

Semantic Web 2008



Semantic Web ca. 2008

- Semantic Web companies starting & growing
 - Siderean, SandPiper, SiberLogic, Ontology Works, Intellidimension, Intellisophic, TopQuadrant, Data Grid, Mondeca, ontoPrise
 - Web 3.0 new buzzword: Garlik, Metaweb, RadarNetworks, Joost, Talis, etc.
 - Semantic Search: Powerset, CK Lingo, Curbside MD, ZoomInfo, etc.
- Bigger players buying in
 - Adobe, Cisco, Dow Jones, HP, IBM, Eli Lilly, Microsoft, etc., Nokia, Oracle, Pfizer, Sun, Vodafone, Yahoo!, Reuters, etc.
 - Gartner identifies Corporate Semantic Web as one of three "High impact" Web technologies
 - Tool market forming: AllegroGraph, Altova, TopBraid, etc.
- Government projects in and across agencies
 - US, UK, EU, Japan, Korea, China, India, etc.
- Several "verticals" heavily using Semantic Web technologies
 - Health Care and Life Sciences
 - Interest Group at W3C
 - Financial services
 - Human Resources
 - Sciences other than Life Science
 - Virtual observatory, Geo ontology, etc.
- Many open source tools available
 - Kowari, RDFLib, Jena, Sesame, Protégé, SWOOP, Pellet, Onto(xxx), Wilbur, etc.

(internal talk, Microsoft Labs, July 2008)

Introduction to the Semantic Web Tutorial

 ISWC 2008

Linked Data:

The Dark Side of the Semantic Web

Jim Hendler

Rensselaer

<http://www.cs.rpi.edu/~hendler>

The Dark Side



Not this!



The Dark Side

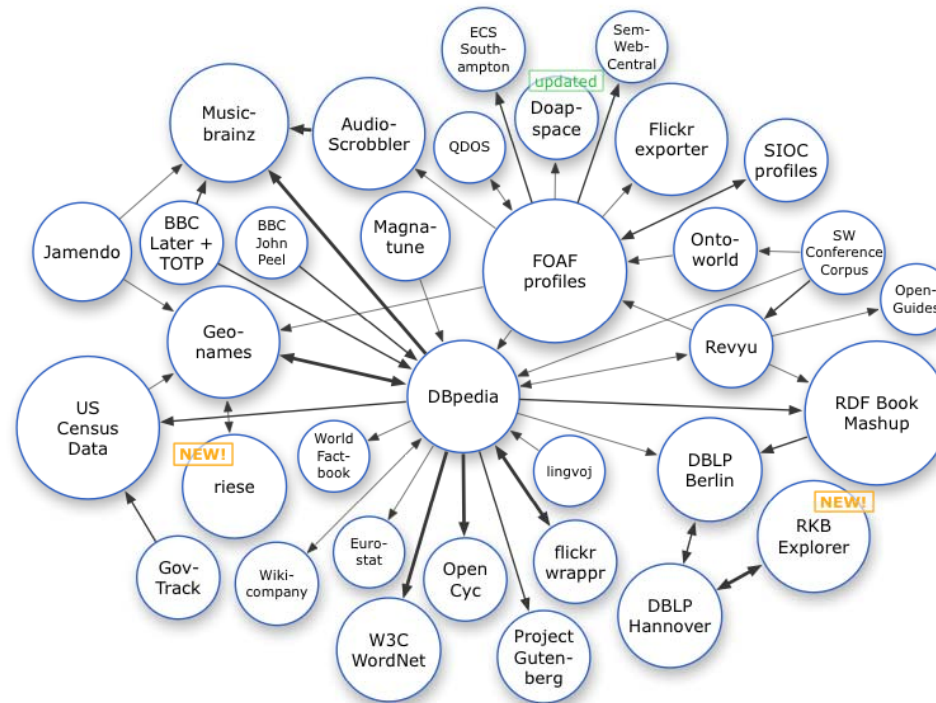


This!

Linking is power!



