

Introduction to the **World Wide Web Consortium**

and the **Workshop on Semantic Web in Energy Industries; Part I: Oil & Gas**



Hosted by  **Human Energy™**

Presented by
Steve Bratt (steve@w3.org)
World Wide Web Consortium
December 2008
<http://www.w3.org/>

Outline

- **W3C Overview**
- **Work in Application Domains**
- **Option for Next Steps in O&G**
- **Workshop Objectives**

World Wide Web Consortium

Sets the Standards that Make the Web Work

- Founded in 1994 by
Tim Berners-Lee
inventor of the Web (W3C Director)
- Serving the world:
 - Global sensibility, presence, outreach
 - Global requirements + global participation
= global use
 - Fair and effective process = quality standards



~ 410 Member organizations representing a wide range of businesses, industries, and academia ...

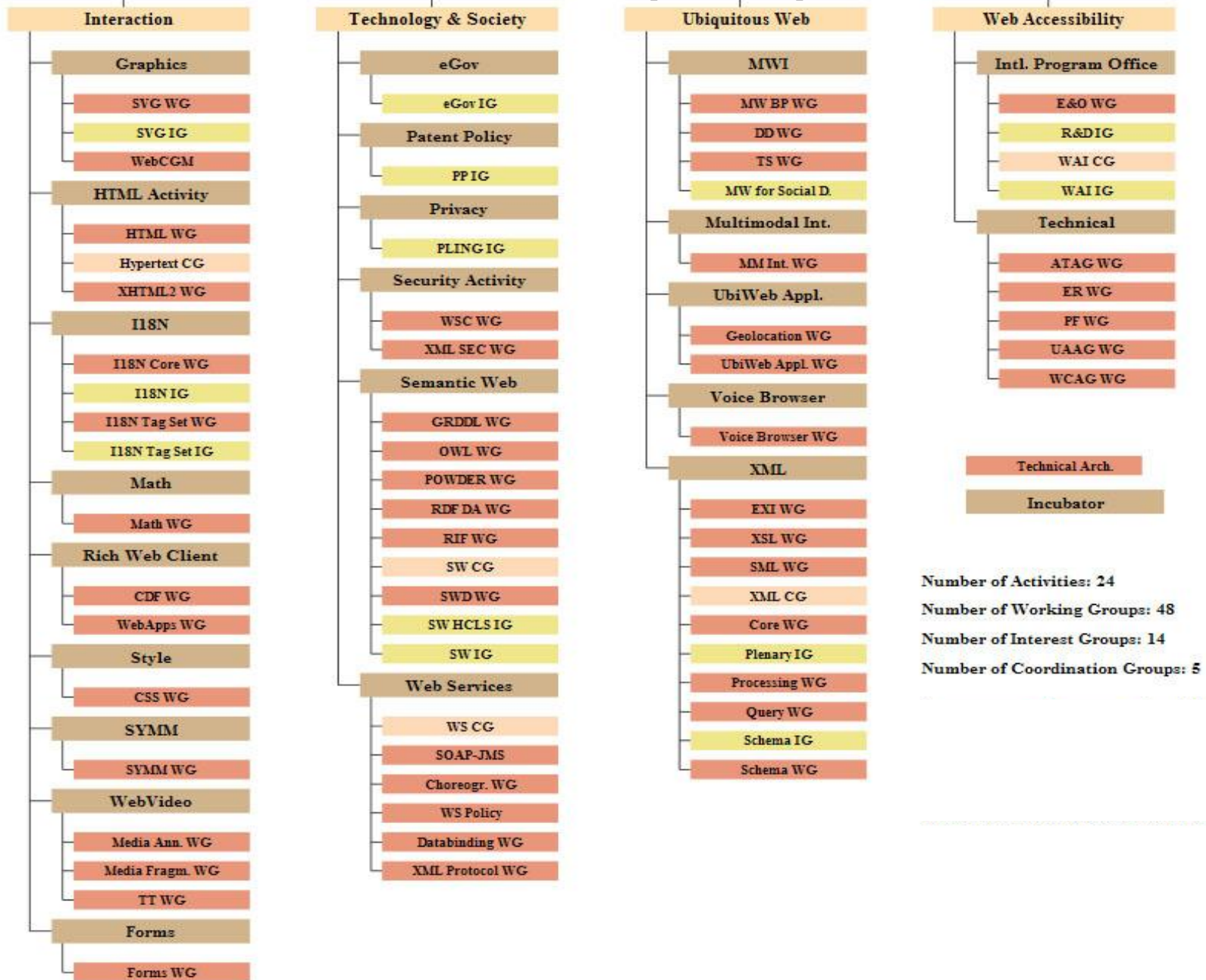
Some of the largest companies:

**Adobe Agfa Alcatel-Lucent Amadeus AOL LLC Apple
Aspect AstraZeneca AT&T Avaya Boeing BT CA Canon
Chevron Cisco DeutscheTelekom Dow Jones Eli Lilly
EMC ERICSSON Fair Isaac FranceTelecom Fujitsu
Google HP Hitachi Hutchison IBM Intel Intervice
JustSystems Lexmark Merck Microsoft Monotype
Motorola NetApp NTT DoCoMo Nokia Networks Novartis
NTTDoCoMo Nuance Openwave Oracle Pfizer
PitneyBowes Progress PTC RealNetworks RedHat
ResearchInMotion Samsung SAP Seiko Epson SFR Sharp
Siemens SKTelecom SoftwareAG Sun TeleCable
TelecomItalia Telefónica TIBCO Toshiba VeriSign
Vodafone Disney Xerox Yahoo!**

More numbers ...

- 410+ Members HQ'ed in 40+ countries
- Translations of standards into 45+ languages
- Liaisons w/ 40+ global standards organizations
UN (IGF), ISO, ITU, IETF, OGF, Unicode, Eclipse, IMA, etc. ...
- 32,000 people subscribed to mailing lists
- 10,000,000 hits/day on www.w3.org
- 100+ Web standards: HTML, XML, Voice, accessibility, etc.

Still more numbers: 1,500+ participants in 60+ Groups



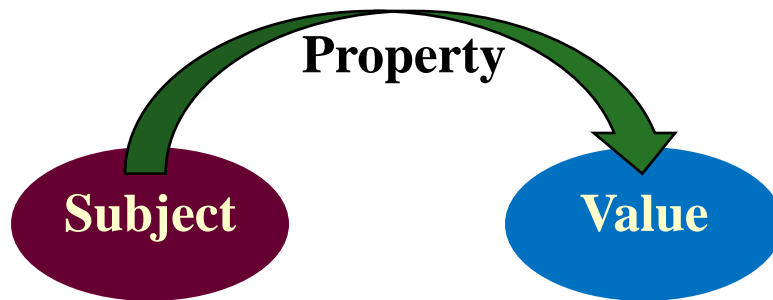
World Wide Web Consortium: Leading the Web's Expansion...



- .. from a Web of linked documents (1.0),
to *One Web*:
- of Creators and Consumers (2.0)
 - of Linked Data and Services (3.0)
 - on Everything
 - for Everyone

