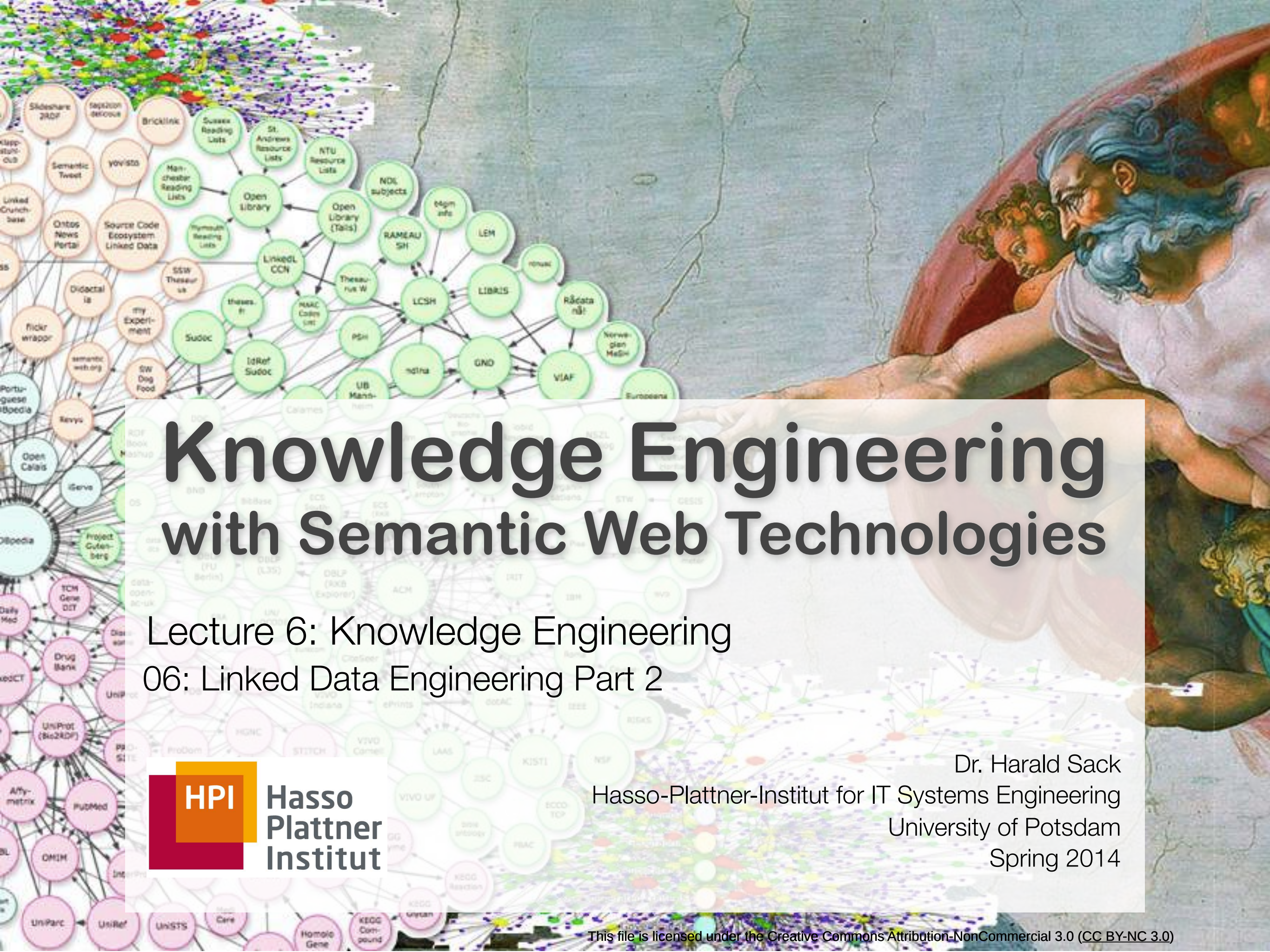




Knowledge Engineering with Semantic Web Technologies

Lecture 6: Knowledge Engineering
06: Linked Data Engineering Part 2