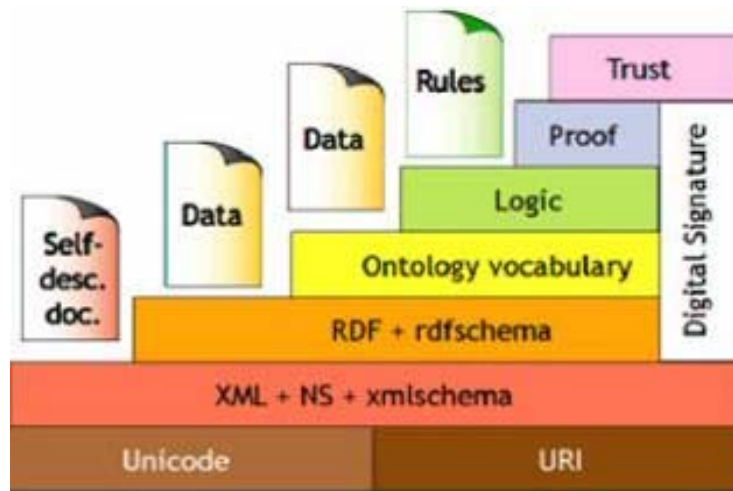
<http://esw.w3.org/topic/SweolG/TaskForces/CommunityProjects/LinkingOpenData>



The linked open data cloud now has billions of assertions, and is growing rapidly

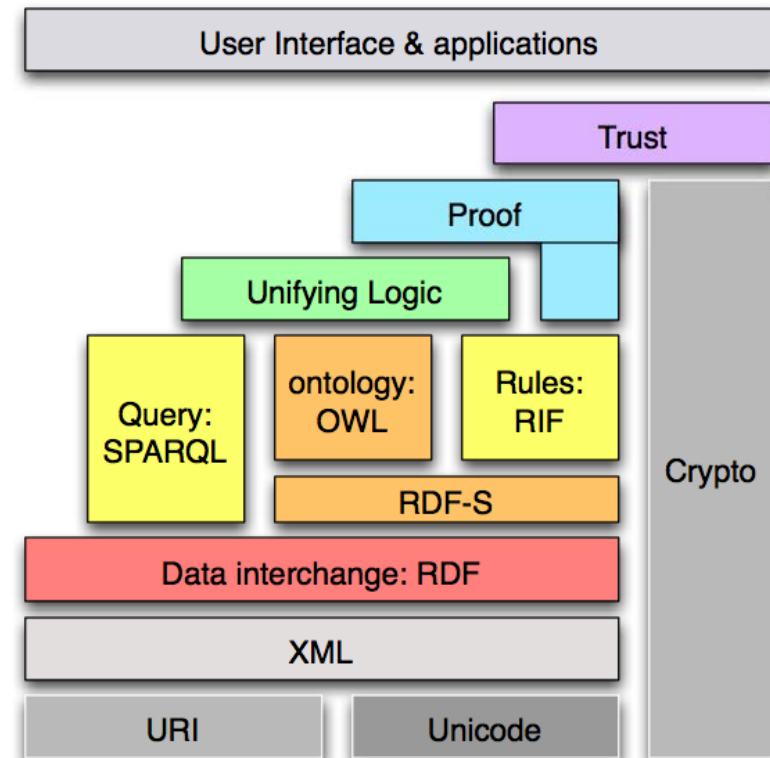


The “Layer Cake” is Evolving...



(Tim Berners-Lee)

2001



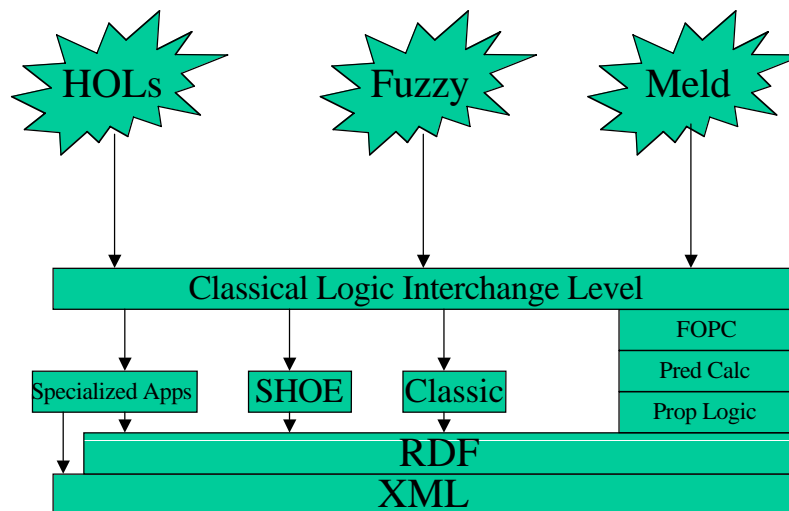
(Tim Berners-Lee)

