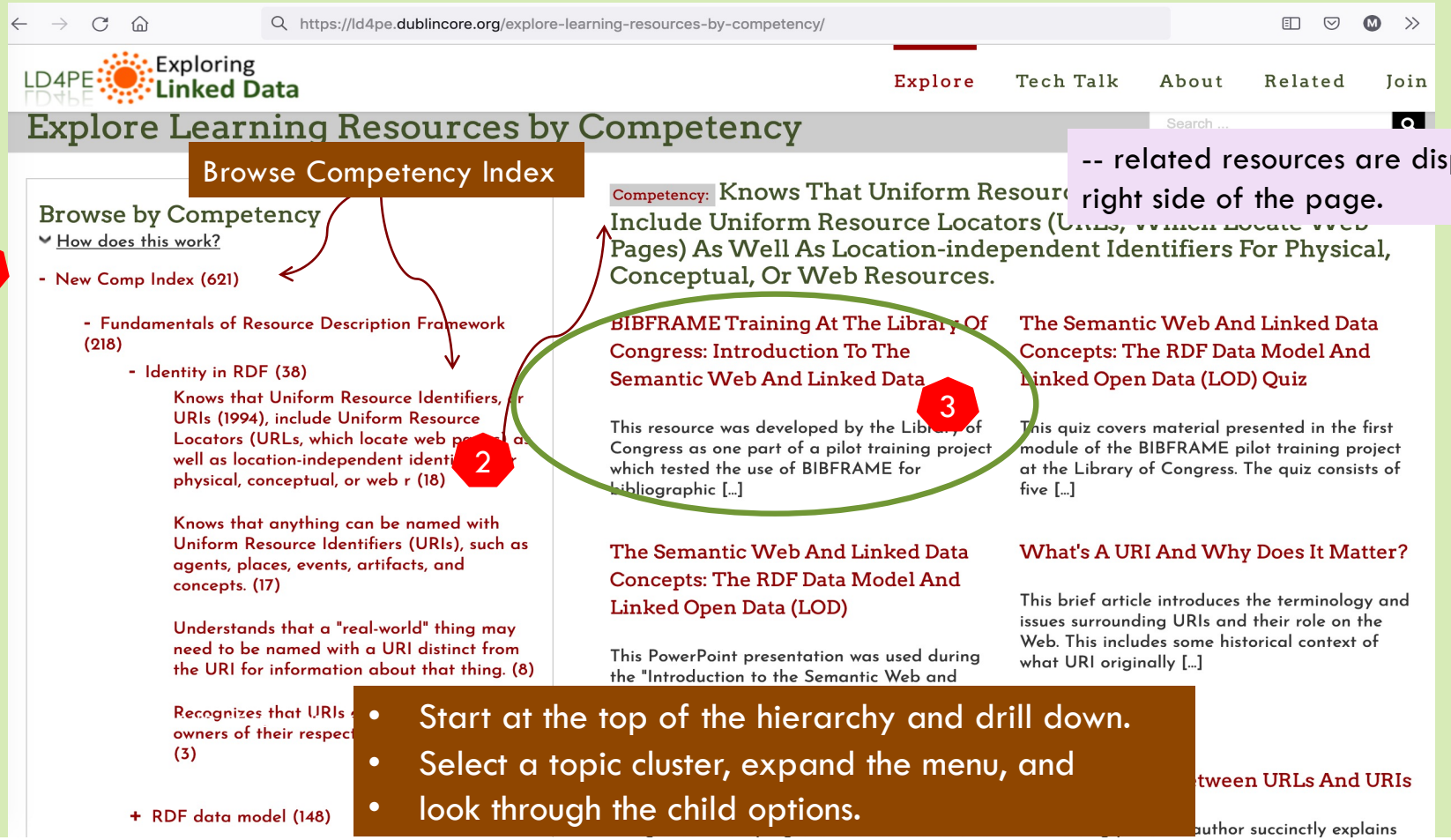
The LD4PE project created an RDF repository containing both the **Competency Index** and metadata for the cataloged **Learning Resources.**



1. **Website** LD4PE Explore
   https://ld4pe.dublincore.org/
   - The full Competency Index
   - aligned with 600+ [open] learning resource descriptions [webinars, podcasts, lectures, web pages, readings …]
2. **Updated version and translations on Github** (2017--)
   https://dcmi.github.io/ldci/D2695955/
3. **Registered** (2016 version) In the Achievement Standard Network (ASN)

LD4PE *Explore* Website https://ld4pe.dublincore.org/

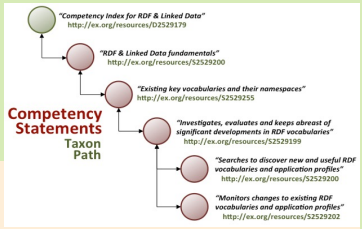
- The full Competency Index --> **Explore**
- aligned with 600+ [open] learning resource descriptions (by 2017)



-- related resources are displayed on right side of the page.

