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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)

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- 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/
1. 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.
- …
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

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

The challenge of acquiring new competencies extends to:
- educators
- trainers

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

**ASN Description Framework Schema**

**Last update:**
2019-11-17

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

**Competency-based education and training**

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

**ASN**

- **Texas Standard**
- **California Standard**
- **New York Standard**

**Educational Resources**

- **Intermediary Statement**
- **Resource Correlations**

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

- **Browse Standards**
  View state, national, and organization standards.
- **ASN Toolkit**
  Learn about our services and start integrating learning outcomes.
- **Subscribe**
  Sign up for the ASN email newsletter.
- **About ASN**
  An overview of how and why the ASN works.
- **Get Involved**
  Make sure you have access to the latest up-to-date standards.
- **What’s New**
  Read our blog and follow the latest ASN activity.

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

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

**http://asn.jesandco.org/**
A thematic set of competencies organized by

- **Topic**
- **Competency**: a tweet-length phrase about knowledge or skills that can be learned
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A Linked Data competency index is built based on ASN model for competency index construction.
II. **LINKED DATA COMPETENCY INDEX (LDCI)**

- 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.
Competencies were proposed based on:
• Literary Warrant
• Resource Warrant
• Expert Warrant

6 topic clusters
30 topics

LD Competency Index (LDCI)
Overview of topics

Content

- 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)

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Linked Data Competency Index (LDCI)
**Browse Competency Index**
- Start at the top of the hierarchy and drill down.
- Select a topic cluster, expand the menu, and look through the child options.

**LD4PE Explore Website** https://ld4pe.dublincore.org/
- The full Competency Index --> Explore
- aligned with 600+ [open] learning resource descriptions (by 2017)

**Explore Learning Resources by Competency**
- 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...
- The Semantic Web And Linked Data Concepts: The RDF Data Model And Linked Open Data (LOD) Quiz
  - This quiz covers material presented in the first module of the BIBFRAME pilot training project at the Library of Congress. The quiz consists of five...
- What's A URI And Why Does It Matter?
  - This brief article introduces the terminology and issues surrounding URLs and their role on the Web. This includes some historical context of what URI originally...
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
**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)

- 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)

**Structure**

- 6 clusters
  - 30 topic groups
    - 95 competencies
      - 75 benchmarks

**Linked Data Competency Index (LDCI)**

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Writing effective competencies and benchmarks

<table>
<thead>
<tr>
<th>Competencies (understanding)</th>
<th>Benchmarks (doing)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understands</td>
<td>Uses</td>
</tr>
<tr>
<td>Knows</td>
<td>Expresses</td>
</tr>
<tr>
<td>Recognizes</td>
<td>Demonstrates</td>
</tr>
<tr>
<td>Differentiates ...</td>
<td>Converts ...</td>
</tr>
</tbody>
</table>

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

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

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

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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
RESOURCE:
TUTORIAL:

- Download Dataset
- N-Triples
- StorePersistently
- Apache Jena’s TDB (Triple Store)
- Query Using SPARQL
- Command Line using TDBQUERY (similar to ARQ)
- Interpreting and storing results

Example: How to get a real dataset for teaching

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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

• Linked Data for Professional Education (LD4PE); Explore Learning Resources by Competency
  https://ld4pe.dublincore.org/
  Archived at: https://web.archive.org/web/20220315024126/https://explore.dublincore.net/

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

