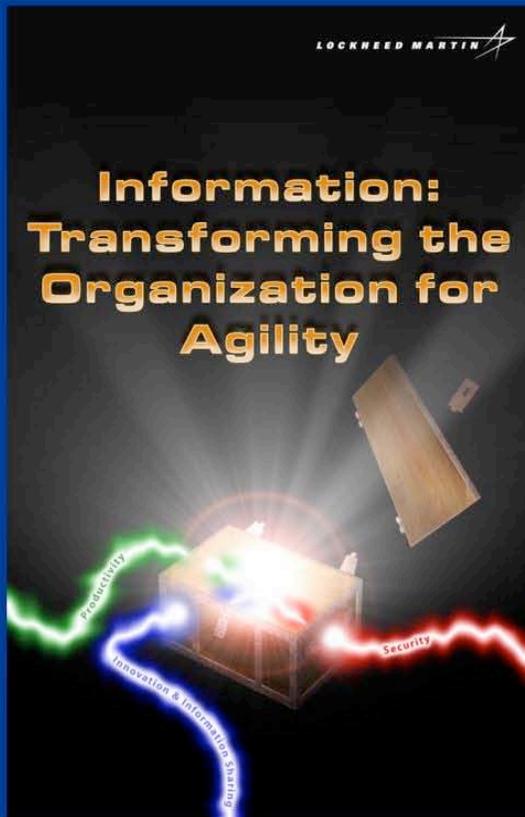




11th Annual Lockheed Martin Information Technology Trends Conference 2006



Semantic Wave 2006

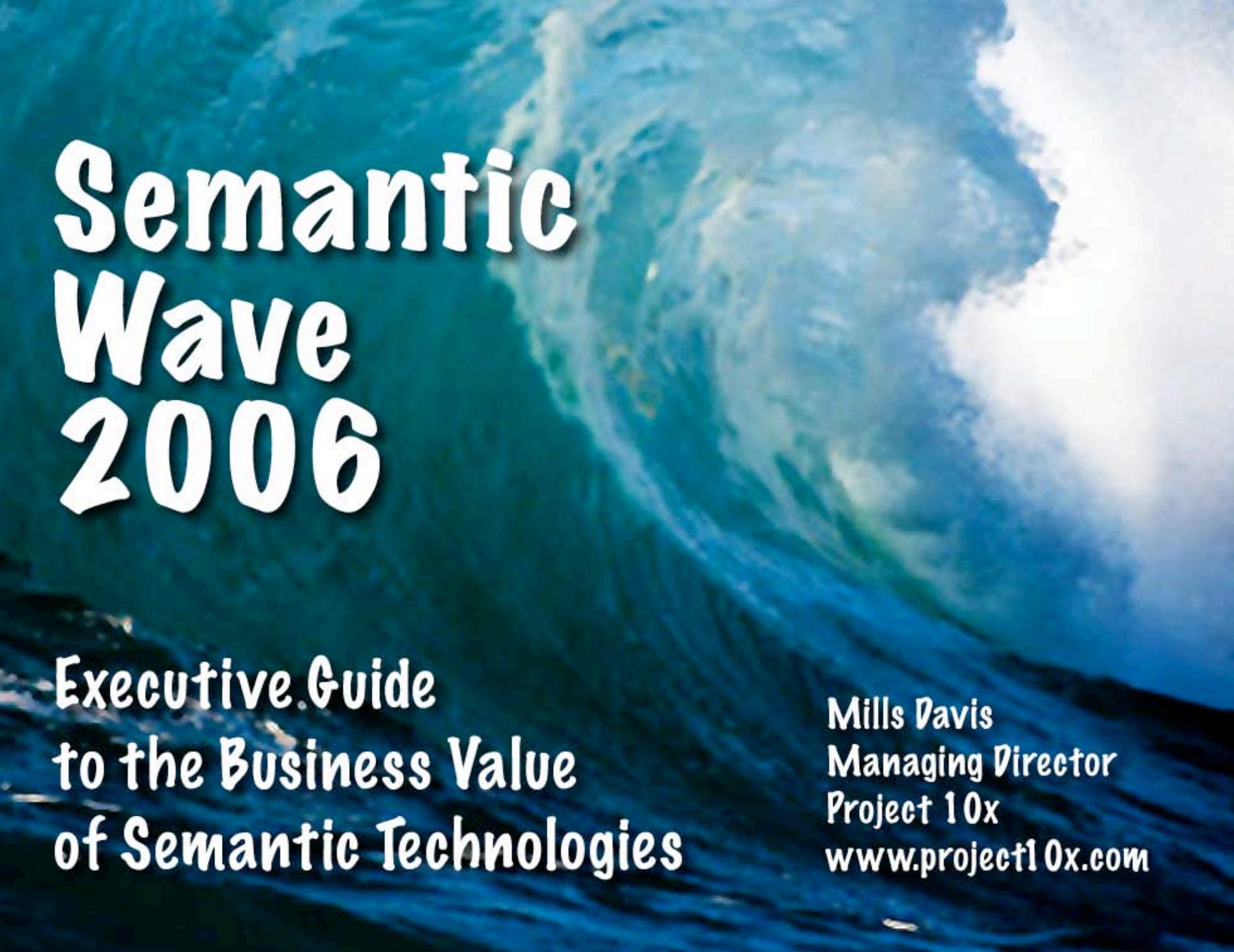
*Executives Guide to the
Business Value of Semantic
Technologies*

Mills Davis

Project10X

Managing Director

Orlando, FL
February 14–16, 2006



Semantic Wave 2006

Executive Guide
to the Business Value
of Semantic Technologies

Mills Davis
Managing Director
Project 10x
www.project10x.com



WARNING!
This presentation makes
Forward Looking Statements

Any statements in this presentation that are not historical facts are forward-looking statements that involve risks and uncertainties; actual results may differ from the forward-looking statements. Sentences or phrases that use such words as "believes," "anticipates," "plans," "may," "hopes," "can," "will," "expects," "is designed to," "with the intent," "potential" and others indicate forward-looking statements, but their absence does not mean that a statement is not forward-looking. Factors that could have a material and adverse impact on actual results are described in Part-2 of the Semantic Wave 2006 report. No Form 10-K has been filed with the Securities and Exchange Commission under the heading "Risk Factors." The presenter undertakes no obligation to publicly release the results of any revisions to these forward-looking statements that may be made to reflect events or circumstances after the date hereof or to reflect the occurrence of unanticipated events.

Mills Davis



- Mills Davis is Project10X's founder and managing director for industry research and strategic programs. He consults with technology manufacturers, global 2000 corporations, and government agencies on next-wave semantic technologies and solutions.
- Mills serves as lead for the Federal CIO council's Semantic Interoperability Community of Practice (SICoP) research into the business value of semantic technologies. Also, he is a founding member of the AIM interoperable enterprise content management (iECM) working group, and a founding member of the National Center for Ontology Research (NCOR).
- A noted researcher and industry analyst, Mills has authored more than 100 reports, whitepapers, articles, and industry studies.

Semantic Wave 2006 Part-1

(<http://www.semantic-conference.com/semanticwave.html>)

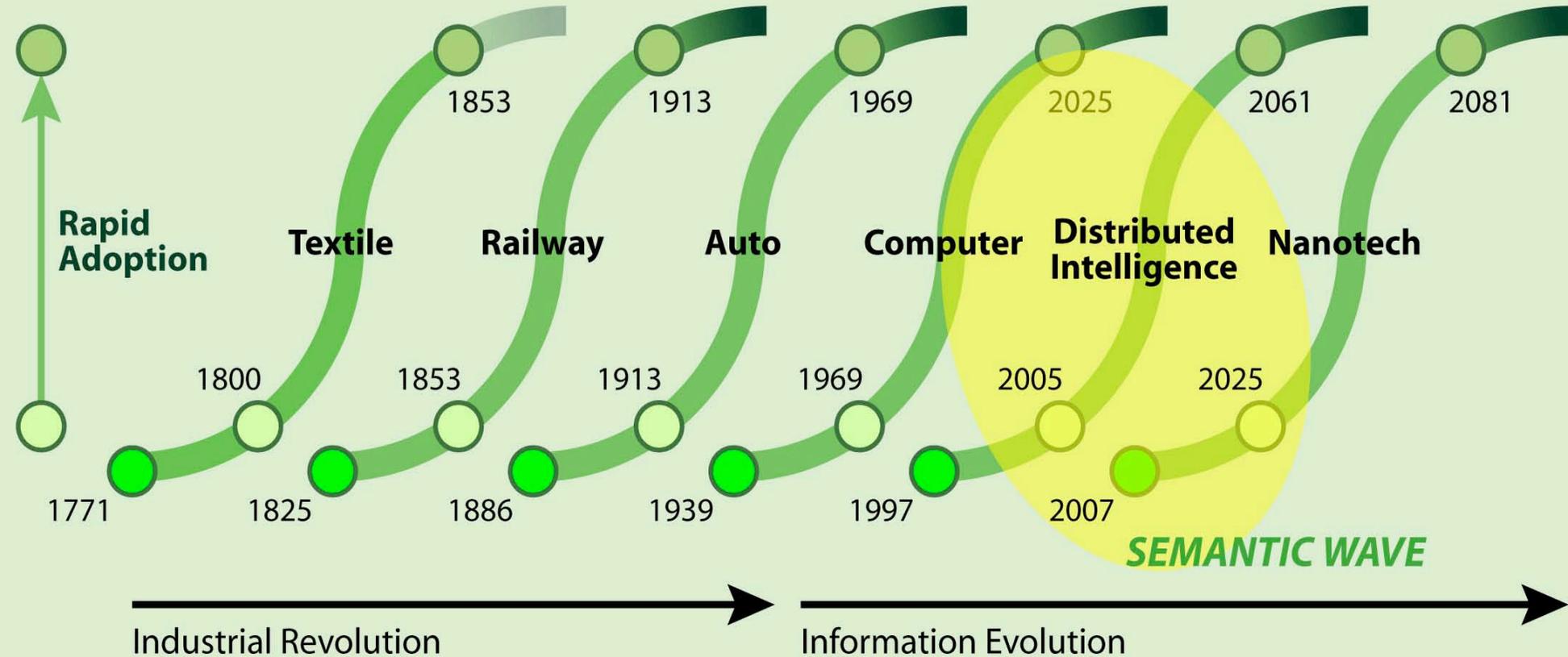
- **Semantic wave**
What is the semantic wave?
What are the economics of the semantic wave?
- **Semantic technologies**
Why are semantic technologies needed now?
What are semantic technologies?
What is the scope of semantic technology R&D?
What are the functions of semantic technology?
How do semantic technologies impact information technologies?
- **Business value of semantic technologies**
What are the dimensions of business value?
What capabilities of semantic technology drive business value?
How do semantic capabilities impact development?
How do semantic technologies impact infrastructure?
How do semantic technologies impact information and knowledge?
How do semantic technologies impact information-intensive applications?
How do semantic technologies impact knowledge-intensive applications?
How do semantic technologies impact system behaviors?
How do semantic technologies impact intellectual property?
How do semantic technologies maximize lifecycle return on investment?
How do semantic technologies improve ROI?

