

The Fellowship of the (Semantic) Web



Ontological Conundrum

- The progress of the Semantic Web has been hampered by significant confusion as to what an ontology, and especially a Web ontology is.
 - Two separate visions (or perhaps two end points on what are a continuum) have caused significant confusion
- And the confusion blurs an important message
 - Both uses have proven valuable in the real world!!
- My goal in this talk is to try to reduce this confusion
 - Which could be a real first for a college Professor!

Outline

- Intro (now done)
- some imprecise analogies for motivation
- The kinda technical stuff
- Some shameless self-promotion
- Boffo Conclusion
 - <http://www.thefreedictionary.com/boffo>

Ontology: the OWL DL view



- Ontology as Barad-Dur (Sauron's tower):

- Extremely powerful!

- Decidable Logic basis
 - ~~Patrolled by Orcs~~
 - inconsistency
 - Let one little ~~hobbit~~ in, and the whole thing could come crashing down



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Inconsistency is the bane of this view

The screenshot shows the Protégé OWL editor interface. The main window displays the 'OWL Ontology: process.owl' with the following statistics:

- Annotations: owl:versionInfo : 1.0
- Total Number of Classes: 1537 (Defined: 1537, Imported: 0)
- Total Number of Datatype Properties: 19 (Defined: 19, Imported: 0)
- Total Number of Object Properties: 102 (Defined: 102, Imported: 0)
- Total Number of Annotation Properties: 2 (Defined: 2, Imported: 0)
- Total Number of Individuals: 150 (Defined: 150, Imported: 0)

The 'Advanced Ontology Statistics' window is open, showing the 'General Statistics' tab. It lists the following statistics:

- No. of Unsatisfiable Classes: 1
- DL Expressivity: [ALCHOFD](#)
- No. of GCIs: 2
- No. of Sub-classes: 1928
- No. of Disjoint Axioms: 1
- No. of Functional Properties: 19
- No. of Inverse Functional Properties: 0
- No. of Transitive Properties: 0
- No. of Symmetric Properties: 0
- No. of Inverse Properties: 0

The 'Axioms causing the inference' window is also open, showing a list of axioms. The first axiom is highlighted:

```
1) (OceanCrustLayer ⊆ owl:Nothing)
```

Other axioms include:

- 2) $\perp (OceanRegion \sqsubseteq TopographicalRegion)$
- 3) $\perp (TopographicalRegion \sqsubseteq EarthRegion)$
- 4) $\perp (EarthRegion \sqsubseteq Region)$
- 5) $\perp (Region \sqsubseteq GeometricalObject_2D)$
- 6) $\perp (GeometricalObject_2D \sqsubseteq (\text{hasDimension} . \{ "2" ^ \wedge \langle \text{xsd:integer} \rangle \}))$
- 7) $(OceanCrustLayer \sqsubseteq CrustLayer)$
- 8) $\perp (CrustLayer \sqsubseteq LithosphereLayer)$
- 9) $\perp (LithosphereLayer \sqsubseteq SolidEarthLayer)$
- 10) $\perp (SolidEarthLayer \sqsubseteq Layer)$
- 11) $\perp (Layer \sqsubseteq GeometricalObject_3D)$
- 12) $\perp (GeometricalObject_3D \sqsubseteq (\text{hasDimension} . \{ "3" ^ \wedge \langle \text{xsd:integer} \rangle \}))$

A red arrow points from the text '1537 classes, 1 modeling error = failure!' to the 'No. of Unsatisfiable Classes: 1' statistic.

1537 classes,
1 modeling error
= failure!



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(Swoop w/Pellet)



ROI: Reasoning over (Enterprise) data

- This "big O" Ontology finds use cases in verticals and enterprises
 - Where the vocabulary can be controlled
 - Where finding things in the data is important
- Example
 - Drug discovery from data
 - Model the molecule (site, chemical properties, etc) as faithfully and expressively as possible
 - Use "Realization" to categorize data assets against the ontology
 - Bad or missed answers are money down the drain

ontology: the RDFS view



- ontology and the tower of Babel
 - We will build a tower to reach the sky
 - We only need a little ontological agreement
 - Who cares if we all speak different languages?

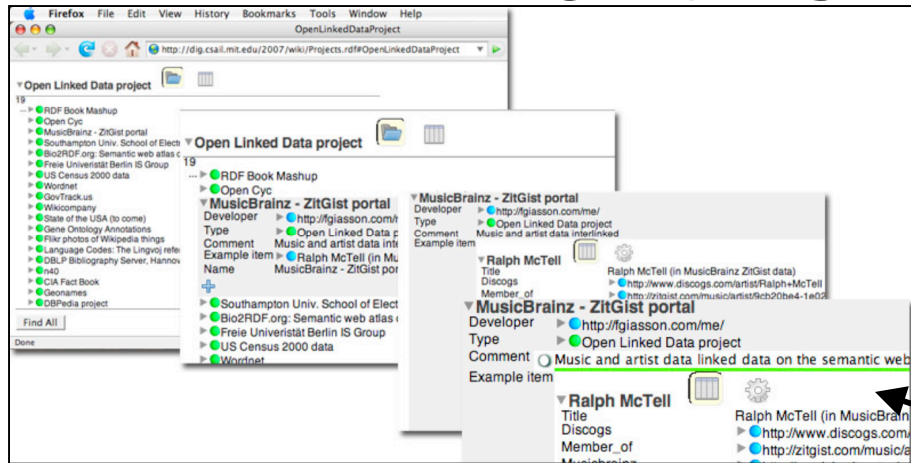
Genesis 11:7 Let us go down, and there confound their language, that they may not understand one another's speech. So the Lord scattered them abroad from thence upon the face of all the earth: and they left off to build the city.