2006

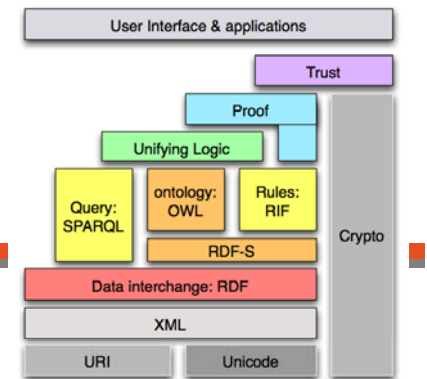
Layercake ca 10/1999



DAML and the Semantic Web



New Languages Underway



- RIF: Rules Interchange Format
 - representing rules on the Web
 - linking rule-based systems together
- SPARQL: Query language for (distributed) triple stores
 - the “SQL of the Semantic Web”
- GRDDL/RDFa: Integration of HTML and Semantic Web
 - “embedding” RDF-based annotation on traditional Web pages
- OWL: New features, specialized subsets
 - OWL RL – simplification, identity, scaling to large datasets
- And more...
 - SKOS thesaurus standard,
 - Multimedia annotation, Web-page metadata annotation, Health Care and Life Sciences (LSID), privacy, Sem Web Service, etc.

From Microsoft CSF 3.0



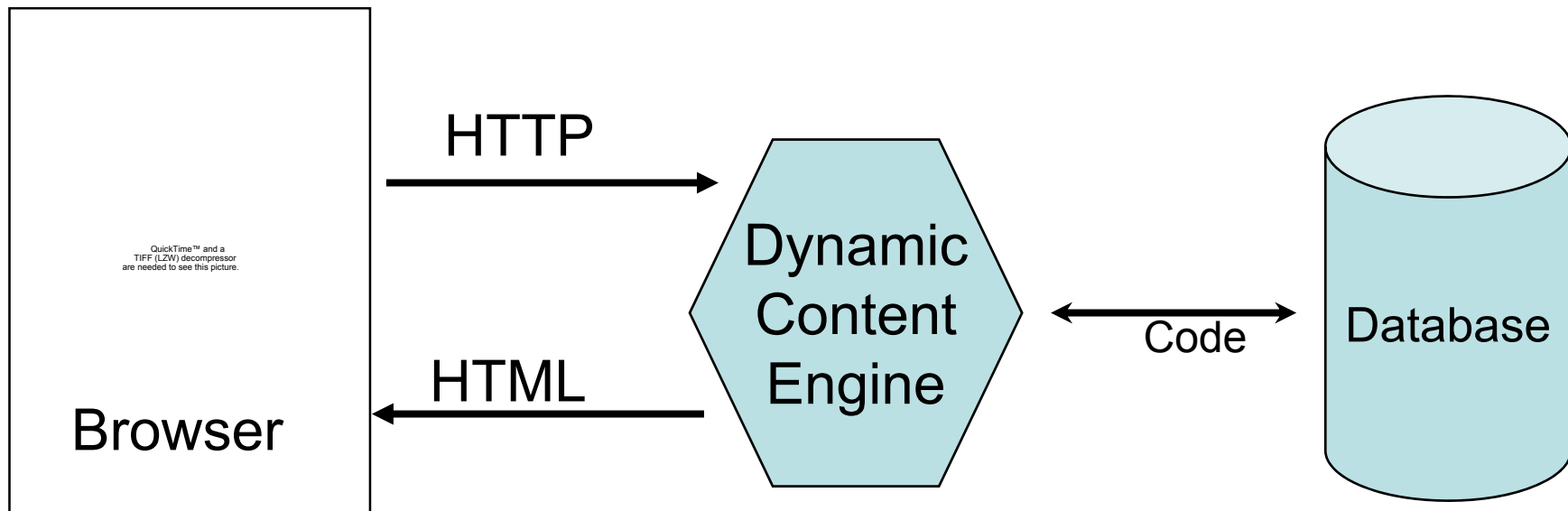
- The Profile Manager enables you to store information about users and services. It is a Resource Description Framework (RDF) data store and is general nature, so you can store any information that is required by your system. ... There are two main benefits offered by a profile store that has been created by using RDF. The first is that RDF enables you to store data in a flexible schema so you can store additional types of information that you might have been unaware of when you originally designed the schema. The second is that **it helps you to create Web-like relationships between data, which is not easily done in a typical relational database.**

