What is Semantic Web?

What is the Semantic Web?

- *"An extension of the current Web in which information is given well-defined meaning, better enabling computers and people to work in cooperation."*
  - Sir Tim Berners-Lee et al., Scientific American, 2001: tinyurl.com/i59p
- *"…allowing the Web to reach its full potential…"* with far-reaching consequences
- *"The next generation of the Web"*

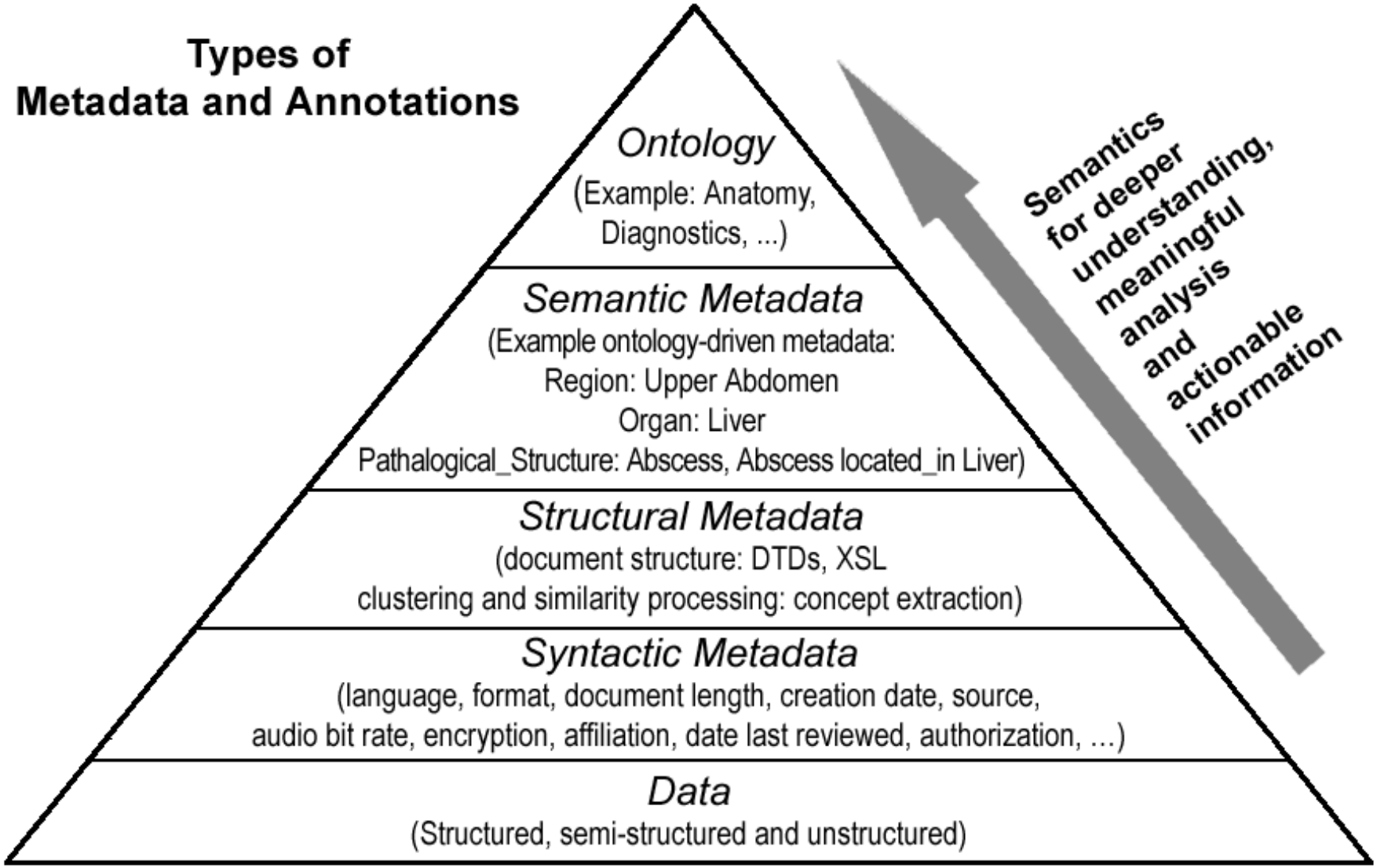
Semantic Web

- Tim Berners-Lee has a vision of a Semantic Web which
  - has machine-understandable **semantics** of information, and
  - millions of small specialized **reasoning** services that provide support in automated task achievement based on the accessible information

The Semantic Web in essence

- The word “semantic” stands for “the meaning of”:
- The Semantic Web is a Web that is able to describe things in a way that computers can process