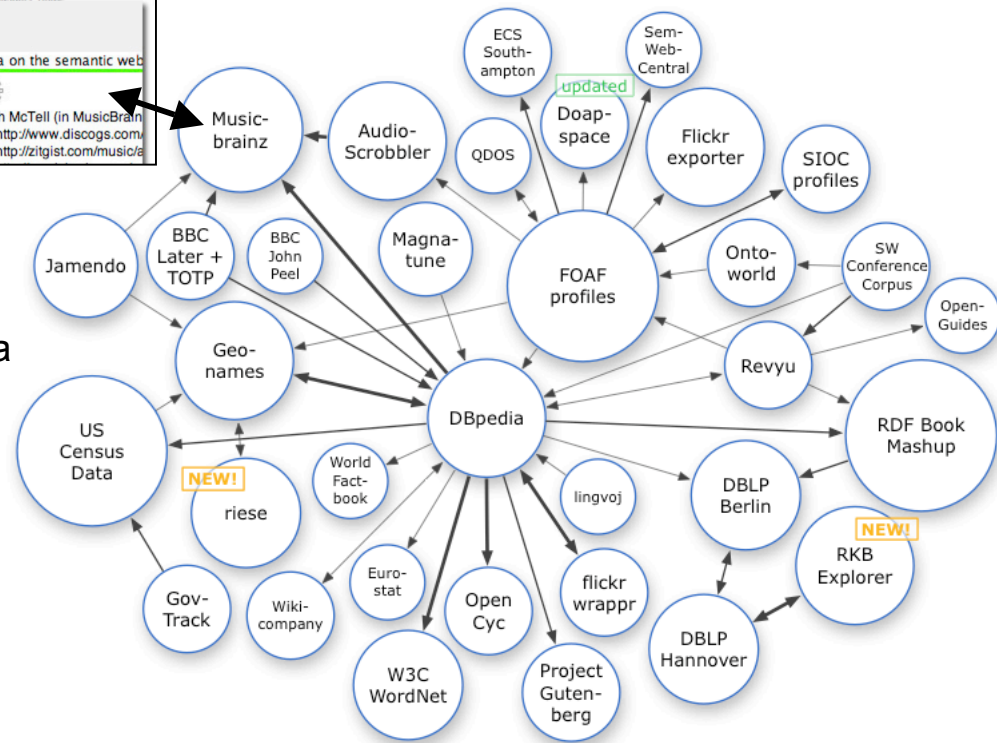
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Boundaries are the bane of this view



Tabulator and Linked Open Data

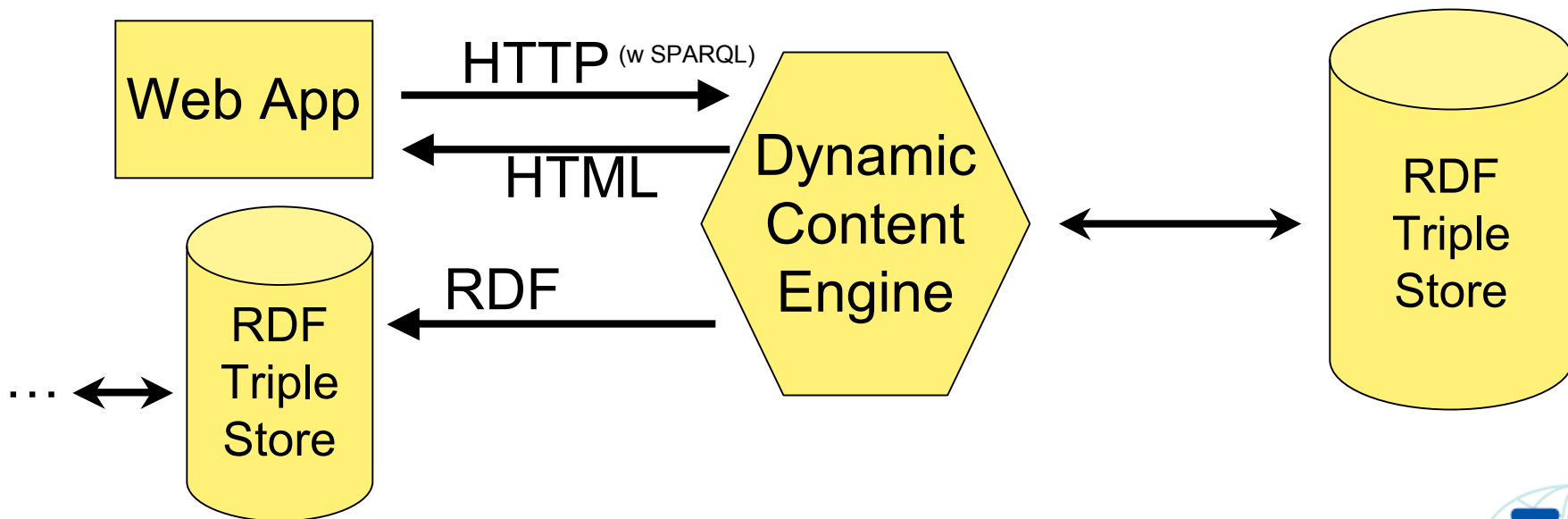


ROI: Web 3.0

- The "small o" ontology finds use cases in Web Applications (at Web scales)
 - A lot of data, a little semantics
 - Finding anything in the mess can be a win!
- Example
 - Declare simple inferable relationships and apply, at scale, to large, heterogeneous data collections
 - eg. Use InverseFunctional triangulation to find the entities that can be inferred to be the same
 - These are "heuristics" not every answer must be right (qua Google)
 - But remember *time = money*!