<http://msdn2.microsoft.com/en-us/library/aa303446.aspx> - 12/06

Web applications



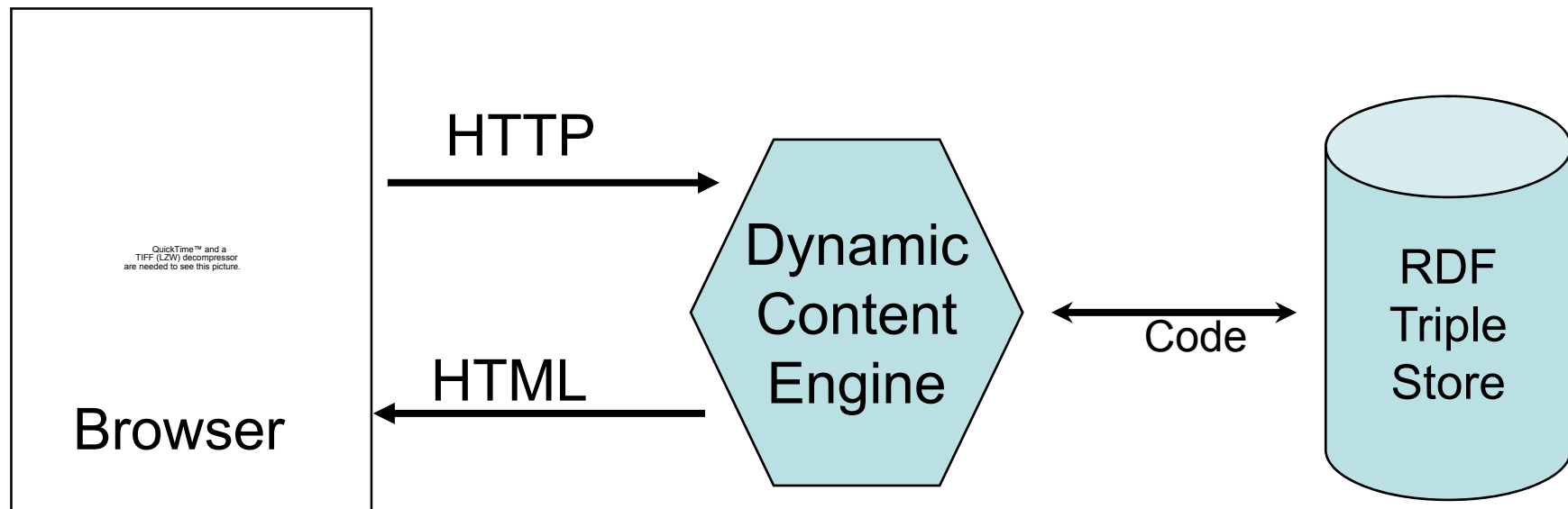
- (also known as a Web app, webapp or webware) is an application which is accessed through a Web browser over a network such as the Internet or an intranet...Web applications are popular due to the ubiquity of the browser as a client ... Web applications are used to implement Webmail, online retail sales, online auctions, wikis, discussion boards, Weblogs, MMORPGs and many other functions.



