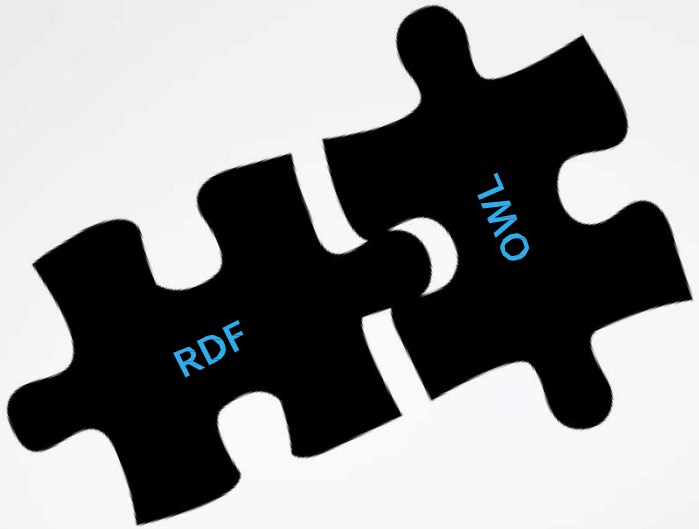


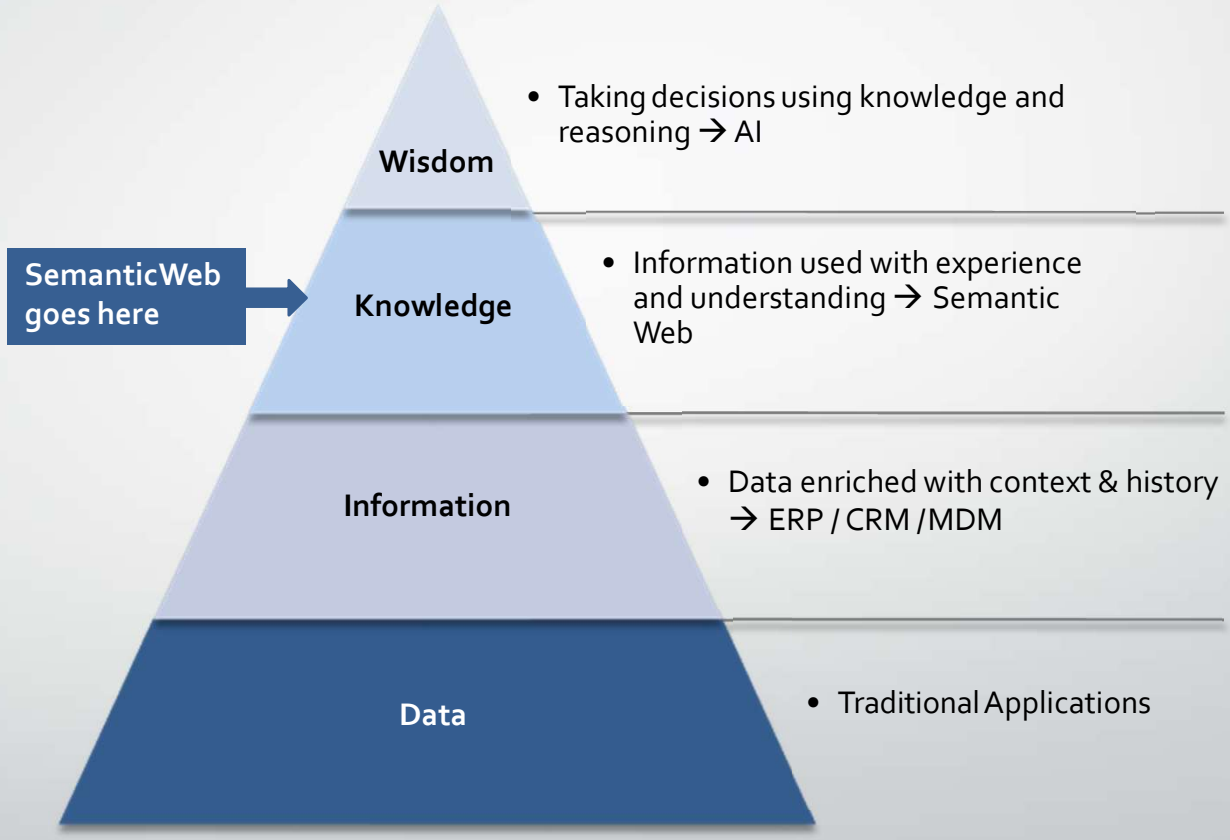
RDF and OWL the powerful Duo

Thanks to: Dr. Tara Raafat

Questions

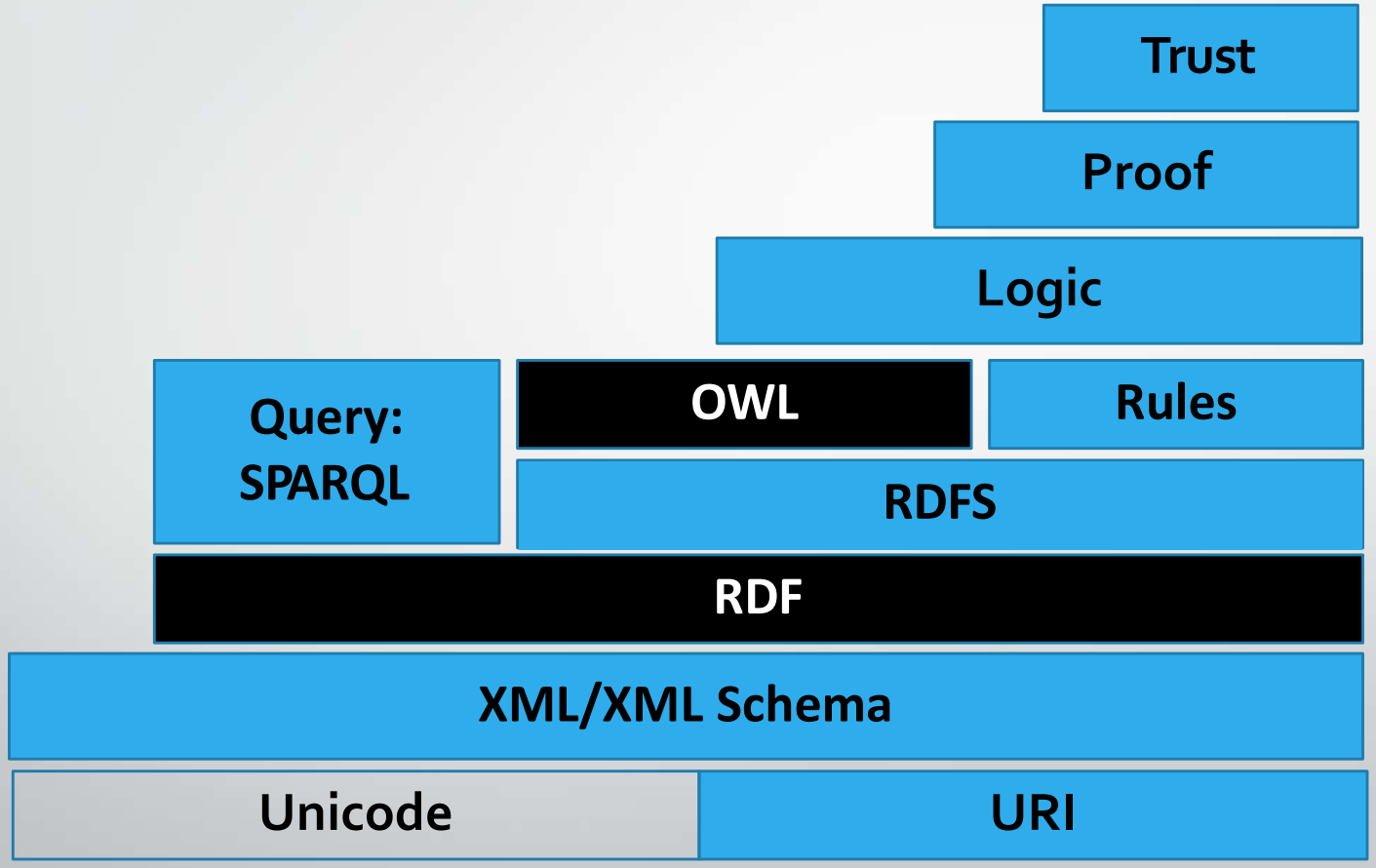
- Why go semantic ?
- Should I use RDF or OWL ?
- What is the difference , what is the link ?
- Did you say smart data ?