- Start at the top of the hierarchy and drill down.
- Select a topic cluster, expand the menu, and
- look through the child options.

Structure



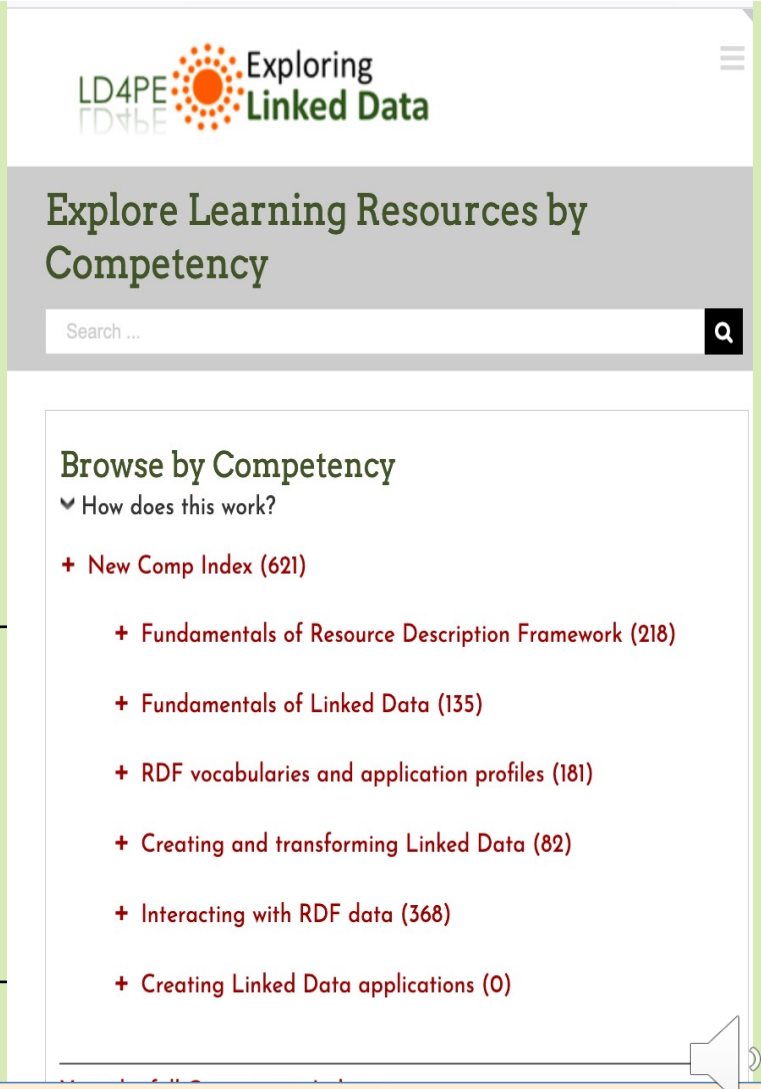
Topic cluster

Topic

Competency: Tweet-length assertion of knowledge, skill, or habit of mind

Benchmark: Action demonstrating accomplishment in related competencies

6 Topic Clusters



TOPICAL CLUSTER » TOPIC » COMPETENCY » BENCHMARK

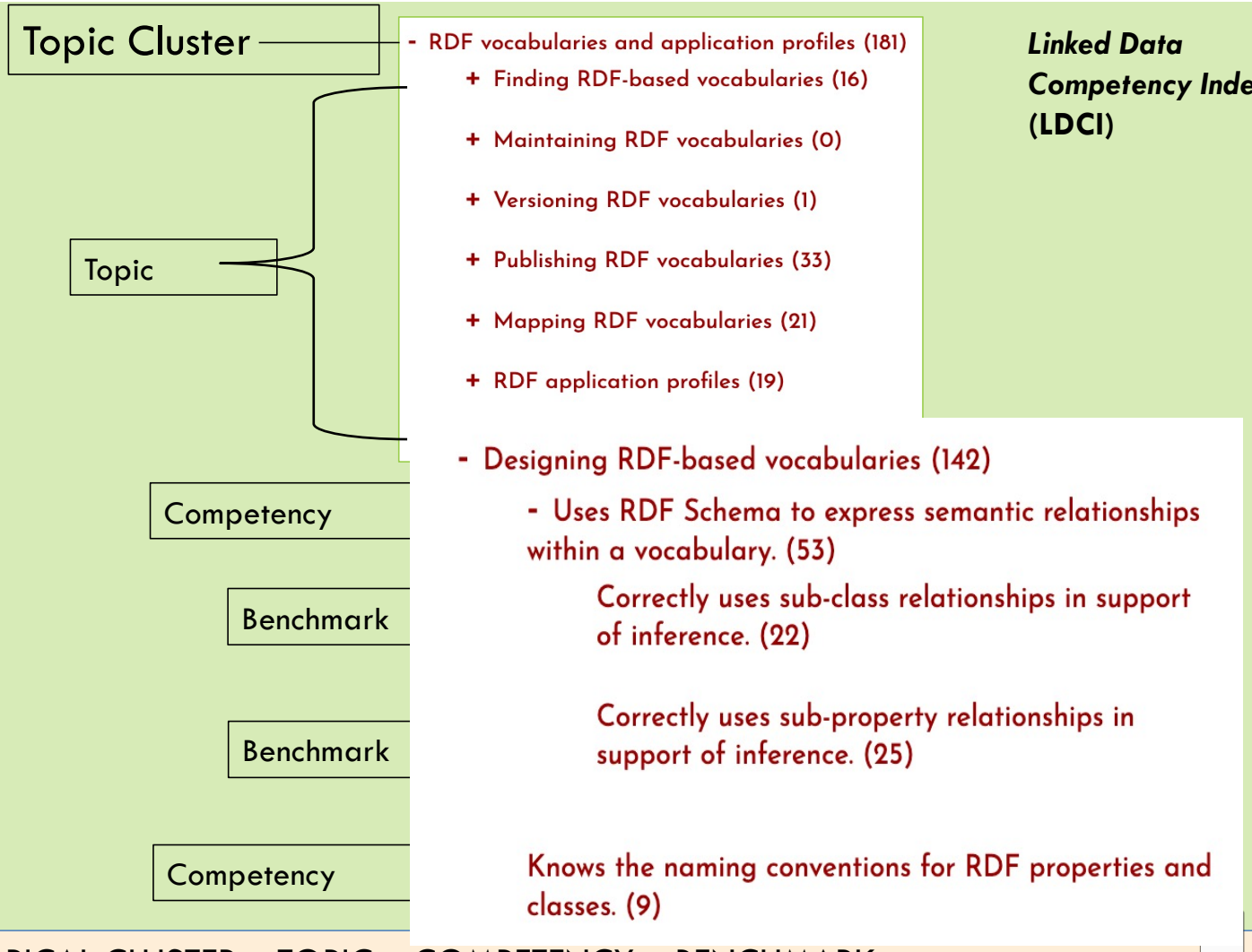
Structure

6 clusters

30 topic groups

95 competencies

75 benchmarks



***Linked Data Competency Index* (LDCI)**

TOPICAL CLUSTER » TOPIC » COMPETENCY » BENCHMARK

Style

Topic Cluster

- RDF vocabularies and application profiles (181)
  - + Finding RDF-based vocabularies (16)
  - + Maintaining RDF vocabularies (0)