Web 3.0*: Semantic Web

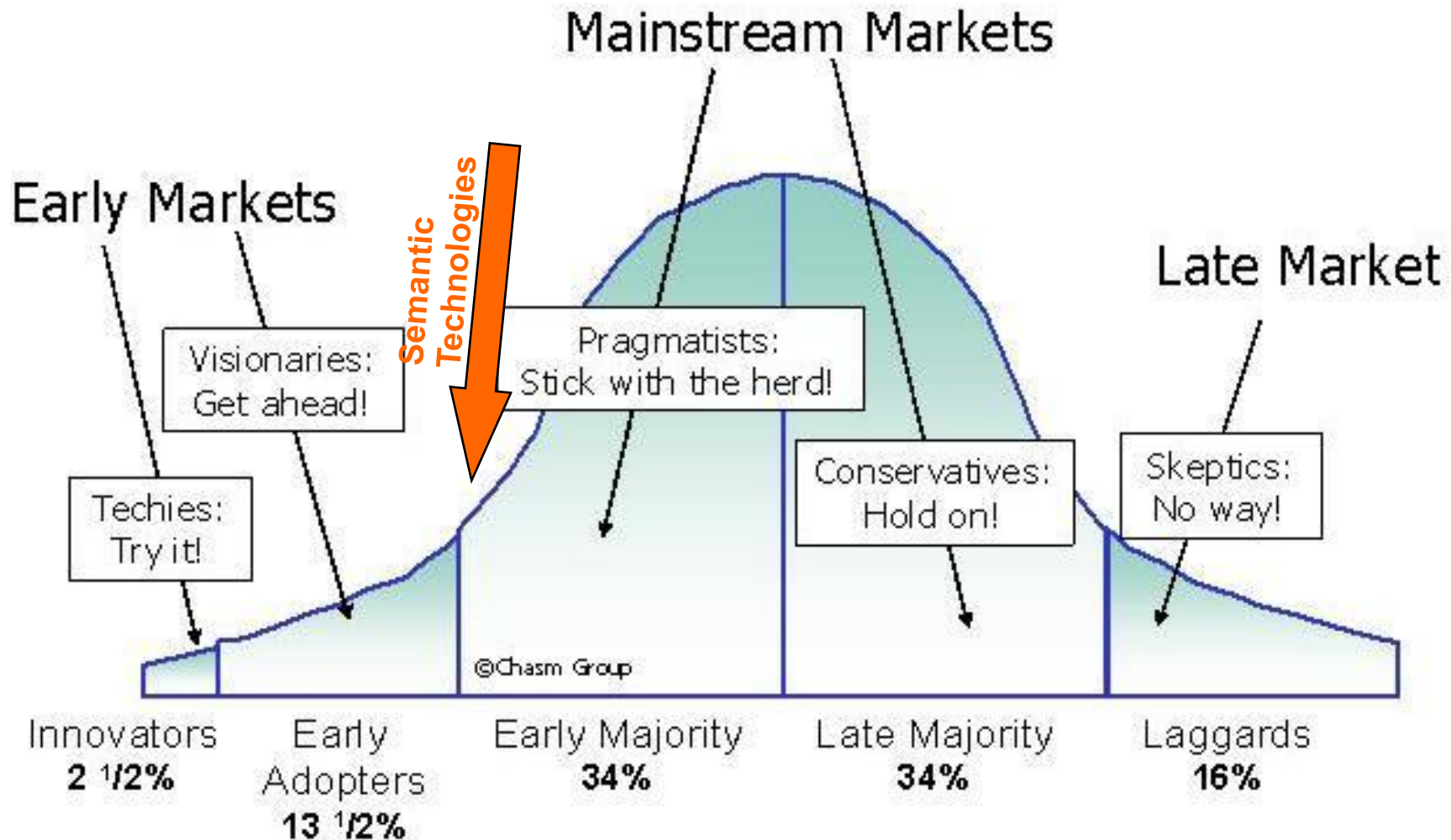
- Web 1.0 = Web of Linked Documents
- Semantic Web = Web of Linked Data