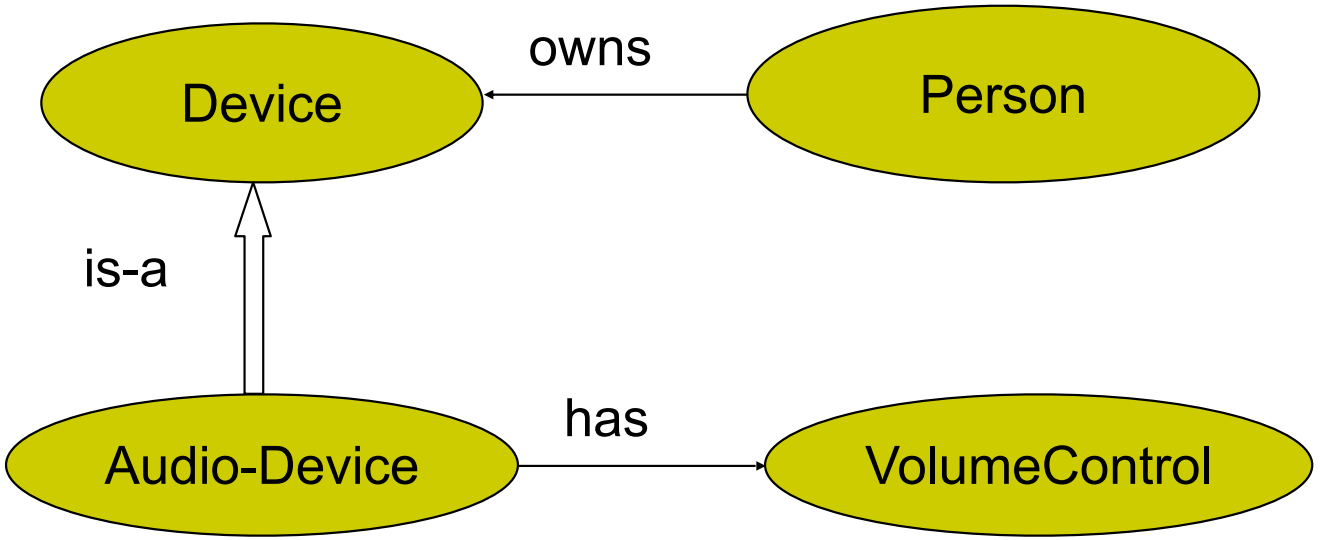
Metadata and Semantics



Ontology

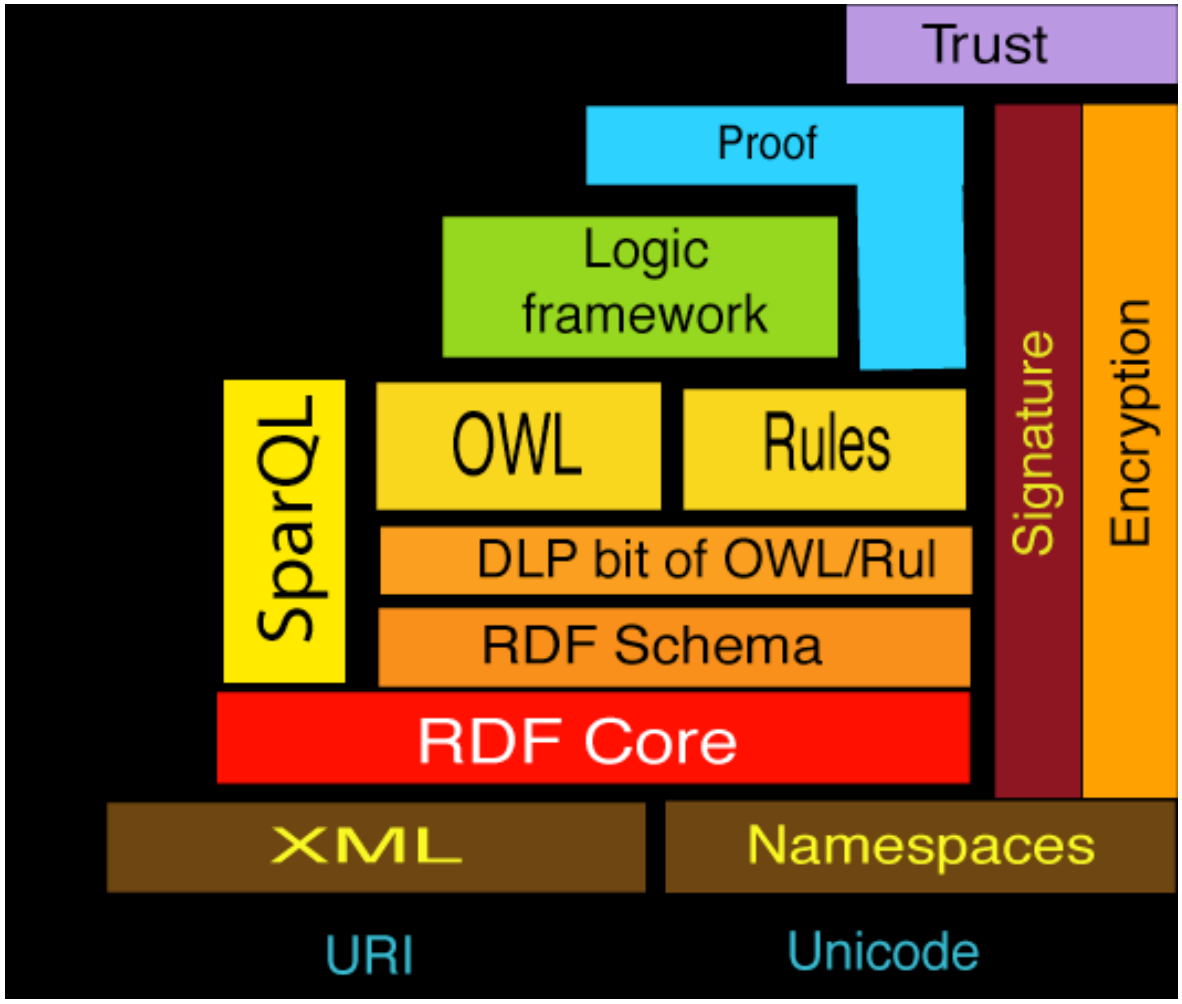
- The semantic Web is essentially based on ontologies
  - ***ontologies*** are ***formal*** and ***consensual*** specifications of conceptualizations…
  - providing a ***shared and common*** understanding of a domain that can be communicated across people and application systems

A very simple Ontology



Ontologies describe *concepts* and their *Relations.*

Semantic Web - Language tower



Tim Berners-Lee
Keynote Speech in
2005

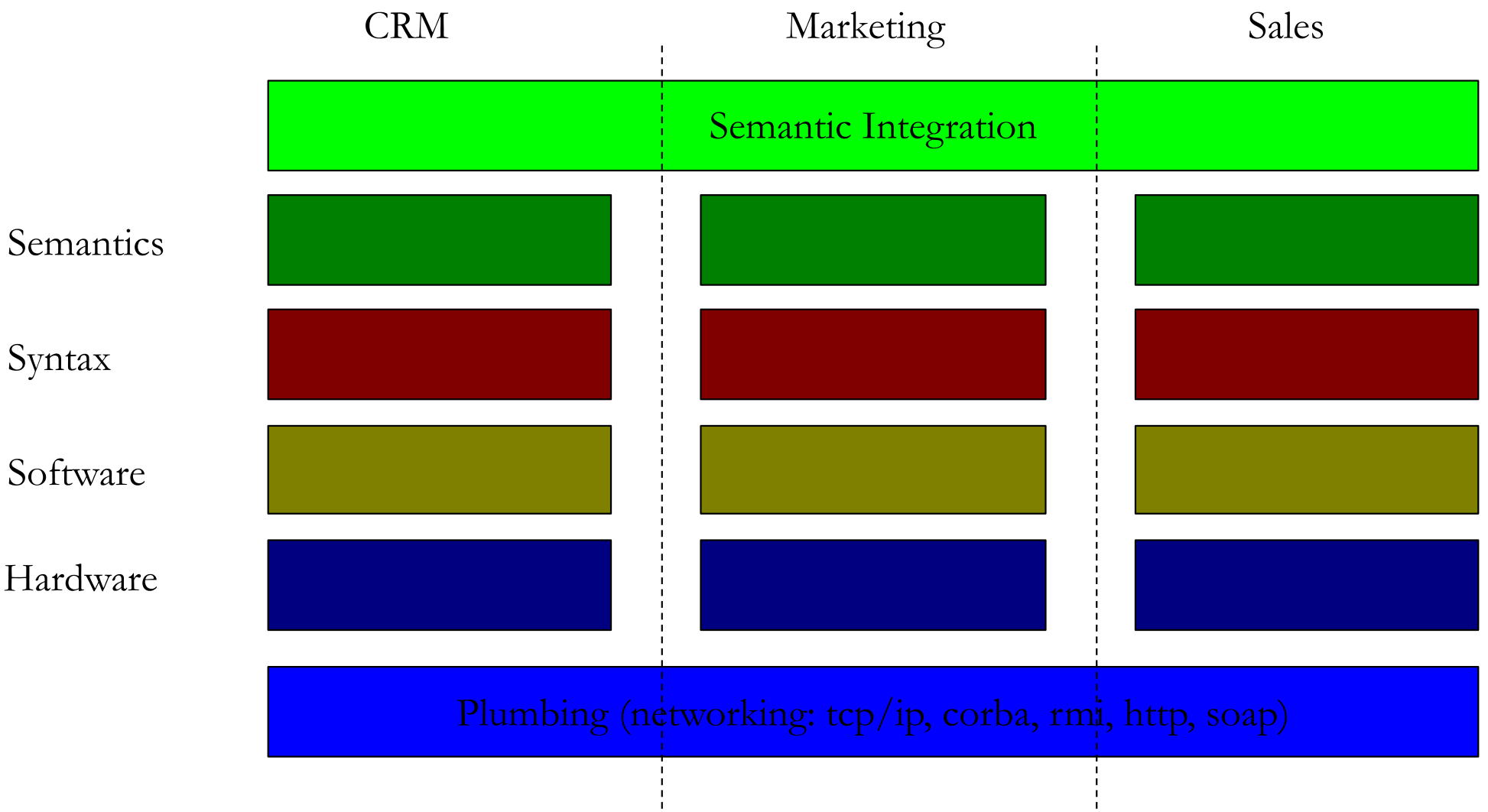
What is Semantic Web for?