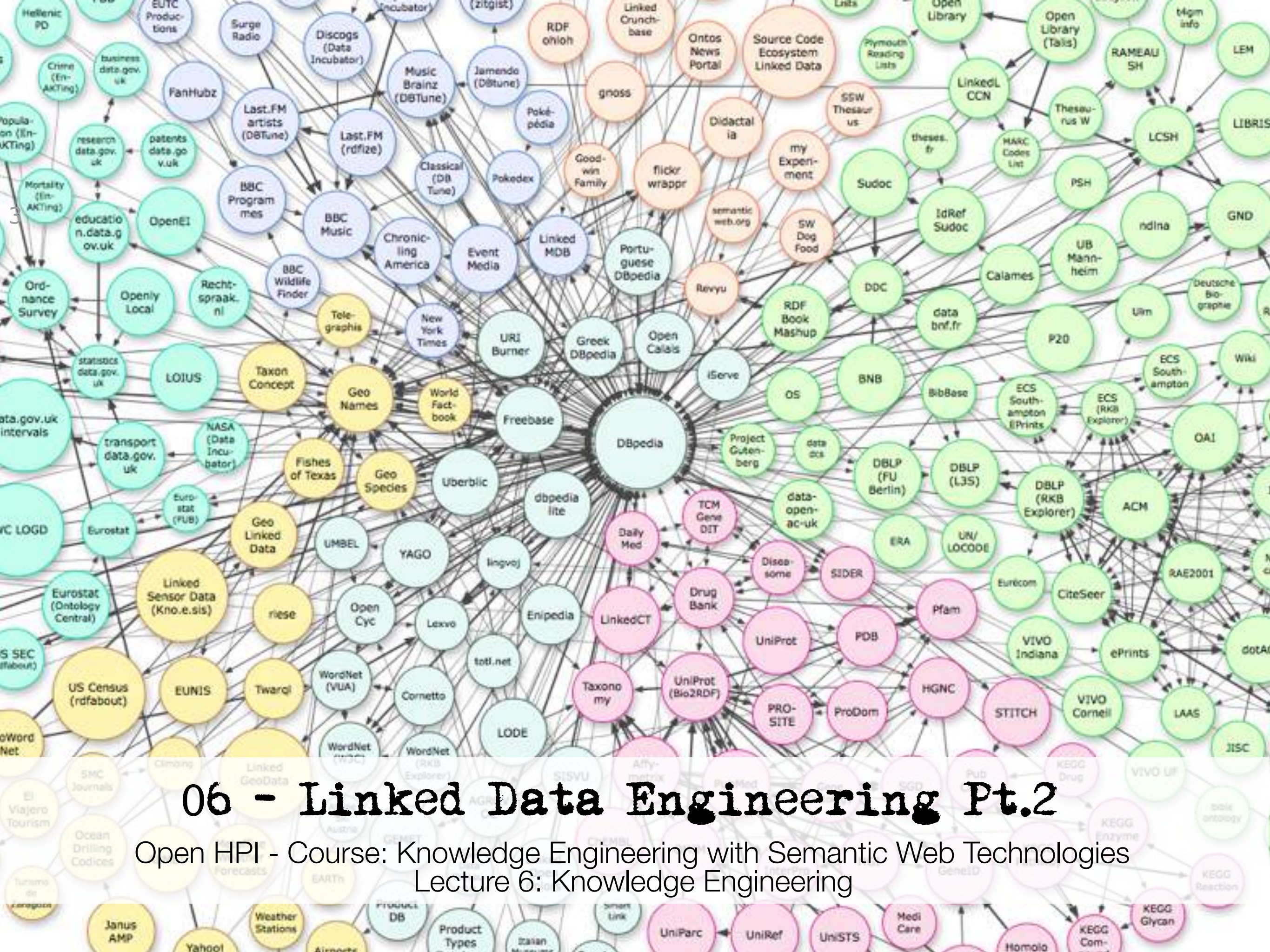


Dr. Harald Sack
Hasso-Plattner-Institut for IT Systems Engineering
University of Potsdam
Spring 2014



