



From Metadata to Ontology: Bootstrapping Our Way To The Next Paradigm

by

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presented to the:

**IBM - Technology Review Team
(Corporate Technology Division)**

July 19, 2007

(v 1.16)

The Quest

- To understand
 - share that understanding
 - Meaning
 - Knowledge
- To improve effectiveness
 - As individuals
 - As communities
 - By delegating some of that to machines
 - The Means:
 - Going from data to **smart-data**
 - Going to the **next level of abstraction**

Abstract

I will be telling the story on the work of the Ontolog community. With that, I hope to share with your team on where I (personally) think we (Ontolog) came from, where we are heading, what we are doing and why it matters.

The Story of Ontolog - Outline

- What is an Ontology?
- What / Who is Ontolog?
- The dialog in Ontologies
- The Ontology Summits
- The Ontolog Body of Knowledge
- Why does it matter?
- Key Concepts at play
- Reflections
- References

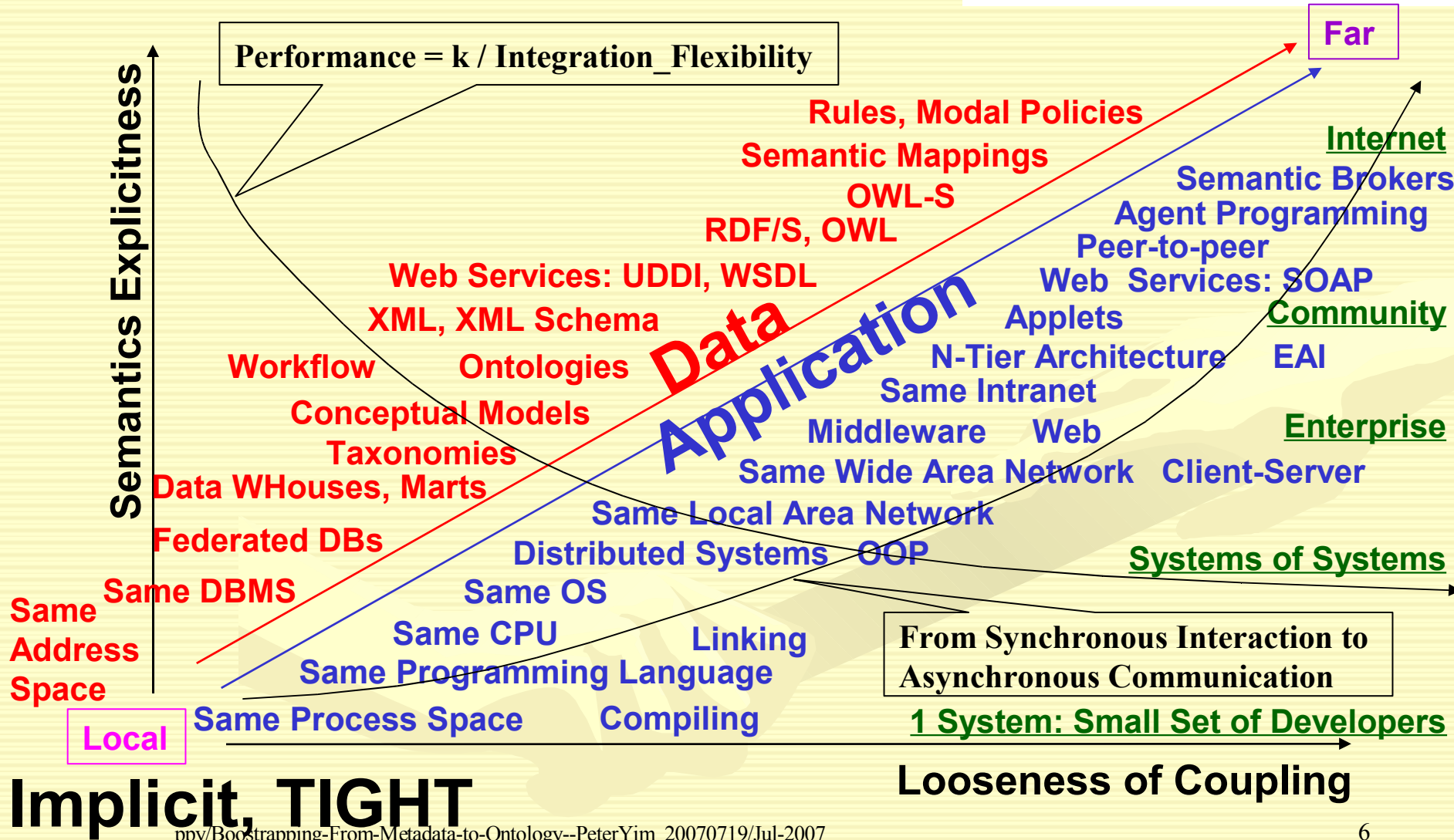
Ontology & Ontologies

- **An ontology defines the terms used to describe and represent an area of knowledge (subject matter)**
 - An ontology also is the model (set of concepts) for the meaning of those terms
 - An ontology thus defines the vocabulary and the meaning of that vocabulary
- **Ontologies are used by people, databases, and applications that need to share domain information**
 - Domain: a specific subject area or area of knowledge, like medicine, tool manufacturing, real estate, automobile repair, financial management, etc.
- **Ontologies include computer-usable definitions of basic concepts in the domain and the relationships among them**
 - They encode domain knowledge (modular)
 - Knowledge that spans domains (composable)
 - Make knowledge available (reusable)

Source: "What is An Ontology" Leo Obrst / Ontolog / 2006.01.12

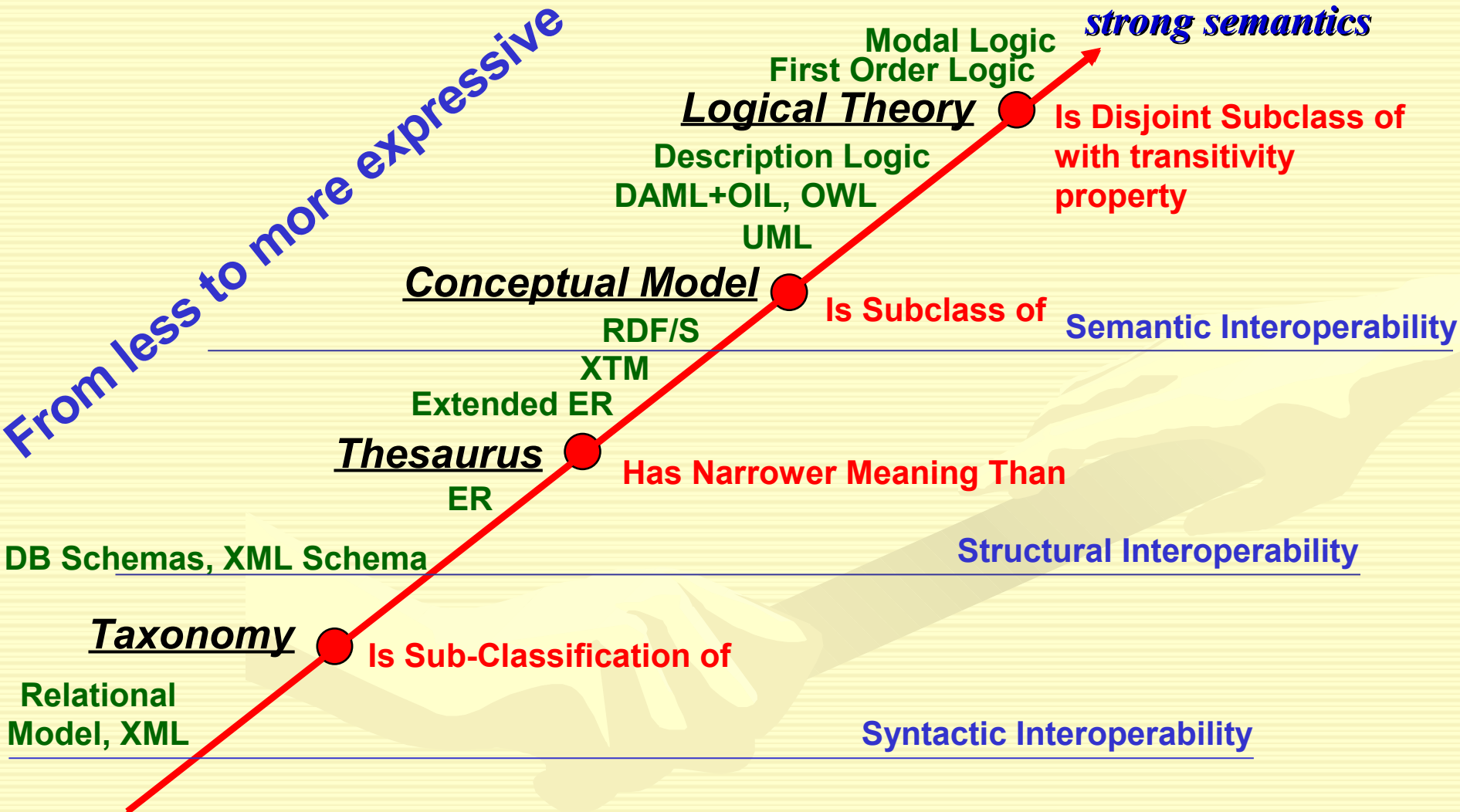
Tightness of Coupling & Semantic Explicitness