Semantic Web applications



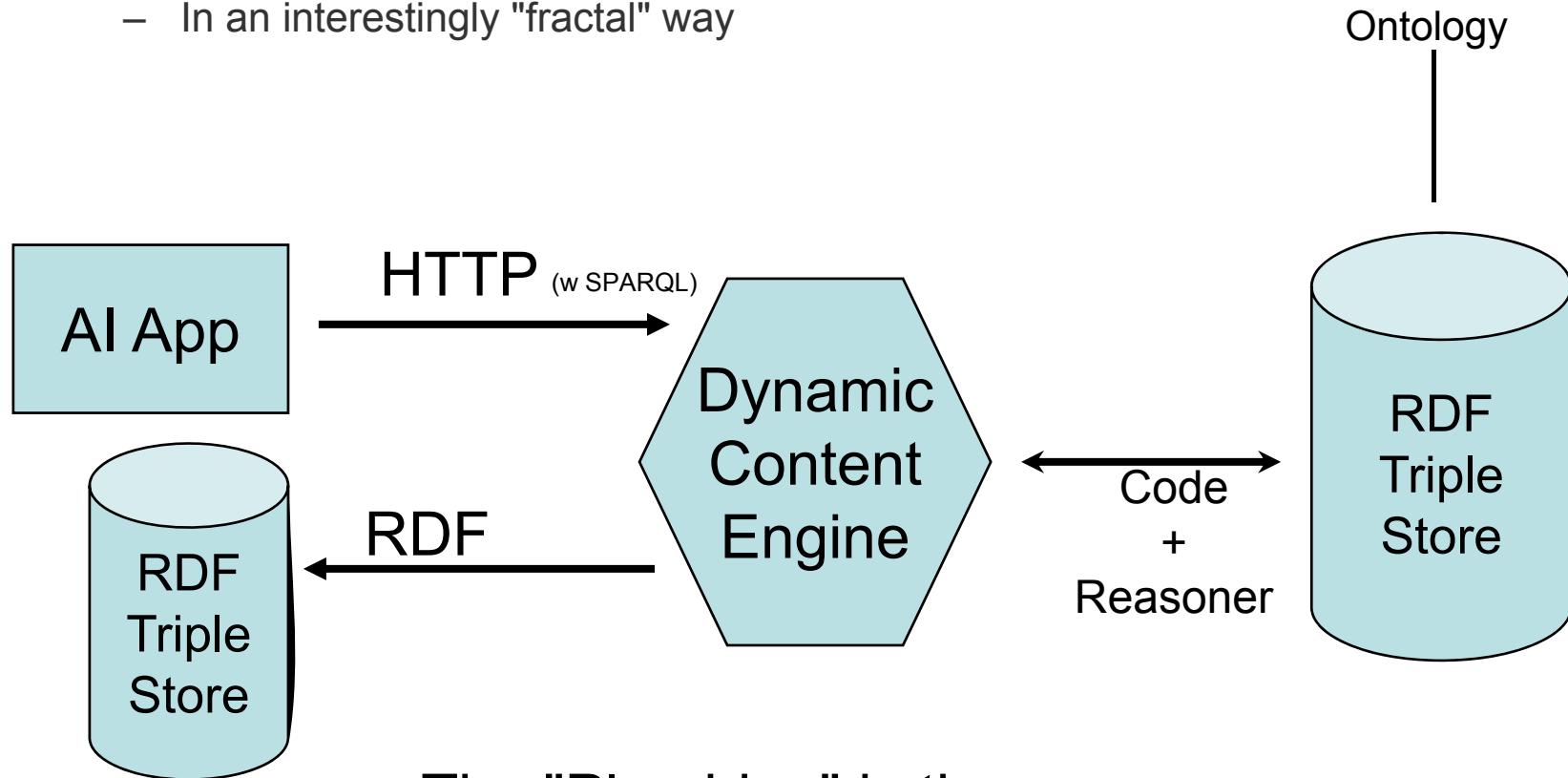
- Growing realization that Semantic Web apps can be built the same way, REST works for the Semantic Web as it does for the Web



Semantic Web applications



- And a similar model can power the "high end" Semantic Web applications
 - In an interestingly "fractal" way