Lecture 6: Knowledge Engineering

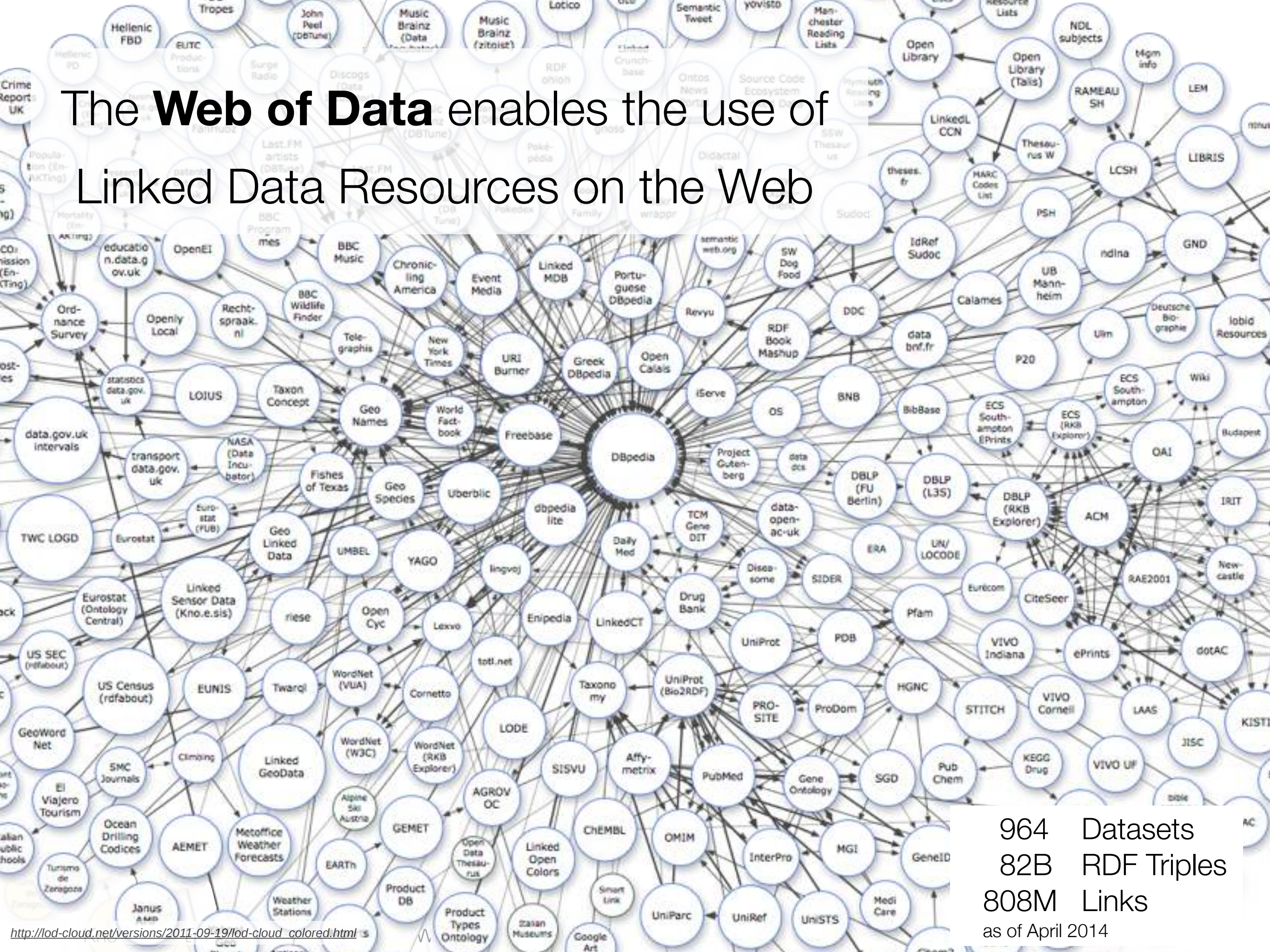
Open HPI Course: Knowledge Engineering with Semantic Web Technologies



06 - Linked Data Engineering Pt.2

Open HPI - Course: Knowledge Engineering with Semantic Web Technologies
Lecture 6: Knowledge Engineering