Explicit, Loose



Ontology Spectrum: One View

From less to more expressive



ONTOLOG (aka. Ontolog Forum) est. Apr.2002

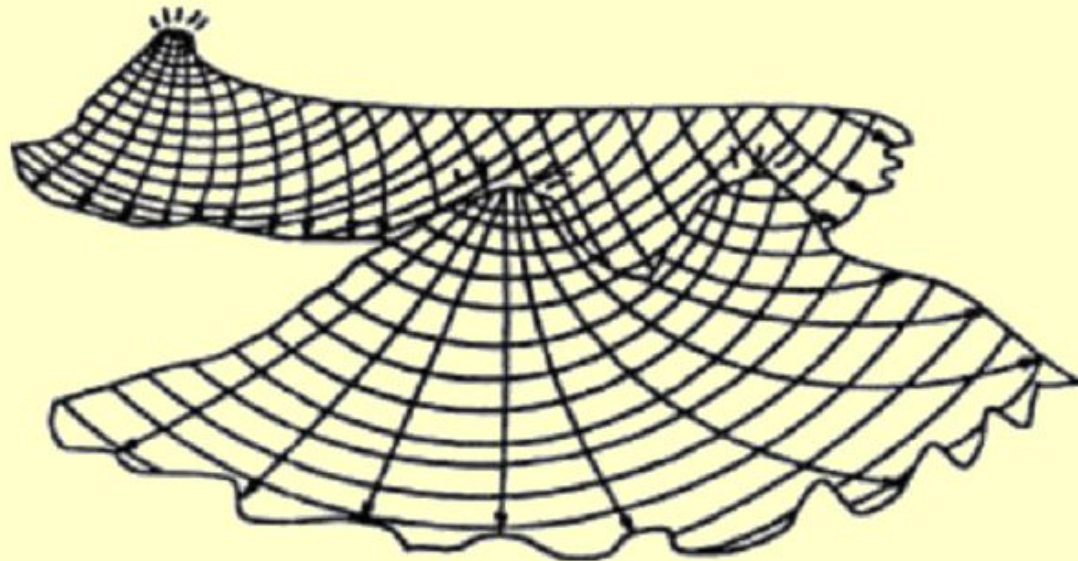
our "*dialog in ontology*"

- **Membership** - 360; from 20 different countries (as at mid Apr-2007)
- **Users** - from 115 cities globally, generating ~3000 visits and ~13,000 hits on our site per day
- **Hosted on the CIM3 collaborative work environment infrastructure**
- **Charter** - Ontolog is an open, international, virtual community of practice, whose membership will:
 - **Discuss practical issues and strategies associated with the development and application of both formal and informal ontologies.**
 - **Identify ontological engineering approaches that might be applied to the UBL effort, as well as to the broader domain of eBusiness standardization efforts.**
 - **Strive to advance the field of ontological engineering and semantic technologies, and to help move them into main stream applications.**
- **Activities:**
 - **Weekly conference calls of active members**
 - **Monthly virtual Invited Speaker events**
 - **Scheduled Technical Discussions**
 - **Specific Projects: like [CCT-Rep], [Health-Ont], NHIN-RFI response, Upper Ontology Summit, Event podcast, Ontologizing the Ontolog Content, Ontology-driven Applications Inventory, Database & Ontology, Ontology Measurement & Evaluation, [ONION] ... OntologySummit2007**
 - **Resides on a virtual collaborative work environment which serves as a dynamic knowledge repository to the community's collective intelligence**
- **We welcome your participation** – see: <http://ontolog.cim3.net/wiki/>
- **Questions? talk to any of our 3 co-conveners** - PeterYim; LeoObrst & KurtConrad

Introducing the Fishnet Organization

An Organizational Form that the CWE aims at Supporting – leading us toward Open Virtual Enterprises

these are temporary (or semi-permanent) hierarchies, that emerge out of the CoP's, which capitalize on distributed capabilities to achieve specific purposes; when those purposes are achieved (or when the opportunities no longer exist), they disband, and the resources (people, knowledge, skillsets) are returned to the CoP's where they come from.



