Network Centric Operations
Industry Consortium

SEMANTIC SOCIAL COMPUTING

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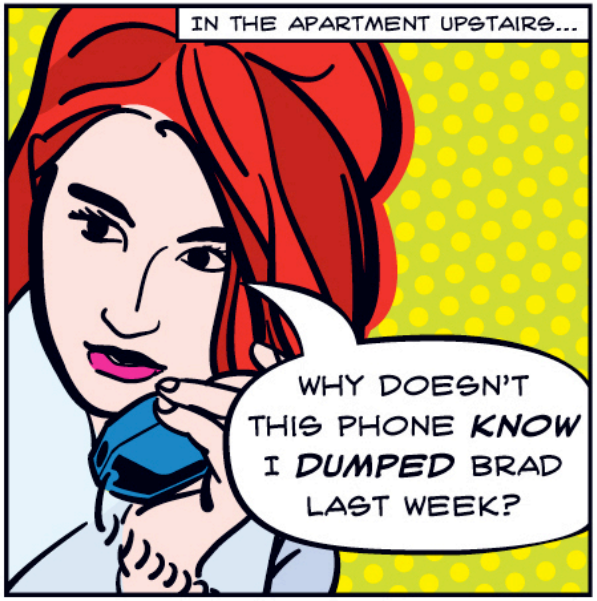
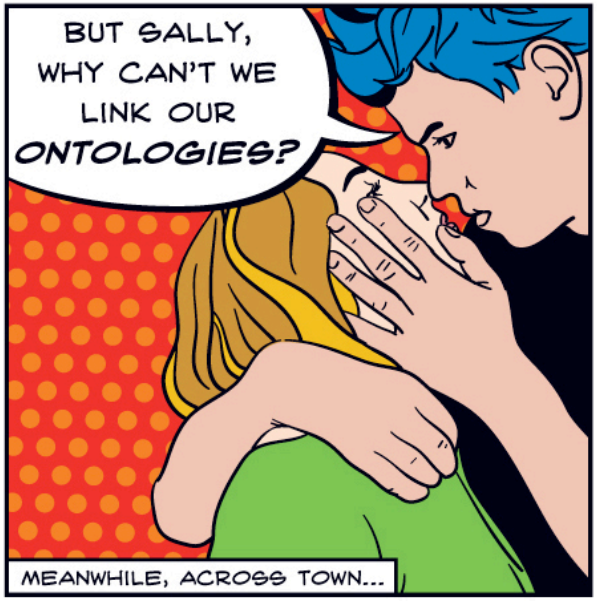
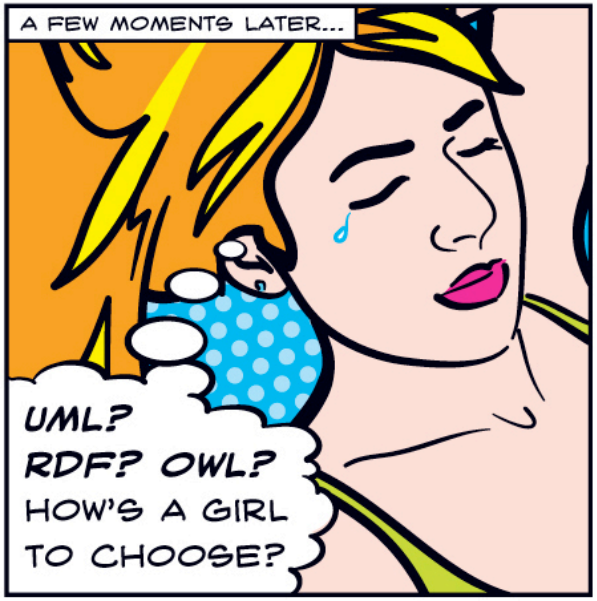
Mills Davis
Managing Director, Project10X
Co-Chair, Federal SICOP
mdavis@project10x.com

What happens when you have lots of web, lots of semantics, and lots of social interaction with it?

Web 3.0!







"Roy Lichtenstein meets the Semantic Web"

Who is Mills Davis?

Industry visionary, researcher, analyst, and consultant.

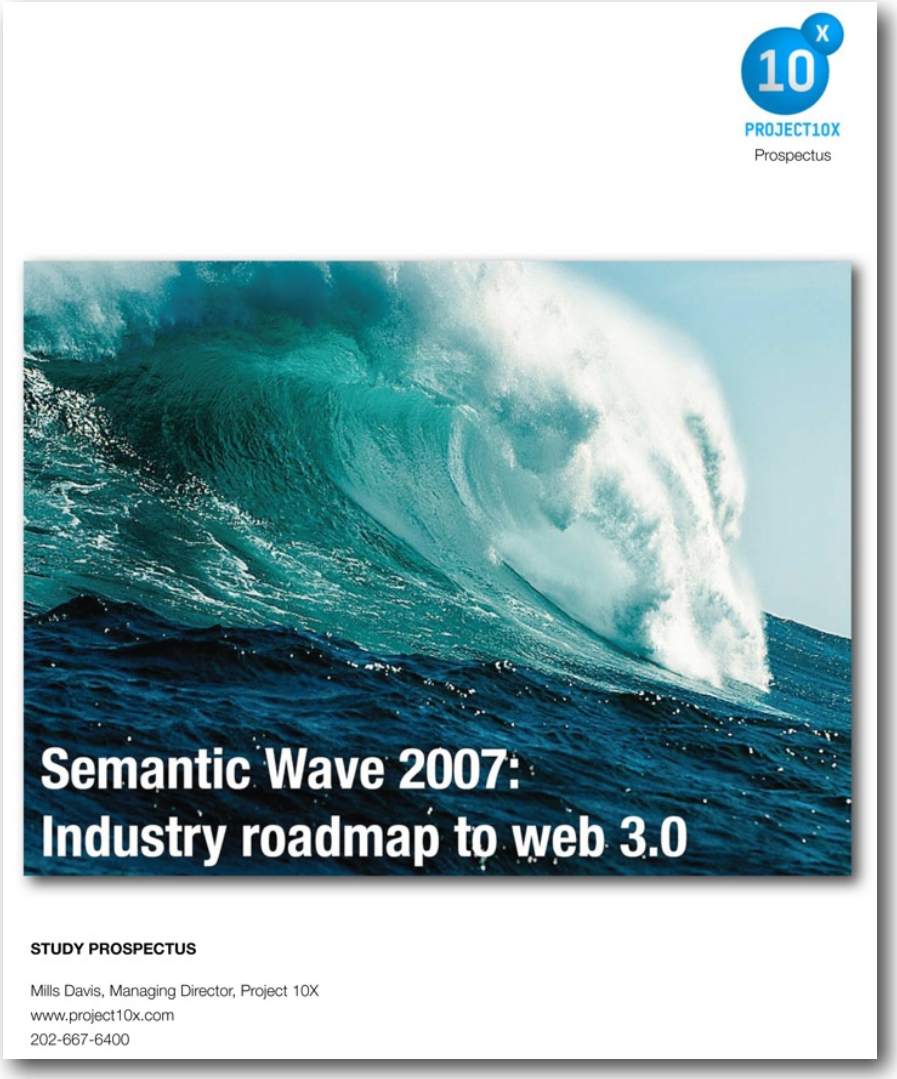
Mills Davis is Project10X's founder and managing director for industry research and strategic programs. He consults with technology manufacturers, global 2000 corporations, and government agencies on next-wave semantic technologies and solutions.

Mills serves as lead for the Federal Semantic Interoperability Community of Practice (SICoP) research into the business value of semantic technologies. Also, he is a founding member of the AIIM interoperable enterprise content management (iECM) working group, and a founding member of the National Center for Ontology Research (NCOR).