Semantic Wave 2006 at a glance

The grid contains 24 slides, each with a title and content:

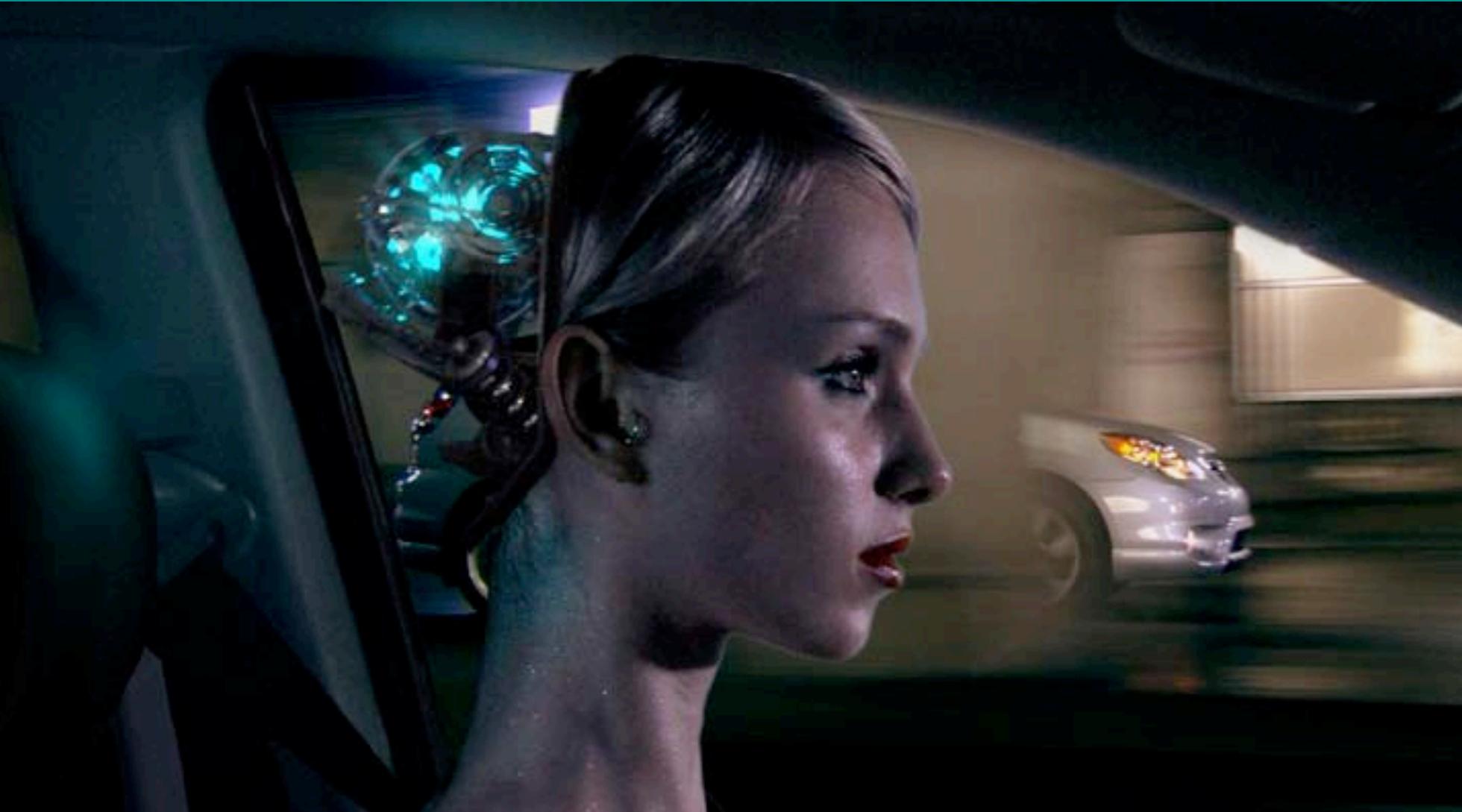
- Slide 1:** Semantic Wave 2006 - Executive guide to billion dollar markets
- Slide 2:** Graph showing growth curves for Semantic Wave 2006.
- Slide 3:** Wave & Tidal Station - A line graph showing trends.
- Slide 4:** Cognition, Web, Grid & P2P, Semantics, Services, Content - A Venn diagram.
- Slide 5:** A flowchart diagram.
- Slide 6:** A network diagram.
- Slide 7:** Business Value Dimensions - A graph with axes for Community, Lifecycle, and Performance.
- Slide 8:** A table with columns: Goal, Strategy, Business Value, and Solution.
- Slide 9:** Semantic Solution Envisioning - A circular diagram with four stages: Vision, Design, Build, and Operate.
- Slide 10:** A complex diagram with nodes and arrows, including terms like ASN, B2B, and Knowledge.
- Slide 11:** From Search to Knowing - A graph showing the relationship between Search and Knowing.
- Slide 12:** Many knowledge applications have a similar lifecycle... - A diagram showing the lifecycle stages: Lead Capture, Marketing & Analysis, First Engagement, Content Personalization, and Lead Nurture.
- Slide 13:** Anatomy of a composite application - Semantic technologies at 3 levels. - A diagram showing three levels of integration.
- Slide 14:** Websites That Think Smarter Like People - Not Possible - A diagram showing a network of nodes.
- Slide 15:** BioCAD - A diagram showing a workflow from data to analysis.
- Slide 16:** Anatomy of a Cognitive System - A diagram showing the components of a cognitive system.
- Slide 17:** Knowledge Stacks - A diagram showing a stack of knowledge layers.
- Slide 18:** A graph showing a curve with labels: Primary activity, Secondary activity, Tertiary activity, and a horizontal axis for Development/Innovation.
- Slide 19:** A table with columns: Simplicity, Effectiveness, and Time.
- Slide 20:** A diagram showing a central node connected to several other nodes.
- Slide 21:** A table with multiple columns of data.
- Slide 22:** A diagram showing a central node connected to several other nodes.
- Slide 23:** A table with columns: Market, 2006, 2010, 2012.
- Slide 24:** A yellow smiley face.

What is the semantic wave?

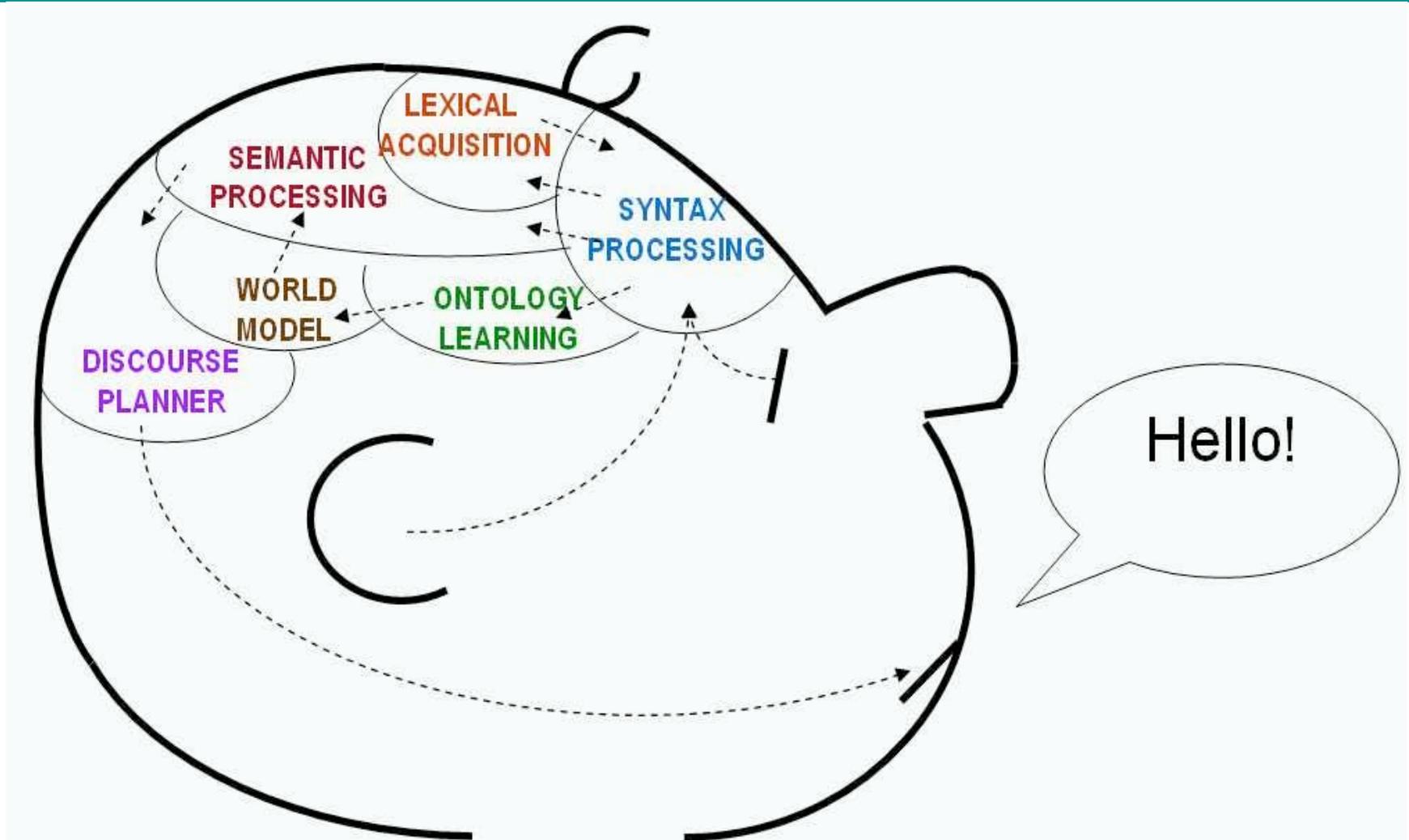


Source: Norman Poire, Merrill Lynch, based on Joseph Schumpeter

Shift in paradigm, technology & economics



Representing meanings & knowledge about things so both computers and people can work with it



What do semantic technologies do?

3 Can Physical Symbol Systems Think?
The History and Status of the Debate — Map 3 of 7
An Issue Map™ Publication

Start Here

Alan Turing, 1950
You, machines can (or will be able to) think. A computational system can possess all important elements of human thinking or understanding.

Can the elements of thinking be represented in discrete symbolic form?

Can a symbolic knowledge base represent human understanding?

Can symbols for human

Knowledge Visualization
the visual explication of conceptual knowledge - is based on:

- Understanding the Domain Knowledge
- Applying Cognitive Principles
- Exploiting the Visual Parameters
- Encoding Salient Features Graphically
- Providing a Useful Process
- Producing Useful Output

Information Graphics
Visualizing quantitative information with graphs and diagrams, such as:
• Node-Link Diagrams
• Data Graphing
• Scientific Visualization
• Technical Illustration

Graphic Arts
The rich legacy of knowledge and techniques developed in art and illustration. Hard-won lessons of aesthetics and communication essential to exploiting the full power of visual representation.

Cognitive Science
The cognitive science relevant to knowledge elicitation, integration, and communication, and the cognitive processes underlying perception, categorization, visual and propositional reasoning, communication, creativity, and motivation.