Source: Institute for the Future: *Johansen, R., Swigart, R.* Upsizing the Individual in the Downsized Organization

Ontolog (Visitors) Users

ClustrMaps for <http://ontolog.cim3.net>



visits since 12 Jun 2006, updated daily

Ontolog's key Differentiation

Activities are community driven; we are neutral, open, and we are not answerable to anyone, except for (explicitly) our charter & IPR policy, and (implicitly) our own professional integrity.

*We are adamant about collaboration, sharing and open knowledge
... and are trying to spur organic or emergent behavior
in the community and our project teams*

Upper Ontology Summit

Ontolog / NIST - 15-Mar-2006

- 3:00pm - Position statements and overviews by custodians of the principal upper ontologies (10 minutes each)
 - DougLenat - OpenCyc - **slides**
 - AdamPease - SUMO - Slides
 - NicolaGuarino - DOLCE - **slides**
 - AldoGangemi - DOLCE - Description & Situation extensions (remote)
 - MichaelGruninger - PSL / ISO 18629 - **slides**
 - JohnBateman - Spatial Cognition, Robotics and Natural Language (remote) **slides**
 - BarrySmith - BFO (remote) - **slides**
 - MatthewWest - ISO 15926 - **slides**
- 4:45pm - Concluding remarks - SteveRay, Summit Chair
- 5:00pm - Adjournment



Ontology Summit 2007

Objective:

“...to define and agree to a systematic means of categorizing the many kinds of things that fall broadly within the "ontology" spectrum.”

Under the Title:

“**Ontology Summit 2007 - Ontology, Taxonomy, Folksonomy: Understanding the Distinctions**”

A Brief Inclusive Characterization of Ontologies (in Computer Science & Engineering)

- Ontologies are used to support sharable and reusable representations of knowledge
 - An early definition of Ontology: “a specification of a conceptualization” (Gruber, 1994)
- Nevertheless, the sheer range of current work in ontologies:
 - Including taxonomies, thesauri, topic maps, conceptual models, and formal ontologies specified in various logical languages
 - Raises the possibility of ontologies being developed without a common understanding of their definition, implementation and applications
- Our objective:
 - To provide a framework that ensures that we can support diversity without divergence
 - So that we can maintain sharability and reusability among the different approaches to ontologies

Source: OntologySummit2007 Symposium / Obrst-Gruninger / 2007.04.24

Ontology Dimensions: Semantic & Pragmatic

- We propose a set of dimensions that can be used to distinguish among different approaches
 - **Semantic**
 - **Pragmatic**
- **Semantic Dimensions:** These constrain how a given approach specifies the meaning of the terms
 - 1) **Degree of Structure and Formality**
 - 2) **Expressiveness of the Knowledge Representation Language**
 - 3) **Representational granularity**
- **Pragmatic Dimensions:** These cover the context in which the ontology is designed and used
 - 1) **Intended Use**
 - 2) **Role of Automated Reasoning**
 - 3) **Descriptive vs. Prescriptive**
 - 4) **Design Methodology**
 - 5) **Governance**

Source: OntologySummit2007 Symposium / Obrst-Gruninger / 2007.04.24

Unprecedented Level of Involvement at the Ontology Summit 2007

(as far as Ontolog is concerned)

- An organizing committee of 12 (from NIST, Ontolog, MITRE, NSF, NLM/NIH, W3C, NCOR, Stanford KSL & SMI, TagCommons, IBM Research and LOA-Italy)
- 50 co-sponsors (from 9 countries, including research institutions, standards groups, university departments-from Philosophy to Computer Science, major corporations to independent consultants, and web 2.0 entities)
- about 25% of the 360 Ontolog members were engaged in this initiative
- 52 individuals from 34 different constituencies responded to the online survey
- 57 people endorsed the Summit Communiqué