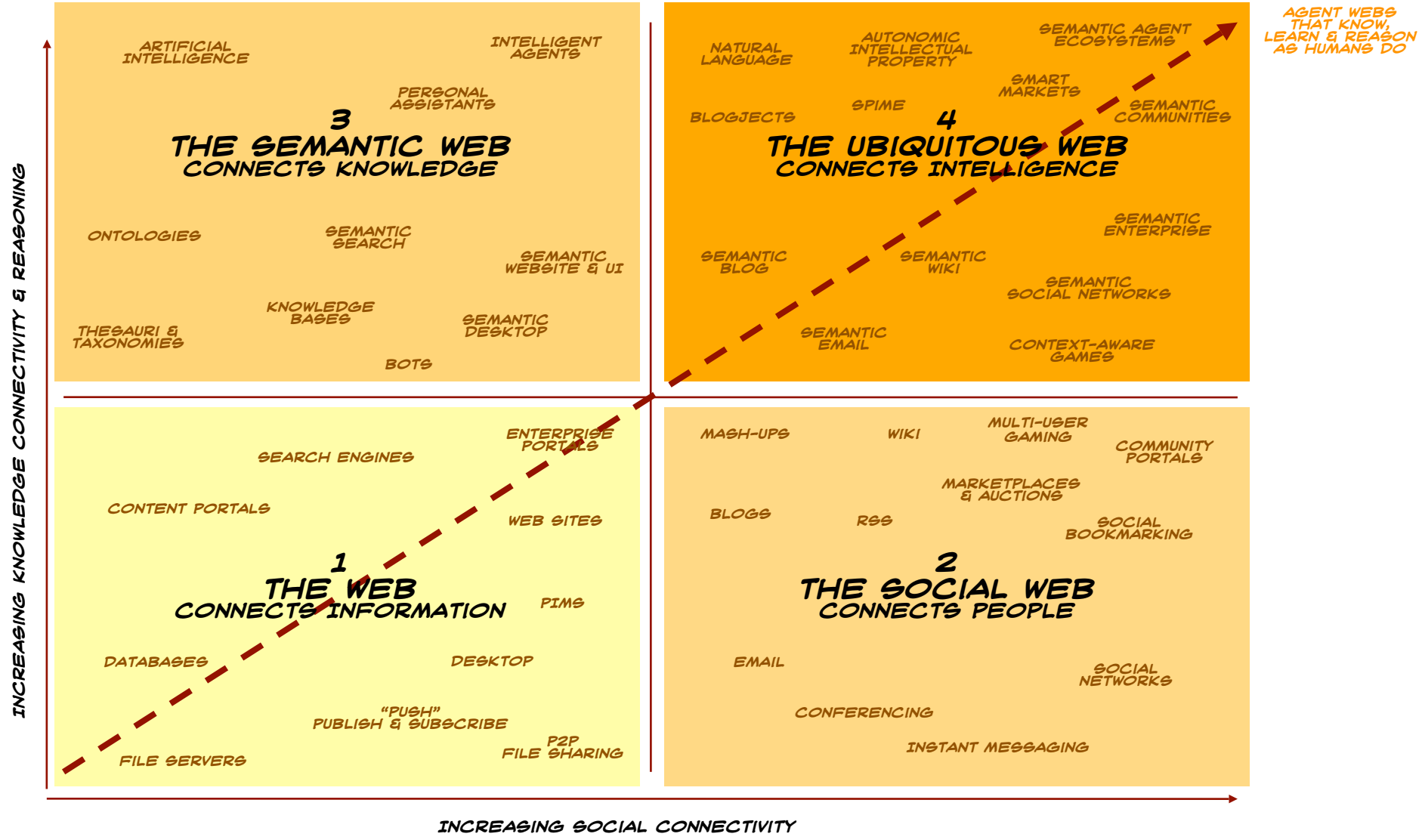
A noted researcher and industry analyst, Mills has authored more than 100 reports, whitepapers, articles, and industry studies.

What is Semantic Wave 2007?

Latest industry research report from Project10x.



What is the evolution of the internet to 2020?



SOURCE: NOVA SPIVAK, RADAR NETWORKS; JOHN BRESLIN, DERI; & MILLS DAVIS, PROJECT10X

What is an integral perspective?

A key to successful development in the semantic wave.

This quadrant diagram depicts four perspectives that are essential for design and evolution of semantic wave products and services:

I — Subjective — the "I" in UI, how I experience things, the demands on my attention, focusing on my personal values, thoughts, emotions, memories, states of mind, perceptions and immediate sensations.

WE — Intersubjective — the "we" in web, social computing, our lived culture, shared values, language, relationships, cultural background, & how we communicate.

IT — Objective — The world of individual things viewed empirically, anything you can see or touch or observe in time and space; like product structure & behavior.

ITS — Interobjective — the world of systems and ecosystems, networks, technology, government, and environment(s).

Source: Ken Wilber, Integral Institute

What are the semantic wave technology themes?

Knowledge, user experience, social computing, applications, and infrastructure.

The integral perspective reveals five major technology themes and lines of development in the semantic wave:

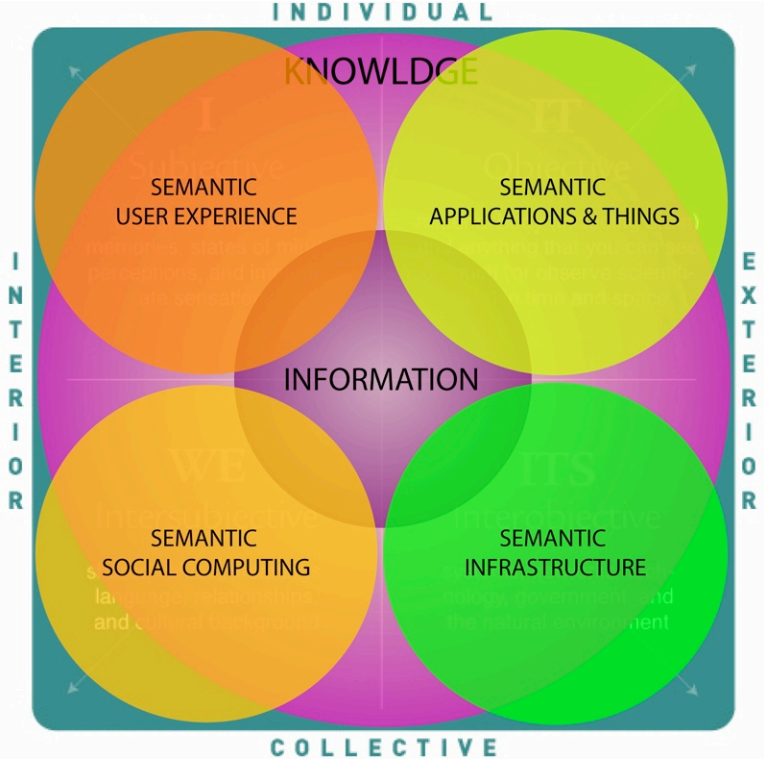
(1) *Executable knowledge* — The fundamental transition in the semantic wave is from information-centric to knowledge centric patterns of computing.

(2) *Semantic user experience* — concerns how I experience things, demands on my attention, my personal values. Trend towards exploiting higher bandwidth content dimensionality, context sensitivity, and reasoning power in user interface.

(3) *Semantic social computing* — concerns our lived culture, intersubjective shared values, & how we communicate. Trend towards collaborative tooling that empowers we humans (and our computers) to co-develop, share, and exploit knowledge in all its forms (e.g., content, models, services, and behaviors).

(4) *Semantic applications, and things* — concerns objective things such as product structure & behavior viewed empirically. Trend towards hi-bandwidth, intelligent, autonomic, autopoeitic, and autonomously communicating digital products, services, and intellectual property.

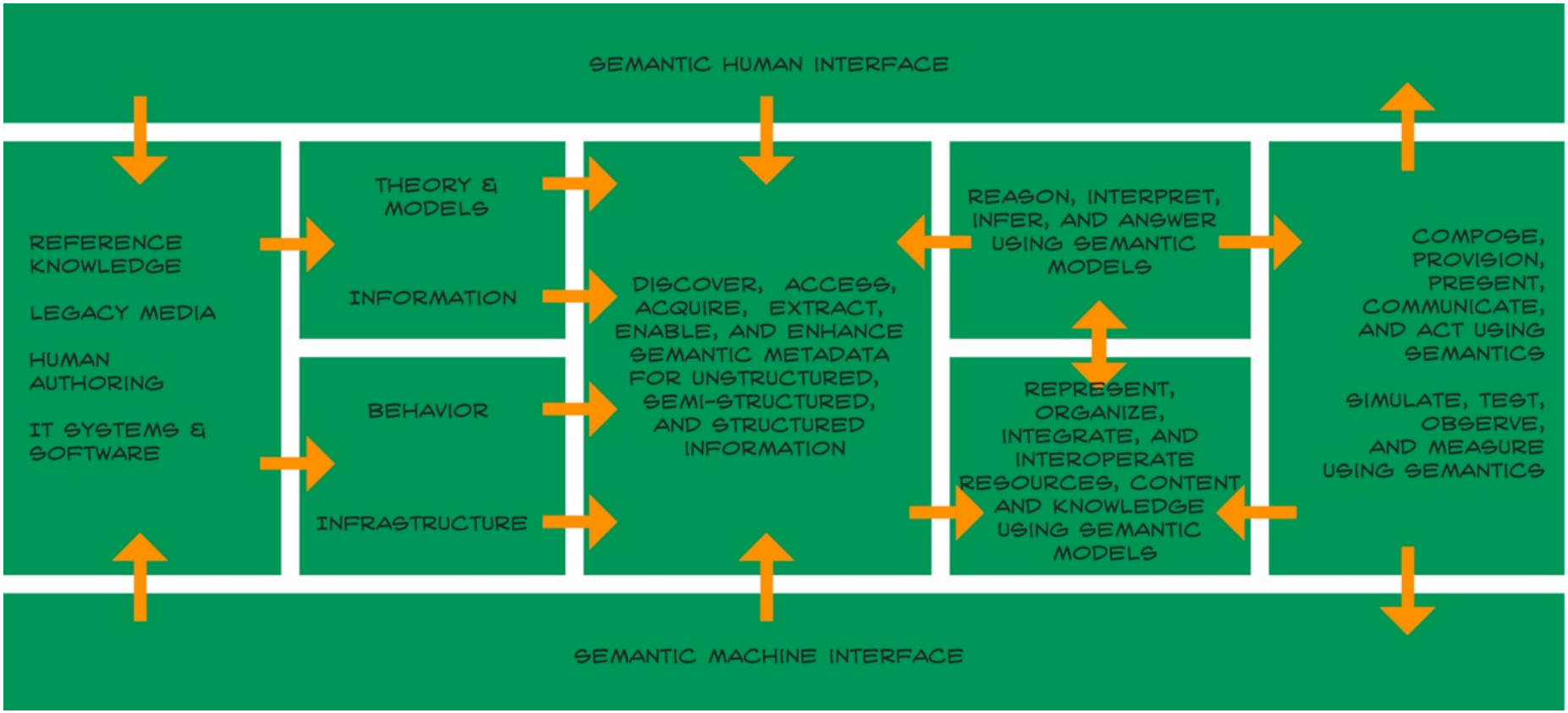
(5) *Semantic infrastructure* — concerns interobjective network-centric systems and ecosystems. Trend towards, everything self-aware, somewhat intelligent, connected and socially autopoeitic, and capable of solving problems of complexity, scale, security, trust, and change management.