Systemsand their..... Representation

The System Concept

Environment

Energy Flow

Boundaries

Image Schemas
• Analogical & mental models

System Representations

- Image Schemas
- Verbal
- Mathematical
- Modeling & Simulation

Representation

Experience & Experimentation

Modeling & Theorizing

Science

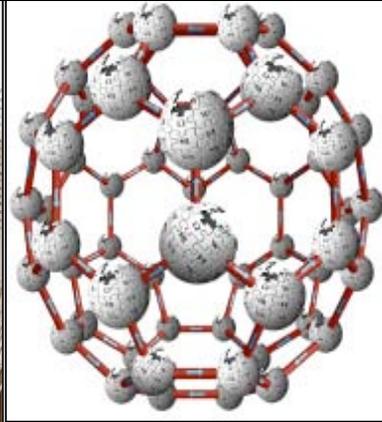
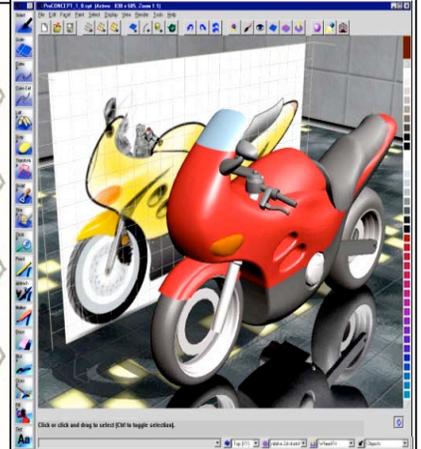
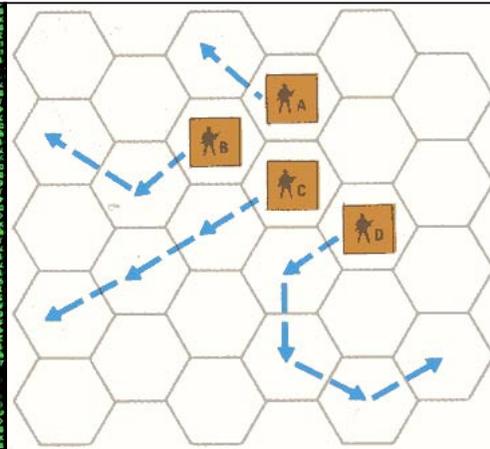
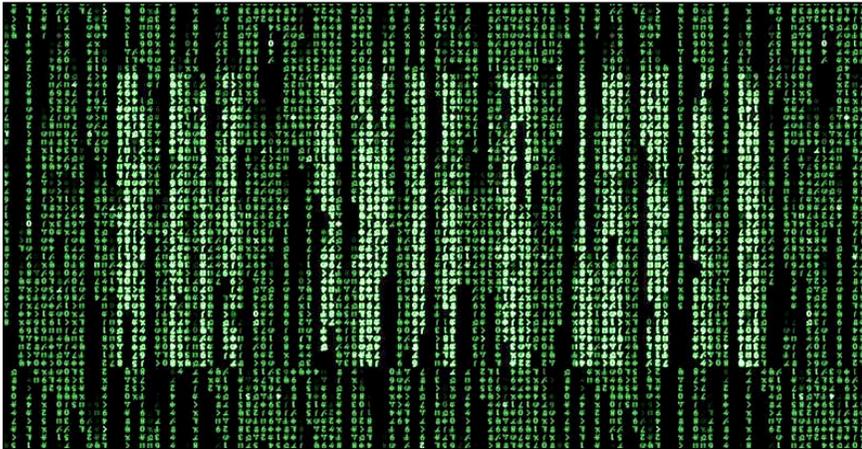
Explanation
Description

Prediction

Simulation

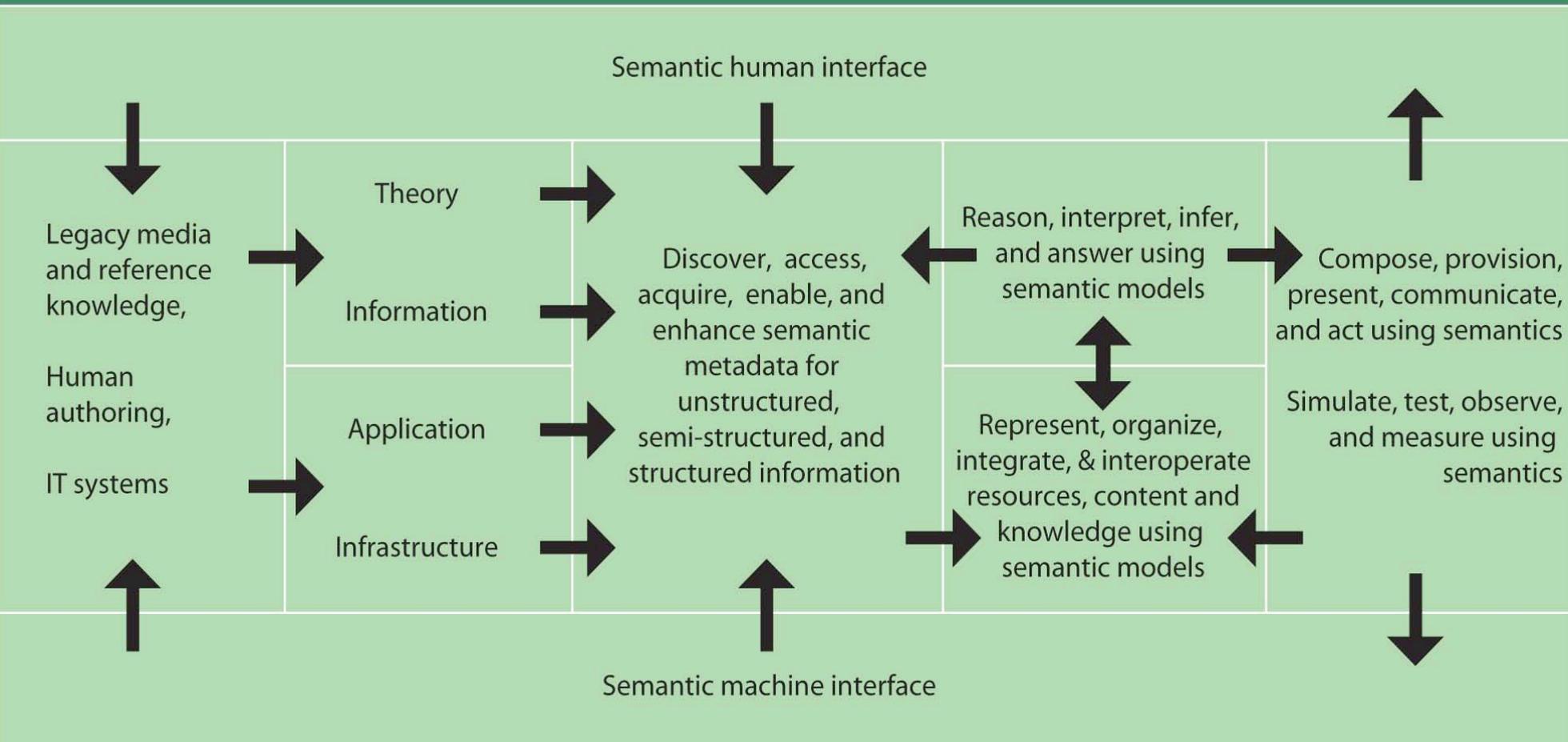
Time

Model knowledge about infrastructure, information, behavior, & domain expertise separately from programs and data...

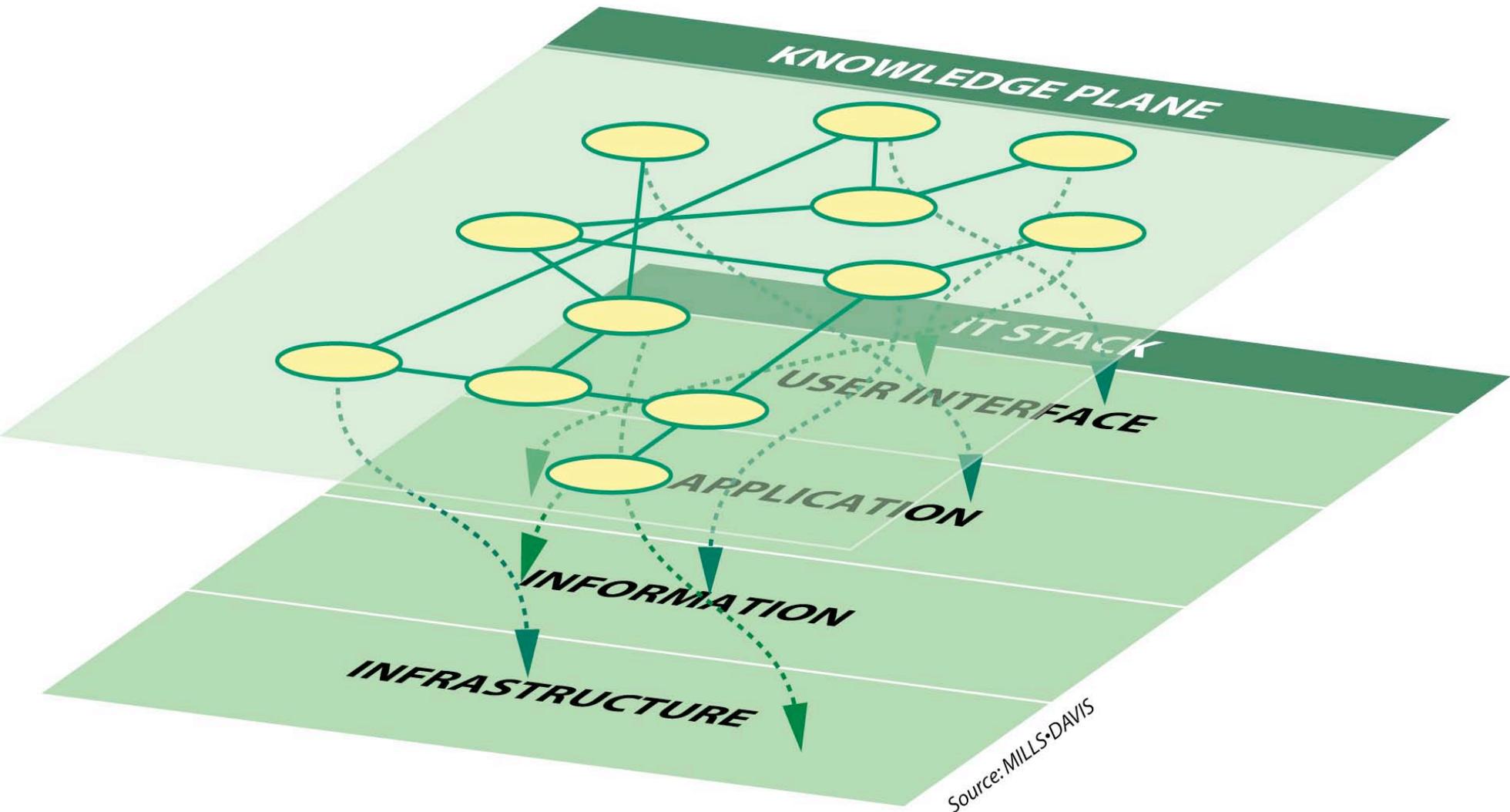


What are the functions of semantic technologies?