The Semantic Web



Semantic web formalizes knowledge in a way that improves decisioning today, and can form the basis for autonomous reasoning in the future

Semantic Web Layer Cake



RDF

(*Resource Description Framework*)

RDF

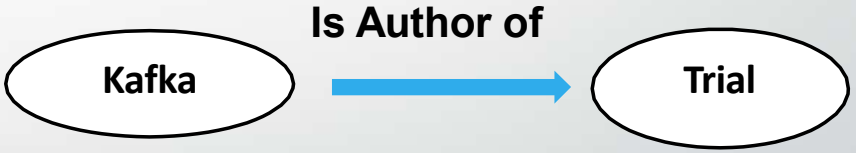
- Simple triple based data model

  Subject, **Predicate**, Object

- Graph- based formalism for representing metadata
  - *Kafka is the author of the book "Trial."*

http://www.mybookstore.com/isAuthorOf

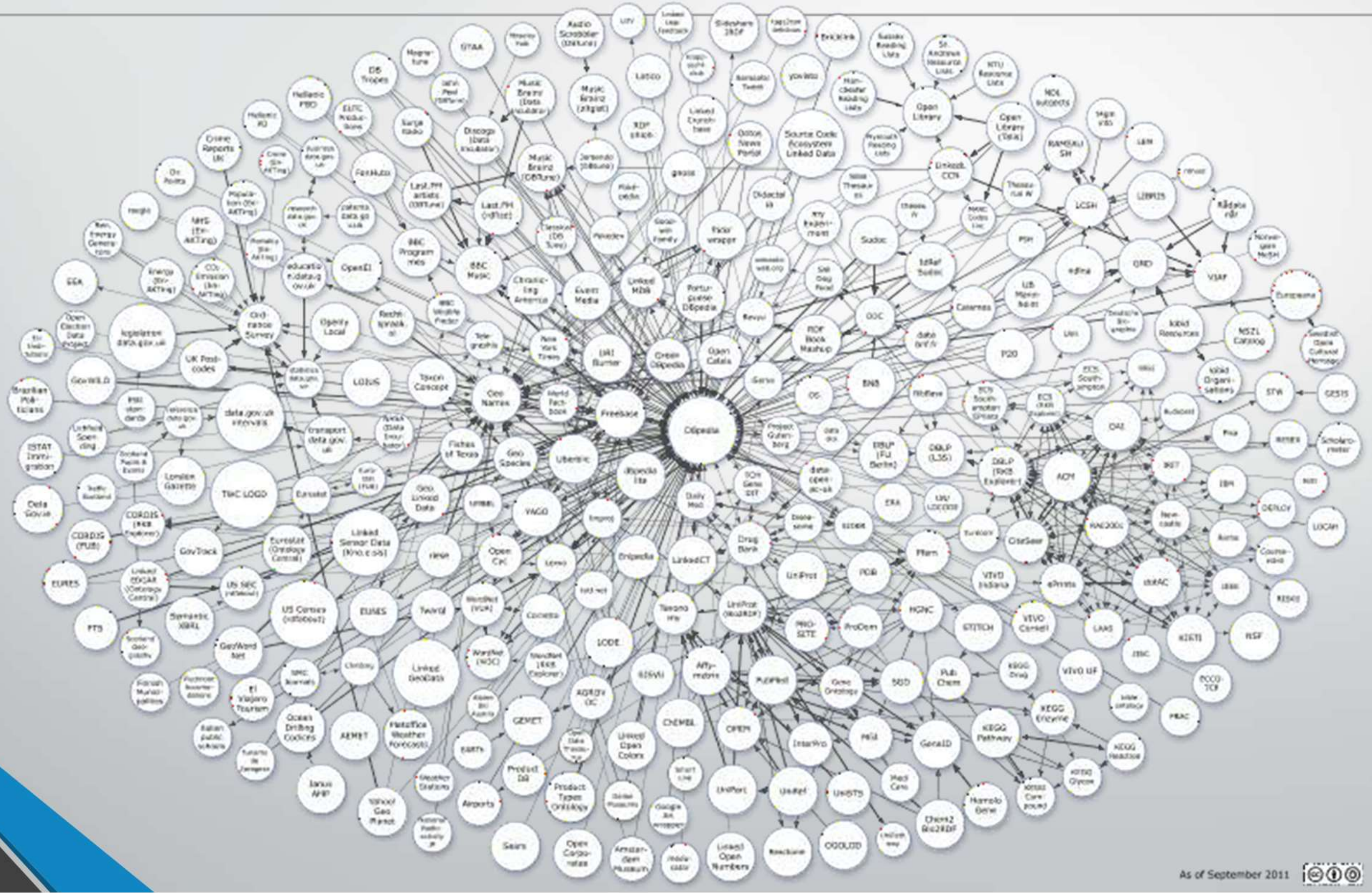
http://www.mybookstore.com/Kafka



http://www.mybookstore.com/Trial

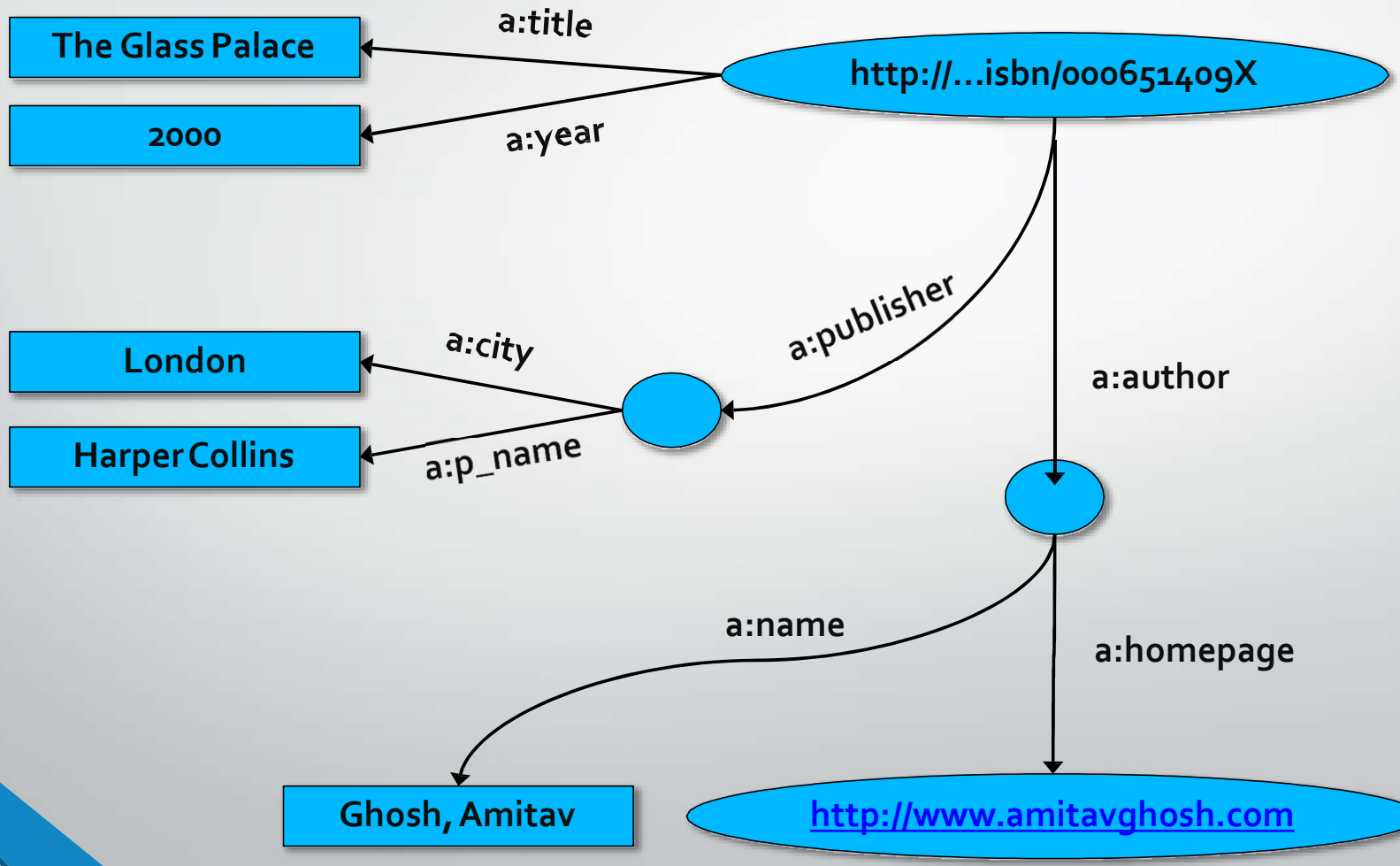
- Individual things, and not just files, are given unique identifiers.
- XML serialization (RDF/XML) for ease of data exchange
- Various textual representations for ease of human understanding
- No Schema