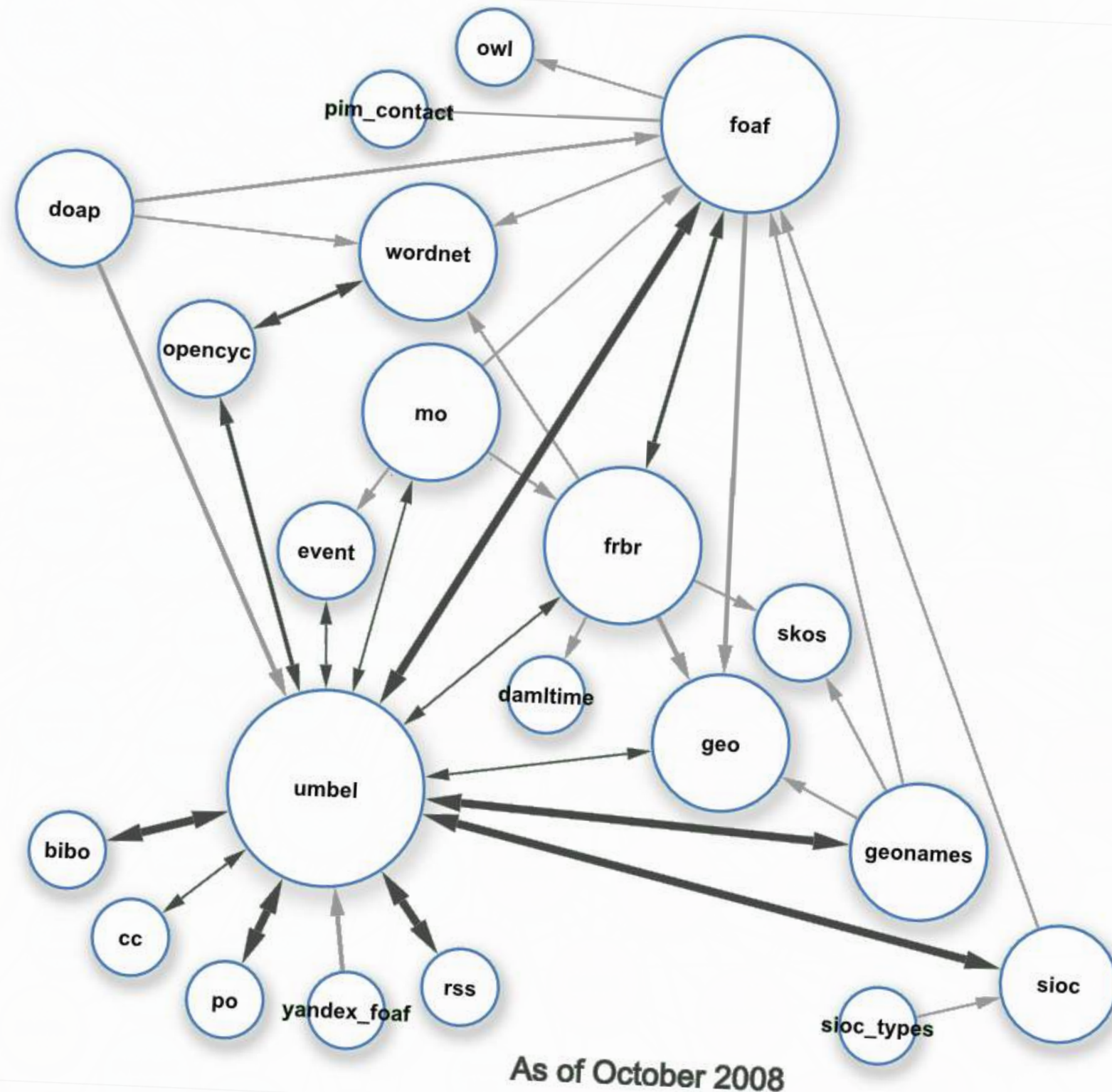
The **Web of Data** enables the use of Linked Data Resources on the Web