SEMANTIC FUNCTIONS

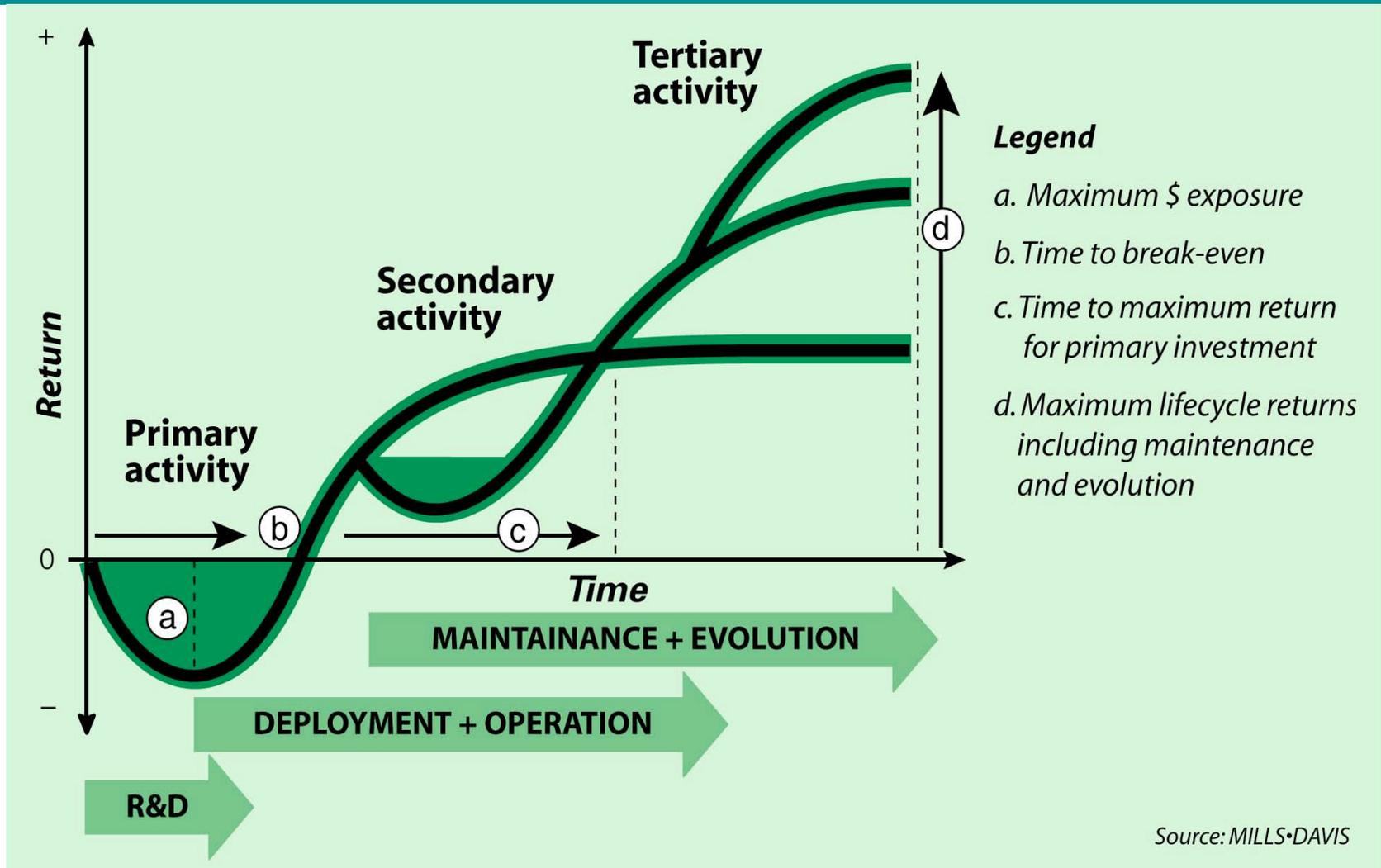


Semantic technologies impact all layers of the IT stack



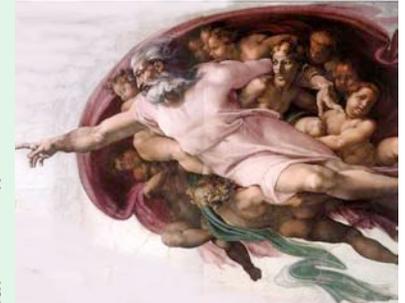
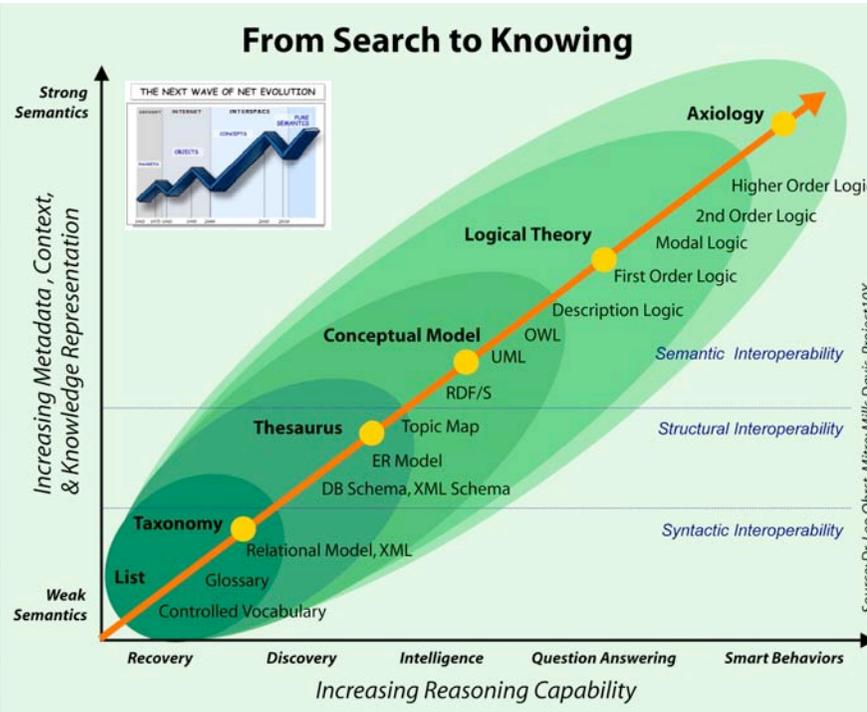
Source: MILLS•DAVIS

Semantic technologies impact all stages of the solution lifecycle

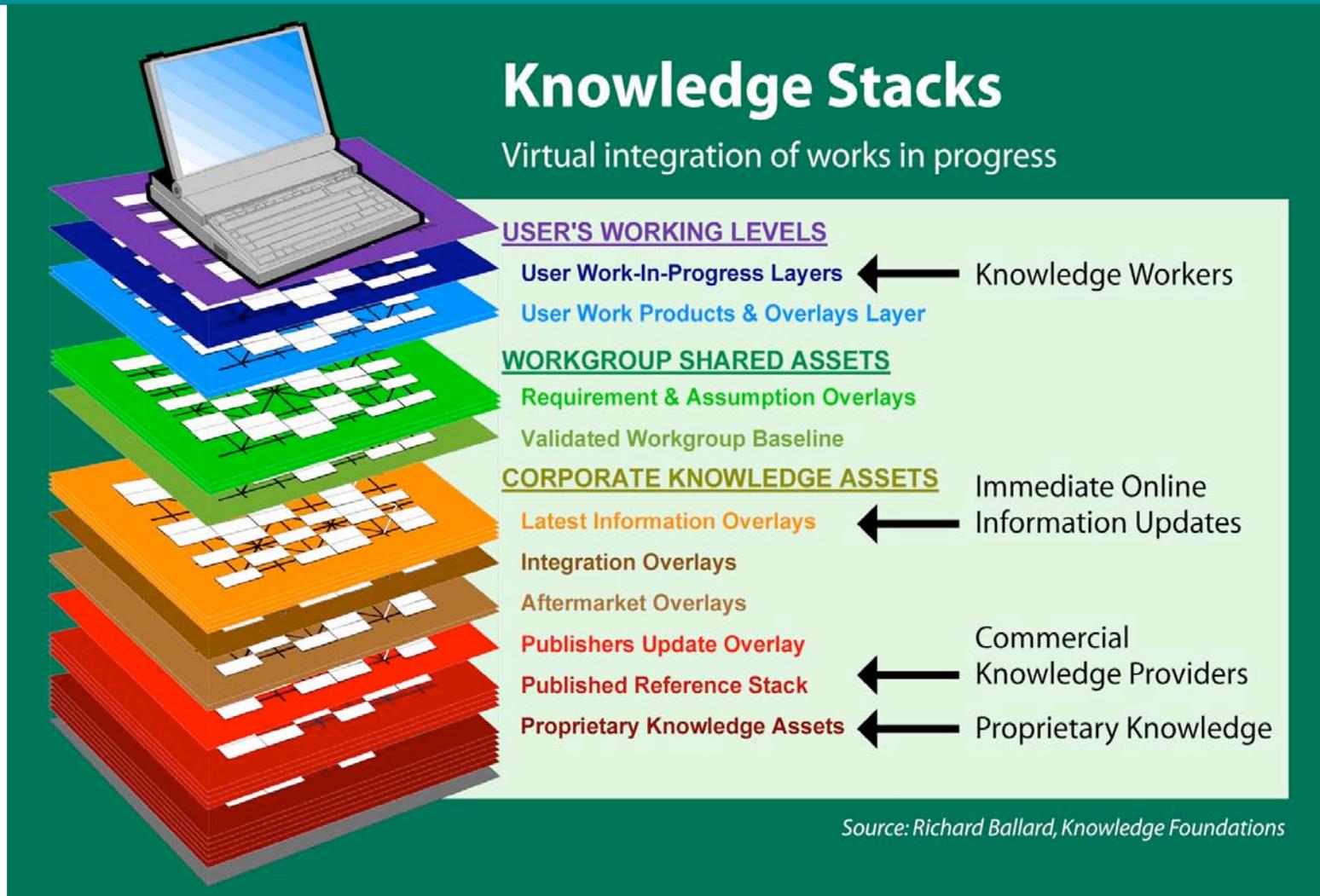


From Search to Knowing

There's so much crap in here... I forgot the whole point of this chapter.



Semantic technologies create new forms of intellectual property



Who is developing semantic solutions?



Who is developing semantic solutions?

Active Navigation	CheckMi	Empolis	Intellisophic	Noetix	SilkRoad
Adobe	Cisco	Endeca	Interwoven	Northrop Grumman	Software AG
Aduna	ClearForest	Engenium	Inxight	nStein	Sony
Agilense	CoeTruman Technologies	Enigmatex	iSOCO	NuTech	SRA International
AKT Triple Store	Cogito	EnLeague Systems	ISX Software	Ontologent	SRI International
Ambliit Technologies	CognIT	Entopia	ISYS Search Software	Ontology Works	Stanford University
Anteon	Cognos	Entrieva	JARG	Ontopia	Stellent
Apelon	Composite	Epistemics Ltd.	Jayna	Ontoprise	Stratify
APR Smartlogik	Compoze Software	Factiva	Kalido	OpenText	Sun Microsystems
Arbortext	Computer Associates	Fair Isaac	Kanisa Software	Oracle	Sybase
Ask Jeeves	Conformative Systems	FAST	Knowledge Foundations	Profium	Synomos
AskMe	Connecterra	FileNet	Knowledge Media Institute	Radar Networks	SYS Technologies
Aspasia	Connotate	Fujitsu	Kofax	Raytheon	Tacit
Astoria Software	Content Analyst	GeoReference Online	Kowari	Readware	Taxonomywarehouse
AT&T	Contextware	Global360	L&C	RuleBurst	TEMIS
ATG	Contivo	Gnowsis	Lockheed Martin	Reed Elsevier	The Brain
Attensity	Convera	Google	Logic Library	SAIC	Thetus
Autonomy	Copernic	Grand Central	Mark Logic	Sandpiper Software	Thomson
Axontologic	Correlate	Groxis	McDonald Bradley	SAP	TopQuadrant
BBN	Cougaar Software	H5 Technology	Metacarta	SAS	Triple Hop
BEA	Coveo Solutions	Hewlett Packard	MetalIntegration	SchemaLogic	Troux
BioWisdom	Crystal Semantics	Hummingbird	Metallect	Semagix	Ultimus
Black Pearl	Cycorp	Hyperion	Metamatrix	Semandex Networks	Unicorn
Blue Oxide	Dassault Systems	i2 Inc	Metatomix	Semantic Light	Verity
BrandSoft	DAY	IBM	Microsoft	Semantic Research	Versatile Info Sys
Broadvision	Digital Harbor	iLog	Mind Alliance	Semantic Sciences	VerticalNet
Business Objects	Discovery Machine	Image Matters	Miosoft	Semansys	Vignette
C24 Solutions	Dynamic Digital Media	Informatica	Modulant	Semaview	Visual Knowledge
Capraro Technologies	Dream Factory	InforSense	Mondeca	Semtation GmbH	Vitria
Captiva	EasyAsk	Infosys	Moresophy	Serena	Vivisimo
Celcorp	Ektron	Innodata (ISOGEN)	NCR Teradata	SiberLogic	WiredReach
Cerebra	EMC/Documentum	Intellidimension	NetMap Analytics	Siderean	XSB
		Intelliseek	Neurok		

Source: MILLS•DAVIS—1/10/2006

Who is investing in semantic technologies?