RDF is the heart of Linked Open Data

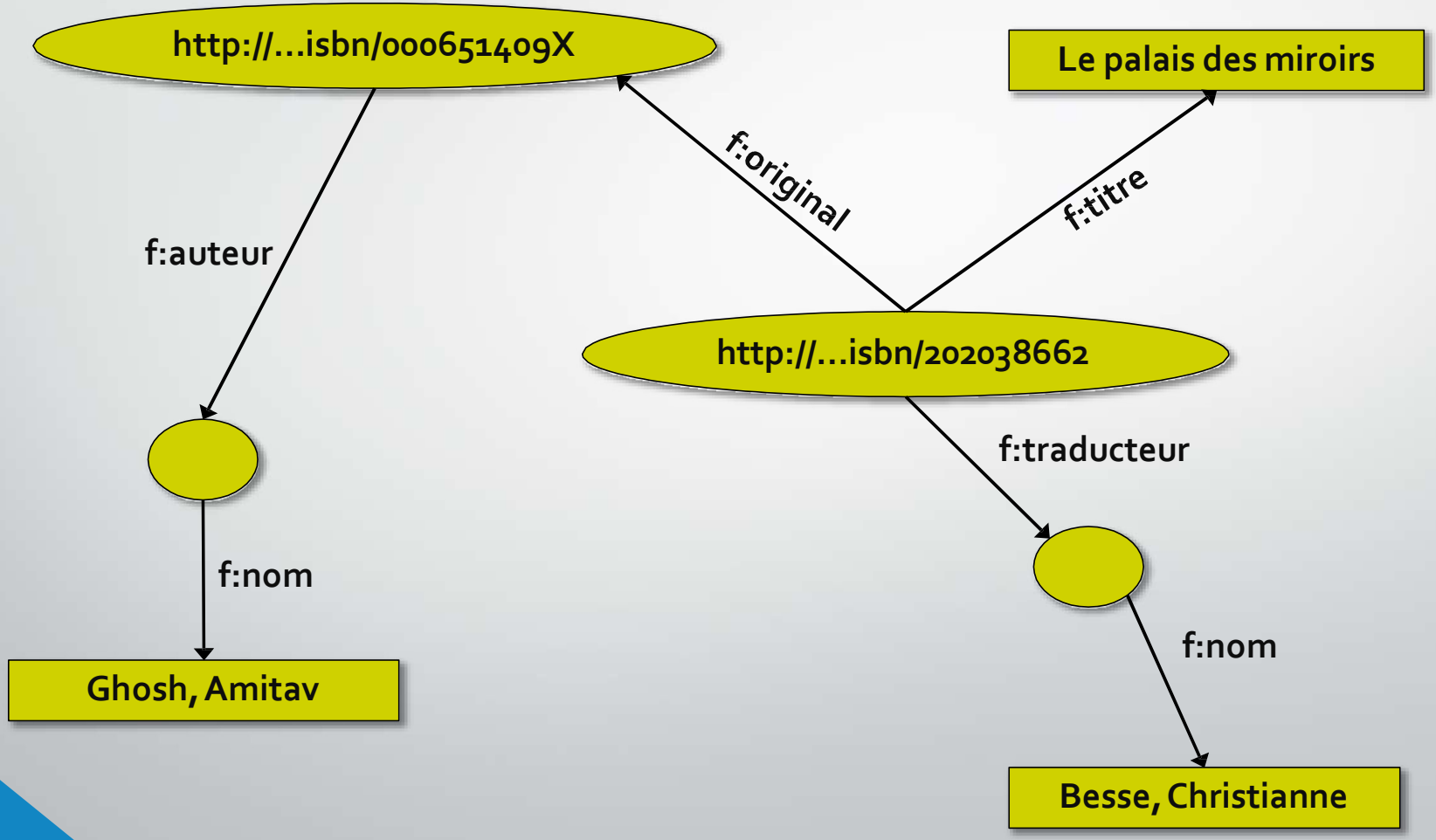


AN RDF Integration Example

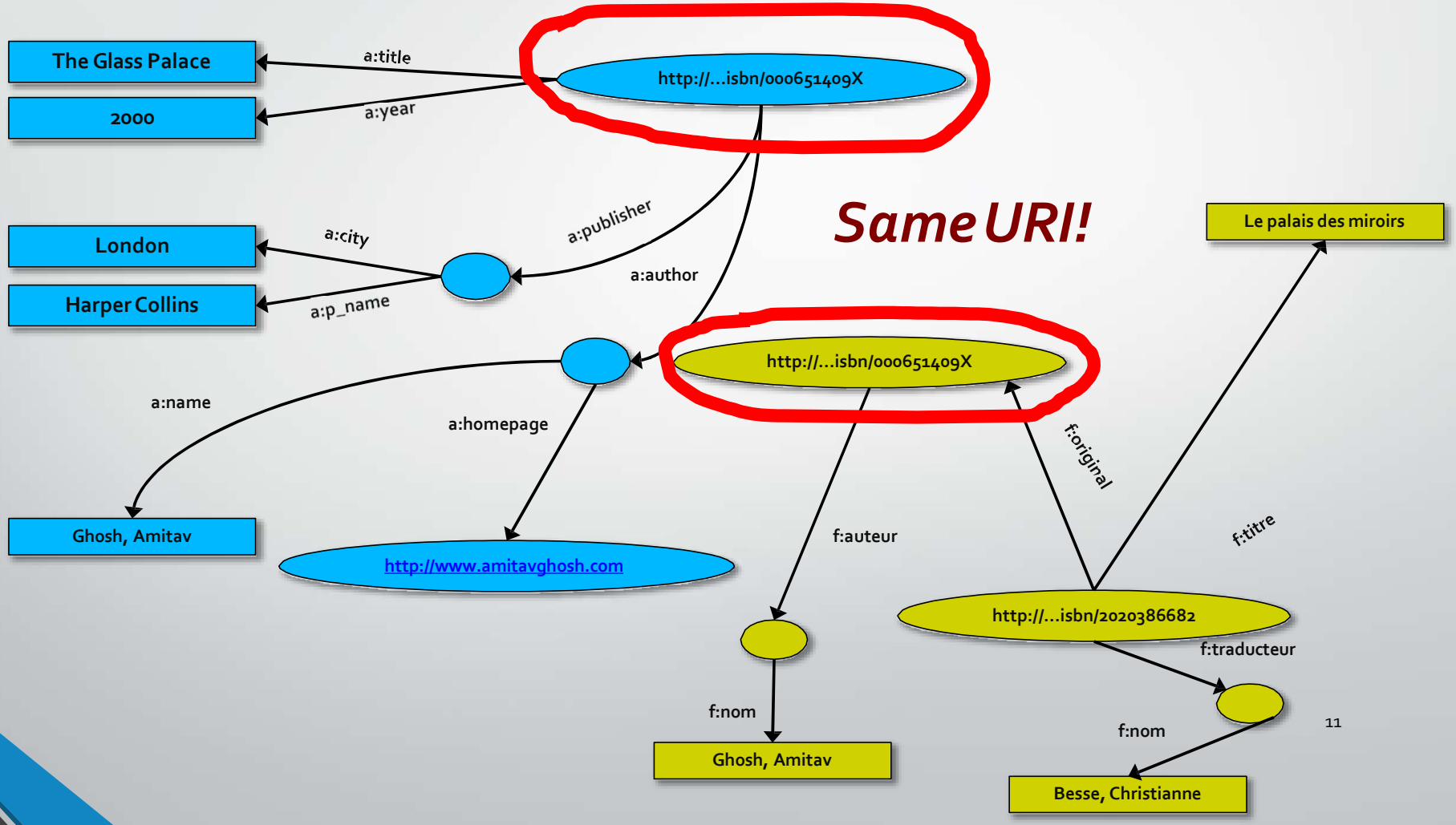
English books database: Export data as RDF