Proceedings Archived

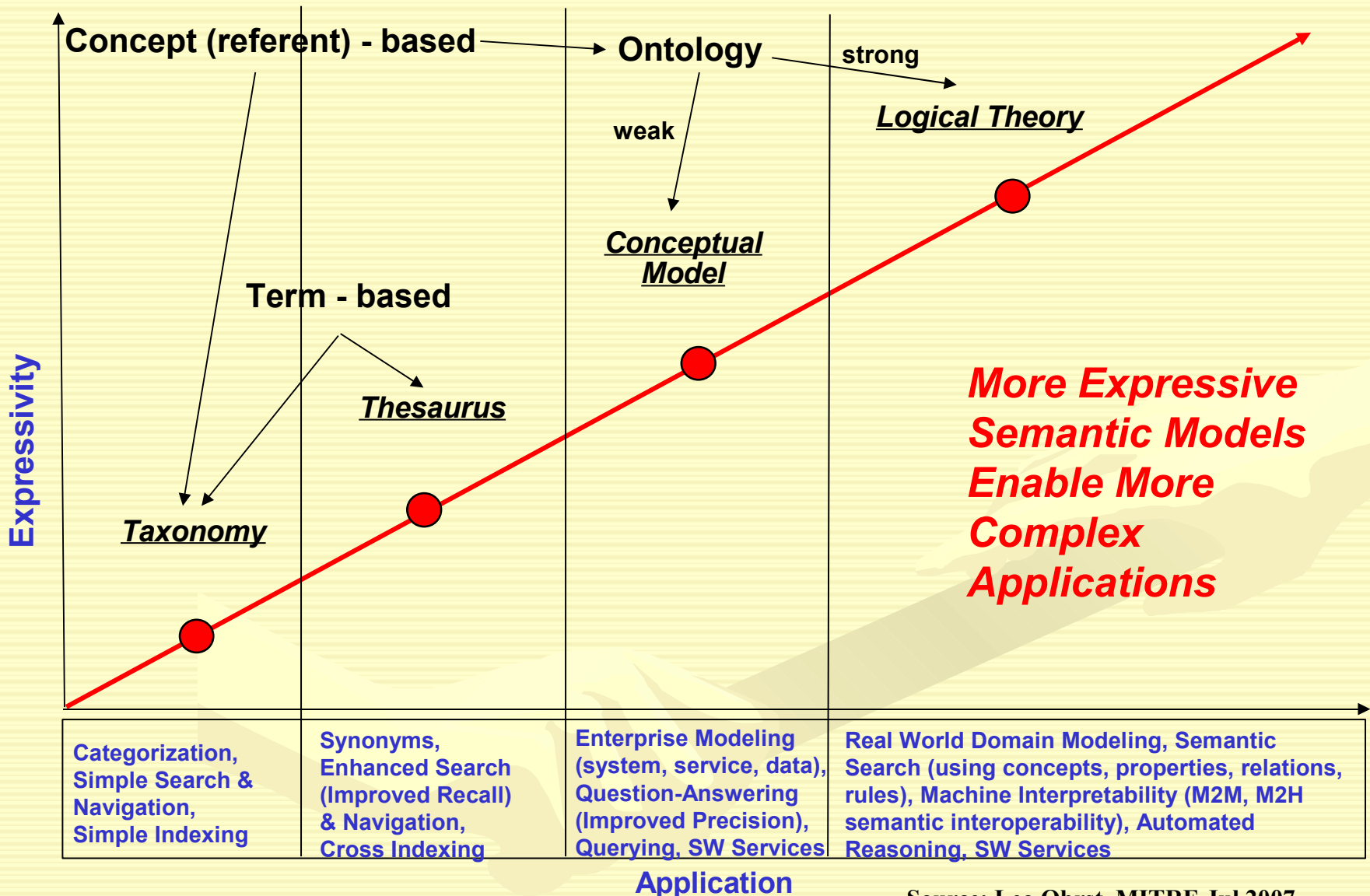
- The virtual process were conductor on Ontolog Forum's collaborative work environment - which consisted of an archived mailing list, a wiki and a shared file (webdav) workspace
- Entire proceedings were archived, all contents accessible from a web browser (with fine grain accessibility), indexed for full text search, tagged with metadata and openly available
- Refer to the **OntologySummit2007** details at: <http://ontolog.cim3.net/cgi-bin/wiki.pl?OntologySummit2007>



Reflections ⁽¹⁾

Semantic Technologies, applied in the presence of the ever increasing computing power and connectivity, could well bode the advent of a paradigm shift (in the sense of Thomas Kuhn's "Scientific Revolution") and usher the real "knowledge economy"