Where, how, and in what ways do semantic technologies have application?



What capabilities of semantic technologies drive business value?

CHALLENGES	SEMANTIC CAPABILITIES	VALUE DRIVERS
Development: Complexity, labor-intensity, solution time, cost, risk	Semantic automation of <i>"business need-to-capability-to-simulate-to-test-to-deploy-to-execute"</i> development paradigm	Semantic modeling is business rather than IT centric, flexible, less resource intense, and handles complex development faster.
Infrastructure: Net-centricity, scalability; resource, device, system, information source, communication intensity	Semantic enablement and orchestration of transport, storage, and computing resources; IPv6, SOA, WS, BPM, EAI, EII, Grid, P2P, security, mobility, system-of-systems	In the semantic wave, infrastructure scale, complexity, and security become unmanageable without semantic solutions.
Information: Semantic interoperability of information formats, sources, processes, and standards; search relevance, use context	Composite applications (information & applications in context powered by semantic models), semantic search, semantic collaboration, semantic portals	Semantic interoperability, semantic search, semantic collaboration, and composite applications become "killer apps."
Knowledge: Knowledge automation, complex reasoning, knowledge commerce	Executable domain knowledge-enabled authoring, research, simulation, science, design, logistics, engineering, virtual manufacturing, policy and decision support	Executable knowledge assets enable new concepts of operation, super-productive knowledge work, enterprise knowledge superiority, and new intellectual property.
Behavior: Systems that know what they're doing	Robust adaptive, autonomic, autonomous system behaviors, cognitive agents, robots, games, devices, and systems that know, learn, and reason as humans do	Semantic wave systems learn and reason as humans do, using large knowledgebases, and reasoning with uncertainty and values as well as logic.

Semantics for Enterprise Architecture

What language & tools do we use to manage enterprise architecture?

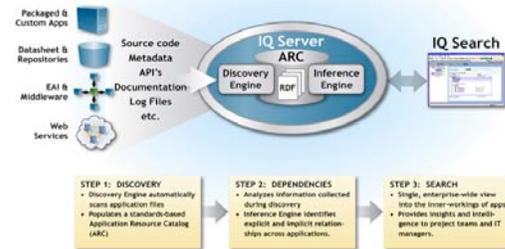
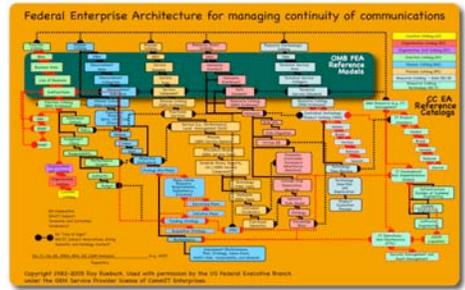
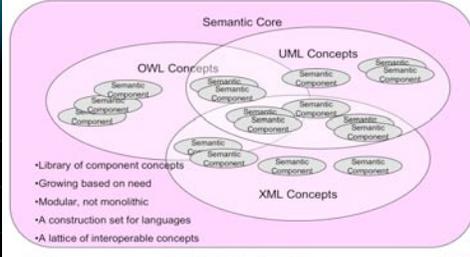
We need a declarative language that addresses the entire spectrum of our enterprise. Semantic web standards provide a common language for modeling the enterprise, documenting applications, and executing the business solution.



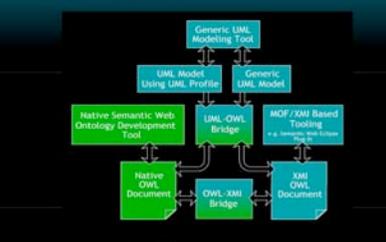
OMG Standards & Zachman Framework

The Zachman Framework	Abstractions (Columns)					
	DATA (What)	FUNCTION (How)	NETWORK (Where)	PEOPLE (Who)	TIME (When)	MOTIVATION (Why)
SCENARIO (Contextual View)	Business Model	Business Process	Business Network	Business Roles	Business Time	Business Motivation
SYSTEM (Systemic View)	Business Model	Business Process	Business Network	Business Roles	Business Time	Business Motivation
TECHNOLOGY (Technology View)	Business Model	Business Process	Business Network	Business Roles	Business Time	Business Motivation
DETAILED REPRESENTATION (Detailed View)	Business Model	Business Process	Business Network	Business Roles	Business Time	Business Motivation

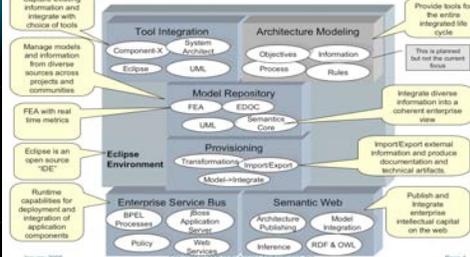
Semantic Components



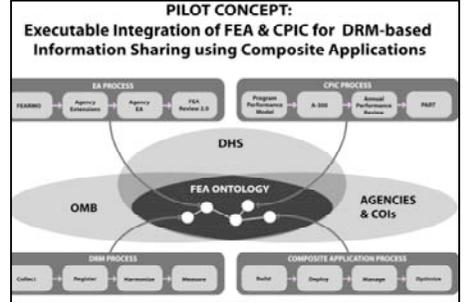
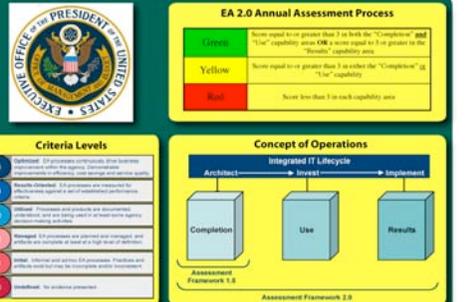
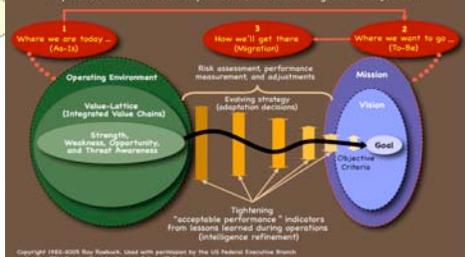
Bridging KR and MDA



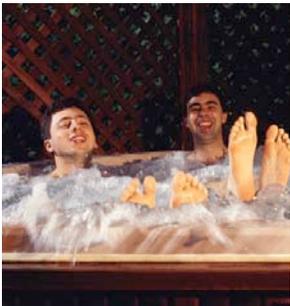
OsEra Stack



Executive Management Function—Migrating from As-Is to To-Be



Semantic Web 2.0



More machine processable than before

New, Improved SEMANTIC Web
Now with added meaning

May be incompatible with existing XML tools. Databases may take up to ten times as much memory and 24 hours to load.



Mobile Collaboration

User Analysis Understanding how people work and the work they want to do. Once the needs of users are identified, we have been able to support existing systems. Markedly different from systems to actually support. Integration of the way larger designing a component for sharing music, providing desktop machines and other mobile collaboration must be computers, can, data, will-based framework for mobile help, to tourists, reducing costs. Human factors, social development. Hardware, need to be represented in collaboration applications, students, using need mobility, awareness, task software, and protocols for novel ways. XML is one way. The goal is to create inspectors, and sharing building, actor, and distributed group. Distributed users, mobile collaboration, and not interact work.

Systems Development

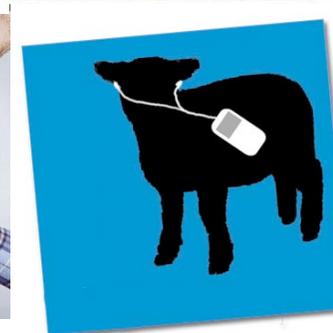
Data Representation

Infrastructure

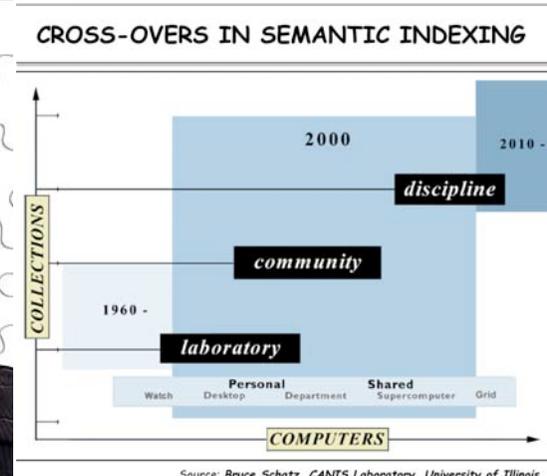
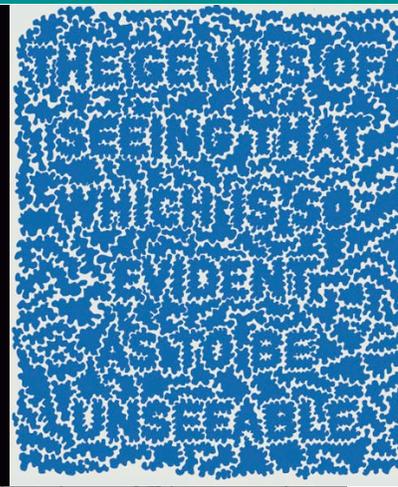
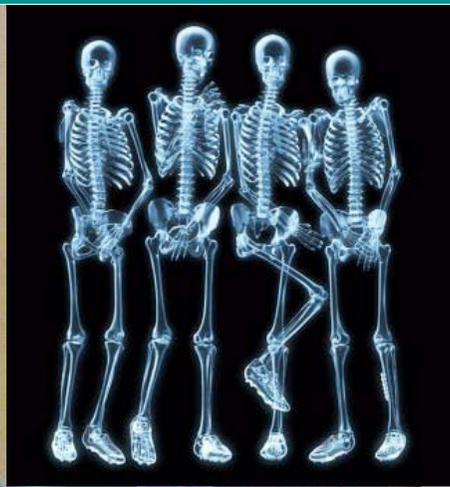
Applications

An infrastructure for mobile collaborative applications can be designed to support new ways of working. Because mobile devices can be developed to support new ways of working, the way larger designing a component for sharing music, providing desktop machines and other mobile collaboration must be computers, can, data, will-based framework for mobile help, to tourists, reducing costs. Human factors, social development. Hardware, need to be represented in collaboration applications, students, using need mobility, awareness, task software, and protocols for novel ways. XML is one way. The goal is to create inspectors, and sharing building, actor, and distributed group. Distributed users, mobile collaboration, and not interact work.