Source: Mills Davis

What are the functions of semantic technologies?

Create, discover, represent, organize, process, manage, reason with, present, share, and utilize meanings and knowledge to accomplish business, personal, and societal purposes.



What is social computing?

Putting the “I” in the UI, and the “we” in web.

According to Clay Shirkey, social computing is software that supports group interaction. It’s about augmenting our human social and collaborative abilities.

Something has changed in the Web during this decade of online history... At the beginning it was all about being online; now it’s about socializing the online environment.

It’s not about technology. The addition of human (social) significance to our online interactions is driving the emergence of a real (cyber)social environment, that extends seamlessly to the “real world”.

It’s about people. Their social (networking) activity is going online to be expanded and amplified by network effects, and the viral nature of the information flowing through the Internet.

It’s about social networks. We are getting linked to them, making the Web itself more social (humane).

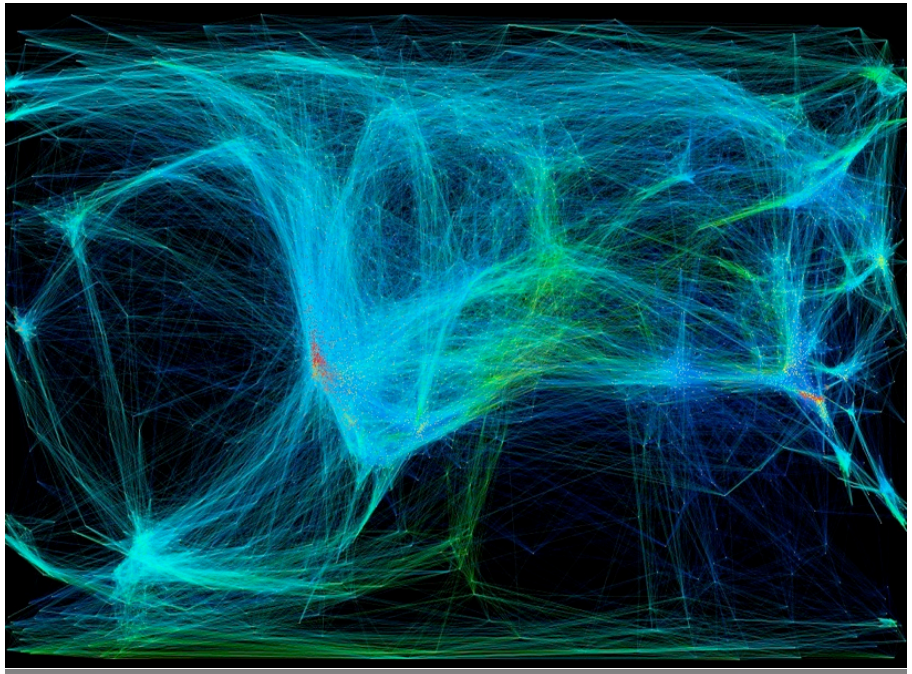
Source: Antonio Fumero

What is semantic social computing?

Using knowledge-centric connecting technologies for social communication, information literacy, and cooperation.

Social computing is software and services that support group interaction. It is technologies of cooperation and techno-socio-economic collaboration. Historically, when social communication media grow in capability, pace, scope, or scale, then people use these media, communication techniques and tools to construct more complex social arrangements and practices that increase human capacity to cooperate at larger and larger scales.

Semantic social computing. Web 3.0 will take social computing to a new level — a semantic fabric for shared development and exploitation of knowledge in all forms, e.g.: content, models, services, & software behaviors. Personal and social computing powered by semantic technologies will add underlying knowledge representations to data, processes, services, and software functionality. A killer app will be collective knowledge systems that provide useful information based on human contributions augmented with structured data from multiple, heterogeneous sources integrated meaningfully, and which gets better as more people participate.

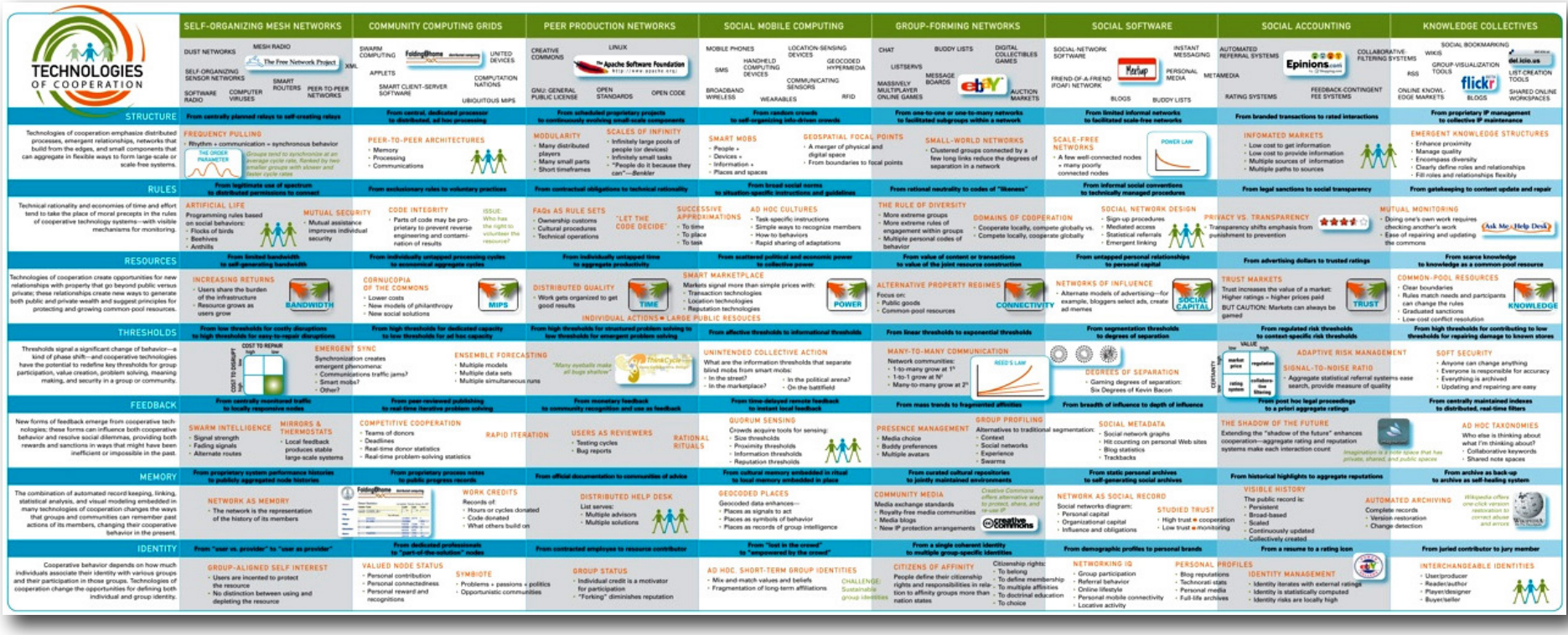


Map of a social network.