Ontology Spectrum: Application



(Ontology Enabled) Opportunities

- for the Scientists

- visions from the likes of Engelbart, McCarthy, Lenat, Berners-Lee, Hendler, etc. will finally come to fruition
- decades of research can be realized in real, non-trivial implementations

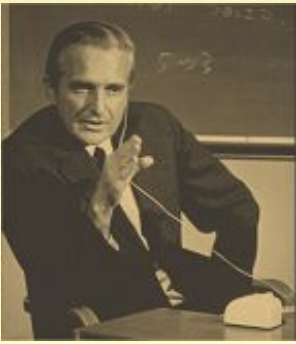
- for the Engineers

- we'll actually be able to build next generation machines (systems, networks, ...) that will off-load from humans, tasks (albeit simple ones) that requires some 'reasoning' and 'thinking'
- these application can actually affect (hopefully benefit) the lives of many millions

- for the Marketeers

- a multi- multi- billion dollar market is right around the corner ...
- please don't kill it by “Hyping it up!”

... this is NOT a “zero-sum game”!

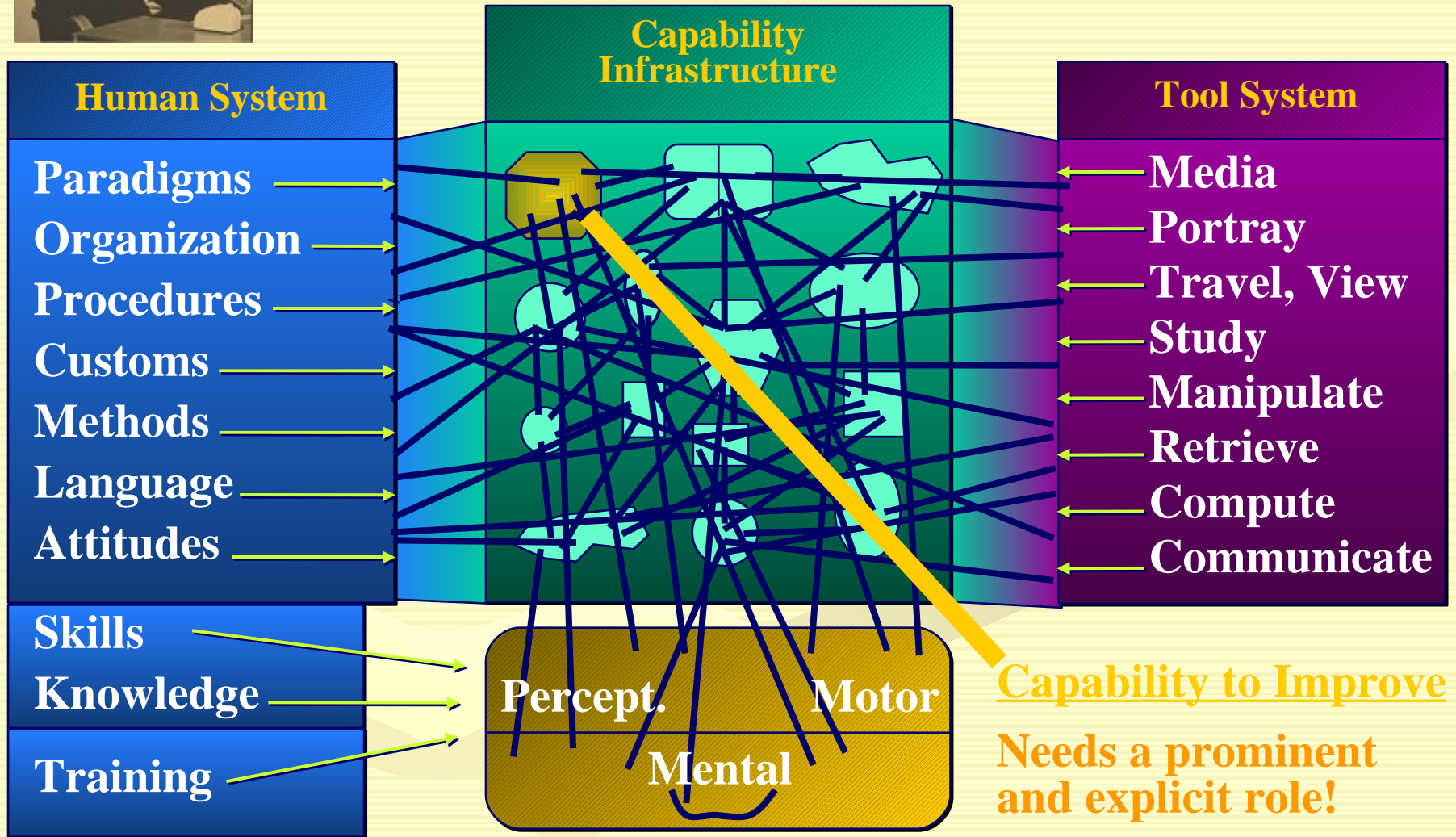


Harnessing explosive technology depends, to a new degree, on the “Capability-Improvement Capability”

Engelbart's Capability Infrastructure

- Doug Engelbart, Jan. 2000

(excerpt from the Stanford 'Unfinished Revolution-II' Colloquium)





Working as Communities of Practice

- small groups of people who have worked together over a period of time. Not a team, not a task force, not necessarily an authorized or identified group. They are peers in the execution of "real work." What holds them together is a common sense of purpose and a real need to know what each other knows. (--John Seely Brown / ref: [http://ps1.cim3.net/ps.php?theurl= http://www.fastcompany.com/online/01/people.html#purp303](http://ps1.cim3.net/ps.php?theurl=http://www.fastcompany.com/online/01/people.html#purp303))
- a group of professionals, informally bound to one another through exposure to a common class of problems, common pursuit of solutions, and thereby themselves embodying a store of knowledge. (--Peter & Trudy Johnson-Lenz / ref: <http://www.co-i-l.com/coil/knowledge-garden/cop/definitions.shtml>)
- groups of people who share a concern or a passion for something they do and who interact regularly to learn how to do it better. (--Etienne Wenger / ref: <http://www.ewenger.com/theory/index.htm>)