964 Datasets
82B RDF Triples
808M Links
as of April 2014

Linked Data Ontologies

- Ontologies hold the Linked Data Cloud together

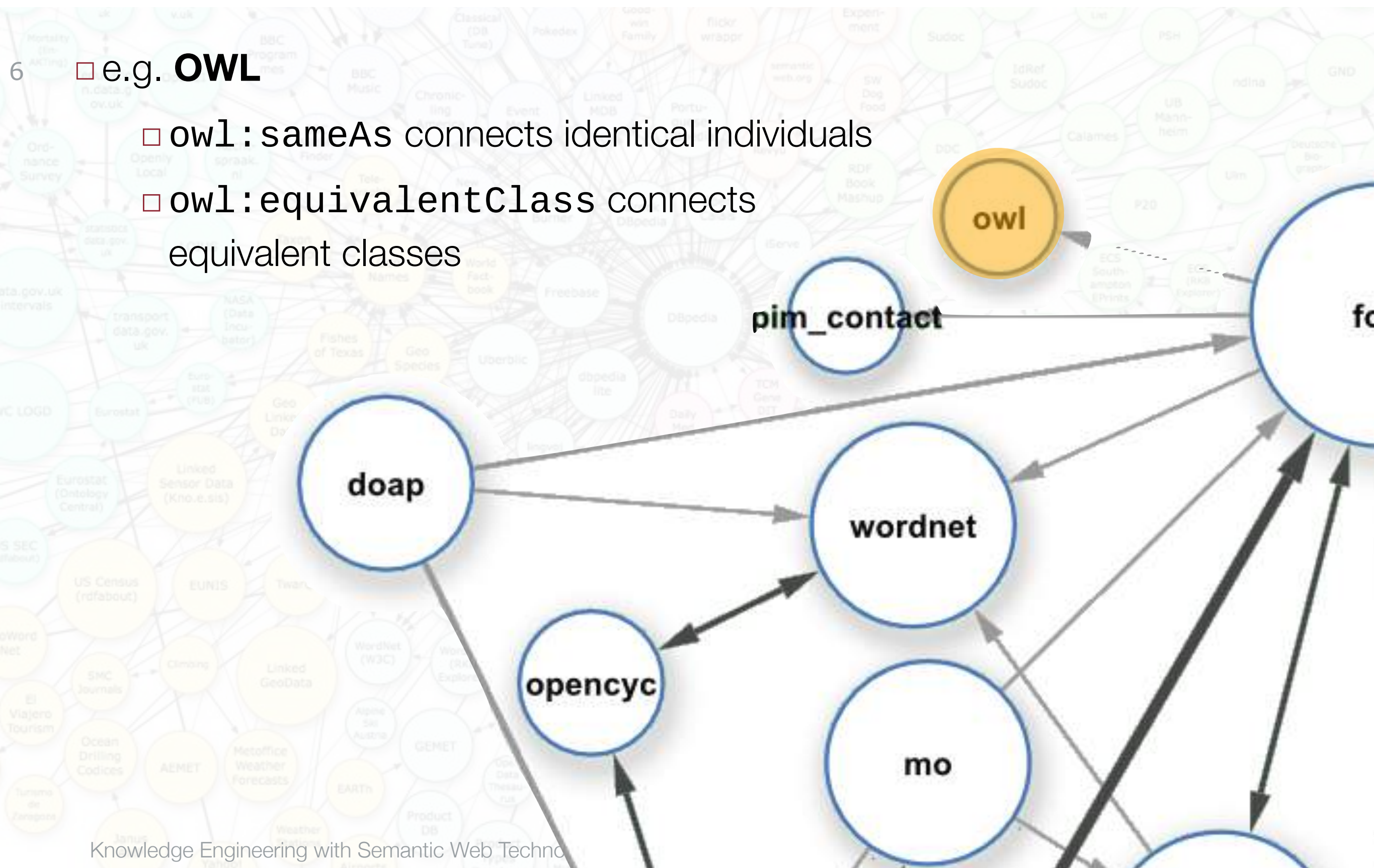


Linked Data Ontologies

6 ☐ e.g. **OWL**

☐ `owl:sameAs` connects identical individuals

☐ `owl:equivalentClass` connects equivalent classes



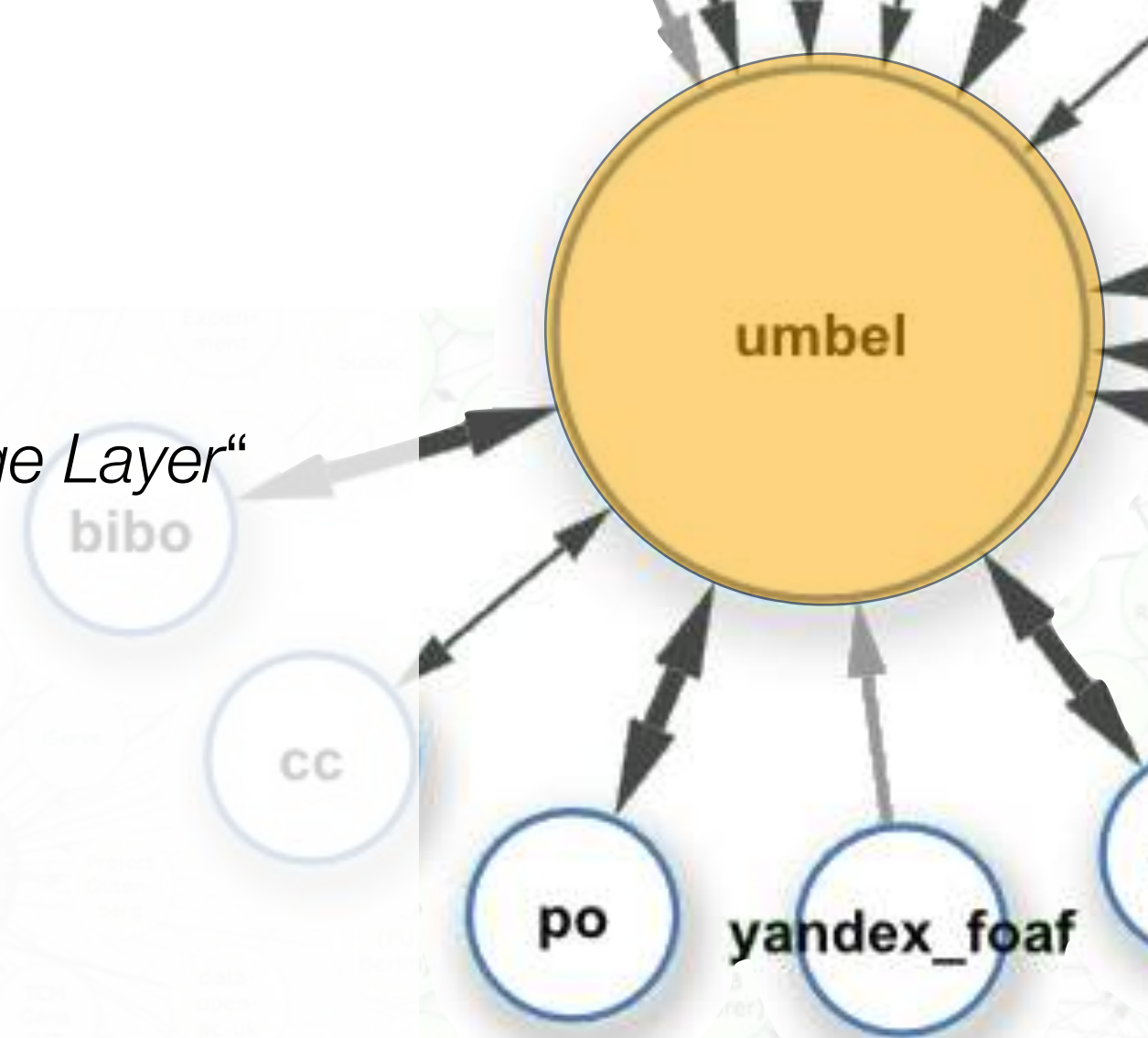
Linked Data Ontologies

7 □ e.g. **SKOS**

- „Simple Knowledge Organization System“
- based on RDF and RDFS
- applied for definitions and mappings of vocabularies and ontologies
 - `skos:Concept` (classes)
 - `skos:narrower`
 - `skos:broader`
 - `skos:related`
 - `skos:exactMatch`, `skos:narrowMatch`,
`skos:broadMatch`, `skos:relatedMatch`

Linked Data Ontologies

- e.g.. **umbel** (version 1.0, Feb. 2011)
 - „Upper Mapping and Binding Exchange Layer“
 - Subset of OpenCyc as RDF Triples based on SKOS and OWL2
 - Upper Ontology with 28.000 concepts (`skos:Concept`)
 - 46.000 Mappings into DBpedia, geonames, e.a. (`owl:equivalentClass`, `rdfs:subClassOf`)
 - Links to more than 2 Mio Wikipedia pages



Linked Data Sources in the Web

□ Native publication

- D2R-Server, OpenLink Virtuoso, Pubby, etc.

□ Implementation of Wrappers around existing applications / APIs

- SIOC Exporter for Wordpress, Drupal, phpBB,...
- RDF Book Mashup (Amazon API, Google Base-API,...)

□ Linking Open Data Project

- Semantic Web Education and Outreach W3C working group
- Catalogue of all known sources of linked data with an open source license
 - » DBPedia, Flickr, Open-Cyc, FOAF, SIOC, GeoNames, ...

Linked Data Driven Web Applications

□ Required Components:

□ **Local RDF Store**

- caching of results
- permanent storage

□ **Logic** (Controller) and
User Interface (=Business Logic)