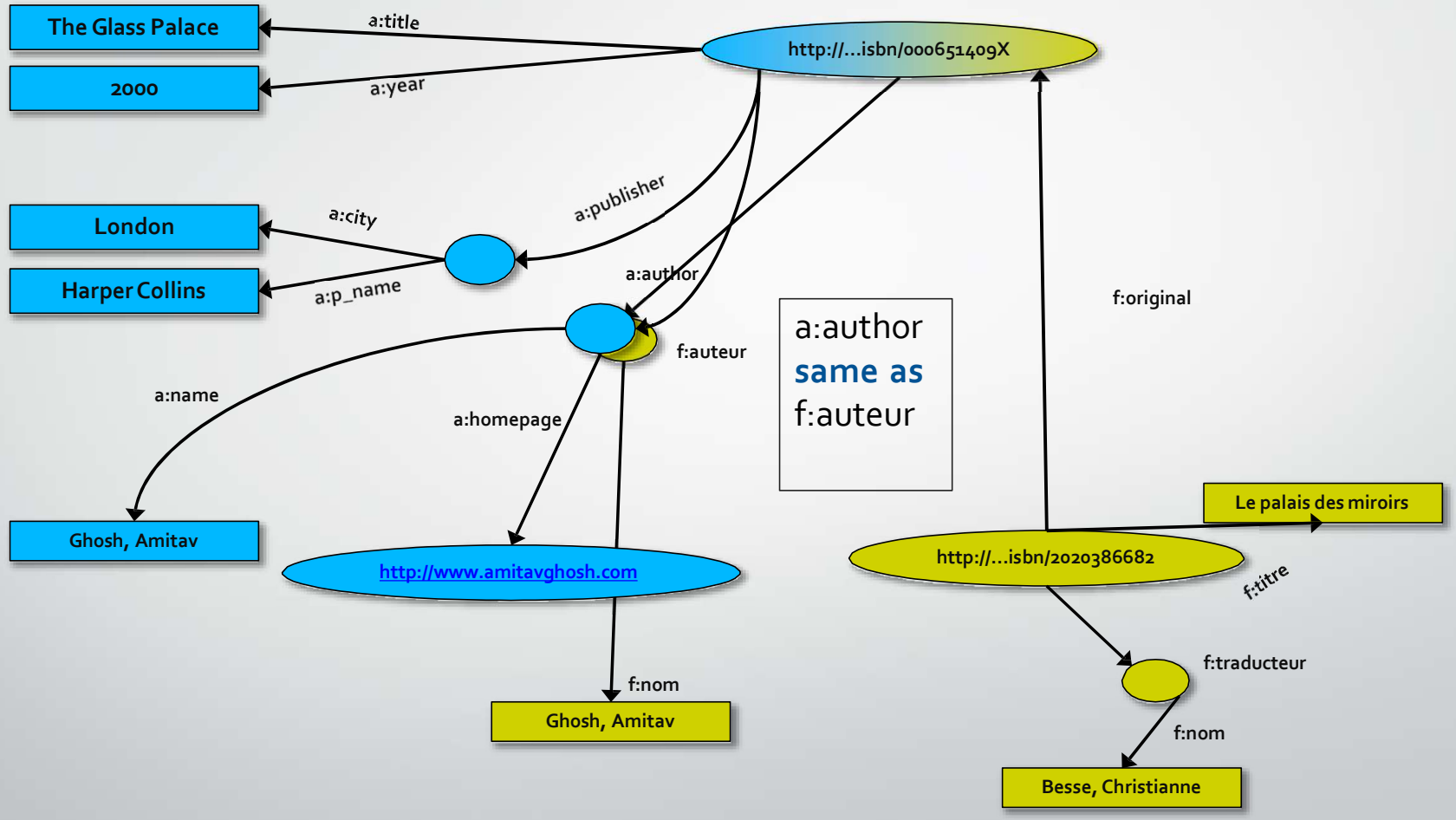


French books Data Base: Export data as RDF



Merge your data




The Glass Palace
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a:name
a:homepage
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http://www.amitavghosh.com
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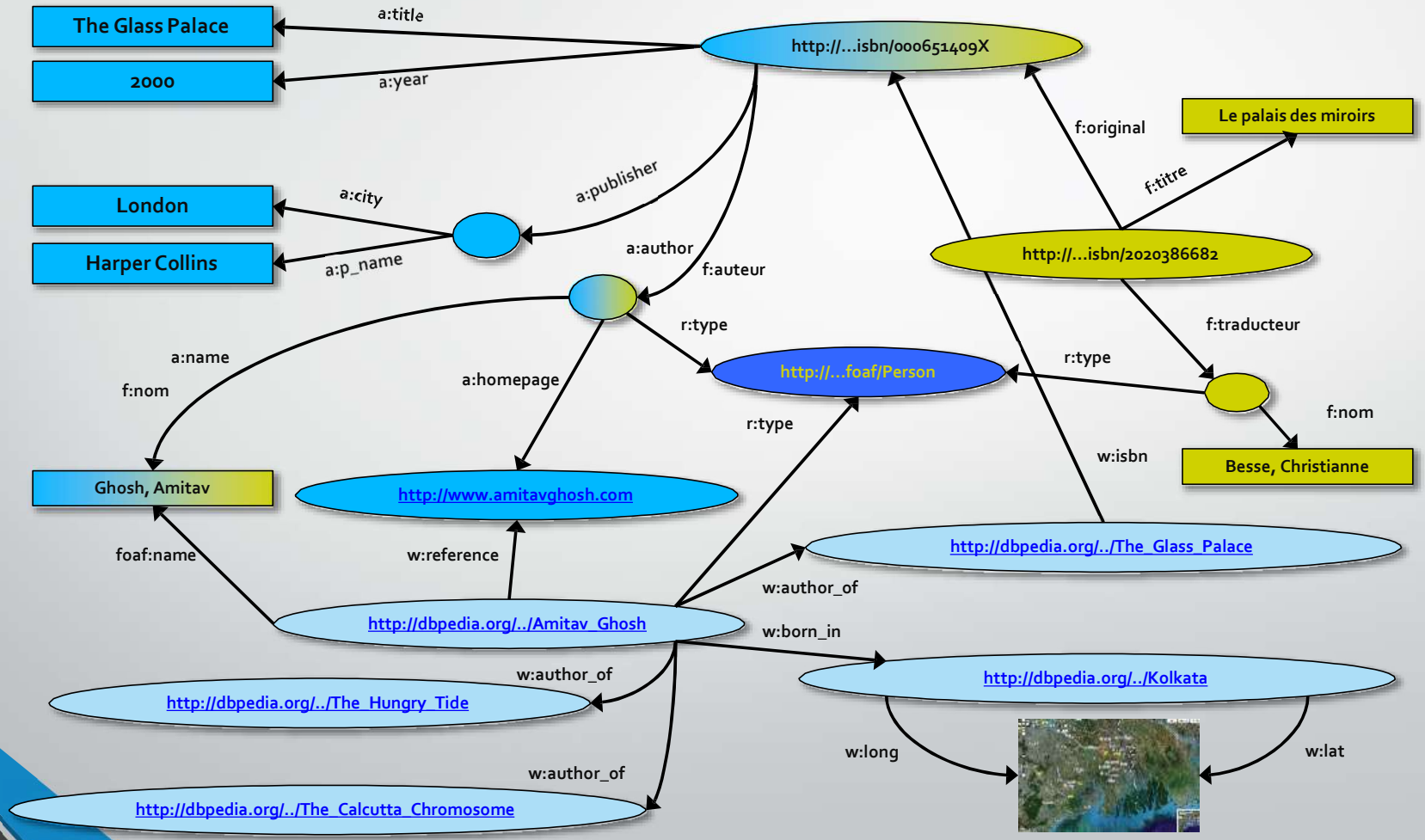
a:author
same as
f:auteur
f:original
Le palais des miroirs
http://...isbn/202038668 2
f:titre
f:traducteur
f:nom
Besse, Christianne