ROI: Web 3.0

- ~2006: Web app developers discover the Semantic Web




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O asks o: how can you ignore soundness?


Recommended Members




Mills Davis
Washington DC USA
83 Twines | 182 Items
Connection Pending




Chris Jones
All ready for '08
Mill Valley
58 Twines | 65 Items
[Connect](#)



John Clarke Mills
doing things and stuff
San Francisco, CA
28 Twines | 34 Items
[Connect](#)



Steve O'Donoghue
Twining my interests
San Francisco
27 Twines | 181 Items
[Connect](#)




tricia
arbiter of style
san francisco, ca
52 Twines | 952 Items
[Connect](#)

- Twine recommends some people I may want to connect to
 - What is correctness in this case?
 - If I find some folks I like this way, I use twine more. Surprises can be fun.
 - But if it does a "bad" job, I may go elsewhere

twine

Home My Items My Twines My Connections Explore Start a Twine Search Twine

Member Profile





38

tricia



arbiter of style
san francisco, ca
Member since: Oct 3, 2007
<http://www.bitsandbobbins.com/journal>
<http://www.wardroberemix.com>

[Connect](#)


Mutual Twines
2 Twines

-  **Web 3.0 - Semantic Web**
897 Items | 2218 Members
-  **Twine News and ...**
47 Items | 3971 Members


tricia's Twines
52 Twines

-  **Web 3.0 - Semantic Web**
897 Items | 2218 Members
-  **Twine News and ...**
47 Items | 3971 Members


Mutual Connections
5 connections




Candice Nobles
happy to be here!
San Francisco, CA
61 Twines | 59 Items
Disconnected




James Todd
living large
05008
72 Twines | 267 Items
Disconnected



Nova Spivack
Learning from Twine,
San Francisco, CA, 94107
284 Twines | 2338 Items
Disconnected



Hrnf Thorisson
A 1400g Crimson Jelly
Reykjavik, Iceland
233 Twines | 851 Items
Disconnected



Dan Perry
www.danperry.com
34 Twines | 106 Items
Disconnected

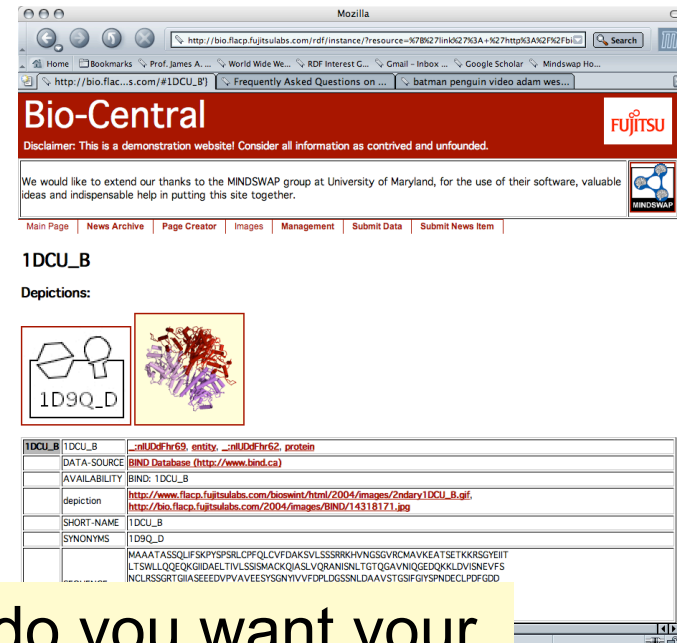
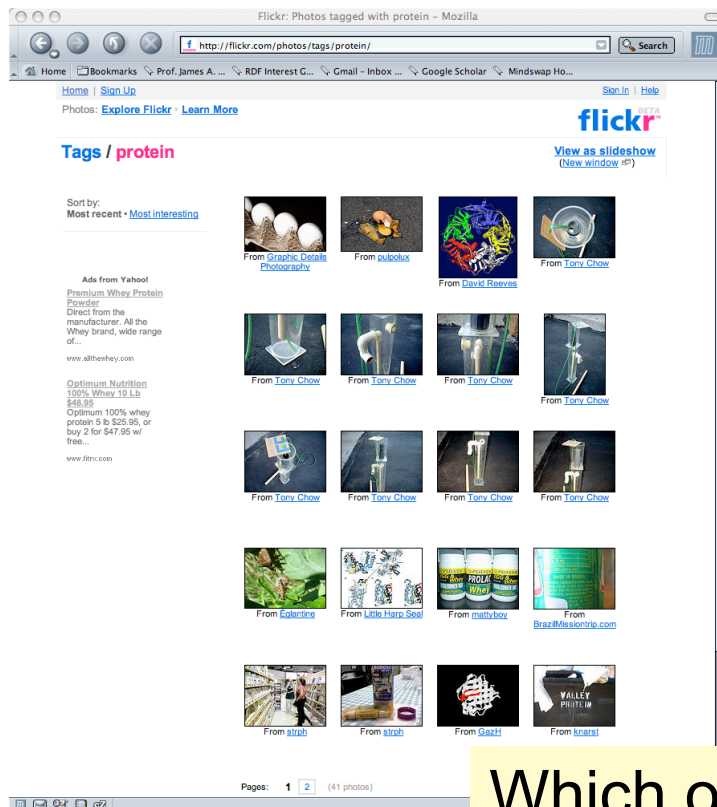


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o asks O: Why do you need expressiveness?

- Often "folksonomy" isn't enough!