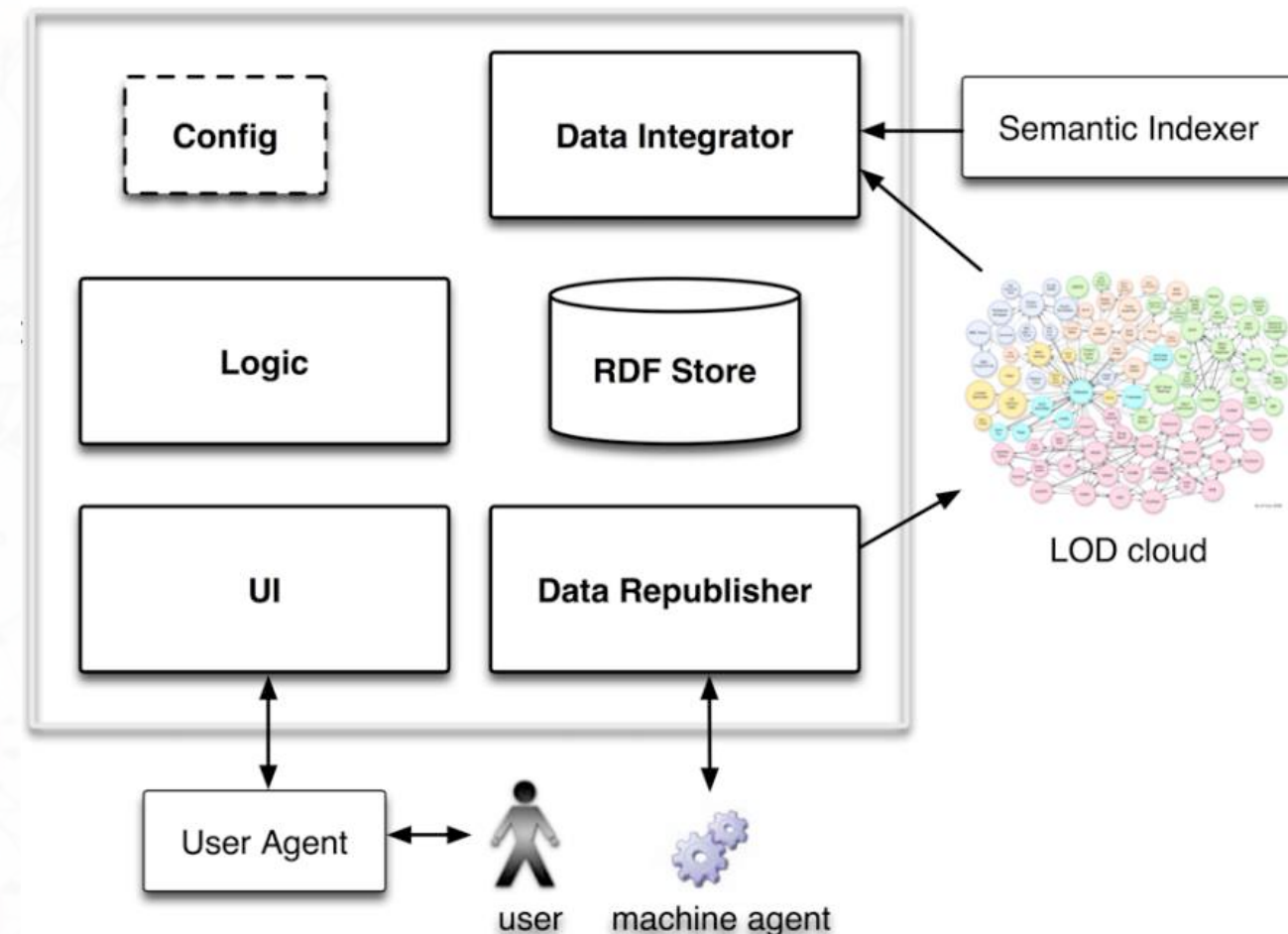
- (not LOD specific)

□ **Data Integration component**

- get data directly from LOD-Cloud or
- via Semantic Indexer

□ **Data Republishing component**

- write back application dependent data into the Web of Data



M.Hausenblas:

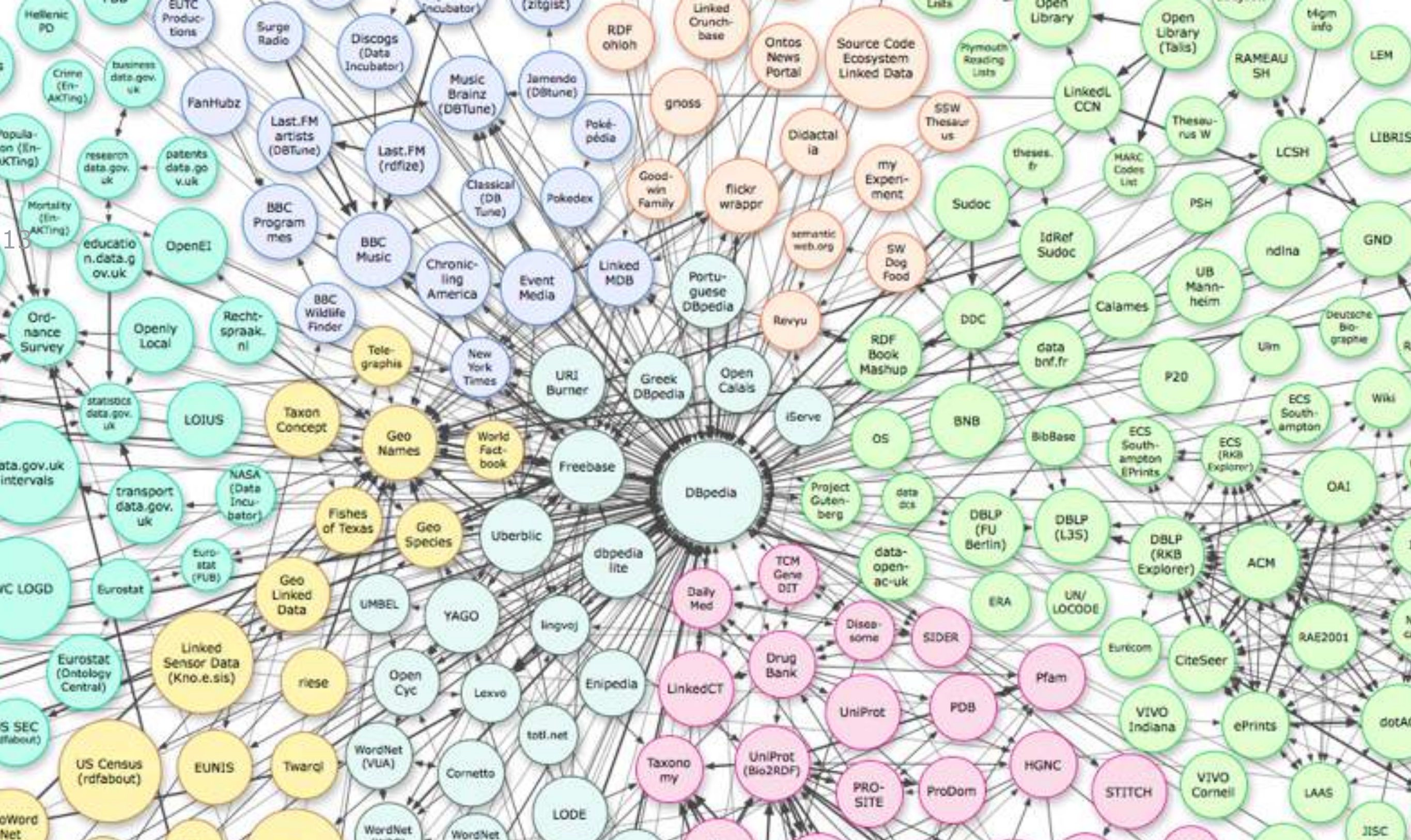
Linked Data Applications, DERI Technical Report, 2009

Linked Data Driven Web Applications

- Access to Linked Data via **SPARQL endpoints**
- ...but where do I find SPARQL endpoints?
 - W3C: Currently Alive SPARQL Endpoints
<http://esw.w3.org/SparqlEndpoints>
- SPARQL endpoints are a **RESTful Web Services**
 - HTTP GET Request with SPARQL query
 - Result available as
 - XML, JSON, plaintext (SPARQL Select/Ask)
 - RDF/XML, NTriples, Turtle, N3 (SPARQL Describe/Construct)
 - Data format can be determined via HTTP Accept Header
z.B. Accept: `application/sparql-results+json`
 - (or via parameters of the SPARQL query)

Linked Data Driven Web Applications

- The easiest way is to make use of a suitable library:
 - SPARQL Javascript Library
http://www.thefigtrees.net/lee/blog/2006/04/sparql_calendar_demo_a_sparql.html
 - ARC for SPARQL (PHP)
<http://arc.semsol.org/>
 - RAP - RDF API für PHP
<http://www4.wiwiss.fu-berlin.de/bizer/rdfapi/index.html>
 - Jena/ARQ (Java)
<http://jena.sourceforge.net/>
 - Sesame (Java)
<http://www.openrdf.org/>
 - **SPARQL Wrapper (Python)**
<http://sparql-wrapper.sourceforge.net/>
 - ...



07 - Linked Data Programming Example

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