Source: Stanford University

What are technologies of cooperation?

Human history is a story of the co-evolution of tools and social practices to support ever more complex forms of cooperative society.



Source: IFTF + Cooperation Commons, Technologies for Cooperation

What are eight technologies of cooperation?

Capability clusters that amplify cooperation.

1 ***Self-organizing mesh networks*** define architectural principles for building both tools and processes that grow from the edges without obvious limits, that distribute the burden of the infrastructure throughout the population of participants, and that establish the foundation for the emergence of swarm intelligence in systems of people and devices.

2 ***Community computing grids*** provide models for recovering currently squandered resources from distributed sources and for providing mutual security within a network of people and/ or devices, supported by explicit choices about when and how to foster cooperation versus competition.

3 ***Peer production networks*** create a framework for volunteer communities to accomplish productive work. These potentially unbounded communities create new value by rapidly solving problems that would tax or stymie smaller workgroups.

4 ***Social mobile computing*** includes a cluster of technologies and principles that allow large or small groups of people—even if they are strangers—to act in a coherent and coordinated fashion in place and space, supported by information accessed in real time and real space.

5 ***Group-forming networks*** represent ways to support the emergence of self-organized subgroups within a large-scale network, creating exponential growth of the network and shortening the social distance among members of the network.

6 ***Social software*** makes explicit, amplifies, and extends many of the informal cooperative structures and processes that have evolved as part of human culture, providing the tools and awareness to guide people in intelligently constructing and managing these processes to specific ends.

7 ***Social accounting tools*** suggest methods and structures to measure social connectedness and establish trust among large communities of strangers, building reputation along dimensions that are appropriate to a specific context and creating a visible history of individual behavior within a community.

8 ***Knowledge collectives*** model the structures, rules, and practices for managing a constantly changing resource as a commons, for securing it against deliberate or accidental destruction and degradation, multiplying its productivity, and for making it easily accessible for wide-ranging uses.

Source: IFTF + Cooperation Commons, Technologies for Cooperation

What are the drivers for semantic social computing?

Semantic Social Computing	
Challenges	Fusion of web 2.0 and Semantic Web. Techno-social-economic collaboration across boundaries. Coping with information overload
Motivation	Lightweight, scaleable, easy-to-use collaboration for content and knowledge development, with governance. Social networking, relationships, communitainment Usites, crowd sourcing, customer generated content, co-creation of value Do-it-yourself applications and services Automation of change management for projects, content, models, and software
End Game	New product categories — social computing fabric for shared development and exploitation of knowledge in all forms, e.g.: content, models, services, & software behaviors Semantic marketing and advertising.
Value vector	Long-tail market economics Efficient support for social computing

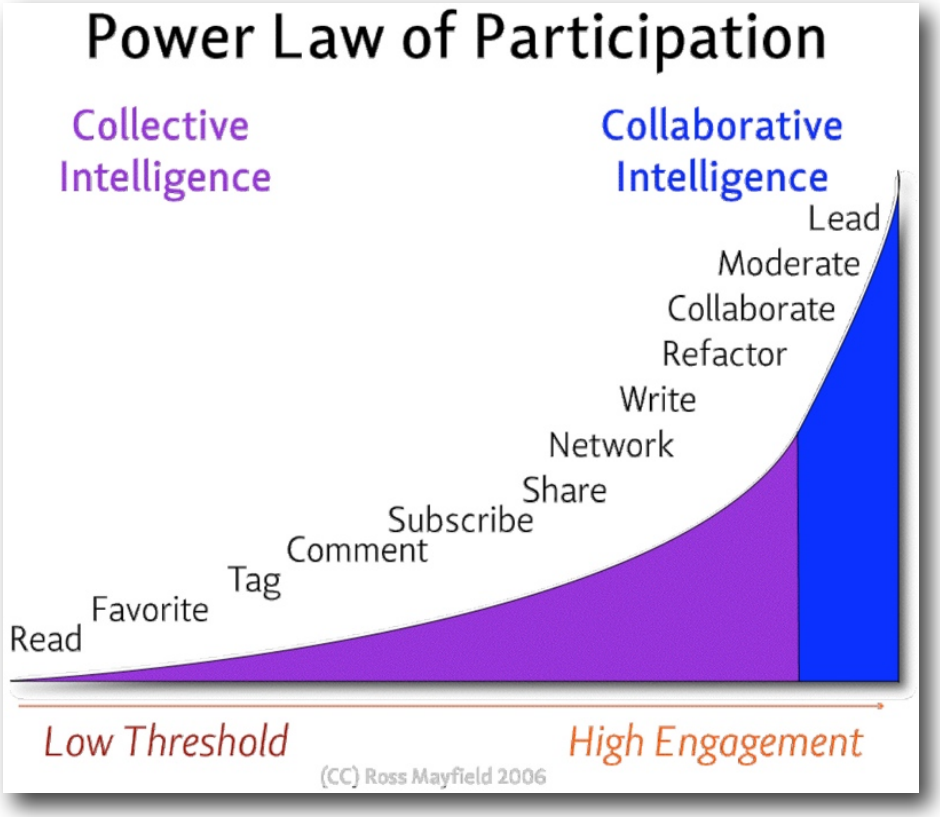
What is the power law of participation?

1% of the people create content;
10% will modify content that's there.

Social software brings groups together to discover and create value. The problem is, users only have so much time for social software. The vast majority of users will not have a high level of engagement with a given group, and most tend to be free riders upon community value. But patterns have emerged where low threshold participation amounts to collective intelligence and high engagement provides a different form of collaborative intelligence.

"Long Tail" economic examples have focused on models of consumption, not production. With consumption, intelligence is largely artificial. Amazonian algorithms guide users down the long tail from Britney Spears to Nobodys, made available without the constraints of shelf space.

But, what will it take to make the tail wag? How can users discover their own power together to either discover something great, or even create it? This report asserts that semantic technologies are key to making this happen by virtue of their ability to model both context and content and to share this knowledge across boundaries.



Source: Ross Mayfield

What is the wisdom of crowds?

Aggregated opinions of the many are smarter than consensus decisions of the few.

The wisdom of crowds thesis is that the many are smarter than the few, and that collective wisdom shapes businesses, economies, societies, and nations. The wisdom of crowds comes not from the consensus decision of the group, but from the aggregation of the ideas/thoughts/decisions of each individual in the group.

The concept has merit. For example, sites like *digg* harness collective judgments to decide the importance of news stories. Google Search uses the number and quality of inbound links to decide a page's importance.

On the other hand, the concept of network effects do not really apply to mashups on Google Maps, or to Basecamp, Writely, 30boxes or any of the other Software-as-a-Service (SaaS) offerings which we associate with Web 2.0.

Similarly, idea of "wisdom of crowds" does not apply to social networks like MySpace, which are about developing and maintaining friendships, although these sites do benefit from network effects.

Source: Google

Source: James Surowiecki

Where do semantic technologies fit in social computing applications?

Semantic instant messaging

Semantic email

Semantic desktop

Semantic blogging

Semantic tagging

Semantic bookmarking

Semantic social networking

Semantic wikis

Semantic usites

Smart mobs

Context-aware gaming

Semantically interlinked online communities

What is semantics-aware instant messaging?

Message, chat, and conference online using a system that understands conversations, keeps track of people, topics & history, searches by concept, & lets you act on messages.

Instant messaging (IM) is a form of real-time communication between two or more people based on typed text that is conveyed via computing devices connected over a network such as the Internet. (Wikipedia).

IM features include: *Instant messages* - send notes back and forth with a friend who is online; *Chat* - create a custom chat room with friends or co-workers; *Web links* - share links to web sites; *Images* - look at an pictures stored on another's computer; *Sounds* - play audio; *Files* - send and share content; *Talk* - use the internet instead of a phone; *Streaming content* - real-time or near-real-time feeds (e.g. news, stock quotes, events, etc.).

Semantic instant messaging uses knowledge models to identify, log, elicit context, semantically categorize, archive, search, and share content and knowledge about these messages making IM more useful with other personal and social applications. SPARQL queries access semantic metadata such as message id, sender, receiver, date & time, message content, history, and add other semantic annotations and profile information encoded in RDF or OWL.

Source: Frank Osterfeld, Malte Kiesel, Sven Schwarz

What is semantic email?

Profiles, threads, topics, contents, and addresses that both humans and machines can interpret and take action on.

Semantic email understands the messages received, and performs corresponding actions according to a schema or semantic model specified in the semantic email system.

The objective is to make emails both human- and machine-understandable in order to simplify many common email related tasks, e.g.: collecting information from a group of people; organizing email by message content, topics, and task as well as by sender and receiver profiles; handling schedule/event information; automating follow-ups and updates; and answering frequently asked questions.