- Integrating - trying to solve the problem of data and service integration
- Searching - Providing better communication between human and computers by adding machine-processable semantics to data.

Semantic Integration

- Top-Down approach: Building up different domain ontologies for better data integration and communication within the domain:
  - PapiNet.org: Vocabulary for Paper Industry
  - BPMI.org: Vocabulary for exchanging Business Process Models
  - XML-HR: Vocabularies for human resources (HR)
  - DMTF: Distributed Management Task Force: Vocabularies for managing enterprises

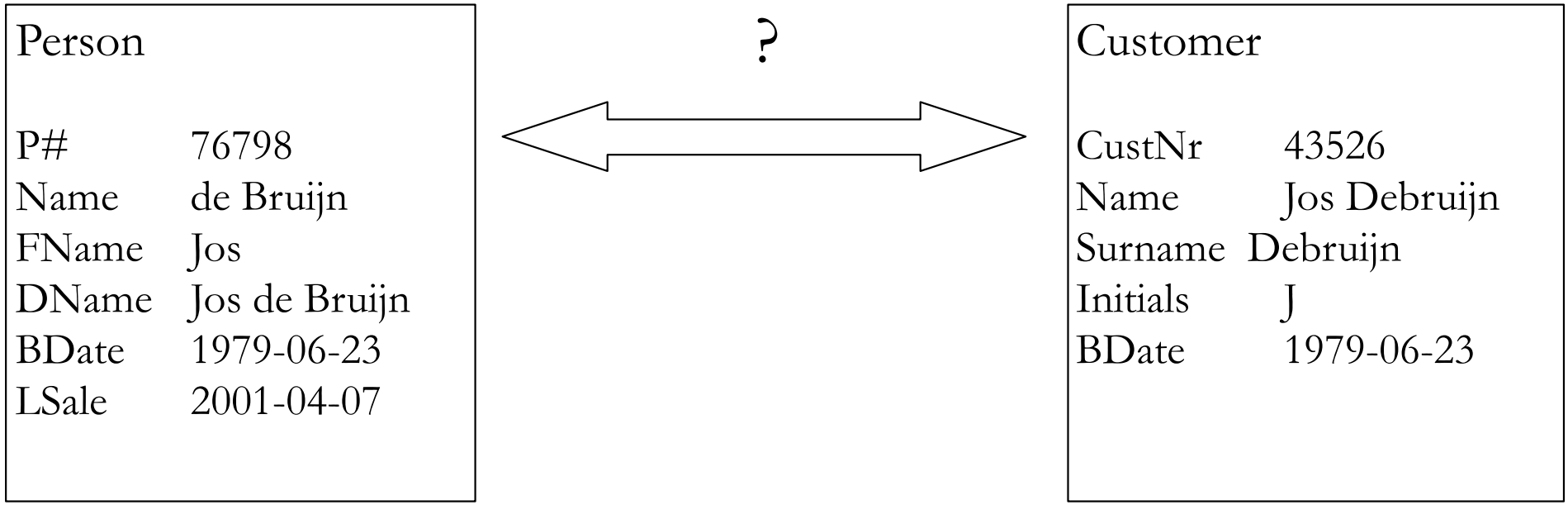
Semantic Integration



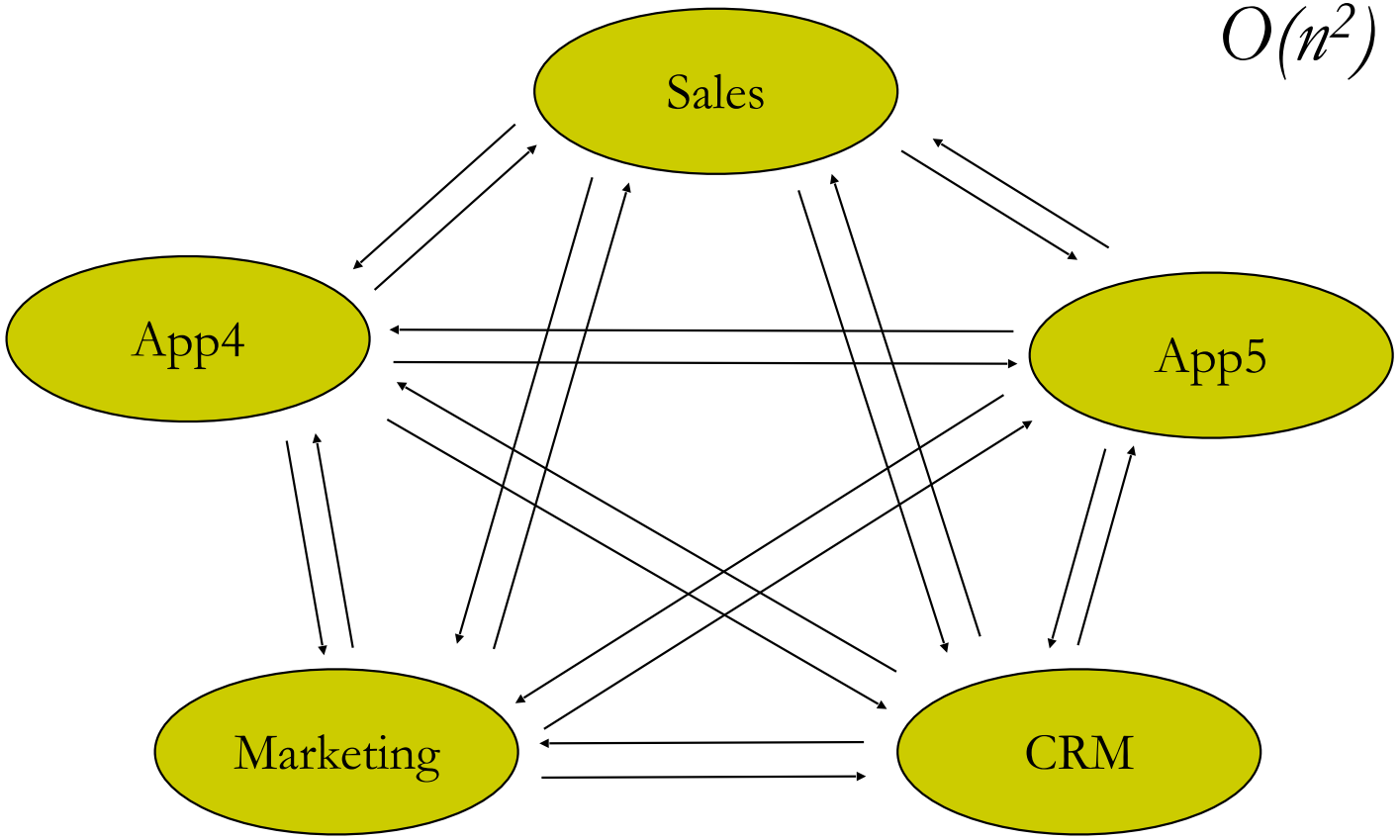
Semantic Differences: Example

Marketing

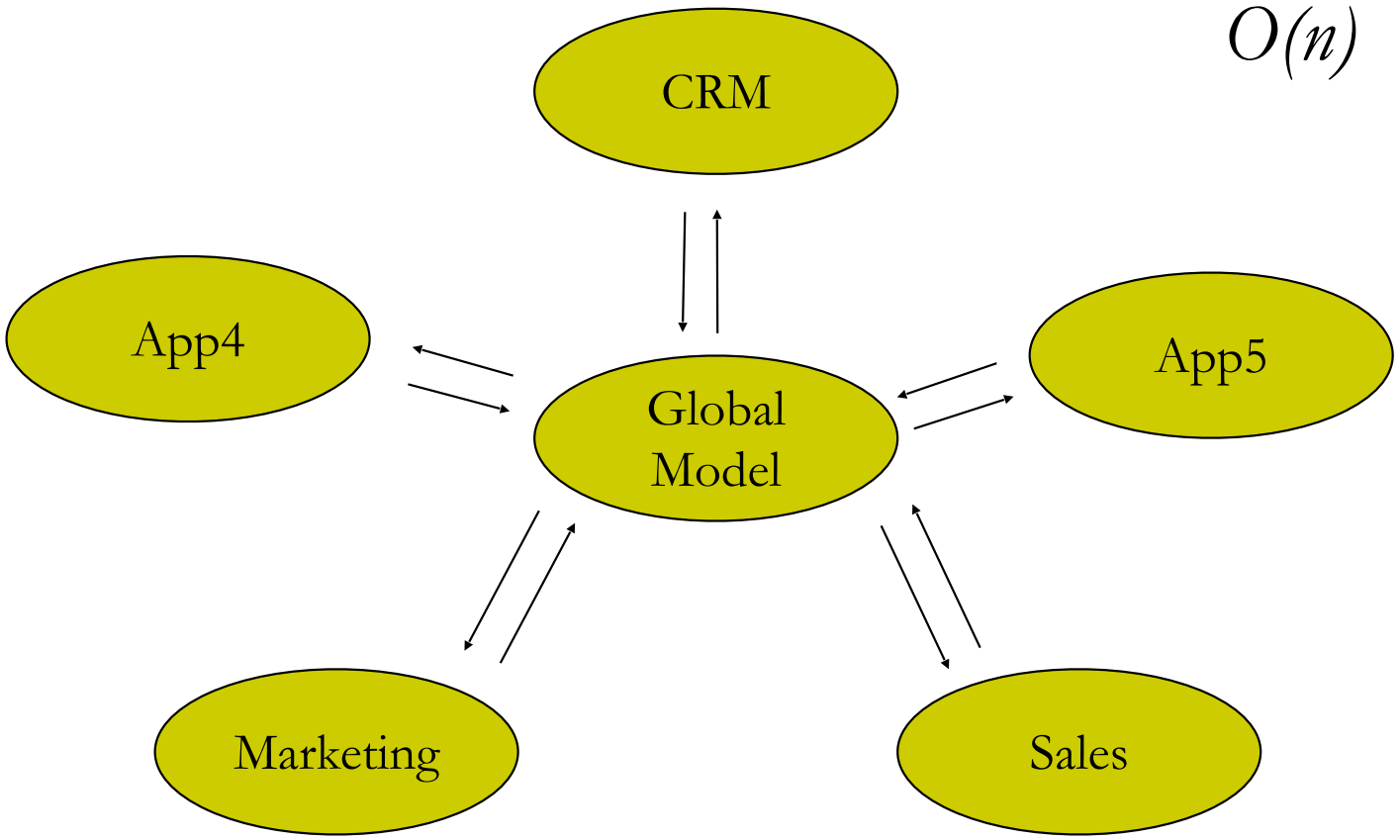
Sales



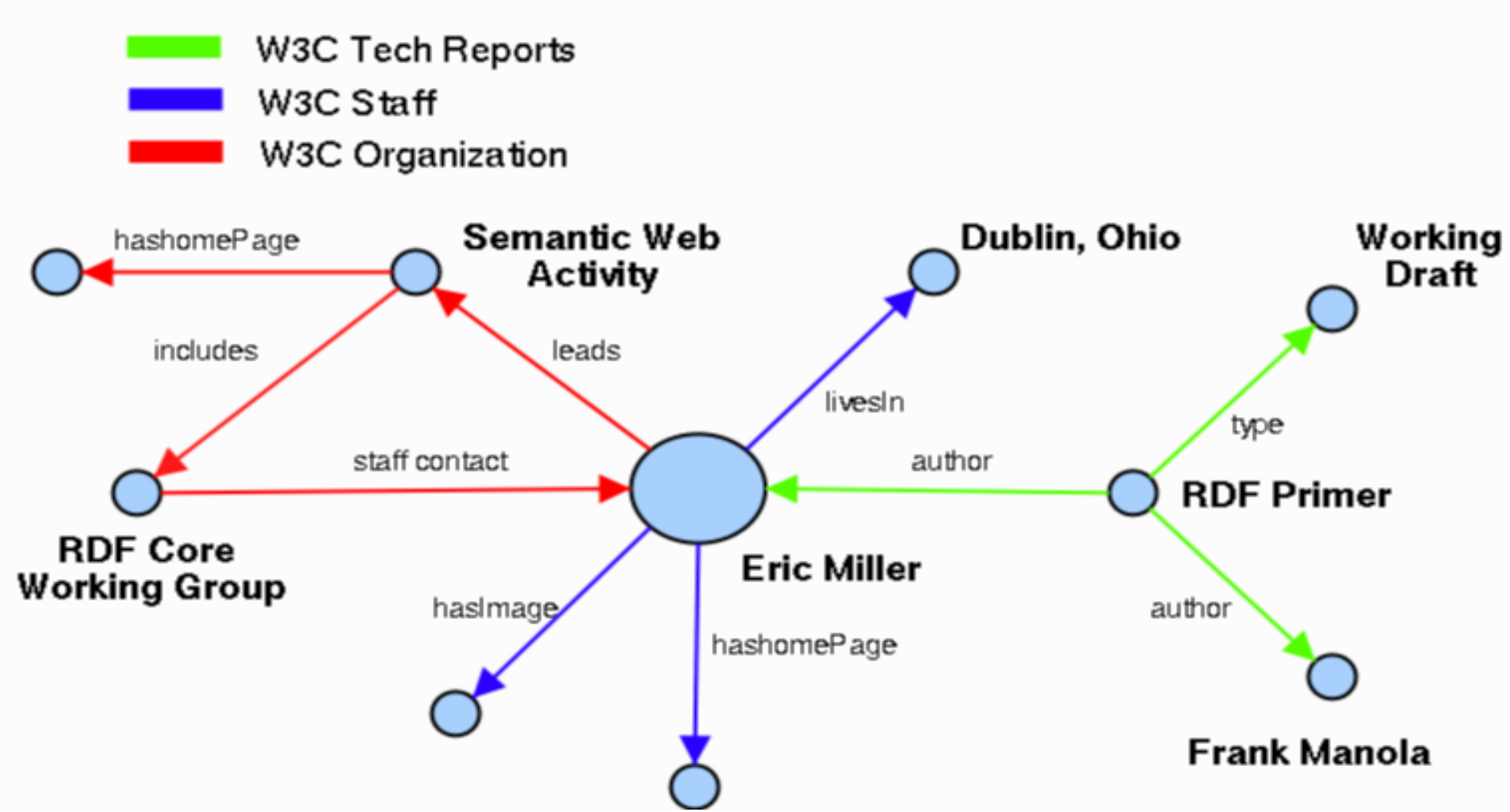
Information Integration Patterns (1): *Ad Hoc* Integration