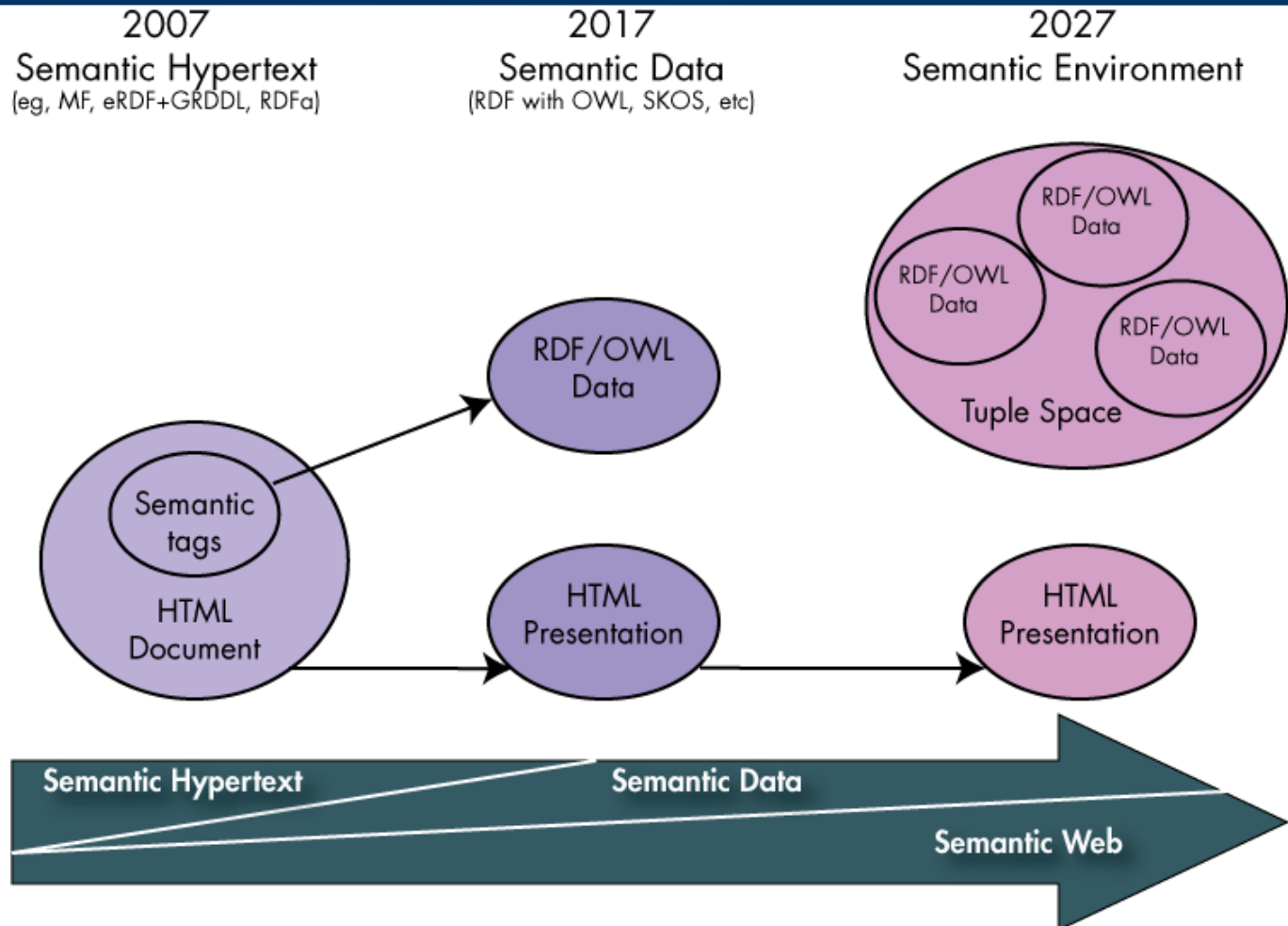
Where Subjects, Properties, Values can each have their own URIs, and thus are unique and linkable across the Web

- Web becomes a global, relational database
- [Semantic Web Activity @ W3C](#)
 - [RDF](#), [Ontologies](#), [Query](#), [Rules](#), [Content Labeling](#), [Scraping XML](#), [SemWeb in HTML](#), [Health Care and Life Sciences](#), [Case Studies](#)

Technology Adoption



The 2007 Gartner Predictions



Based on:

"Finding and Exploiting Value in Semantic Web Technologies on the Web" Gartner Research Report, May 2007

Increasing Focus on the *Application* of Standards

- User participation = win/win
 - **Helps users:** Expert support in the application of emerging and advanced standards to real, important problems
 - **Improves standards:** Feedback via use cases, requirements, implementation, testing from the users themselves
- Domains expressing interest
 - Health Care and Life Sciences
 - Financial Services
 - Industries, including oil and gas
 - Social networking
 - Government
 - Media ... etc.