The "Plumbing" is the same

Complementary Networks

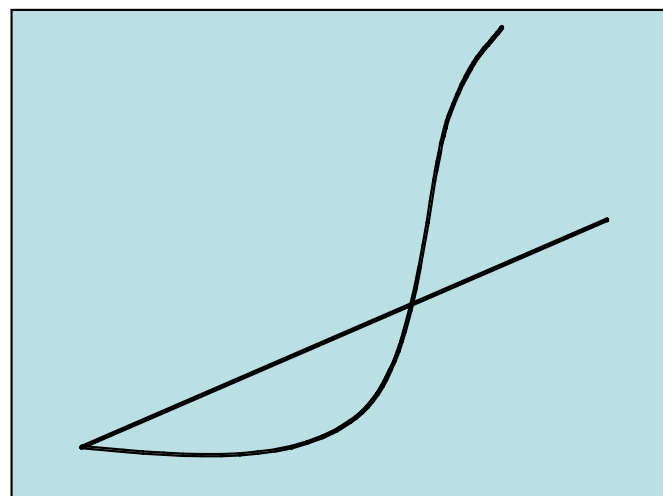


- Web 2.0 is powered by "social context"
 - Tagging runs into usual vocabulary issues
 - The network effect is in the social network
 - At scale
- Web 3.0 is powered by shared data and linked ontologies (vocabularies)
 - Controlled vocabularies, near the data; linking of the vocabularies
 - The network effect is in the vocabulary/data relationships
 - At scale!



Web 2/Web 3 together

- Today we can find thousands of ontologies
 - Available on the Web
 - Linked to Web resources
 - Linked to data resources
 - Linked to each other
 - Linked to Web 2.0-like annotations
- And billions of annotated (semi-Knowledge engineered) objects
 - Available on the Web
 - Linked to Web resources
 - Linked to data resources
 - Linked to each other
 - Linked to the ontologies
- Many Large (and curated) "Vocabularies" for Grounding Applications
 - Natl Library of Agriculture (SKOS)
 - NCI Ontology (OWL)
 - Getty Catalog (OWL, licensed), UMLS (RDFS, licensed),
 - GeoNames (RDF), PlaceNames (OWL, proprietary)
 - ...