  - + Versioning RDF vocabularies (1)
  - + Publishing RDF vocabularies (33)
  - + Mapping RDF vocabularies (21)
  - + RDF application profiles (19)

Topic

Linked Data Competency Index (LDCI)

Writing effective competencies and benchmarks

Competencies (understanding)	Benchmarks (doing)
Understands	Uses
Knows	Expresses
Recognizes	Demonstrates
Differentiates ...	Converts ...

Competency

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

Benchmark

Correctly uses sub-class relationships in support of inference. (22)

Benchmark

Correctly uses sub-property relationships in support of inference. (25)

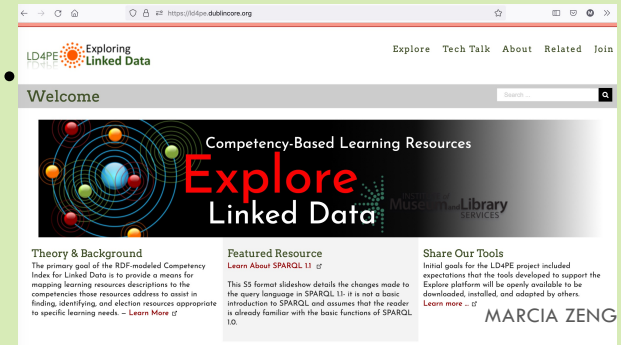
Competency

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

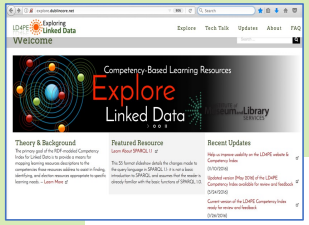
TOPICAL CLUSTER » TOPIC » COMPETENCY » BENCHMARK