Semantic addressing identifies recipient(s) by concepts, properties, roles, and criteria, rather than character strings.

Semantic querying obtains specific information from others (e.g. personal profile, calendar microformat, project ontology). Semantics enable generating automatic answers to common questions (e.g., what is my phone number, or directions to my office?).

Semantic searching accesses email by concepts, relationships, and context.

Updating: We can extract content and semantic metadata from email and link these concepts with other knowledge models and information sources. This allows adding data in context to some source, e.g., a wiki web page with discussion threads by topic, or a semantic content repository for managing email attachments, or an actionable alert or message to a task or software service.

Semantic processes use semantic email messaging to manage simple but tedious manual tasks, trigger actions, and communicate status.

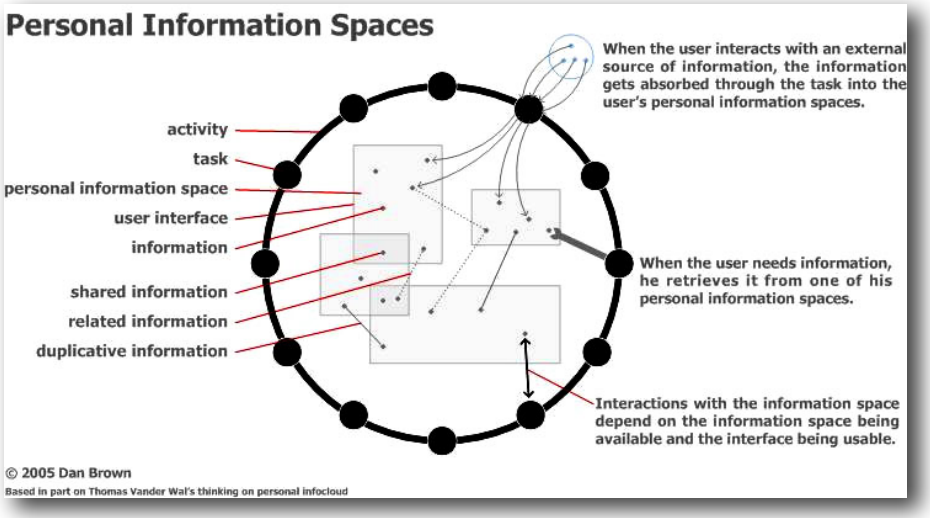
Source: Mozilla Thunderbird

What is a semantic desktop?

Managing every piece of information a person encounters through their computer using ontologies.

Semantic desktops manage more than just calendars, contacts, process support, and e-mails. A semantic desktop provides rich features for organizing, interrelating, integrating, and sharing all sorts of personal information from standard applications. It does this through the use of ontologies, or knowledge models, that provide:

- a representation of abstract concepts: *Love, Rome, Acme*
- a representation of concrete, addressable resources: *"w3c homepage at www.w3.org"*
- a representation of documents: *"the document at http://www.w3.org/"*
- multiple names for a thing: *"Love", "Liebe", "W3", "WWW"*
- same name for two different things: *"Apache - helicopter", "Apache - software"*
- class-subclass relations: *a subclass has all properties of the superclass + its own*
- class-instance relations
- part-of relations: *the city of Rome is part of Italy*
- related information: *Spaghetti is related to Italy*
- data properties to describe details: *Rome has a population of 2.8 million*
- document-has-topic: *the document "http://www.w3.org/2001/sw" is about the "Semantic Web"*
- a representation of time: *the document was created in 2005. The project started on 1.1.2006*
- a representation of location: *geospatial coordinates, maps*



Source: Leo Sauermann

Source: Dan Brown

What is a semantic blog?

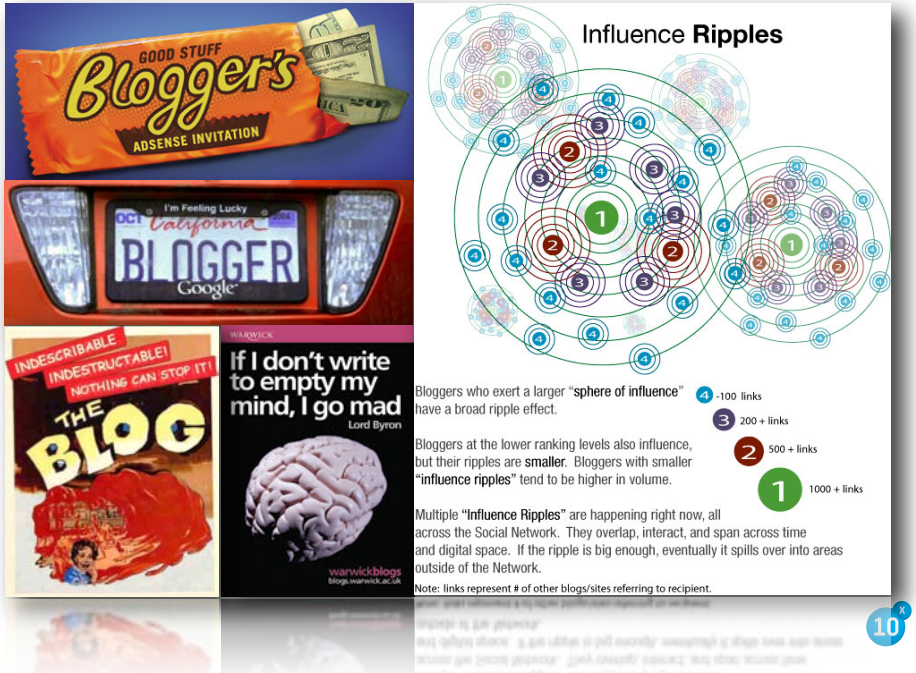
Personal web journal enhanced with machine interpretable semantic annotations and personal ontologies.

Blogs are “diary” type online sites, with new postings published regularly (daily, weekly) by individuals or groups. Postings are generally a mixture of personal thoughts, pictures, video, and web links.

Semantic blogs add semantic metadata to posts. These annotations associate concepts, relationships and other structured information to the content, e.g., contact details of a person, the date and venue of a conference, bibliographic data about a paper, etc.

Semantic blog authors reference objects from desktop applications and annotate blog posts with these objects. Computers process semantic annotations realized as RDF resources or microformats. Semantic blogs syndicate this metadata over RSS. This embeds “intelligent findability” into blogging so that others get more from the information, ideas, and analyses the blog provides. Semantic blogging lets authors and readers intelligently research feeds and posts, aggregate relevant content, find connections between posts on different blogs, and build dynamic social networks and collected knowledge systems with extended influence in the blogosphere.

Semantic blog capabilities include: (a) *semantic view* — adjusting blog presentation in a semantically appropriate manner; (b) *semantic navigation* — browsing semantic connections (e.g., ‘more like this’); (c) *semantic query* — concept-based search e.g., give me papers written by X; and (d) *personal ontology* — linking data from many different perspectives — author, location, time, etc. — as well as to external contexts (what friends like).



What is semantic bookmarking?

Associating links to web resources with externally represented concepts in a domain ontology.

Bookmarks are shortcuts that enable quick access of the desired Web content on a specific web page.

Semantic bookmarks associate the content in web pages, even from different websites, with externally represented concepts in a domain ontology.

This semantic layer may be imported as predefined then linked to resources, semi-automatically defined through machine learning, or manually created.

Defined associations between concepts and links make semantic bookmarks resilient in the face of structural changes to web pages, and searchable based both on concepts and relationships.

Source: Douglas Johnston

What is a semantic tag cloud?

Folksonomy + semantic relationships mapped between tags, users, and site resources.

Tags are descriptive words applied by users to links. Tags are searchable. Tagging is a way to create metadata through human collective intelligence. Individuals express their interests. Groups leverage social networks through collaborative tagging.

A *folksonomy* is a tag cloud with frequencies of tags that emerges from a spontaneous, collaborative work to categorize links by a community of users. Its basic elements are user, tag cloud, tag and resource.