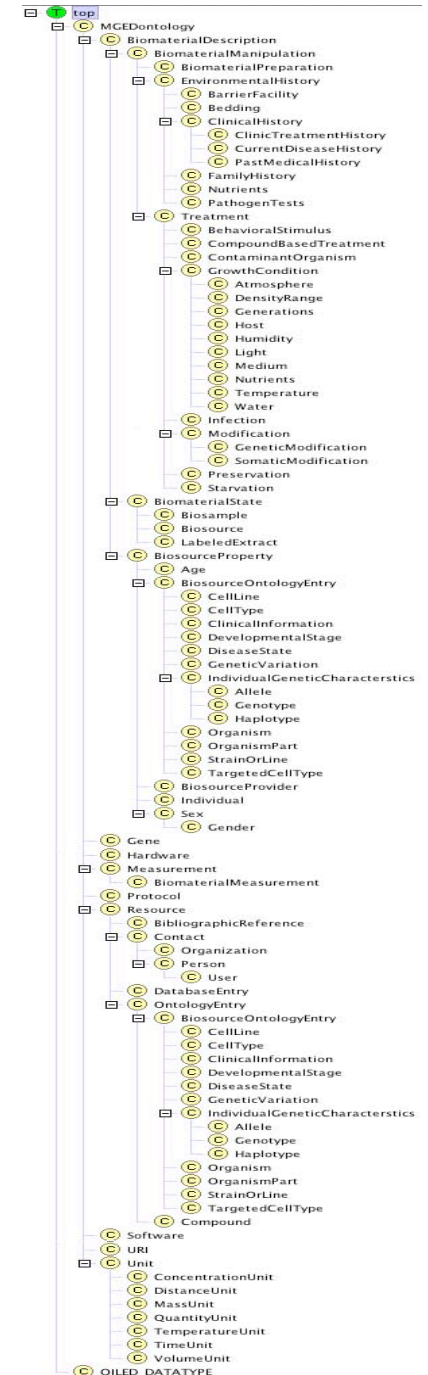
Which one do you want your doctor to use?



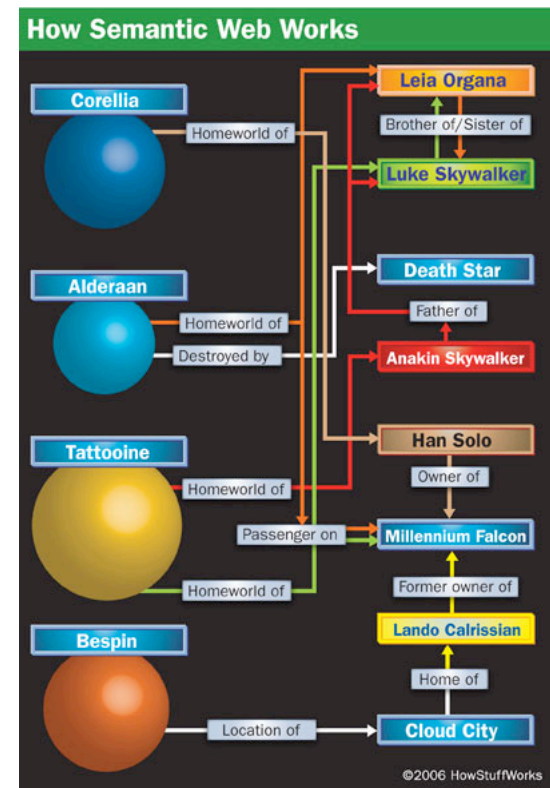
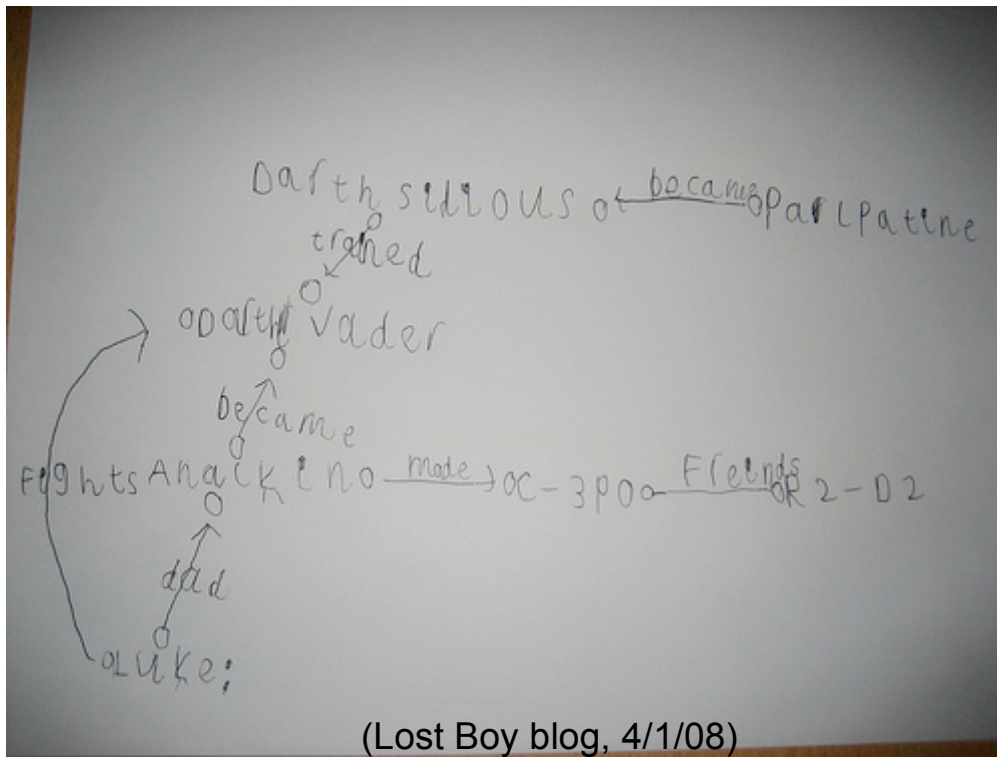
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- Ontology mapping



Is not a big problem for o



Slogan: A little semantics goes a long way



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A big problem for o

- What do we do with all this stuff?