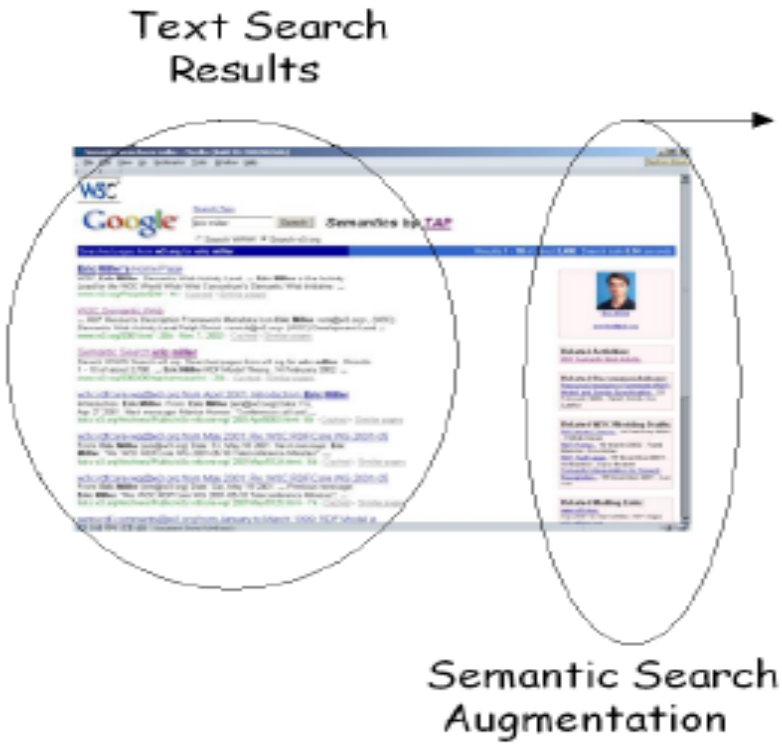
Information Integration Patterns (2): *Global* Integration



Semantic Searching



Semantic Searching



Eric Miller

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Related Activities:
W3C Semantic Web Activity

Related Recommendations:
Resource Description Framework (RDF) Model and Syntax Specification , 22 February 1999 , Ralph Swick, Ora Lassila

Related W3C Working Drafts:
RDF Model Theory , 14 February 2002 , Patrick Hayes
RDF Primer , 19 March 2002 , Frank Manola , Eric Miller
RDF Test Cases , 15 November 2001 , Art Barstow , Dave Beckett
Semantic Interpretation for Speech Recognition , 16 November 2001 , Luc Van

Related Mailing Lists:
www-rdf-rules
Sep 2001 to April 2002 (197 msgs)

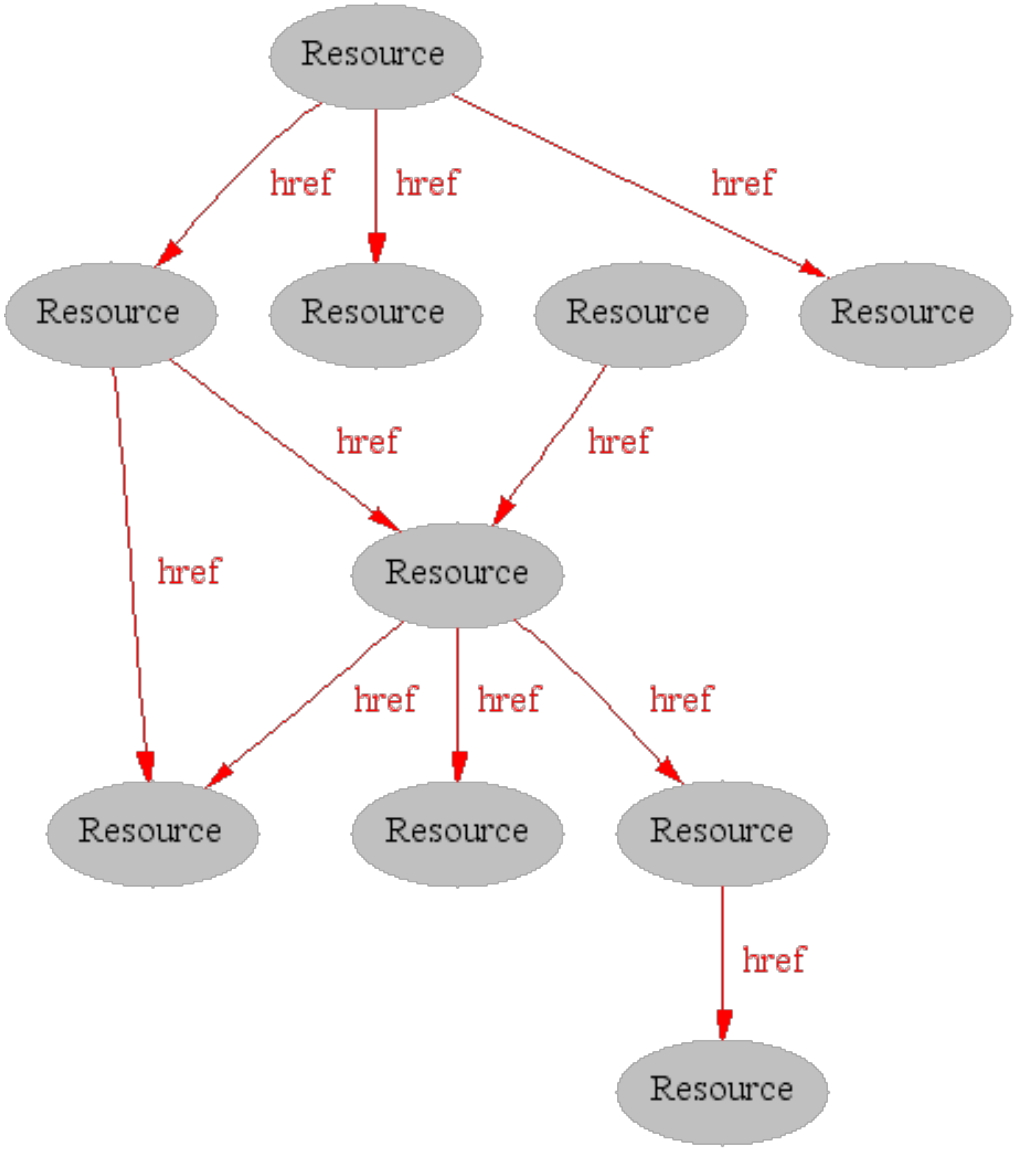
Information from AllMusic
Top Albums:
Soul of the Tango
Appalachia Waltz
Simply Baroque
Transcriptions
Portrait of Yo-Yo Ma
Biography:
Yo-Yo Ma was the cello's foremost contemporary proponent; while primarily a classical performer, he also made a number of highly successful crossover recordings. Born October 7, 1955 to Chinese parents living in Paris, he began playing ...
See full bio.