III. LEARNING RESOURCES CONNECTED WITH THE COMPETENCIES

- 600+ [open] resources' descriptions
  - webinars, podcasts, lectures, web pages, readings
  - aligned with competencies
- a dataset from OCLC (free for several years)
- a tutorial with some examples
- suggested learning maps
- … …



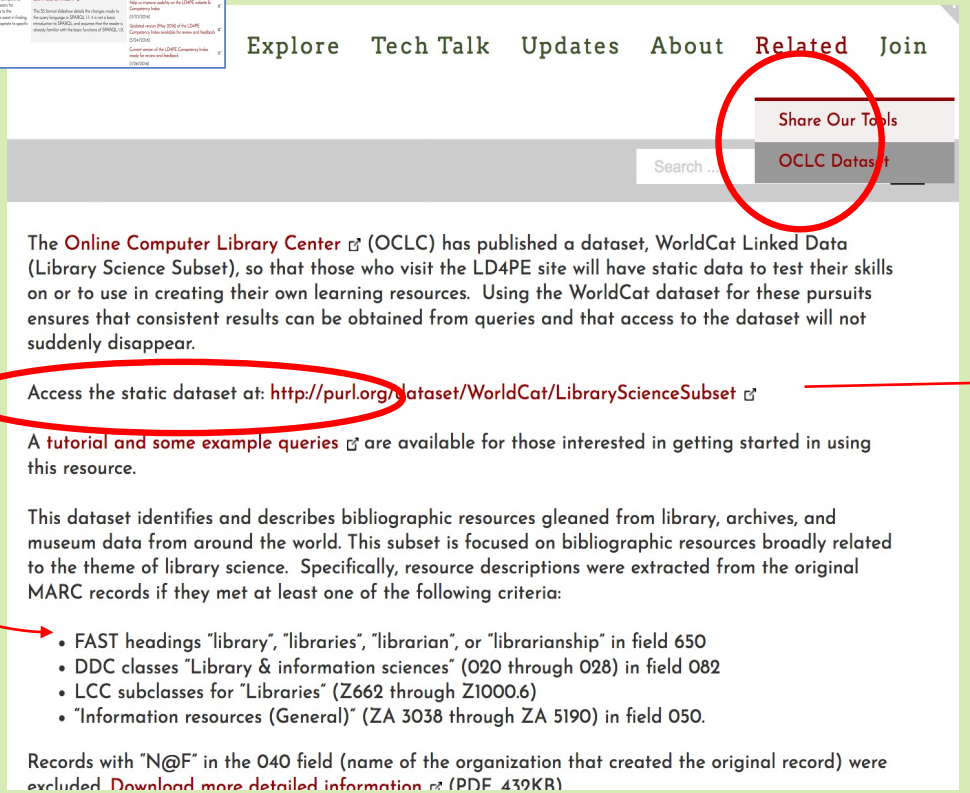
Example: How to get a real dataset for teaching



resource: 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

Example: How to get a real dataset for teaching

RESOURCE:

TUTORIAL : LD4PE Exploring Linked Data — 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

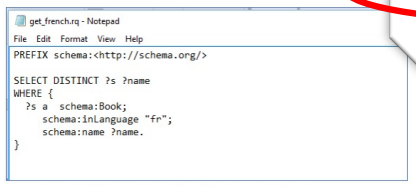


Figure 12: SPARQL query to retrieve all *books* written in *French*

Introduction

This tutorial was created both to highlight the potential … 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 t… 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 o… some s… for users new to the SPARQL query langu…ge.

Simple Query 1: Union and Shared Subjects

Start with this query: *What languages are represented in …*

To write this query, you need to determine one vital piece … Fortunately, you already know all the classes and properti… you skim through the result set you saved, you see that th… *"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 pr…

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 l… Let's limit the type of Creative Works we are looking for t… 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).

…ownload SPARQL exercises (PDF, 128KB)

…ad exercise answer walkthrough (PDF, 169KB)

LD4PE Exploring Linked Data

Linked Data Competency Index

Who can benefit from it?

- **Students:** help choose courses that cover what you want to learn
- **Instructors:** design a course, syllabus, homework, quizzes, exams
- **Employers:** write a job description
- **Self-learners:** explore technologies and methods related to Linked Data

REFERENCES

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