- * The primary goal is to for submissions to show how they add value to the very large triple store. This can involved browsing, visualization, queriable in the original tied to part(s) or the who
- * The tool or application by the organizers.
- * The tool or application but there is still an exper
- * The tool or application for the Open Track Cha interaction with the large of this challenge, solution the success of future ap



(ISWC 2008 - Open Web, Billion Triple Challenge -

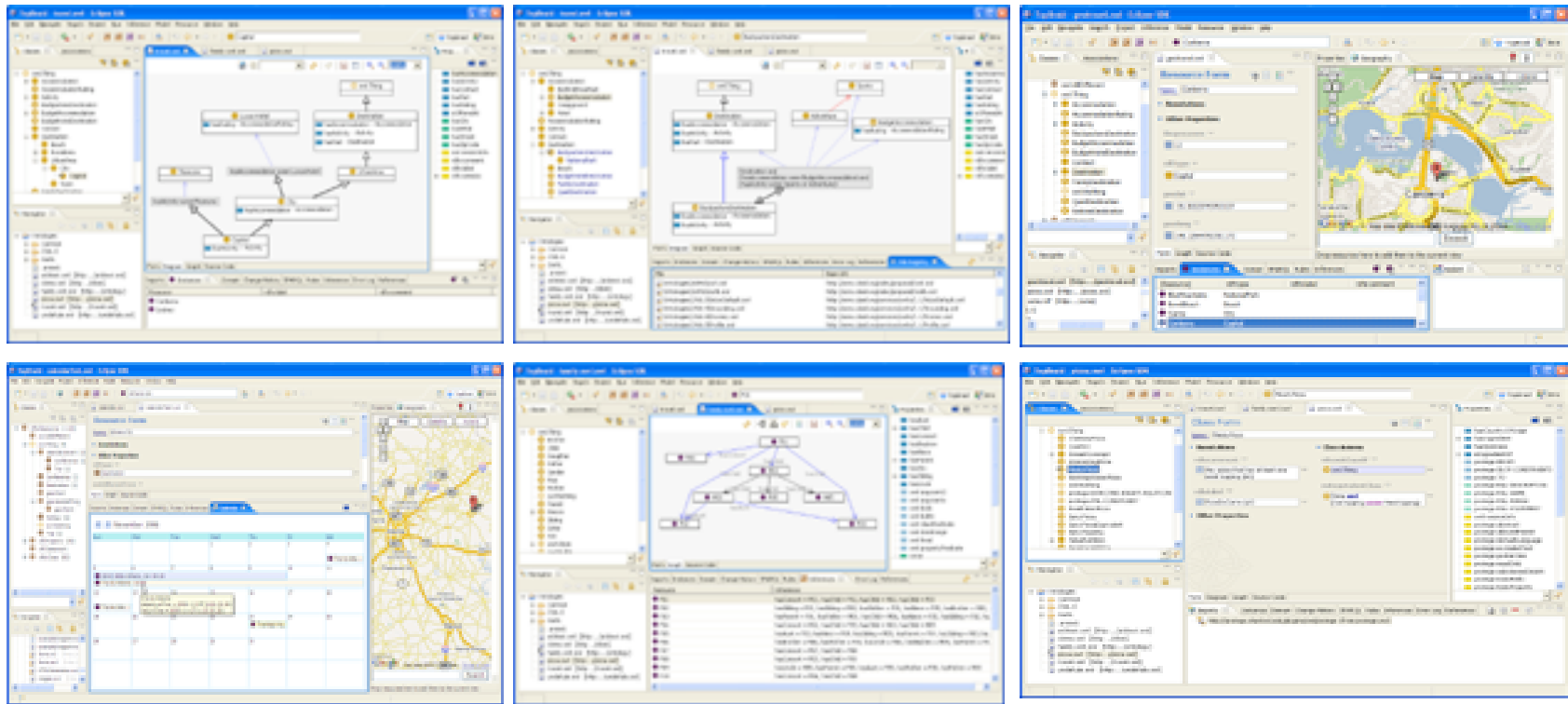
<http://iswc2008.semanticweb.org/calls/call-for-semantic-web-challenge-and-billion-triples-tracks/>



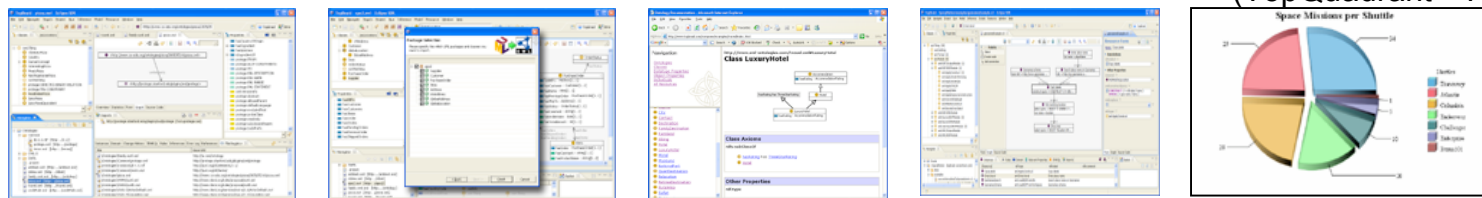
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Is well understood in O



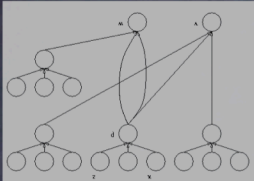
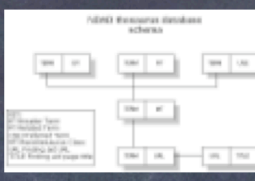
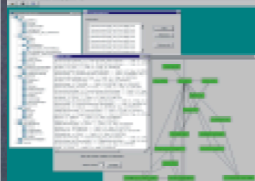
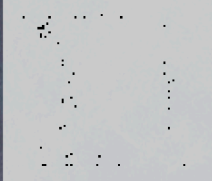
(TopQuadrant - TopBraid)



Slogan: Knowledge is power

We use the same word...