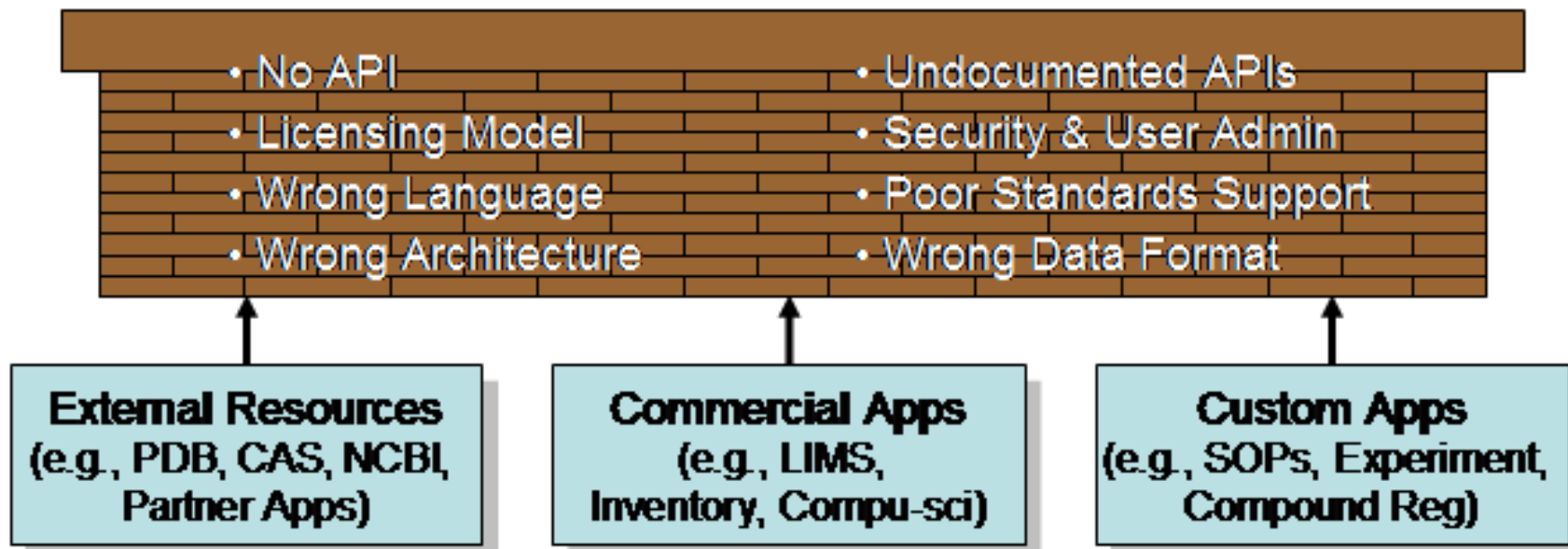


Blast from the Past

Following slides are from
presentations to
Health Care and Life Sciences
organizations a few years ago

HCLS Informatics Interoperability: Current Situation

- Interoperability barriers are abundant
 - Millions wasted on low-value-added workarounds. User learning curves are high, adoption is low.