Merge with external data: Wikipedia



Ontologies & OWL
(Web Ontology Language)

Ontology (according to Tom Gruber (1992))

An ontology is a **formal**, **explicit specification** of a **shared** **conceptualization**

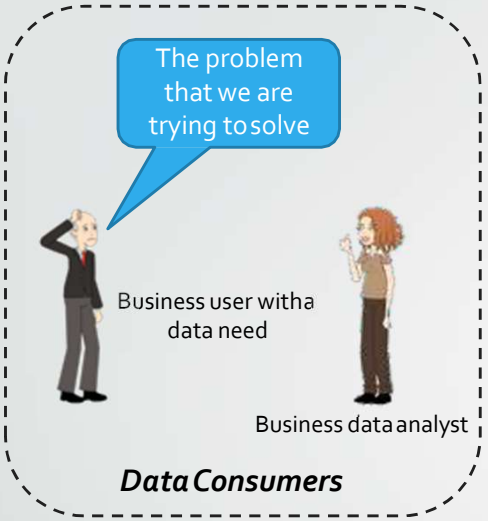
Machine Readable

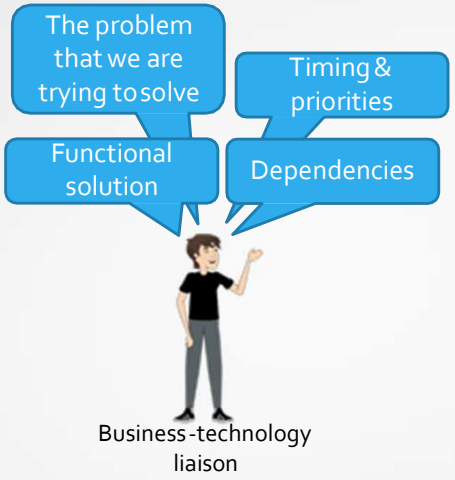
Concepts, properties
Relations, functions,
Constraints, axioms,
Are explicitly defined

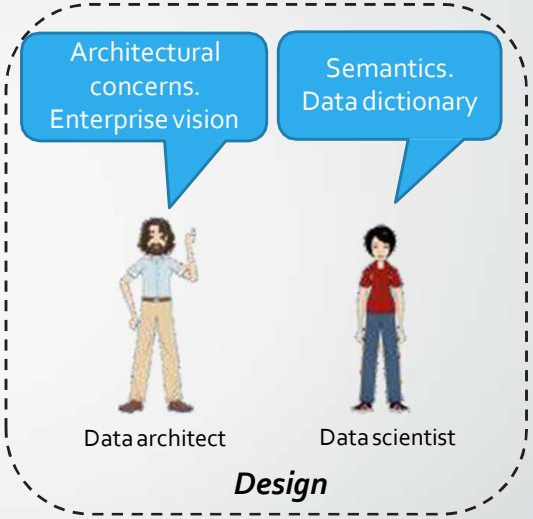
Consensual Knowledge

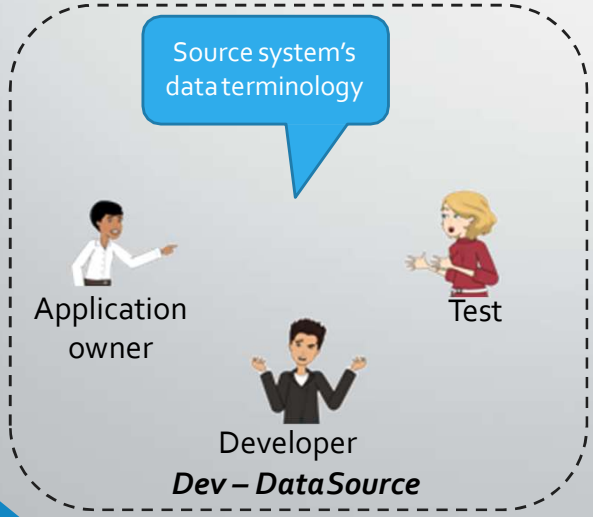
Abstract model and simplified view of some phenomenon in the world that we want to represent

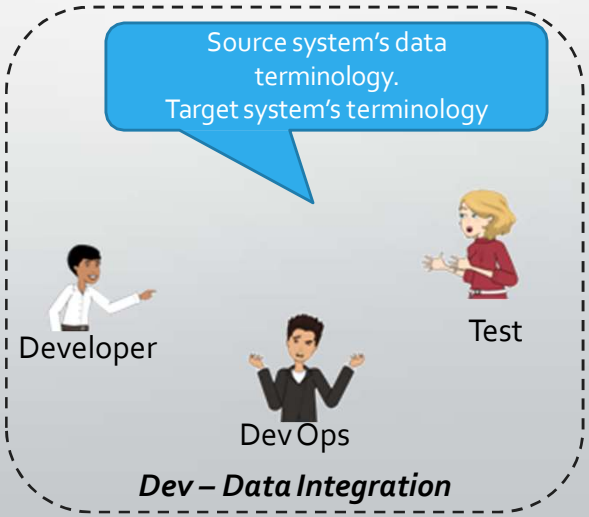
Different Teams: Different Languages …

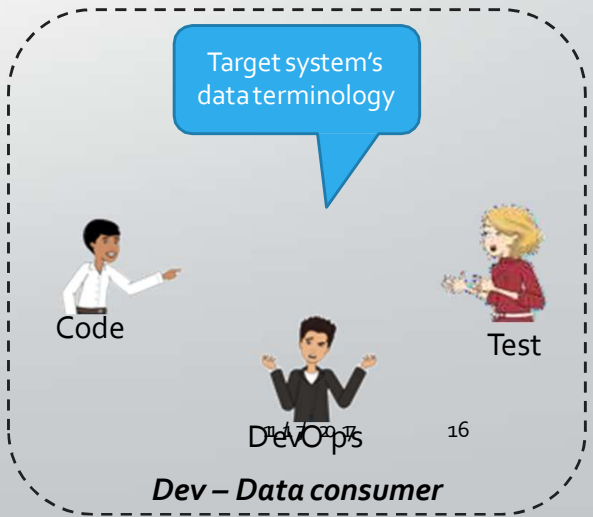












Ontology

- a **knowledge model** which defines a set of **concepts** and the **relationship** between those concepts within a specific **domain**
- Supports **automated reasoning** and **inference** of data using logical rules
- Provides Knowledge sharing and **reuse** among people or software agents

OWL (Web Ontology Language)

- RDF based
- A defacto standard for ontology development
- Main components include