Sem Web Modeling

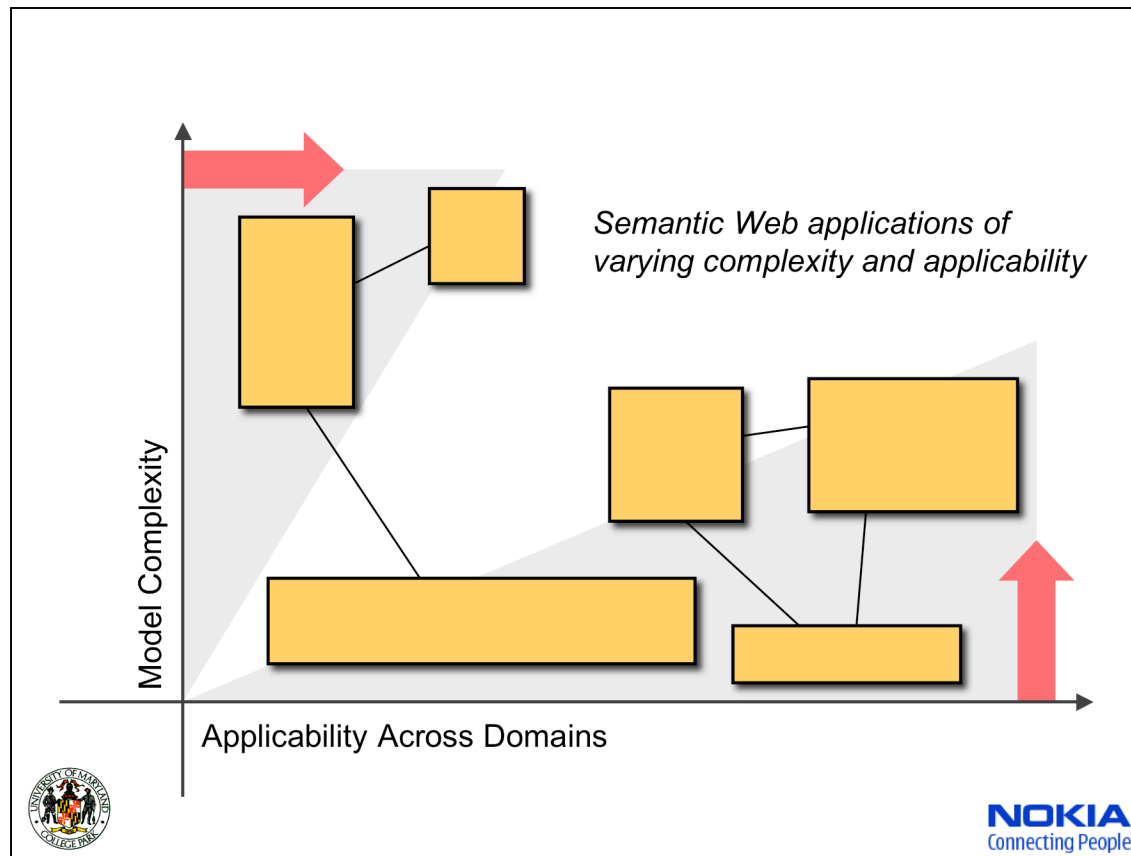
			...	
Graph Ontology	Labeled graph Data Dictionary Data Schema Ontology	Graph + limited logic Ontology	...	Logic Ontology
RDF	RDF Schema	OWL	...	KIF?



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But $O \neq o$



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Why does this matter

- Different issues of concern
 - Confuses messaging
- Effort is spent in different parts of the space
 - i.e. scaling vs. modeling
 - Leads to confusion in costs, esp. for interested parties
 - Starting out: You must know which O/o you're going after
- Different "first-concern" tools for the different models
 - Big O: ontology creation and modeling
 - Small o: triple store and SPARQL
- ...