Shop@AOL
800.Com Music - Soul Of The Tango - ...
Appalachia Waltz / Yo-Yo Ma, Edgar ...
Yo-Yo Ma: Made In America: $11.97
800.Com Music - Brahms: Sonatas For ...
Grappelli Stephane/Yo Yo Ma: Anythi ...
More Shopping@AOL

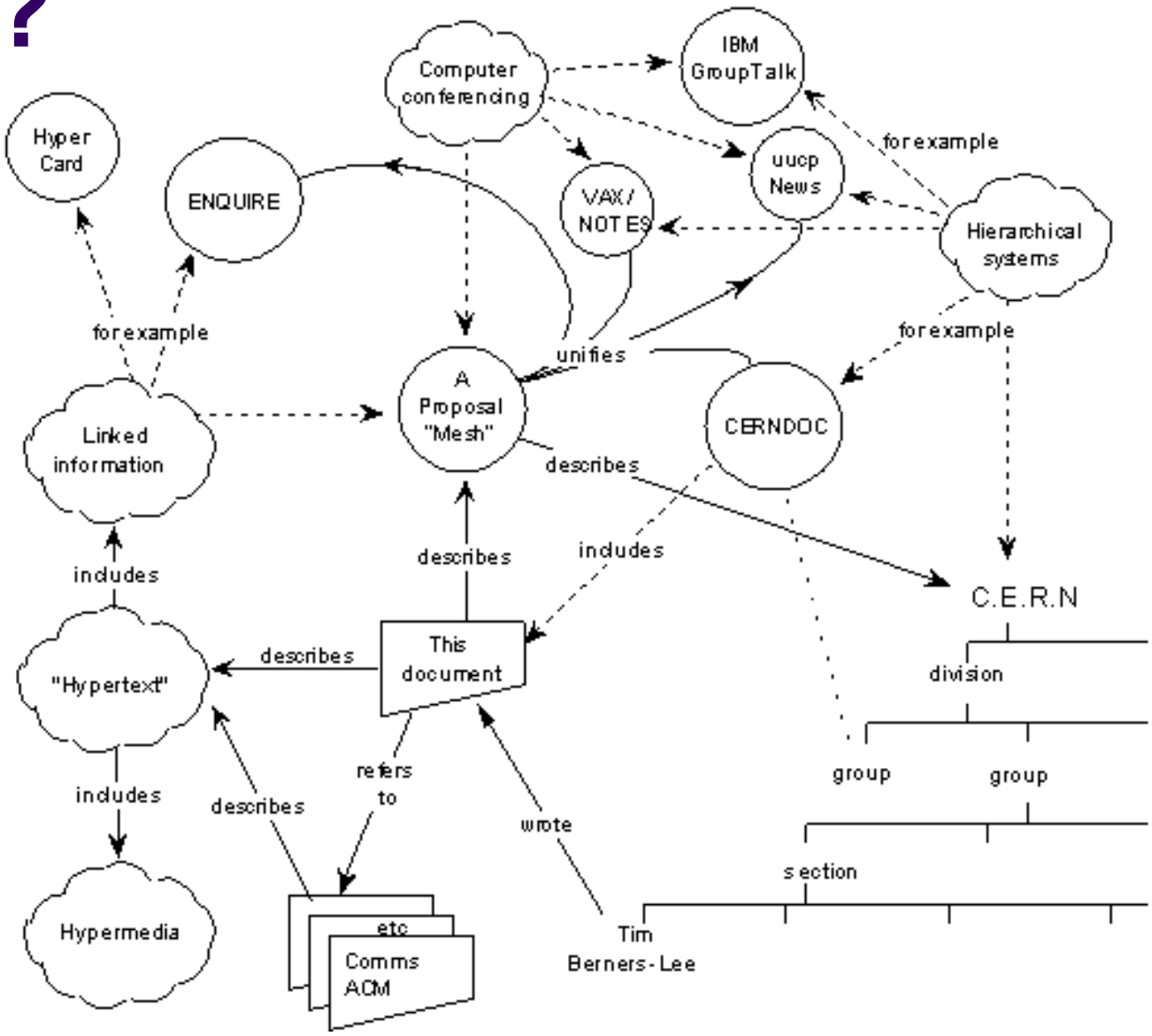
Concert tickets from TicketMaster
Silk Road Project With Yo Yo Ma-Cello
On 5/12/02 at Seattle, WA
Silk Road Project With Yo Yo Ma-Cello
On 5/13/02 at Seattle, WA
Seattle Symphony Silk Road Project ...
On 5/14/02 at Seattle, WA
Silk Road Project With Yo Yo Ma-Cello
On 5/15/02 at Seattle, WA
Seattle Symphony Silk Road Project ...
On 5/16/02 at Seattle, WA
More TicketMaster concerts

Semantic Web: Past

The current (syntactic / structural) Web



Was the Web meant to be more?



How to realize Tim's vision

- Another chance for "Artificial Intelligence (AI)"?
  - Knowledge Representation (representing semantics)
  - Logic Programming (reasoning semantics)

- Decisions for:
  - Background logic for semantic web language (RDF, OWL)
    - Description Logic

AI Influence

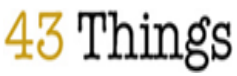
- Too much AI
  - Ontologies are too heavy
    - Too many axioms, complicated rules, concepts and relationships
  - Things are too formal
    - Too many formal logic, logic reasoning,
    - Knowledge base, expert system