  Classes : which define concepts in a domain

  Properties: which are of two type

    Object properties : define relationships between concepts

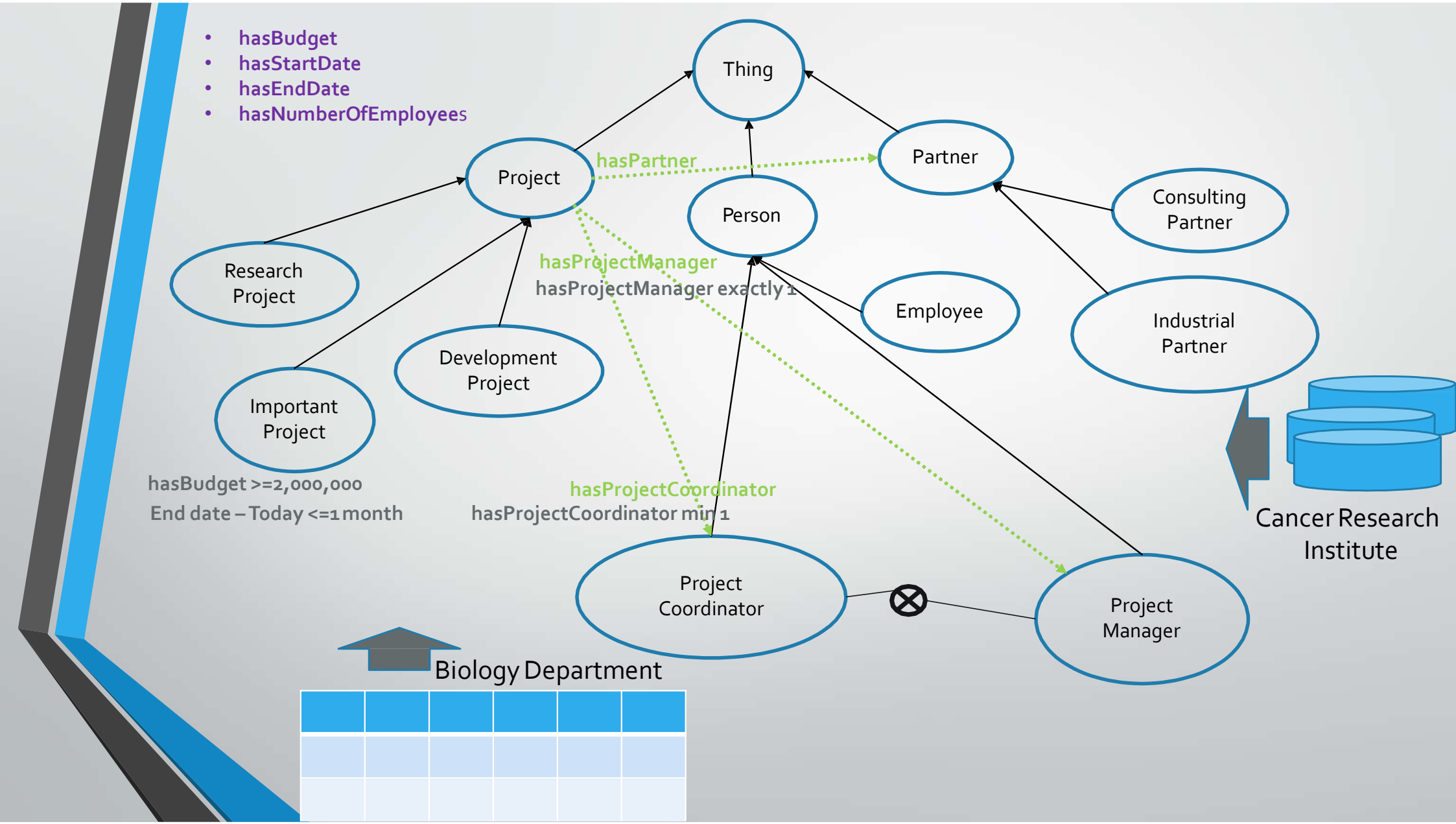
    Datatype properties: define relationships between a concept and a literal