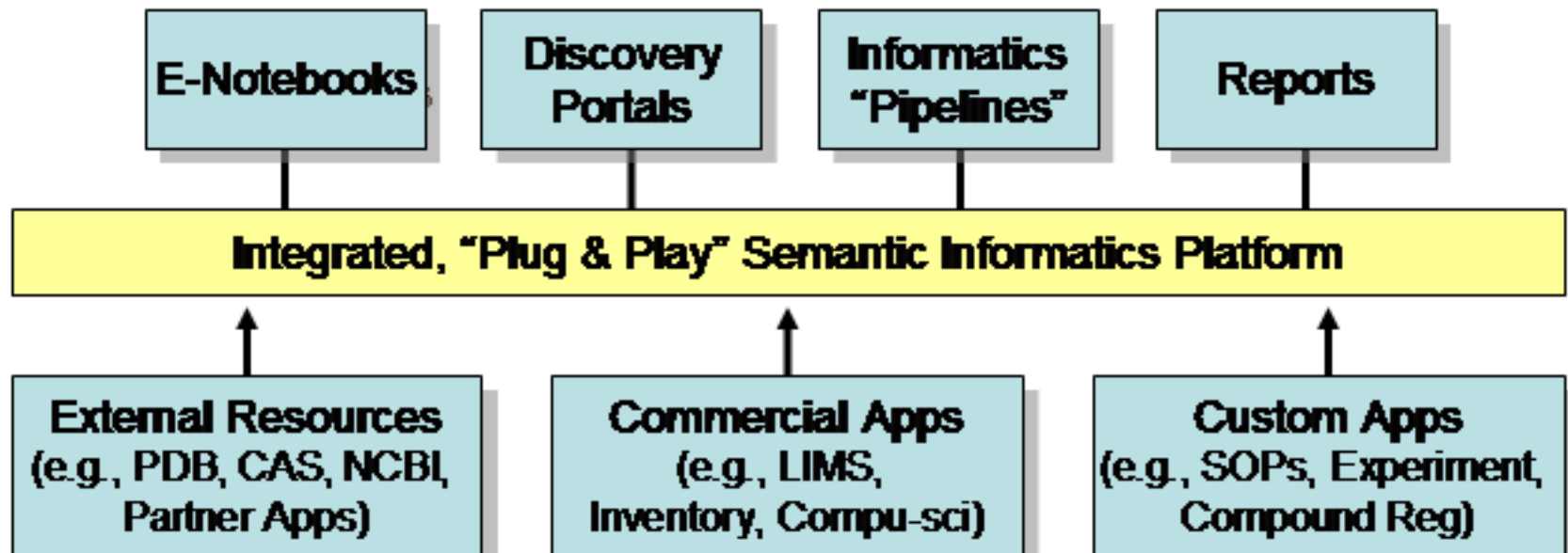


Value of Semantic Web to the Health Care and Life Sciences

- Semantic Web technologies offer common data model:
 - ... to support domain-specific knowledge, vocabularies, taxonomies, etc.
 - ... and make it easier for cross-domain understanding, searching, sharing, re-using, aggregating, and extending information
 - "[Masters of the Semantic Web](#)" (17 Oct 2005)
 - Science and the Semantic Web: J. Hendler, Science, Vol 299, Issue 5606, 520-521 , 24 January 2003
- By embedding semantics, people will be able to:
 - Find cures to diseases
 - Make drugs safer and more affordable
 - Enable health-care providers to offer individualized care for patients
 - etc., etc., etc.

Informatics Interoperability: Based on Semantic Web Standards

- Interoperability: n. The ability of software and hardware from multiple providers on multiple machines to communicate
 - Better-informed users, decision making, prediction, automation.



W3C's Semantic Web for Health Care and Life Sciences

- Mid 2004: Domain expert became a W3C Fellow
- Oct 2004: Organized [W3C Workshop](#)
- End 2005: [Health Care & Life Science IG](#)
 - First face-to-face meeting in [January 2006](#)
 - ~70 participants from 35+ organizations, including:
 - Initial participants: Agfa, AstraZeneca, Cleveland Clinic, Eli Lilly, HL7, IBM, Merck, MITRE, Oracle, Partners, Pfizer, Science Commons, Siemens, Teranode, U. Manchester, Yale
 - [Now also includes: Novartis, Kaiser Permanente, and many others]

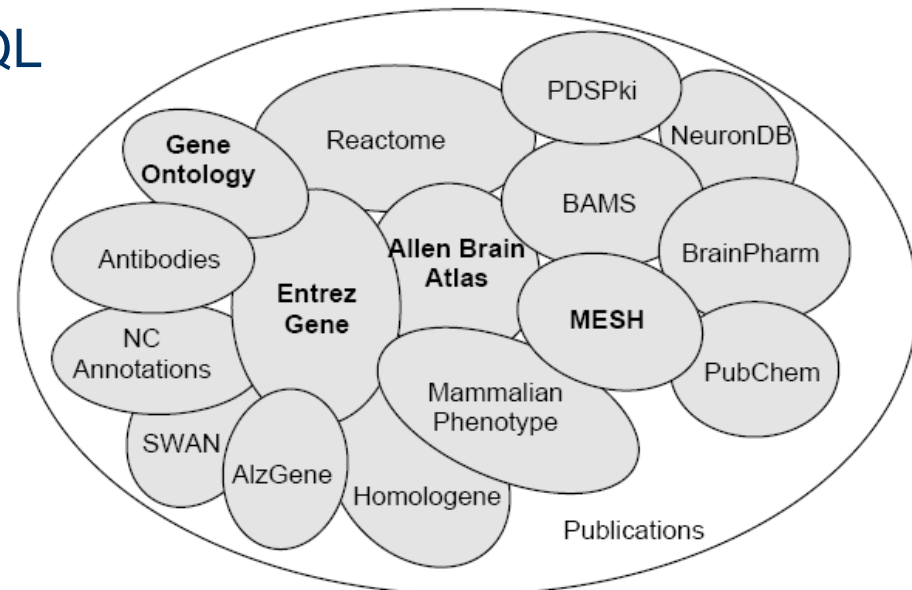
Current Semantic Web for Health Care and Life Sciences Task Forces

- **BioRDF:** Expose biomedical data in RDF/OWL.
- **Linking Open Drug Data:** Survey. Link. Apps.
- **Terminology:** Syntactic Mapping from standard healthcare terminologies to OWL.