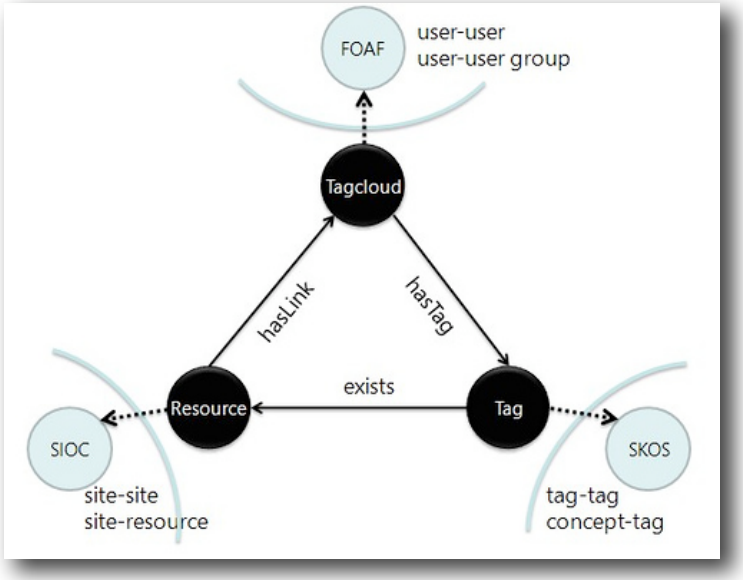
"*Semantic tag clouds*" extends the concept of folksonomy to represent the structure and semantics of a collection of tags, and the social networks among users, based on the tags.

FOAF (Friend of a Friend) concepts can describe human or machine agents, which generate tags, as well as relationships among users.

SKOS (Simple Knowledge Organization Systems) and Topic Maps concepts can provide a semantically rich way to specify the concept of a tag and the relationships among tags in a given social space.

SIOC (Semantically Interlinked Online Community) concepts can describe site information, relationships among site-resources, and site-site relationships.

Semantic tagging maps relationships between tags, enables tag meta-searching to look for similar patterns of tagging between users and tag clouds, and allows sharing and faceted navigation across community content.



Source: DERI

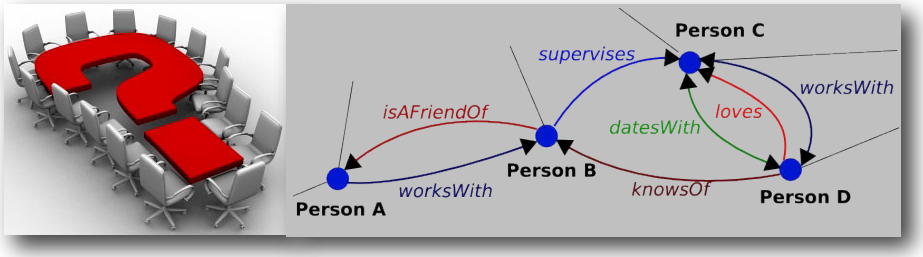
What is a semantic social network?

Web of people, content, sites, and profiles that machines help humans build, interrelate, communicate with, & enjoy.

A *social network* is a map of the relationships between individuals, showing ways they are connected through various social familiarities ranging from casual acquaintance to work, to close familial bonds. Social networking websites allow users to create a profile and connect that profile to profilesof other users.

Semantic social networks extend the concept of social computing and content syndication with explicit semantic descriptions of people, sites, and content and new functionality such as: (a) *Personal profile generator*; (b) *Blog / comment / content reader*; (c) *Search / aggregation tool* ; (d) *Authoring tool* that publishes blog posts plus a content syndication (RSS) file that also (automatically) includes references to the author's personal profile (FOAF) and the FOAFs of any cited authors; *(e) Other tools* to create and join communities, auto-tag contributions and enable the body of a person's contributions to be seen in a single place.

Combining semantic technologies with Interest-based social networking has important market space implications. One is reinvention of magazines. They become micro-segment subject-oriented, participatory, customer created media. Another is brand and domain driven social networking by businesses, religions, political parties, hobbyists, professional societies, trade associations and other groups.



Source: Stephen Downes

What are smart mobs?

Groups of people who meet online to complete tasks that they jointly consider important.

Smart mobs are groups of people who meet online to complete tasks that they jointly consider important. This happens often in the gaming world, where players organize to build new objects or levels for games. Other groups self-organize to achieve political ends, lodge protests, or solve puzzles.

Mobile devices connect them with other information devices in the environment as well as with other people's telephones and computers. Dirt-cheap microprocessors embedded in everything from box tops to shoes are beginning to permeate furniture, buildings, neighborhoods, products with invisible intercommunicating *smartifacts*. When they connect the tangible objects and places of our daily lives with the Internet, handheld communication media mutate into wearable remote control devices for the physical world.

What are social operating systems?

Software platforms enabling systematic management and facilitation of human social relationships and interactions.

Social networking sites are opening their platforms to outside developers. So are communications services, game sites, and business sites. What's next?

Some key capabilities of an ideal "social operating system" would include: (a) *Identity management* — open portable identity, personal profiles ("personas"), and privacy control; (b) *Relationship management* — includes directory and lookup services (location of people to communicate with), social networking (opt-in relationship formation, indirect social connectivity via social networks), and spam control; (c) *Communication* — person to person communication (e.g., IM, VOIP, email, SMS) and group communication such as conferencing and group discussions; (d) *Social content distribution* — personal publishing (blogging, home pages) and public content distribution;

(e)*Social coordination* — event management, scheduling, invitations, RSVP's, and calendaring; (f) *Social collaboration* — file sharing, document collaboration (communal authoring/editing), collaborative filtering, recommendation systems, knowledge management, human powered search, project management, and workflow; and (g) *Commerce* — classified advertising, auctions, and shopping.

Source: Nova Spivak

What are collective knowledge systems?

Web 3.0 “killer apps”.

Collective knowledge systems are a new class of application that combine strengths of the social web (web 2.0) with the semantic web. The social web is an ecosystem of participation, where value is created by the aggregation of many individual user contributions. The semantic web is an ecosystem of data, where value is created by the integration of structured data from many sources. Precursor examples include: *FAQ-o-Sphere* - self service Q&A forums; *Citizen Journalism* – “We the Media”; *Product reviews* for gadgets and hotels; *Collaborative filtering* for books and music; and *Amateur Academia.*

Key properties of collective knowledge systems are:

(a) *User generated content* — the bulk of the information is provided by humans participating in a social process. A database or expert system, in contrast, gets the bulk of its information from a systematic data gathering process.

(b) *Human-machine synergy* — The combination of human and machine capacity to provide useful information that could not be obtained otherwise. These systems provide more domain coverage, diversity of perspective, and sheer volume of information that could be achieved by searching “official” literature or talking to experts.

(c) *Increasing returns with scale* — As more people contribute, the system gets more useful. The system of rewards that attracts contributors and the computation over their contributions is stable as the volume increases. In contrast, a text corpus and simple keyword search engine does not get more useful when the volume of content overwhelms the value of keywords to discriminate among documents. Similarly, if the reward system encourages fraud or fails to “bubble up” the best quality content, the system will get less useful as it grows.

(d) *Emergent knowledge* — The collective knowledge system enables computation and inference over the collected information, leading to answers, discoveries, or other results that are not found in the human contributions. Emergent knowledge is not magic. In fact, normal science works this way: scientists read the literature, talk with colleagues, synthesize new ideas, and “bubble up” the best work through the peer review process. Science is not a collection of knowledge; it is a system for creating it.

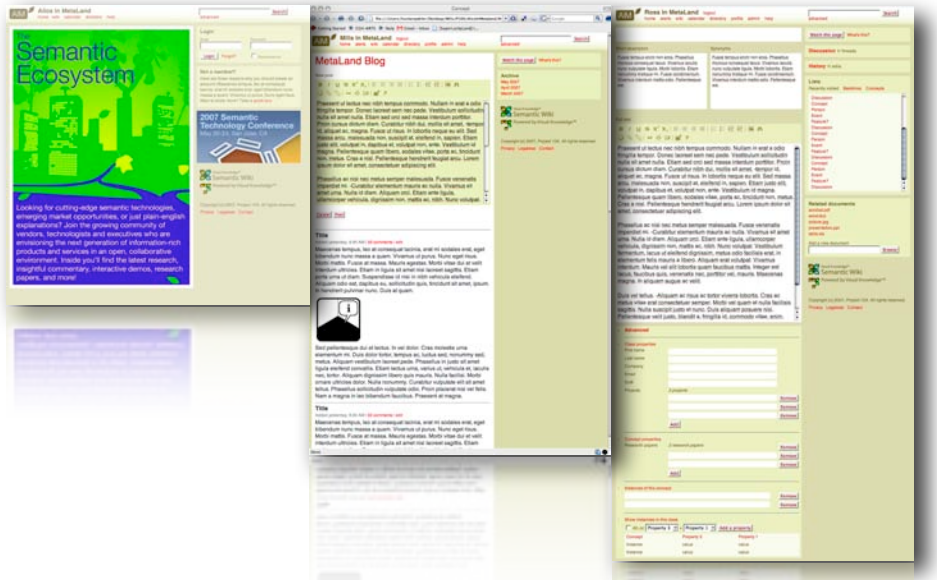
Source: Tom Gruber

What is a semantic usite?

A collaborative website with predominantly user generated content linked to a machine-interpretable knowledge model.