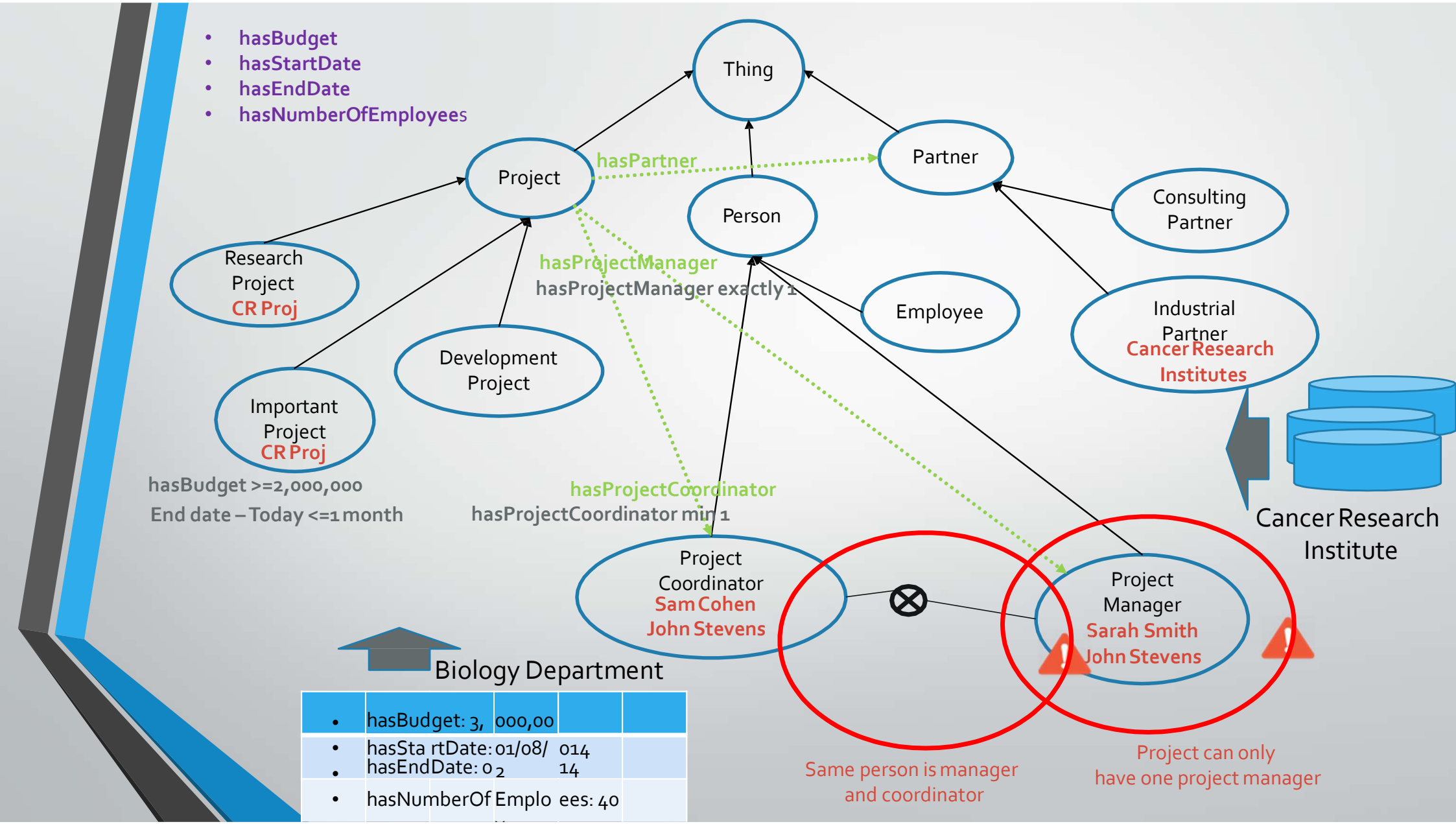
  Individuals: instances of classes

  Restrictions: Allow definition of cardinality restrictions as well existential and universal quantifications

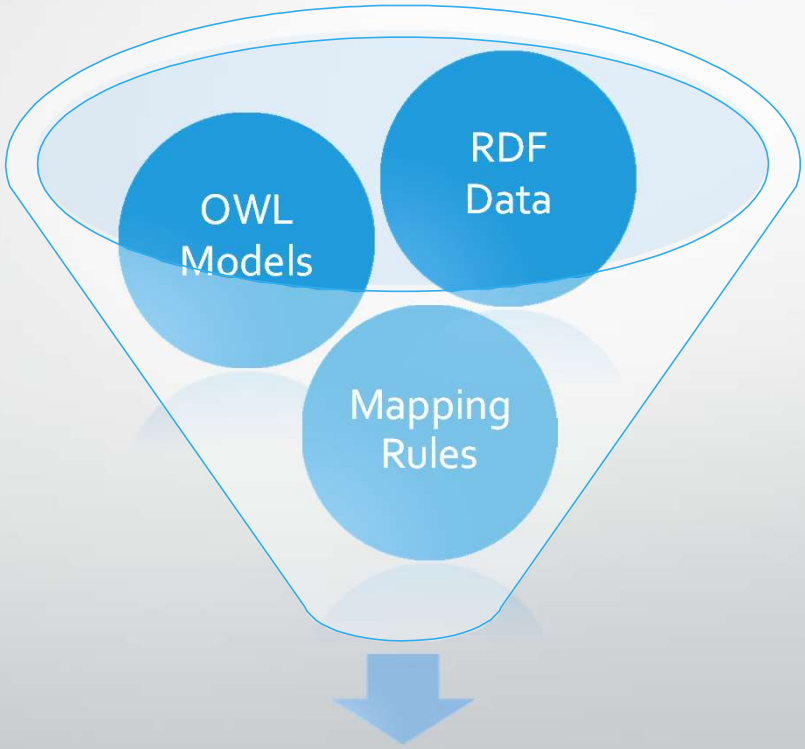
- Has three levels
  - OWL Full
  - **OWL DL**
  - OWl-Lite

Project Example


hasBudget
hasStartDate
hasEndDate
hasNumberOfEmployees
Thing
Project
hasPartner
Partner
Person
Consulting Partner
Research Project
hasProjectManager
hasProjectManager exactly 1
Employee
Industrial Partner
Development Project
Important Project
hasBudget >=2,000,000
End date – Today <=1 month
hasProjectCoordinator
hasProjectCoordinator min 1
Cancer Research Institute
Project Coordinator
Project Manager
Biology Department


hasBudget
hasStartDate
hasEndDate
hasNumberOfEmployees
Thing
Project
hasPartner
Partner
Person
Consulting Partner
Research Project
CR Proj
hasProjectManager
hasProjectManager exactly 1
Employee
Industrial Partner
Cancer Research Institutes
Development Project
Important Project
CR Proj
hasBudget >=2,000,000
End date – Today <=1 month
hasProjectCoordinator
hasProjectCoordinator min 1
Cancer Research Institute
Project Coordinator
Sam Cohen
John Stevens
Project Manager
Sarah Smith
John Stevens
Biology Department
hasBudget: 3, 000,00
hasStartDate: 01/08/2014
hasEndDate: 02/08/2014
hasNumberOfEmployees: 40
Same person is manager and coordinator
Project can only have one project manager

So what happens when you combine OWL + RDF?



Use of Ontologies

- Knowledge representation
- Semantic annotation
- Semantic search
- Back bone of Process Automation
- Knowledge inference

An Industrial UseCase for SMART DATA