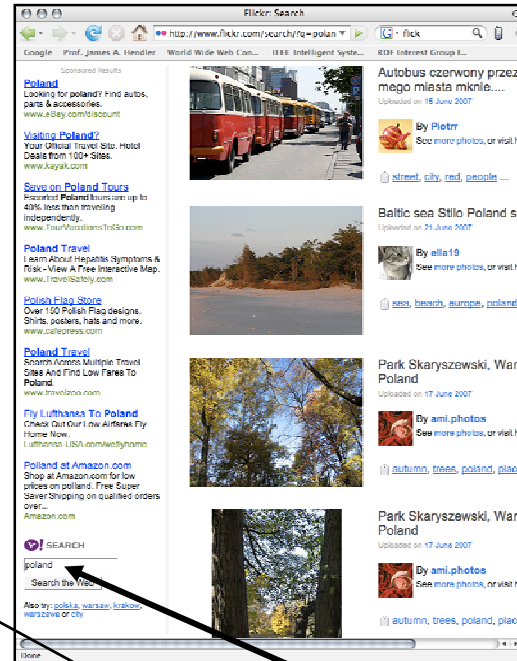
Metcalfe's Law

Example: Seeded tagging



Place names

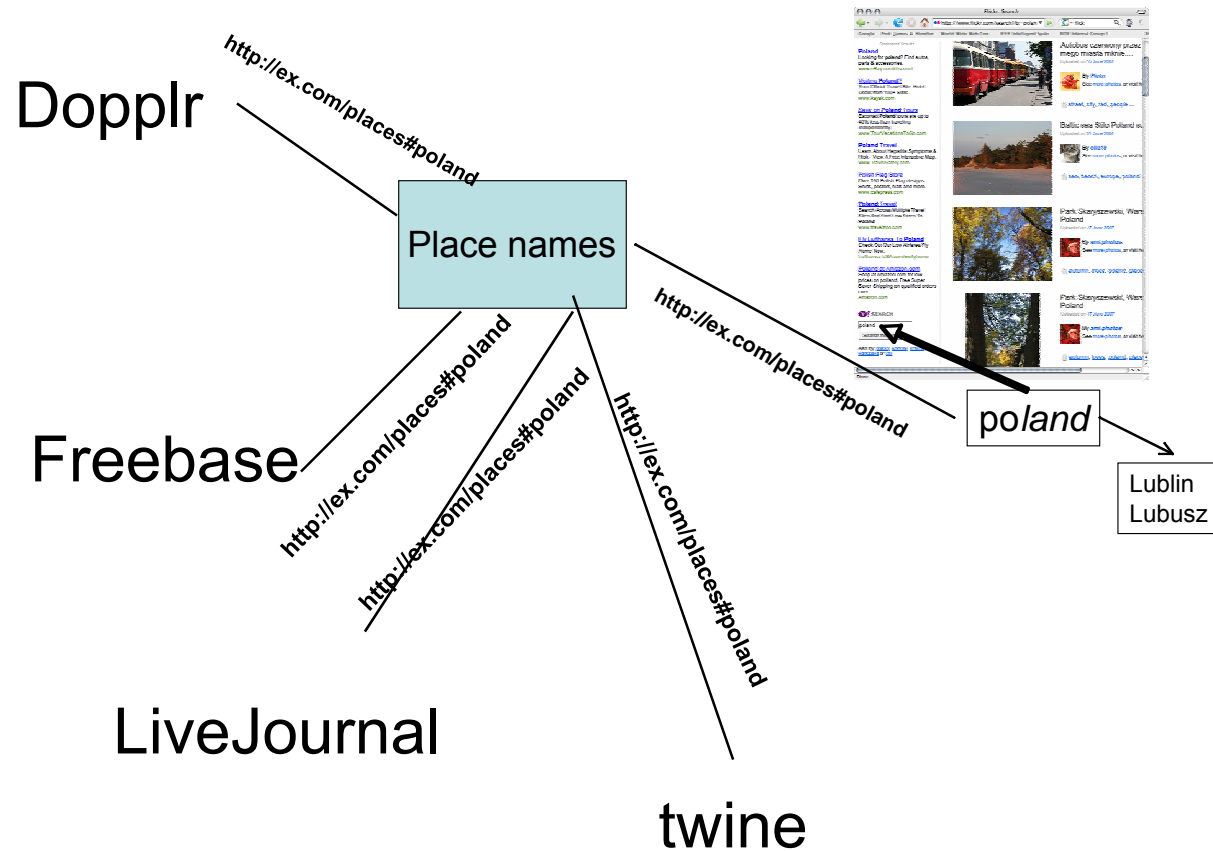
<http://ex.com/places#poland>



poland

Lublin
Lubusz

Network Effect



The wine ontology (wine.owl)



- Original view: Consensus knowledge of wine and food
 - Lots of debate in its creation
 - Eventually completed with "correct" wine recommendations
 - You disagree, tough! You're wrong.

Wine Ontology Take II



TW Wine Agent

[Overview](#)
[Acknowledgements](#)

To view recommendations for a given type of food, click the desired food in the menu below.

+ * [Meat \(1 / 13 below\)](#)

+ * [Fowl \(0 / 6 below\)](#)

+ * [OtherTomatoBasedFood \(1 / 1 below\)](#)

- * [Seafood \(2 / 24 below\)](#)
 * [Shrimp \(1 / 0 below\)](#)
 - * [Shellfish \(1 / 8 below\)](#)
 - * [Non Oyster Shellfish \(1 / 5 below\)](#)
 * [Crab \(2 / 0 below\)](#)
 * [Mussels \(1 / 0 below\)](#)
 * [Lobster \(1 / 0 below\)](#)
 * [Clams \(1 / 0 below\)](#)
 - * [Oyster Shellfish \(1 / 1 below\)](#)
 * [Oysters \(1 / 0 below\)](#)
 - * [Fish \(3 / 11 below\)](#)
 - * [Non Bland Fish \(2 / 4 below\)](#)
 * [Tuna \(1 / 0 below\)](#)
 * [Swordfish \(3 / 0 below\)](#)
 - * [Bland Fish \(2 / 3 below\)](#)
 * [Flounder \(1 / 0 below\)](#)
 * [Scrod \(1 / 0 below\)](#)
 * [Halibut \(1 / 0 below\)](#)

+ * [Fruit \(1 / 5 below\)](#)

+ * [Dessert \(1 / 8 below\)](#)

+ * [Pasta \(3 / 9 below\)](#)



TW Wine Agent

[Overview](#)
[Acknowledgements](#)