A *usite* is a read-write website with predominantly user generated content. Examples such as mySpace, and uTube come to mind, but there are many other usites that are more interest-specific. Usites may support tagging and folksonomy as a way of accessing information of interest.

A *semantic usite* extends this idea by adding collaborative machine-interpretable, conceptual-level knowledge to the site to organize and interrelate content in the site and facilitate access to, navigation of, and dynamic reporting of information. Metaweb's Freebase illustrates this principle. Semantic usite knowledge representations are created by the community manually and semi-automatically.



Alice in Metaland is a semantic usite for all things web 3.0. This figure shows preliminary design comps: splash page, blog page, and concept page.

Source: James Huckenpahler

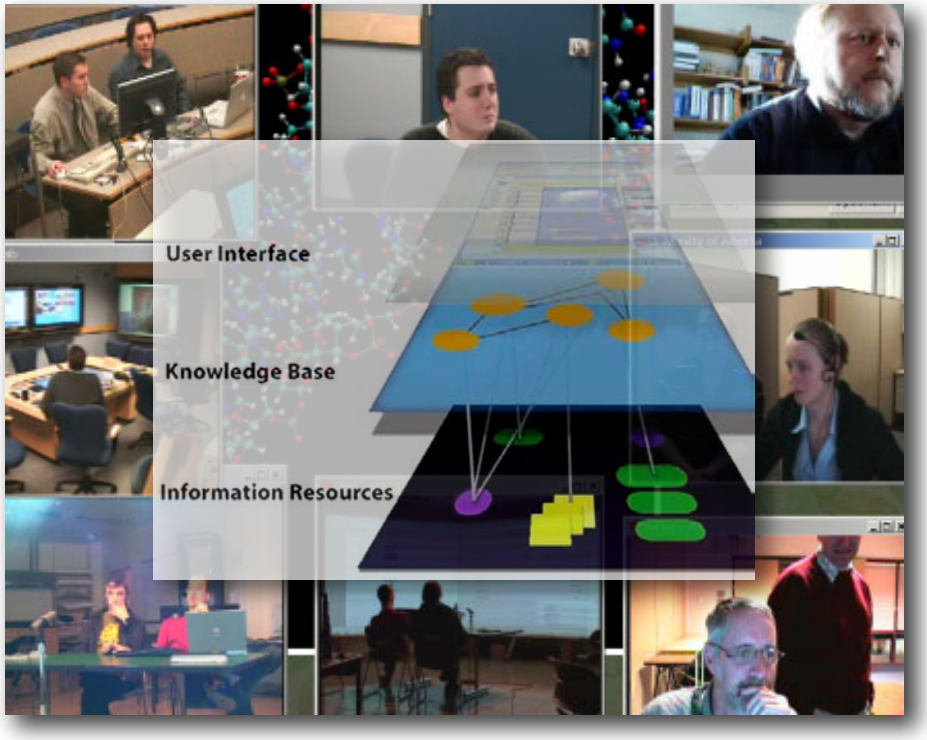
What is a semantic wiki?

A read-write website that includes an underlying model of the knowledge described in its pages.

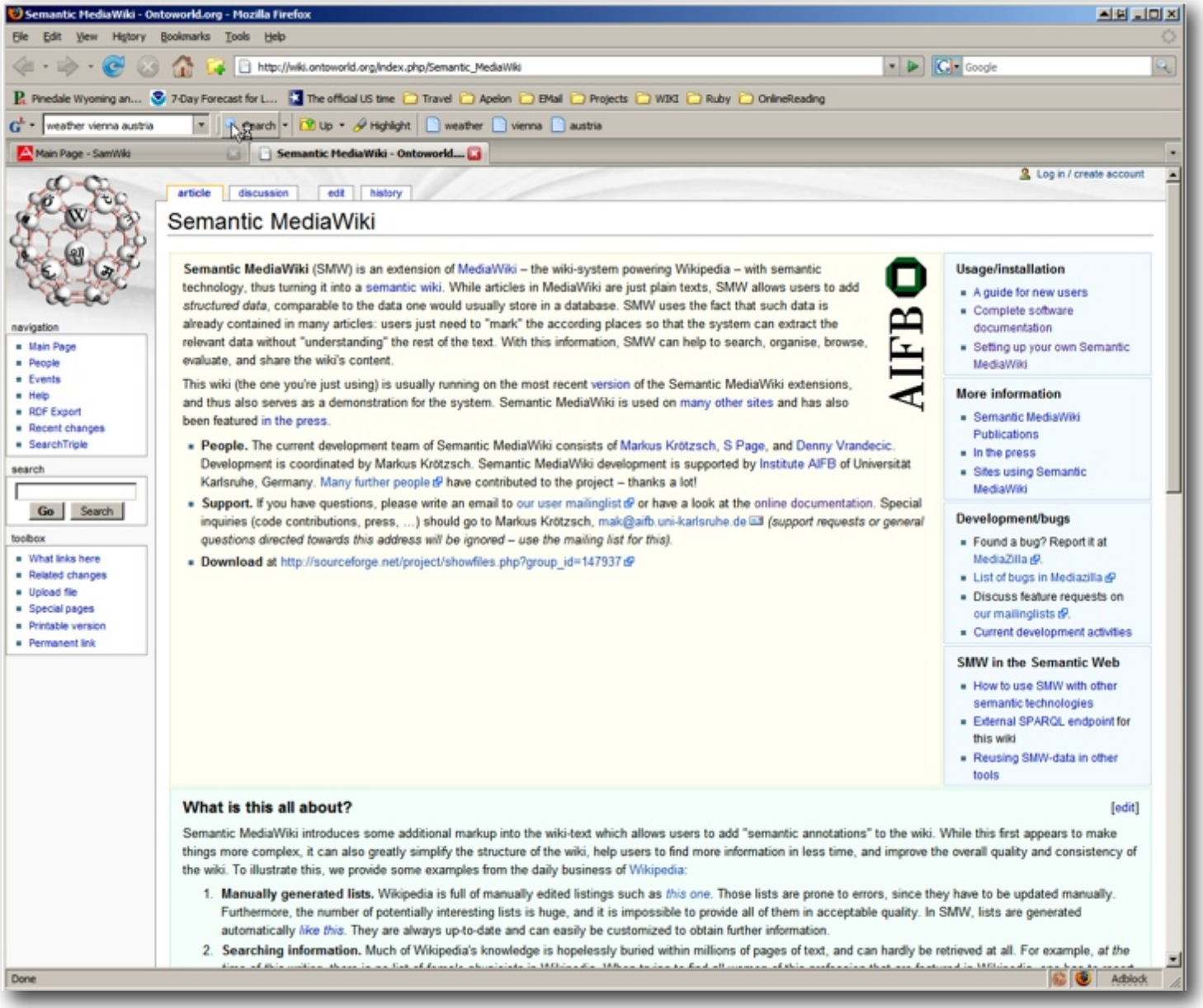
A Wiki (from WikiWiki, meaning ‘fast’ in Hawaiian) is read-write website consisting of a set of linked web pages, created through the incremental development by a group of collaborating users. Also, it is the software used to manage the set of web pages. A Wiki: (a) enables web documents to be authored and edited collectively; (b) uses a simple markup scheme; (c) allows for review and governance, and does not publish content instantly, once an author submits an update to the Wiki engine; (d) generates new web pages when users create hyperlinks that point nowhere.

“A wiki is more than software that enables multiple people to edit web sites. It is a metaphor for a new era of collaboration and participation. A new art and science of collaboration is emerging — we call it “wikinomics.” (-Don Tapscott)

A *semantic wiki* extends the concept of a wiki to include an underlying model of the knowledge described in its pages. Regular wikis have structured text and untyped hyperlinks. Semantic wikis capture and identify further information about topic pages and their relations (i.e., semantic metadata). This knowledge model is expressed in a formal language, so that machines can process it.



What is Semantic MediaWiki?



What capabilities does a semantic wiki provide?

So many good things, it'll make your head spin.

Semantic wikis enhance collaboration and information sharing by providing concept-based rather than language-based searching. Queries can span vocabularies, languages, and search engines. Also, overlay ontologies and knowledgebases can integrate with major web searching engines. Question answering rather than simple retrieval becomes possible.

Semantic wikis provide richly structured content navigation, including multiple views or perspectives, multiple levels of abstraction, dependency/contingency relationships, etc.. It is possible to provide alternative, context-specific visualization, presentation, and editing of content structure (categories, taxonomies, semantic nets, models etc.).

Semantic wikis allow mining of relationships in content. Wiki content can link with external repositories, file systems (e.g. personal desktop, enterprise servers, web sources, semantic-enabled feeds [e.g. RSS]) Also wiki content can link to dynamic models, simulations, visualizations, and services.