- in the case of US eGov folks, it could be groups that work together along lines of business within the government that are dedicated to the support of certain business functions (ref: http://colab.cim3.net/cgi-bin/wiki.pl?DataReferenceModel_09_2004/TheGlossary_DRM_Vollv1#mid2K8F)



Key Concepts at Play

- Ray Kurzweil's "Law of Time and Chaos"
- Horst Rittle's "Wicked Problems"
- Thomas Kuhn's "Paradigm Shift"
- Bob Johansen's "Fishnet Organization"
- Jon Bosak's "OASIS TC Process"
- Doug Engelbart's "Bootstrapping"
- Don Tapscott's "Wikinomics"
- Jim Spohrer's – Service Science, Augmented

Ontolog – an open CoP



Caption: John McCarthy having a dialog with Doug Engelbart at a tavern ... with 'the fishnet' on the wall

**Will we be able to make the best
of these opportunities?**

one last conjecture:

... it might just depend on

***'our attitude toward collaborating
to bring ontology
into the mainstream'***

Reference

- Doug Engelbart's Bootstrap Vision and Mission
- The Ontolog Website: <http://ontolog.cim3.net/wiki/>
- Upper Ontology Summit (2006):
<http://ontolog.cim3.net/cgi-bin/wiki.pl?UpperOntologySummit> ; &
Obrst, Leo; Patrick Cassidy; Steve Ray; Barry Smith; Dagobert
Soergel; Matthew West; Peter Yim. 2006. The 2006 Upper Ontology Summit
Joint Communiqué. Journal of Applied Formal Ontology. Volume 1: 2, pp.
203 - 211, 2006.
- Ontology Summit 2007:
<http://ontolog.cim3.net/cgi-bin/wiki.pl?OntologySummit2007>
- "Ontologizing the Ontolog Body of Knowledge" Series of Events: <http://ontolog.cim3.net/cgi-bin/wiki.pl?OntologizingOntolog>
- Ontolog activities & projects
<http://ontolog.cim3.net/cgi-bin/wiki.pl?WikiHomePage#nidF>
- Noteworthy Ontolog Past Events: <http://ontolog.cim3.net/cgi-bin/wiki.pl?WikiHomePage#nidZ>
- The Ontolog Charter: <http://ontolog.cim3.net/cgi-bin/wiki.pl?WikiHomePage#nidB>
- The Ontolog Membership Information:
<http://ontolog.cim3.net/cgi-bin/wiki.pl?WikiHomePage#nid1J>