Why MountEdenVineyardEdnaValleyChardonnay was selected for Fish

Wine Properties

NAME: MountEdenVineyardEdnaValleyChardonnay
COLOR: White
BODY: Medium
FLAVOR: Moderate
SUGAR: Dry

List of recs being considered

Supporting Recs

TOTAL IN SUPPORT: 9

ID	COLOR	BODY	FLAVOR	SUGAR
MountEdenVineyardEdnaValleyChardonnay	White	Medium	Moderate	Dry
Bland-2Dfish	White	Medium U Full	Moderate U Strong	
RecDLM Swordfish	White	Medium	Moderate	Dry
RecDLM Tuna	White	Medium	Moderate	Dry
RecSwordfish	White	Medium		
RecNonBlandFish	White		Moderate	
RecDLM NonBlandFish	White	Medium	Moderate	Dry
RecFish	White		Moderate	Dry
RecDLM Fish		Medium		Dry
RecSeafood	White			

Opposing Recs

TOTAL IN CONFLICT: 6

ID	COLOR	BODY	FLAVOR	SUGAR
MountEdenVineyardEdnaValleyChardonnay	White	Medium	Moderate	Dry
RecDLM_Scrod	White	Medium	Delicate ☒	Dry
Melville_Estate_Chardonnay_2006	White	Light ☒	Strong ☒	Sweet ☒
RecDLM_Halibut	White	Medium	Delicate ☒	Dry
Rec-2Dhendler	Red ☒	Light ☒		Dry
RecDLM_Flounder	White	Medium	Delicate ☒	Dry
RecDLM_BlandFish	White	Medium	Delicate ☒	Dry



TW Wine Agent

[Overview](#)
[Acknowledgements](#)

Why LongridgeMerlot was selected for Swordfish

Wine Properties

NAME: LongridgeMerlot
COLOR: Red
BODY: Light
FLAVOR: Moderate
SUGAR: Dry

List of recs being considered

Supporting Recs

TOTAL IN SUPPORT: 1

ID	COLOR	BODY	FLAVOR	SUGAR
LongridgeMerlot	Red	Light	Moderate	Dry
Rec-2Dhendler	Red	Light		Dry

Opposing Recs

TOTAL IN CONFLICT: 6

ID	COLOR	BODY	FLAVOR	SUGAR
LongridgeMerlot	Red	Light	Moderate	Dry
RecSwordfish	White ☒	Medium ☒		
RecNonBlandFish	White ☒		Moderate	
Melville_Estate_Chardonnay_2006	White ☒	Light	Strong ☒	Sweet ☒
RecFish	White ☒		Moderate	Dry
RecDLM_Swordfish	White ☒	Medium ☒	Moderate	Dry
RecSeafood	White ☒			

[back](#)

Web 3.0 in use



- Cross enterprise data integration is also finding use beyond the "web app" domain
 - Demand of the big apps creating a transition from research via open source and/or productization
- Uptake in similar domains to engineered ontologies, but different effort for different returns
 - eScience
 - Organization of Text repositories (semi-structured)
 - Web 2 for scientist: "Spacebook," myExperiment, VSO,...
 - Provenance "annotation" for data
 - Group curation of domain ontologies
 - Semantic Wikis, "reverse engineering" tools
 - Finance/Business
 - Qualitative investment (better feeds w/fast domain reasoning)
 - Personnel finders/matchmaking for business
 - ...

The excitement is growing...



- "Data Web" approach finds its use cases in Web Applications (at Web scales)
 - A lot of data, a little semantics
 - Finding anything in the mess can be a win!
 - These are "heuristics" not every answer must be right (qua Google)
 - But remember *time = money!*
- Motivation: the big one for 3.0 is still out there somewhere!
 - Web 1.0: Google™; Web 2.0: Facebook, Wikipedia ...
 - Web 3.0: not the "Google killer," the next big one

Bottom line



- The "low end Semantic Web, powered by technologies such as GRDDL, SPARQL, and a little bit of OWL is showing tremendous promise
 - Closer to Web 2.0 in look and feel
 - Similar implementation base
- Can embed the power of the Semantic Web in traditional Web apps
 - In new and exciting ways
- Significant and growing industrial interest