Marc Friedenberg (mfriedenberg@tst.psu.edu)
IST 501, Fall 2004

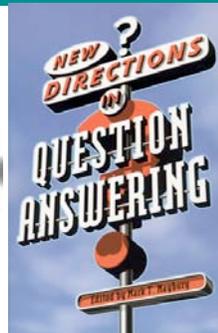
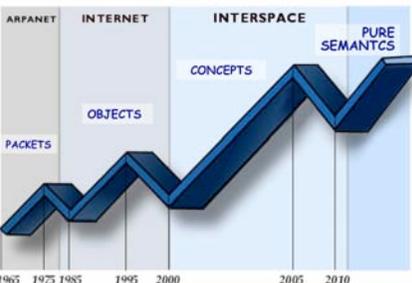


Semantic Discovery: Extract, Annotate, Enhance

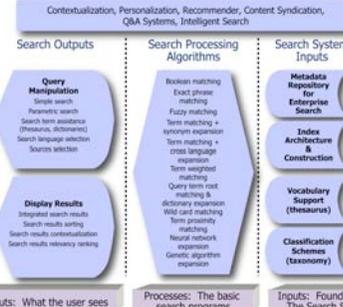


Semantic Search & Navigation

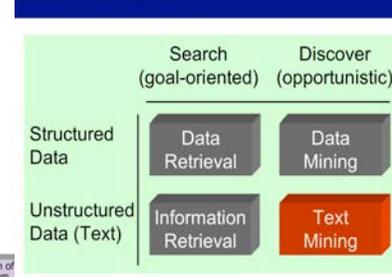
THE NEXT WAVE OF NET EVOLUTION



Functional Architecture of Search System



Search vs. Discover



Google for enterprise search?

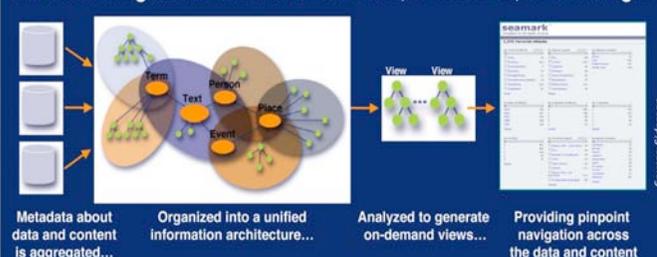
"Despite any reports you may read in the general literature, buying a fast crawler (Google) definitely did not solve our search problems. Implementing a fast crawler simply surfaced our information management and data quality challenges directly to the users.

"The crawler approach provided high hit rates, and very low relevancy rates AND very low precision rates (it created more problems than it solved). Our users were very unhappy with the search system and requested a new solution..."

— Denise Bedford, World Bank

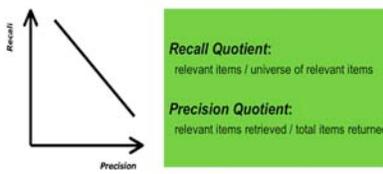


Search & navigation via linked vocabularies, taxonomies, and ontologies



Search recall and precision

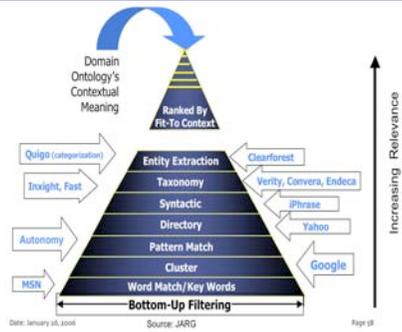
Text-based searching necessarily fails to yield accurate and comprehensive results due to the inherent elasticity of language. For machines to be able to achieve comparable precision and recall, they need semantics (controlled vocabularies and rich syndetic networks)



Enterprise search supports processes and social networks

Customer Relationship Mgmt	Product Lifecycle Mgmt	Supply Chain Mgmt	Strategic Mgmt	Financial Mgmt	Human Capital Mgmt	Intellectual Capital Mgmt	Technology
Target to Engage (Marketing)	Design to Deploy (Control)	Source to Settle (Procurement)	Plan to Act (Strategic Planning)	Record to Measure (Capital & Report)	Attract to Outbound (Recruit and Hire)	Find to Act (Analyze)	Plan to Monitor (Efficiency)
Engage to Close (Sales)	Plan to Produce (Build)	Call to Invest (Finance)	Assess to Develop (Plan)	Collect to Store (Datawarehouse)	Manage to Availability (Protect)	Request to Replenish (Outpost)	
Respond to Resolve (Customer Support)	Order to Cash (Finance)	Propose to Complete (Project)	Track to Deploy (Manage & Pay)	Request to Replenish (Outpost)	Plan to Forward (Invest)	Develop to Deploy (Develop)	

Semantic search improves both precision and recall

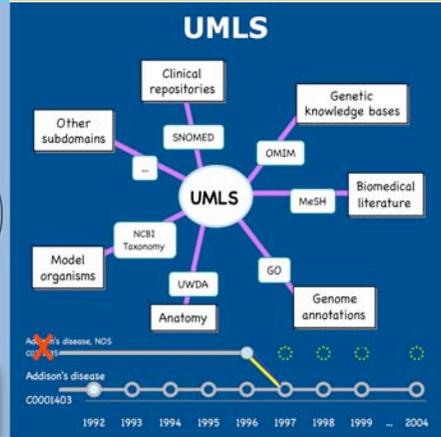
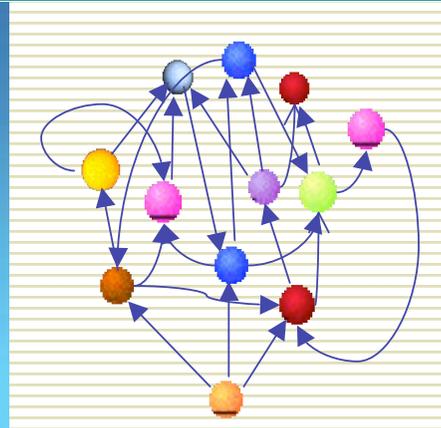


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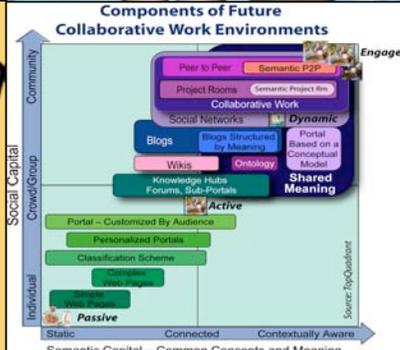
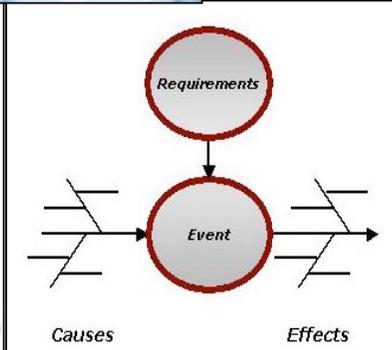
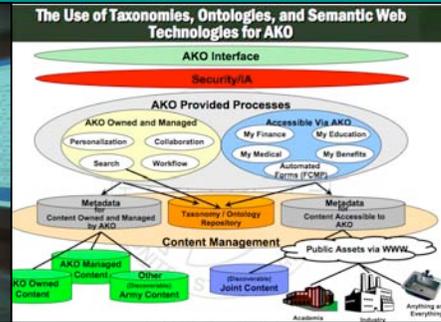
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Page 26

Subject Ontology Management

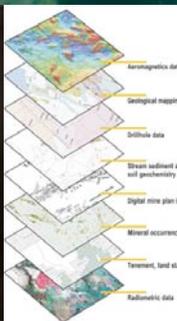
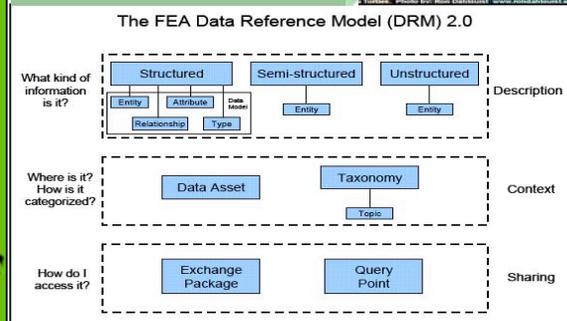
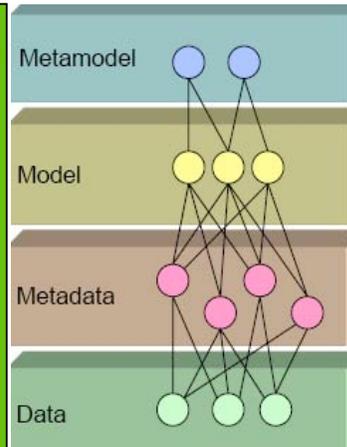


Semantics for Collaboration



Semantics for Information Sharing

Data Reference Model					
Data Description		Data Sharing		Data Context	
Data Models	Data Assets	Data Exchange Packages	Query Points	Controlled Vocabularies	EA/FEA Alignment
<ul style="list-style-type: none"> XML schemas IDEF1X logical data models UML class models OWL ontologies Physical data models (SQLDDL) 	<ul style="list-style-type: none"> Databases Websites Registries Repositories Portals Intranets Extranets 	<ul style="list-style-type: none"> XML schemas and DTDs WSDL interfaces SOAP envelopes ANSI X.12 EDI messages RSS feeds 	<ul style="list-style-type: none"> XML web services Search engines ISO 23950 SQL-92 CQL SOAP 	<ul style="list-style-type: none"> Taxonomies Thesauri Glossaries Topic Maps 	<ul style="list-style-type: none"> Data Flow Diagrams CRUD Matrices Component Diagrams BRM PRM SRM TRM

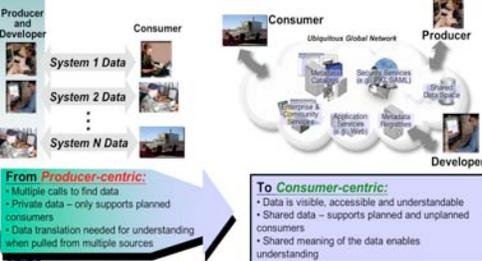


Net-Centric Information Sharing

Enabling Net-Centricity → Data Strategy

The Department's Strategy

To move from privately owned and stored data in disparate networks and within legacy systems/applications to an enterprise information environment where authorized known and authorized unanticipated users can access any information and can post their contributions for enterprise-wide access.