Smart Data for Trade Based Anti Money Laundering

Trade Documents

Transaction Data

Marine traffic Website

CIS systems

Trade Documents

Transaction Data

Legal Document

Bill of Lading BOLLOC453

Letter of Credit ABCCorpLOC453

Item Cotton shirts

Item

Total Number

27

Has Price

has Invoice

Price 54$

Price 2$

Total Price

Invoice #JS54

Letter of Credit

Trade Transaction #76873

Posted In

Legal Contract

Account #89222

Issuing Bank

Bank BankUSA

Freight Forwarder

Legal Entity

Company ShippersStar

vessel

Vessel BSLE9

buyer

Consignee/Shipper

Legal Entity

Company

Customer ABCCorp

holds

profile

Trade Profile JSmithProfile45

Port of Loading/ Port of Discharge

Marine traffic Website

Port Bangladesh-Amsterdam

Journey Route548

Port Bangladesh-Jaipur-Amsterdam

Date 7/08/2016

Vessel ID V245

Business NAICSCode767

Business Sector

CIS systems

Brief Answers

- **Why go semantic ?**
  - To present knowledge about your data.
  - To allow data integration
  - To bring intelligence to your system
- **Should I use RDF or OWL ?**
  - If you just want to link your data or annotate-> USE RDF
  - If you want to make your data smart and apply reasoning and inference -> USE OWL +RDF
- **What is the difference , what is the link ?**
  - RDF is to present data in triple formats and give it some structure and unique identifiers so that data can be easily linked
  - OWL provides a rich vocabulary to add semantics and context and allow reasoning and inference
- **Did you say smart data ?**
  - Yes! A data that can be understood by the computer and therefore allows for intelligent automation