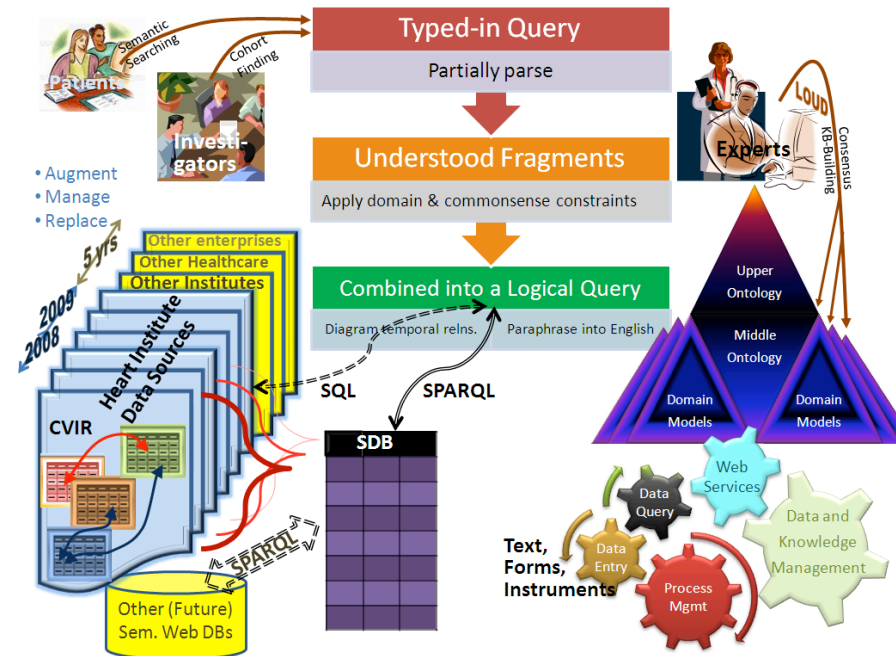
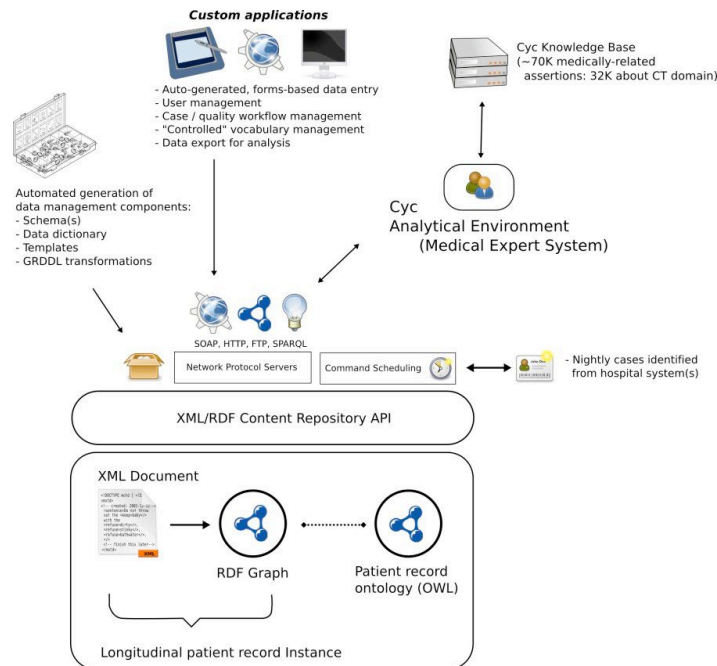


Tensions

- There are also some serious tensions between these models
 - Base in RDF (links) vs. XML (validation)
 - Soundness and Completeness
 - Big O: Mandatory
 - Small o: Impossible
 - Consistency impossible to maintain in large scale distributed efforts
 - Error, Disagreement, Fraud
 - Business Model
 - Enterprise v. Web Scale



Not Irreconcilable Differences



Cf. Cleveland Clinic "Semantic DB" effort

OR \neq XOR



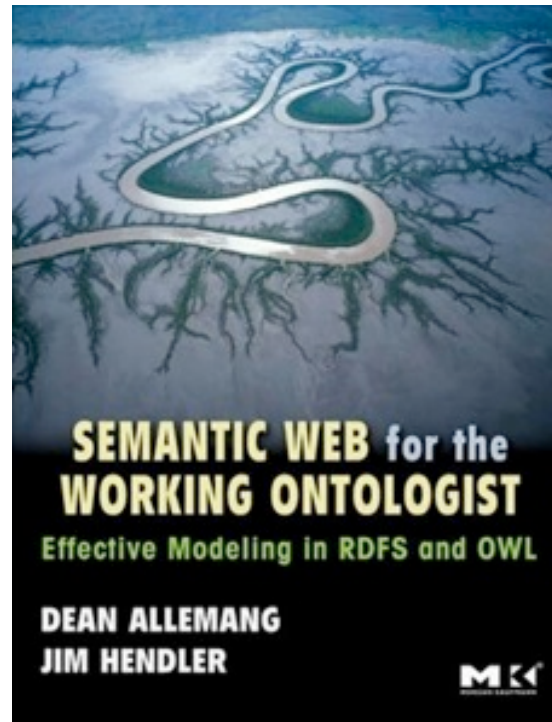
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Which is why RDFS/OWL matter

- From the Original W3C OWL Faq*
 - Q. How is OWL different from earlier ontology languages?
 - A. OWL is a Web Ontology language.
 - Ability to be distributed across many systems
 - Scalable to Web needs
 - Compatible with Web standards for accessibility and internationalization.
 - Open and extensible
- Interoperability is lost if these two towers grow too far apart
 - It is important that RDFS and OWL remain WEB languages
 - Which is much harder in "O" than "o"
 - (W3C members: make sure your AC rep is watching the OWL 2 space with this in mind)

Where can I learn more?



<http://www.amazon.com/Semantic-Web-Working-Ontologist-Effective/dp/0123735564>



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Or Ask the Experts

RENSSELAER POLYTECHNIC INSTITUTE TROY, NY USA

TETHERLESS WORLD RESEARCH CONSTELLATION

Join Rensselaer for a panel discussion on the future of the Web, and the launch of the Tetherless World Research Constellation, June 11, 2008
2:30 p.m. in the Center for Biotechnology and Interdisciplinary Studies Auditorium

<http://www.>



James Hendler Semantic Web visionary and Tetherless World Constellation professor	Deborah McGuinness Web language expert and Tetherless World Constellation professor	Tim Berners-Lee Inventor of the Web and Director of the World Wide Web Consortium	Wendy Hall VP of the ACM and Senior VP of the Royal Academy of Engineering	Nigel Shadbolt Former president of the BCS and Chief Technology Officer of Garlik	Nova Spivack High-tech entrepreneur and founder of Radar Networks
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Washington, Wikipedia, and Web 3.0: What is the Future of the Web?

On June 11, 2008, leading authorities on the World Wide Web will gather at Rensselaer Polytechnic Institute for an old-fashioned debate with a social media twist. The questions for discussion will be shaped and selected by the collective wisdom of Web users from around the world.