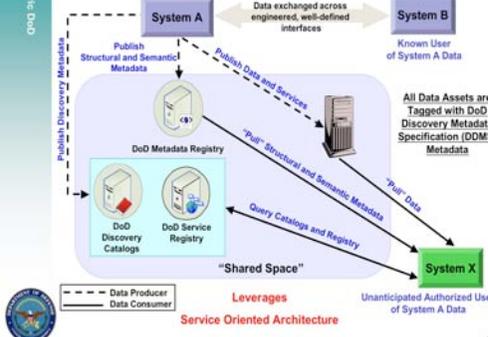
Barriers to Identifying, Accessing and Understanding Data

Defining The Data Problem

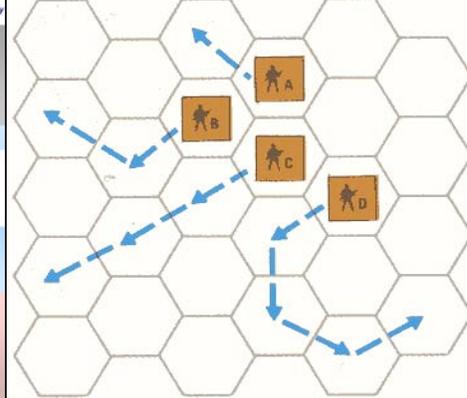
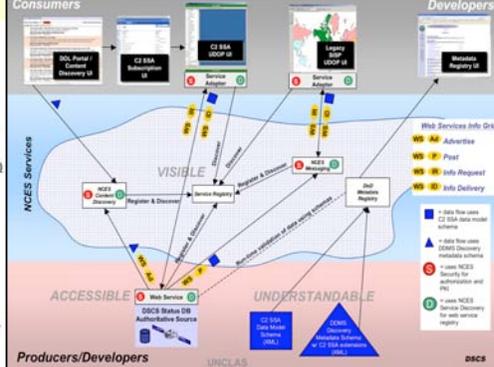


Publishing and Subscribing of Data & Services

Supporting Both Known and Unanticipated Authorized Users



C2 SSA COI Service + C2 SSA Data Model + NCES Security/Discovery/Adapter + NCES Messaging + DoD Metadata Registry

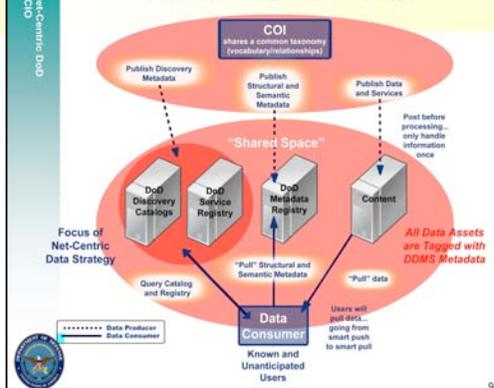


Community of Interest (COI) Approach

- Define data sharing shortfall as a problem statement
- Define COI-specific vocabularies and taxonomies
 - Vocabularies to improve data exchange within COI and among COIs
 - Taxonomies to improve precision discovery
- Make their data assets visible and accessible
 - Visible via service registry (WSDL), metadata registry (XSD), and data catalogs (DDMS)
 - Accessible via web services and common mime types
- Register semantic and structural metadata to the DoD Metadata Registry (<http://metadata.dod.mil>)
 - XML Gallery for XML schemas, stylesheets, domain sets, samples
 - Taxonomy Gallery for discovery taxonomies (OWL syntax)
- Pilots, Exercises, Integration with Programs of Record
 - Data asset discovery and understanding
 - Data asset posting to shared spaces

http://www.defenselink.mil/nii/org/cio/doc/COI_FAQ.doc

COIs Implementing the Data Strategy



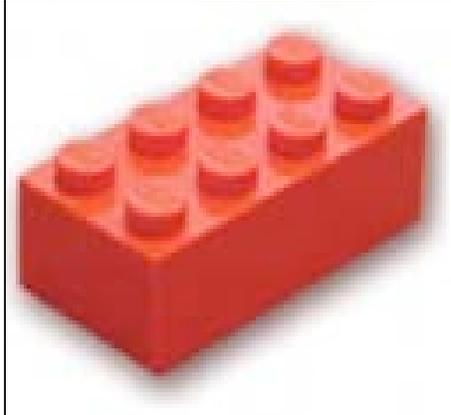
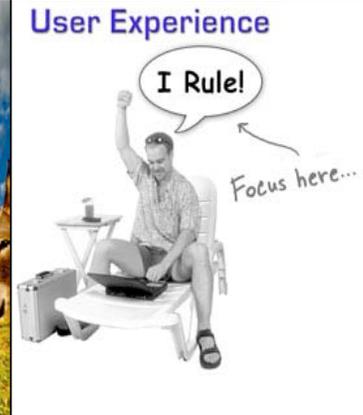
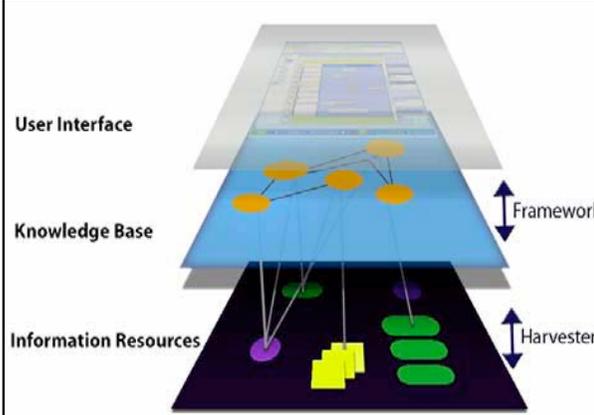
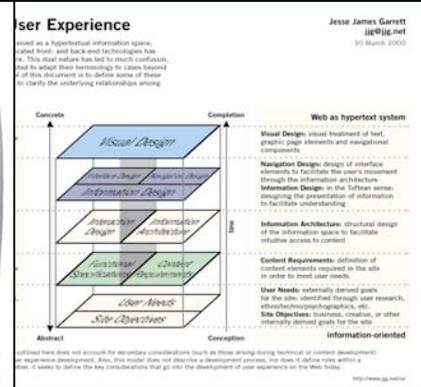
Criminal Justice Scenario

Multiple Agencies, Multiple Departments, Multiple Records Systems – One Job

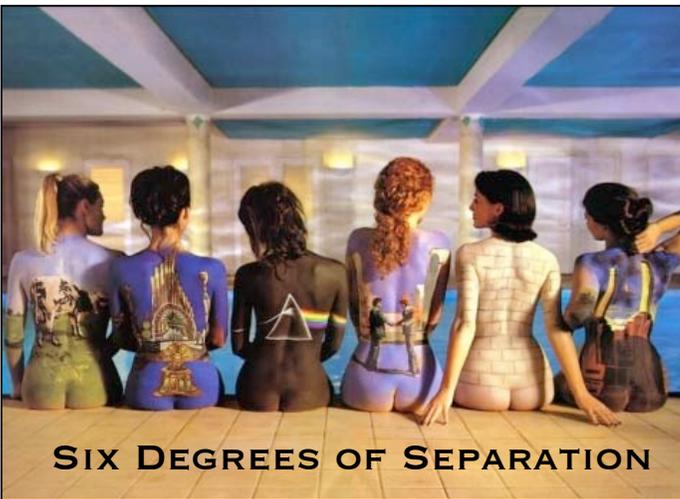
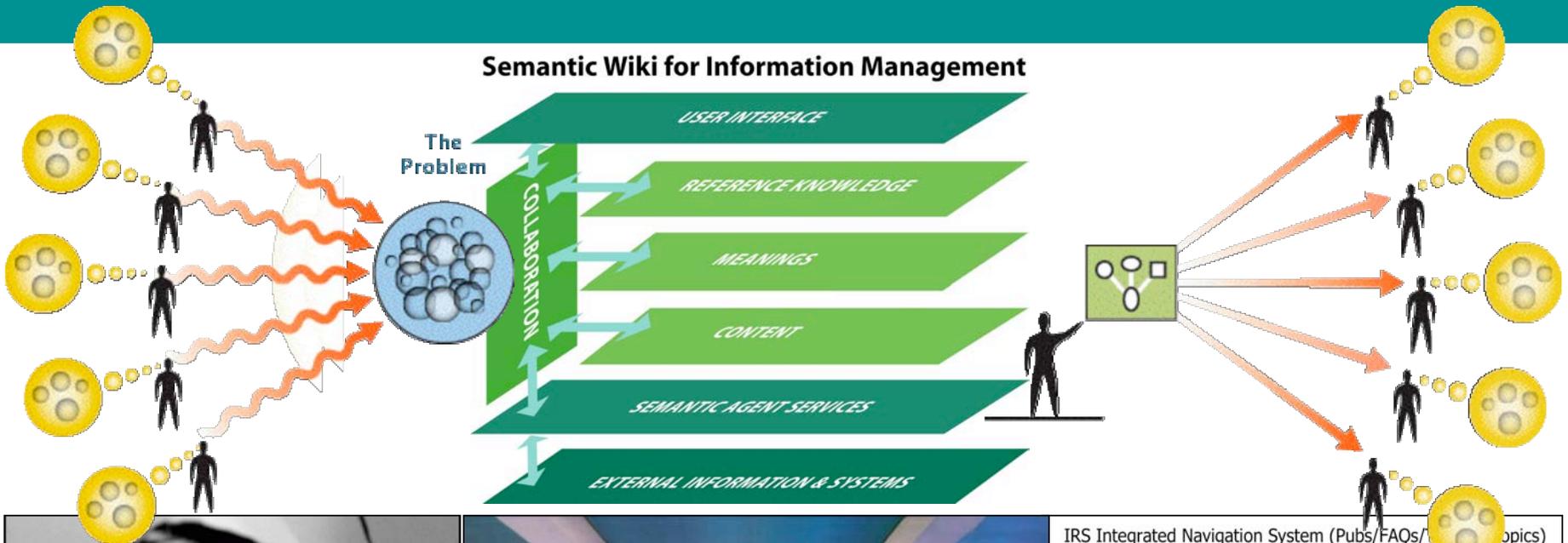


Organizations must share and manage many kinds of information across organizational and system boundaries. US Federal Criminal Investigations span 12 – 15 different agencies. Information is kept in 40 – 60 different siloed systems. Impossible to share and manage effectively across these boundaries today.