Semantic Web: Now

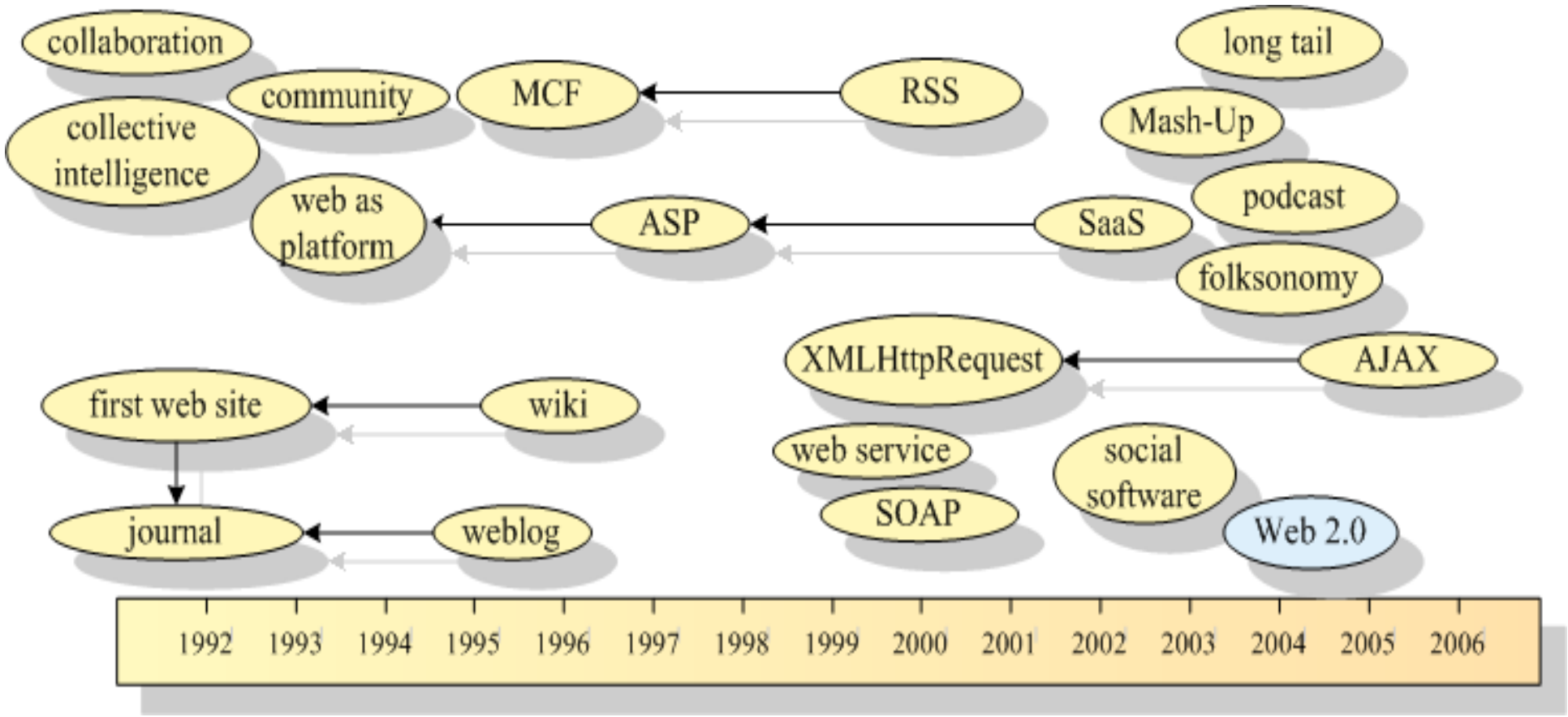
Social Web – Web 2.0

- The term *Web 2.0* was made popular by Tim O'Reilly:
  - http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html
- http://en.wikipedia.org/wiki/Web_2.0
  - *"Web 2.0 … has … come to refer to what some people describe as a second phase of architecture and application development for the World Wide Web."*
- The Web where "ordinary" users can meet, collaborate, and share using **social software** applications on the Web (tagged content, social bookmarking, AJAX, etc.)
- Popular examples include:
  - Bebo, del.icio.us, digg, Flickr, Google Maps, Skype, Technorati, orkut, 43 Things, Wikipedia…

Social Networks



When did Web 2.0 appear?



Features / principles of Web 2.0

- http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html

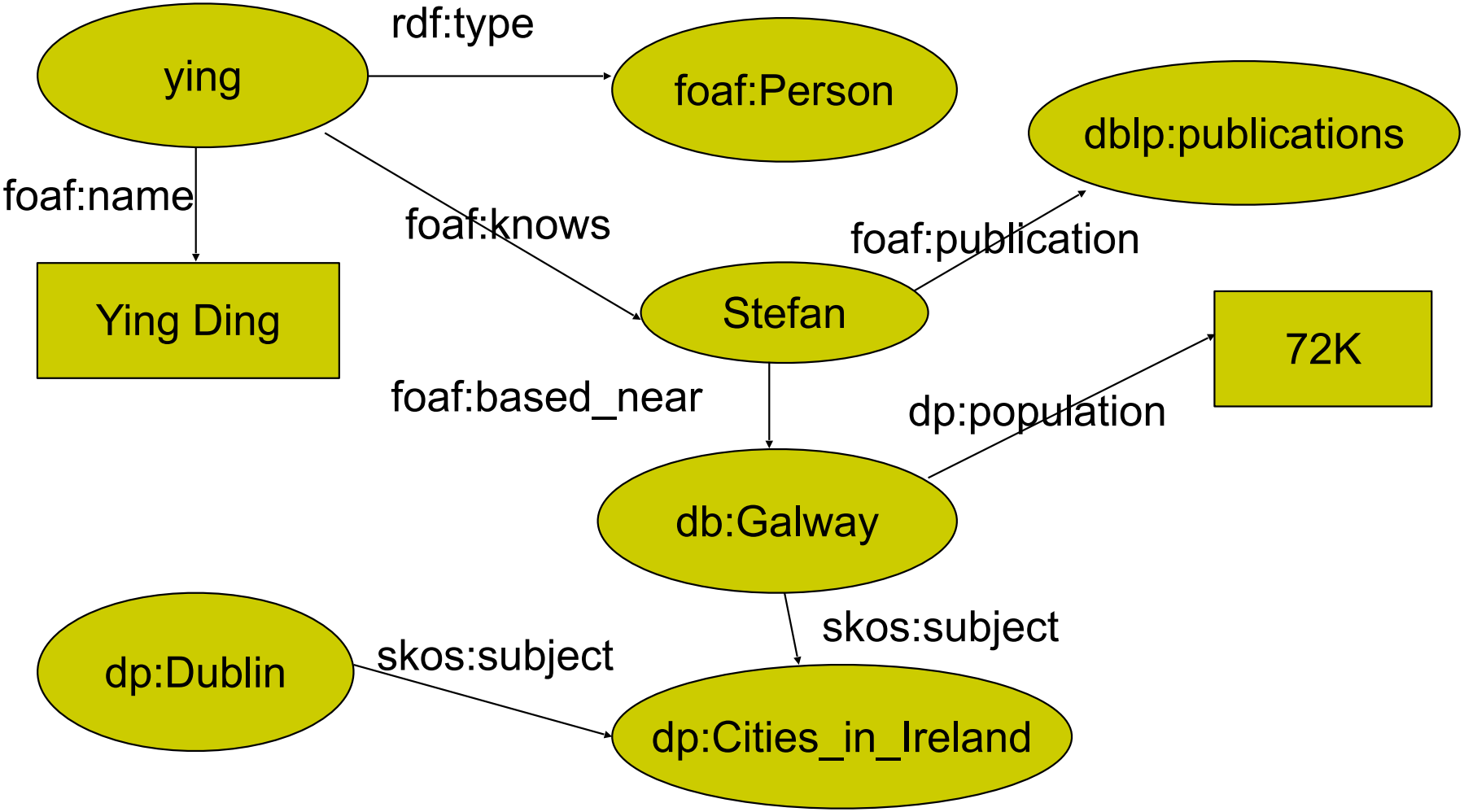
1. The Web as platform
2. Harnessing collective intelligence
3. Data is the next “Intel Inside”
4. Rich user experiences

Web 2.0 meme cloud

W3C SWEO Linking Open Data Project

- Project aims to
  - Publish existing open license datasets as linked data on the web
  - Interlink things between different data sources
  - Develop clients and applications that consume linked data from the web