- **Scientific Discourse:** Flexible platform for biomedical discussion.
- **Clinical Observations Interoperability:** Electronic records and health care org. needs.
- **Clinical Decision Support:** Rules. Inferencing.

Integrating Key Datasets

- W3C HCLS IG has already exposed a number of public datasets and ontologies in RDF and OWL
 - assign URI-s to bio entities
 - data converted or made reachable in RDF
 - use reasoners to infer extra triples to increase expressiveness
 - query the data with SPARQL and visualization tools
 - 500+ million triples so far...



Use SPARQL to query ... *“find me genes involved in signal transduction that are related to pyramidal neurons”*

```

prefix go: <http://purl.org/obo/owl/GO#>
prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#>
prefix owl: <http://www.w3.org/2002/07/owl#>
prefix mesh: <http://purl.org/commons/record/mesh/>
prefix sc: <http://purl.org/science/owl/sciencecommons/>
prefix ro: <http://www.obofoundry.org/ro/ro.owl#>

select ?genename ?processname
where
{ graph <http://purl.org/commons/hcls/pubmesh>
  { ?paper ?p mesh:D017966 .
    ?article sc:identified_by_pmid ?paper.
    ?gene sc:describes_gene_or_gene_product_mentioned_by ?article.
  }
  graph <http://purl.org/commons/hcls/goa>
  { ?protein rdfs:subClassOf ?res.
    ?res owl:onProperty ro:has_function.
    ?res owl:someValuesFrom ?res2.
    ?res2 owl:onProperty ro:realized_as.
    ?res2 owl:someValuesFrom ?process.
  }
  graph <http://purl.org/commons/hcls/20070416/classrelations>
  ...
  ...

```

Mesh: Pyramidal Neurons



Pubmed: Journal Articles



Entrez Gene: Genes



GO: Signal Transduction

Value of Working in W3C

- **Leadership**
 - Introduce ideas through [submissions](#), [workshops](#), [Incubator Groups](#)
 - Influence standards => [Working Groups](#), review, implementation
- **Early insight into market trends**
 - Access world's top Web technologists from [Members](#) and [Team](#)
 - Plan for emerging technologies & markets through [Member access](#)
- **Productive, neutral, legally-safe environment**
 - People, process, experience, collaboration tools, global scope
- **Promoting image as innovator**
 - Participate in int'l media activities, [press releases](#), testimonials
 - Display logo on [W3C site](#) (300K visits/day) & [W3C logo](#) on your site

([Membership](#) / [Benefits](#) / [How to join W3C](#) / ["At a Glance" brochure](#))

Recipe for a W3C Oil and Gas / Energy Group - *Preparatory*

- ☑ Preliminary discussions
- ☑ Workshop
 - O&G expert becomes a W3C “Fellow”
 - Engage more O&G companies in W3C
 - Expand liaisons with industry experts and orgs
- Assess progress along the way

Recipe for a W3C Oil and Gas / Energy Group - *Starting*

- Interest Group
 - to explore, prototype, gather the community
- Incubator Group
 - to develop requirements, use cases, draft specifications, ontologies quickly
- Working Group
 - to create Web standards (specs, guidelines, notes, test suites, etc.)
- Keep building community along the way

Goals of this Workshop (a)

- Business issues around connecting information from diverse sources
- How automated inference might help to solve particular business problems
- Use cases for Semantic Web technologies and standards
- Experience using Semantic Web technologies and standards
- Taxonomies and ontologies that could support Semantic Web implementations

Goals of this Workshop (b)

- Discuss the potential, pragmatic impact of Semantic Web for oil and gas industry
 - Identify low hanging fruit
 - Prioritize potential areas of application
- Identify key target audiences and needs, e.g.:
 - End users (operations, management, R&D)
 - Business partners (suppliers, contractors, operators)
 - IT (architects, analysts, developers)
- Outline possible roles for W3C and participating organizations, and identify next steps

Have a Great Workshop



<http://www.w3.org/>