Semantic Desktop



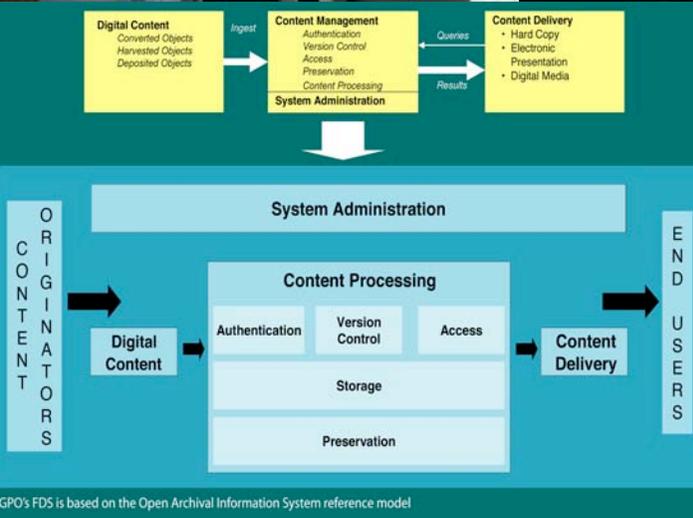
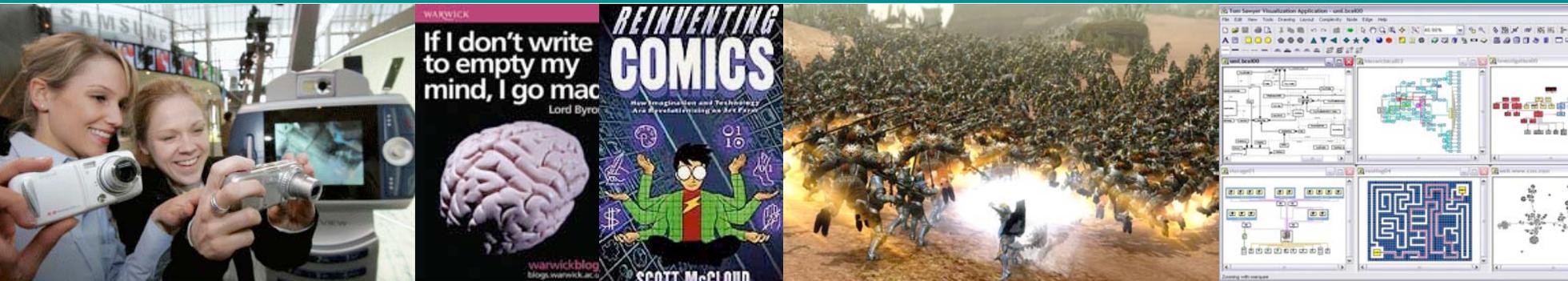
Semantic Wiki



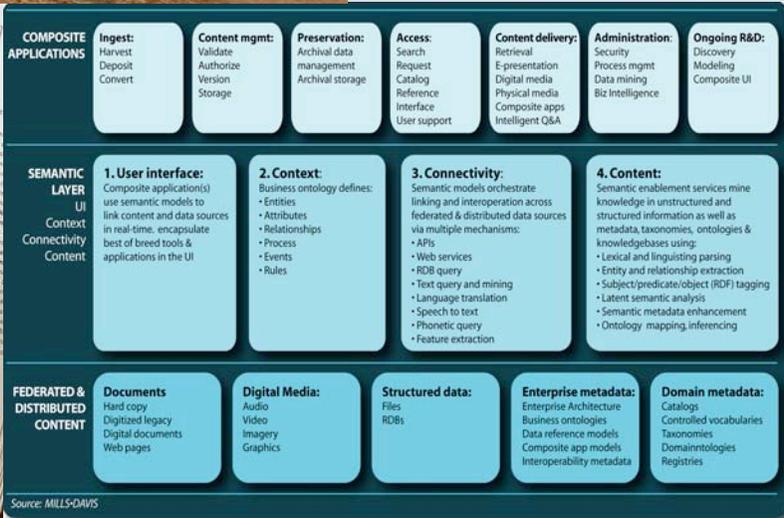
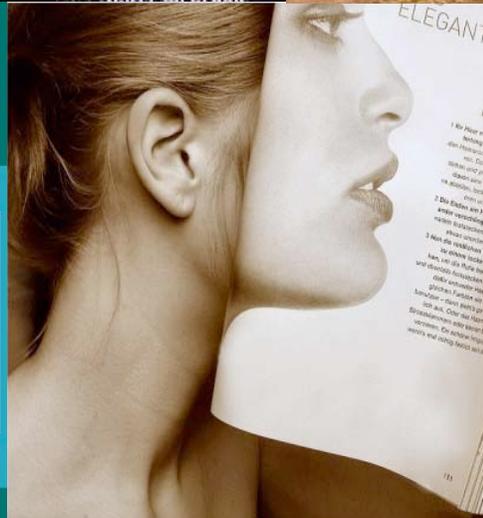
IRS Integrated Navigation System (Pubs/FAQs/Topics)

Publications(SGML)					Indexes (HTML)
FAQs (XML)					FAQs (HTML)
Teletax topics(XML)					Tele-tax topics (HTML)
					Indexes, TOCs and Topic Screens (HTML)
IRS Documents	IRS Topic Map Model	IRS Merging Specification	IRS XTM Topic Map	IRS Style sheets (CSS)	
1	2	3	4	5	
Preprocessing	Extracting Topic Map Information	Merging & Associating	Creating the Topic Map	Formatting Navigable view	
<ul style="list-style-type: none"> •Slicing •Link Tables 	<ul style="list-style-type: none"> •Topic names •Occurrences •Roles 	<ul style="list-style-type: none"> •Merging by name •Applying rules 	<ul style="list-style-type: none"> •XTM version •Internal storage 	<ul style="list-style-type: none"> •HTML docs •Indexes •Topic Screens •Tables of contents 	
IRS Specific Scripts	Topic Map Loom Standard Application				
Configuration Files wrt.document.types	Merge Spec defined by IRS experts	XTM spec. conforming To ISO/IEC-13250-2002	Configuration Files wrt.document.types		

Semantics for Publishing



GPO's FDS is based on the Open Archival Information System reference model



Semantics for Learning

Everyone knows learning must be serious and difficult and you must remain seated at all times. No fun allowed.

Embedded learning

Blue-collar knowledge workers using embedded learning in personal learning devices:

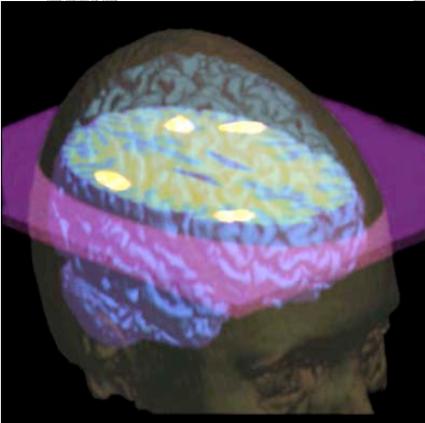
Source: Microvision, 2003; Sam Adkins, Ambient Insight

2005 is the Year of the Personal Learning Device: People are Surrounded by "Learning-ware, Everywhere"

Entering the Post-Network Era: Federations of Temporary "Meshes" of People, Locations, Processes, and Devices

Post-Browser Stage Began in 2004 - Wide Adoption of 3G-4G by 2008-2010
IBM Joined The Liberty Alliance in October 2004 accelerating Federated Identity Management

Loosely-coupled Federations: Decentralization and Fragmentation of Individuals into Federations of Business Stacks and Government Stacks



Decentralization Dominates Current Corporate Learning Technology Innovation

Personal Learning Technology for the Other Half: The Rise of Blue Collar Geeks

Collaboration is Hot: Fastest Growing Learning Product in all Customer Segments

Wireless Learning: Today, 50% of workforce is mobile; by 2010, 75% will be mobile
Humans are the best learning objects and preferred over other forms of learning

Information Increase Rate Accelerating - Will Double Every 72 Hours by 2010

Decentralized Training Teams, Shrinking Training Budgets and Staffs

Location: Wireless Revolution and Decentralization of Information Devices, Personal Learning Devices

Presence: Expertise and Device Awareness, Task Analytics in Collaboration WorkSpaces

Decentralization of Workforce: Virtual Teams, Outsourcing, Mobile, Telework

Federated Identity Islands, Personalized Content in Federated Portals, Personal Information Architects

Shrinking Workforce, High Turnover Rates Fast (Near real-time) Changing Job Tasks

● Socio-Economic Trends
■ Technology Trends

● One-to-One Mentoring is the most effective knowledge transfer method so far (Bloom's 2 Sigma study)

Semantics for Composite Applications

Many knowledge applications have a similar lifecycle...

Lifecycle often begins with automated capture of events, followed by human monitoring and analysis of situation based on information from different sources in different formats (structured & unstructured). People need to keep the context, share the picture of the situation, and resolve it.



Anatomy of a composite application — Semantic technologies at 3 levels:

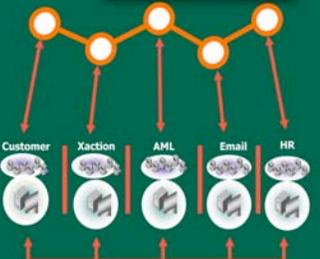
(1) Composite User Interface

UI must persist and expose semantics such that users can interact with meaningful objects



(2) Composite schema (business ontology)

A business ontology describes the semantics of data relationships, workflow, events, and business rules



(3) Composite query (EII)

Logically map multiple databases, applications, and web services as if they came from a single source

Source: Digital Harbor



Are You Exposed?

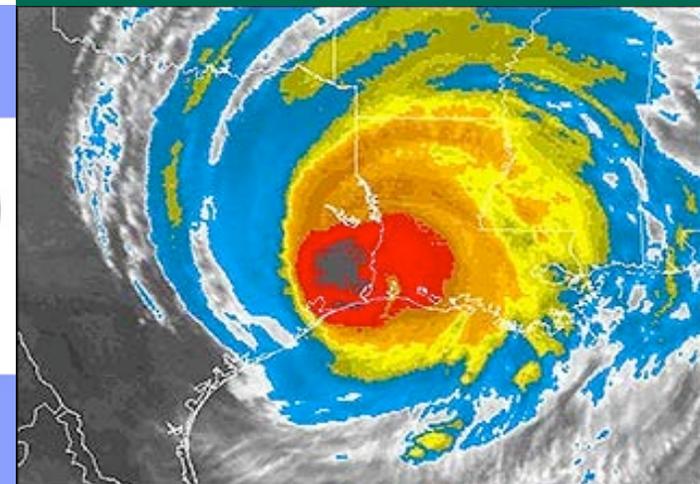
Financial institutions are being asked to investigate and manage threats like the CIA does, but are not equipped to do so.

Learn how 'Composite' investigative capabilities developed for national security can help you connect-the-dots across compliance silos to increase effectiveness and reduce risk

John E. Clark
Executive Consultant
IBM Corporation

Austin Wells
Vice President
Digital Harbor Inc.

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Systems that Know

Characteristics of Complex Systems

A 'complex' system

Complex Systems

Involves: Many Components

Dynamically Interacting and giving rise to A Number of Levels or Scales

Emergent behavior that cannot be simply inferred from the behavior of the components

Emergence

Hierarchy

Self-Organization

Control Structures

Composites

Substructure

Decomposability

A 'simple' system

Time

Evolution of Integrated Data Exchange

Commonality of data

Self-organizing systems

Self-integrating systems

Explicit, formal systems

Source: Greg Schmidt, MIT

Anatomy of a Cognitive System

Cognitive Agent

Reflective Processes

Deliberative Processes

Reactive Processes

Short-term Memory

Long-term Memory (Knowledgebase)

Concepts

Sentences

Perception

Sensor

External Environment

Eff

Source: Ron Brachman, Director, Defense Advanced Research Projects Agency's Information Processing Technology Office (DARPA/IPTO)

ALEXANDER

THE MAN WHO KNOWS

How do semantic technologies improve performance?

EFFICIENCY	EFFECTIVENESS	EDGE
<p><i>Cost savings</i></p> <p>Doing the same job faster, cheaper, or with fewer resources than it was done before</p>	<p><i>Return on assets</i></p> <p>Doing a better job than the one you did before, making other resources more productive and increasing their return on assets and attainment of mission</p>	<p><i>Return on investment</i></p> <p>Changing some aspect of what the business does, resulting in growth, new value capture, mitigation of business risk, or other strategic advantage</p>

EARLY ADOPTER CASE EXAMPLES

20-80% less labor hours	50-500% quality gain	2-30X revenue growth
20-90% less cycle time	2-50X productivity gain	20-80% reduction in total cost of ownership
30-60% less inventory levels	2-10X greater number or complexity of concurrent projects, product releases & units of work handled	3-12 month positive return on investment
20-75% less operating cost	2-25X increased return on assets.	2-300X positive ROI over 3-years
25-80% less set-up & development time		
20-85% less development cost		

Q&A