Power of Linked Data

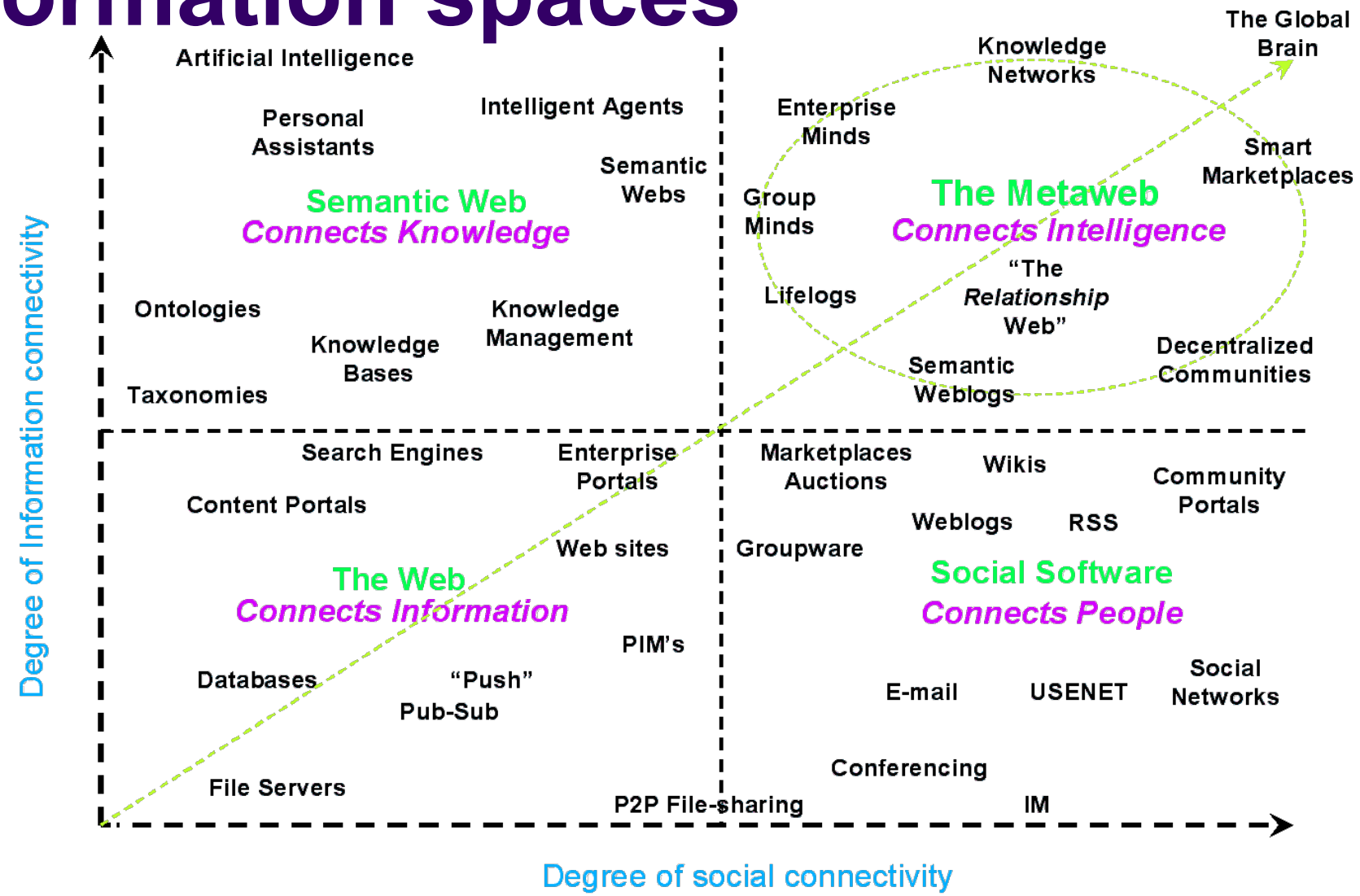


What LOD can bring?

- It will lift current document web up to a data web
- LOD browsers can let you navigate between different data sources by following RDF links.
- It can drill down to the lower granularity of the information
  - allowing you for more fine search on the web
  - making the question-answer search on the Web possible
  - meshing up different data through RDF links
  - Making the built-on-top application easier

Semantic Web: Future

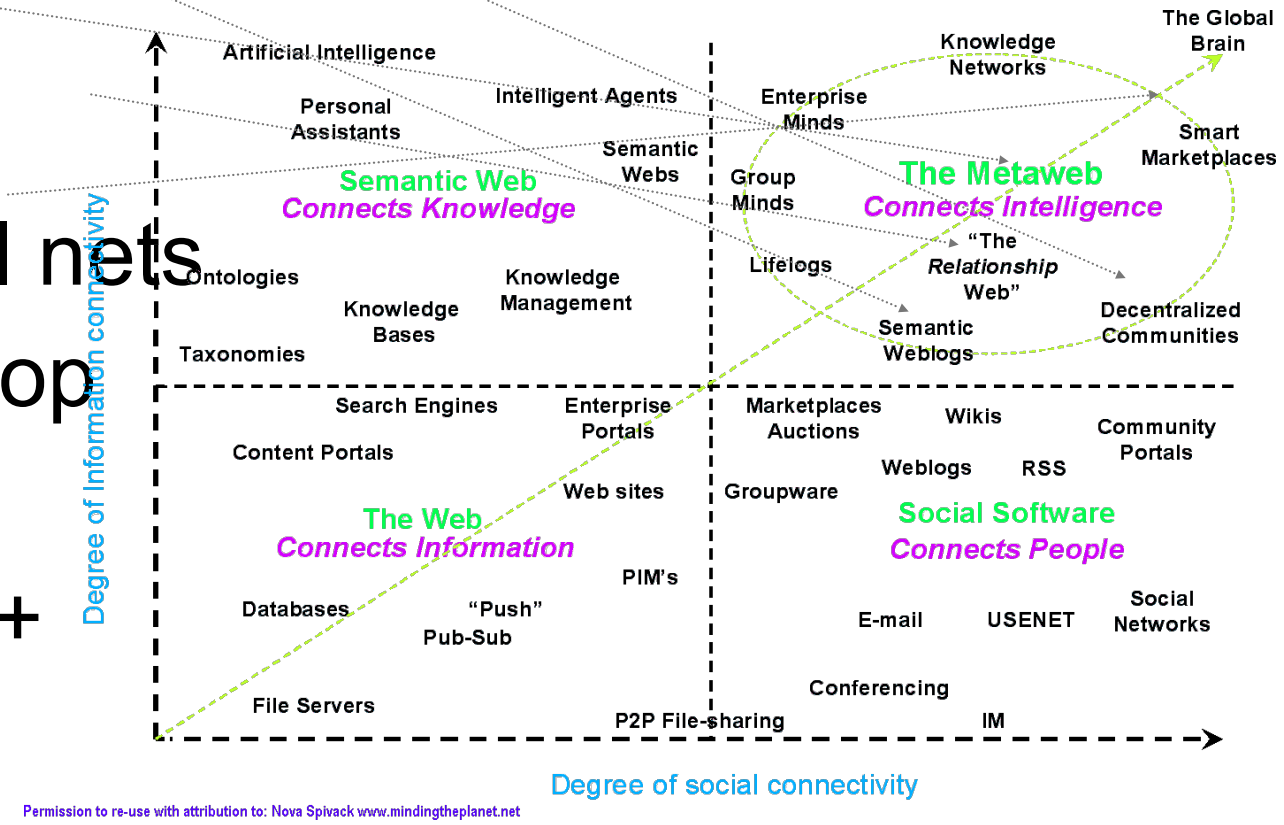
Metaweb ≡ social semantic information spaces



1+1>2

- Semantic forums
- Semantic blogs
- Semantic wikis
- Semantic social nets
- Semantic desktop

Semantic Web + social software



The path to Web 3.0 (the Semantic Web)

- The Semantic Web effort is mainly towards producing standards and recommendations that will **interlink data and applications**
- The Web 2.0 is about **providing user applications**
- Not mutually exclusive:
  - http://www.oreillynet.com/xml/blog/2005/10/is_web_20_killing_the_semantic.html
  - With a little effort, many Web 2.0 applications can and do use Semantic Web technologies to great benefit

Document Web vs. Data Web

- Document Web
  - Glued by hyperlinks
  - Data are HTML pages
  - Query result is HTML pages, which can not be further processed
  - Data are just interlinked, but not integrated
  - Data access through different APIs
- Data Web
  - Glued by RDF links
  - Data are RDF triples
  - Query result is RDF triples which can be easily further processed (e.g., web services)
  - Data are interlinked and integrated, and links are typed
  - Data access through a single and standardized access mechanism (maybe it will called in the future LOD API?)