After delivering a keynote address, Tim Berners-Lee, inventor of the Web, will join a panel of experts from academia and industry for a public discussion about the Web's future.

The content of the debate will be collaboratively created by Web users, who can submit questions and promote them through a user-based ranking system, similar to the community-based news site Digg. The most popular questions will drive the discussion at the June 11 debate.

The public debate, which will be streamed live via an interactive Webcast, is part of a daylong event to celebrate the launch of the Tetherless World Constellation at Rensselaer — a new academic center devoted to the emerging field of Web Science.

Submit Your Questions Now
Members of the public are invited to submit and vote on questions for the panelists until the day of the debate.

Watch the live Webcast during the discussion on June 11. Viewers will be able to interact with panelists by submitting follow-up questions and comments in real time.

Schedule of Events

2:30 p.m. – Opening Remarks
Shirley Ann Jackson, Ph.D.,
President of Rensselaer Polytechnic Institute

2:45 p.m. – Keynote Address
Tim Berners-Lee, Senior Research Scientist
MIT Laboratory for Computer Science and
Artificial Intelligence

3:45 p.m. – Issue Debate
"Washington, Wikipedia, and Web 3.0:
What is the Future of the Web?"

- Submit your questions on line for Tim, Nova, Wendy and Nigel
 - Vote on the ones you want to hear
- Watch the Webcast
- Or show up in person
 - We're buying the drinks!



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<http://tw.rpi.edu/launch/>



~~Boffo~~ Conclusion

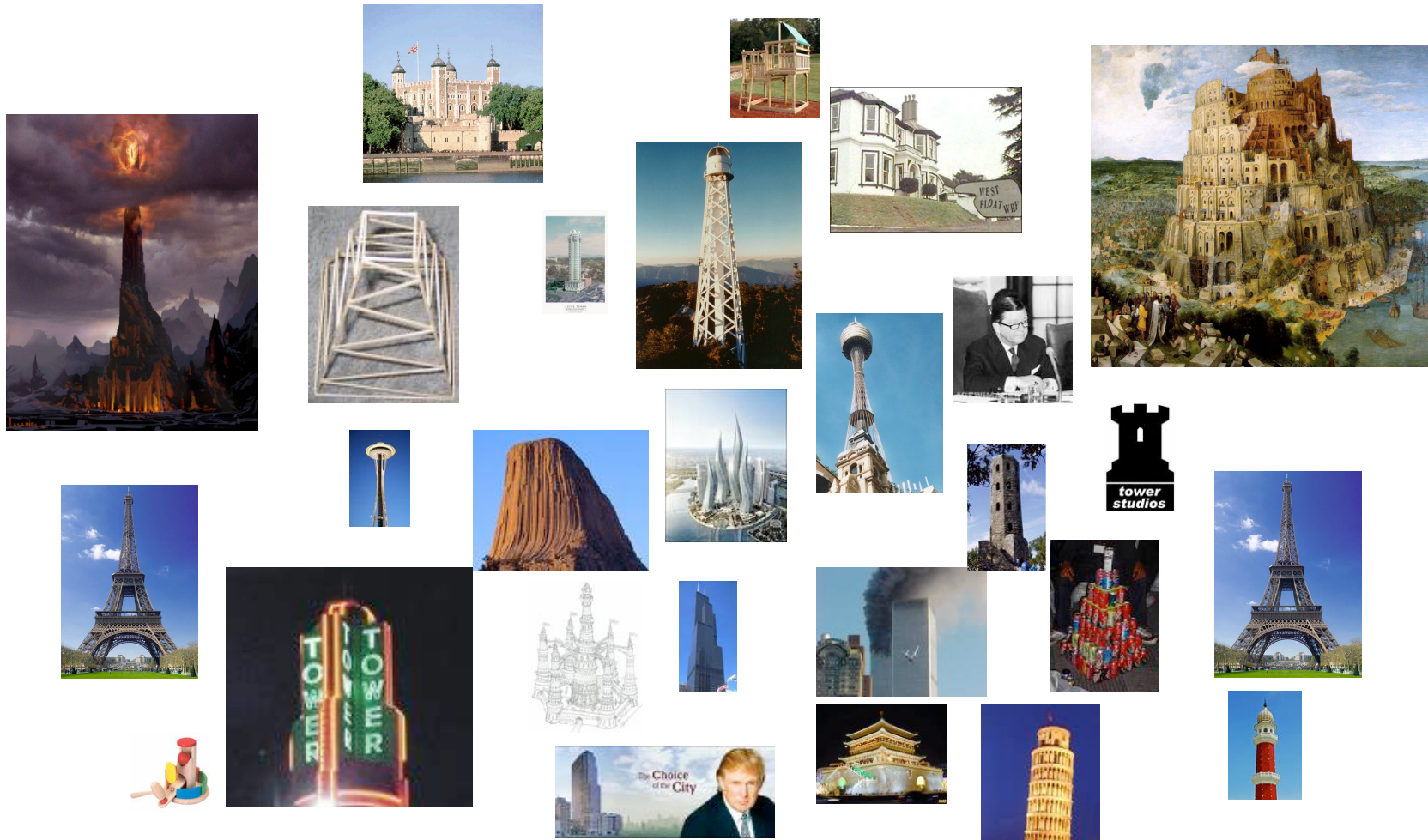
- There's no ontology ontology
 - The term is used in many ways in our community
- This causes great confusion
 - And hurts our technology adoption
- The Web is a big place
 - Room for more than one vision
 - But they must play nice to get the network effect
- Which leads to...



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... the Semantic **WEB** Vision



Interoperability trumps homogeneity ever time!



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