Semantic wikis provide rich user access/rights models, including reputation systems. These are implemented at the level of individual concepts, not just user roles.

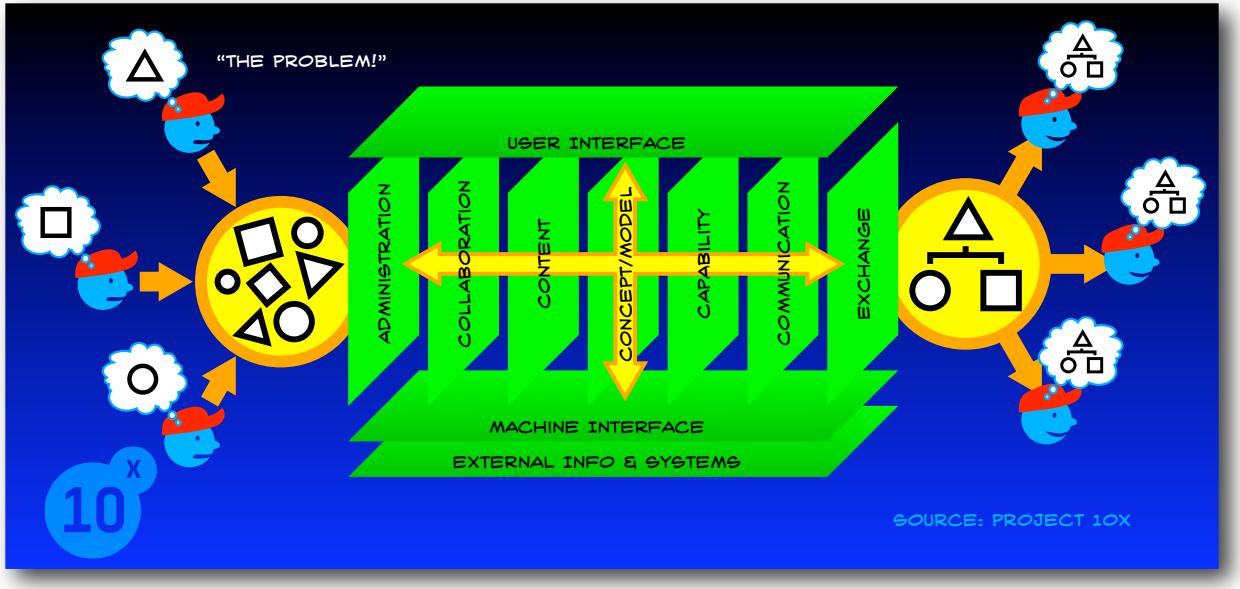
What is a semantic agent wiki?

Web 3.0 platform for collaborative content creation, knowledge management, and software development.

A semantic agent wiki is a unified environment where individuals with diverse skills and expertise can collaborate.

Each person contributes using the form of knowledge expression they understand best such as documents, drawings, pictures, models, software behaviors, user interface designs, etc. — yet all have visibility into all the underlying concepts and relationships.

Versioning and change management are automated, so that the community can jointly create, understand, manage, and evolve their solution together.



This figure depicts functional dimensions of a semantic agent wiki: (a) Administration determines who can do what in the wiki — policies, roles, access, security, governance; (b) Collaboration is how people work together — meetings, events, group activities, project management, threaded discussions; (c) Content functions include authoring & editing natural & visual language, all formats: data, text, tables, artwork, imagery, etc.; (d) Concept and modeling allow working with the structure of information and knowledge — standards, schemas, taxonomies, thesauri, entities, attributes, relationships, models, rules, axioms, ontologies; (e) Capability modeling is putting knowledge to work in the form of software behaviors, agents, and active functionality; (f) Communication features are the essence of the user experience—browser, website & multimedia UI; (c)Search & navigation. Contextual speech acts (people & machine); and (g) Exchange services share capabilities, models, and content in the form of secure, sharable, reusable, recombinant knowledge assets.

Source: Mills Davis

How do humans encode thoughts and share knowledge and meanings?

By using language(s).

Language is a system of signs, symbols, gestures and rules used in communicating. Meaning is something that is conveyed or signified.

Humans have plenty of experience encoding thoughts and meanings using language in one form or another… Our proficiency varies. We tend to be better at some kinds of language, and not so good at others.

Project teams often combine different skills and expertise, e.g. to make a movie; design and construct a building; or coordinate response to an emergency.

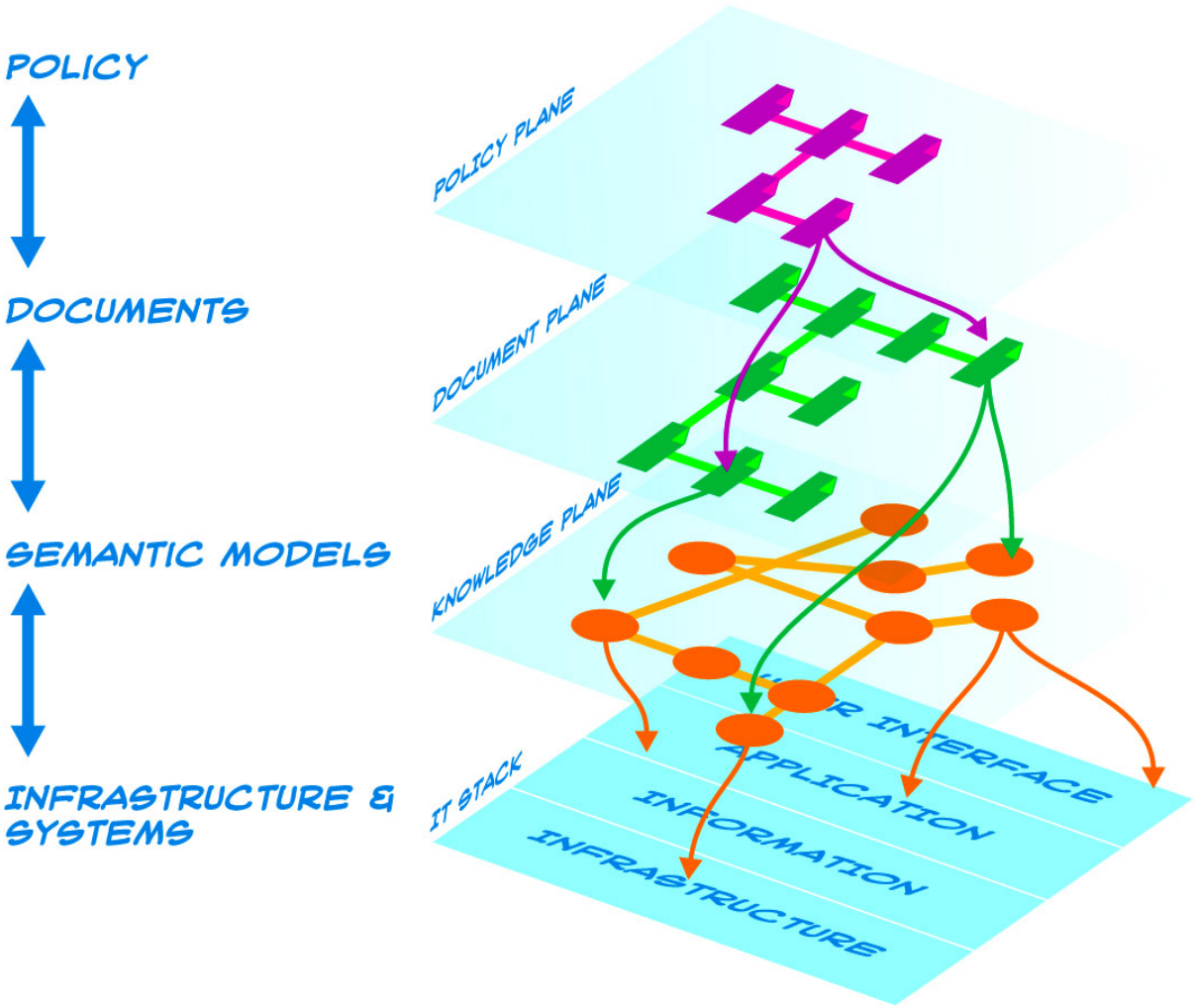
Unfortunately, our computer applications are hardwired much like electronic pencils that can only manipulate the symbols of one or another of these languages, without understanding what these languages express, let alone understanding how to interrelate one form of language with another.

This figure lists and gives examples of five forms of human language: natural, visual, formal, behavioral, and sensory language.

Natural language	Documents, speech, stories
Visual language	Tables, graphics, charts, maps, illustrations, images
Formal language	Models, schema, logic, mathematics, professional and scientific notations
Behavior language	Software code, declarative specifications, functions, algorithms
Sensory language	User experience, human-computer interface

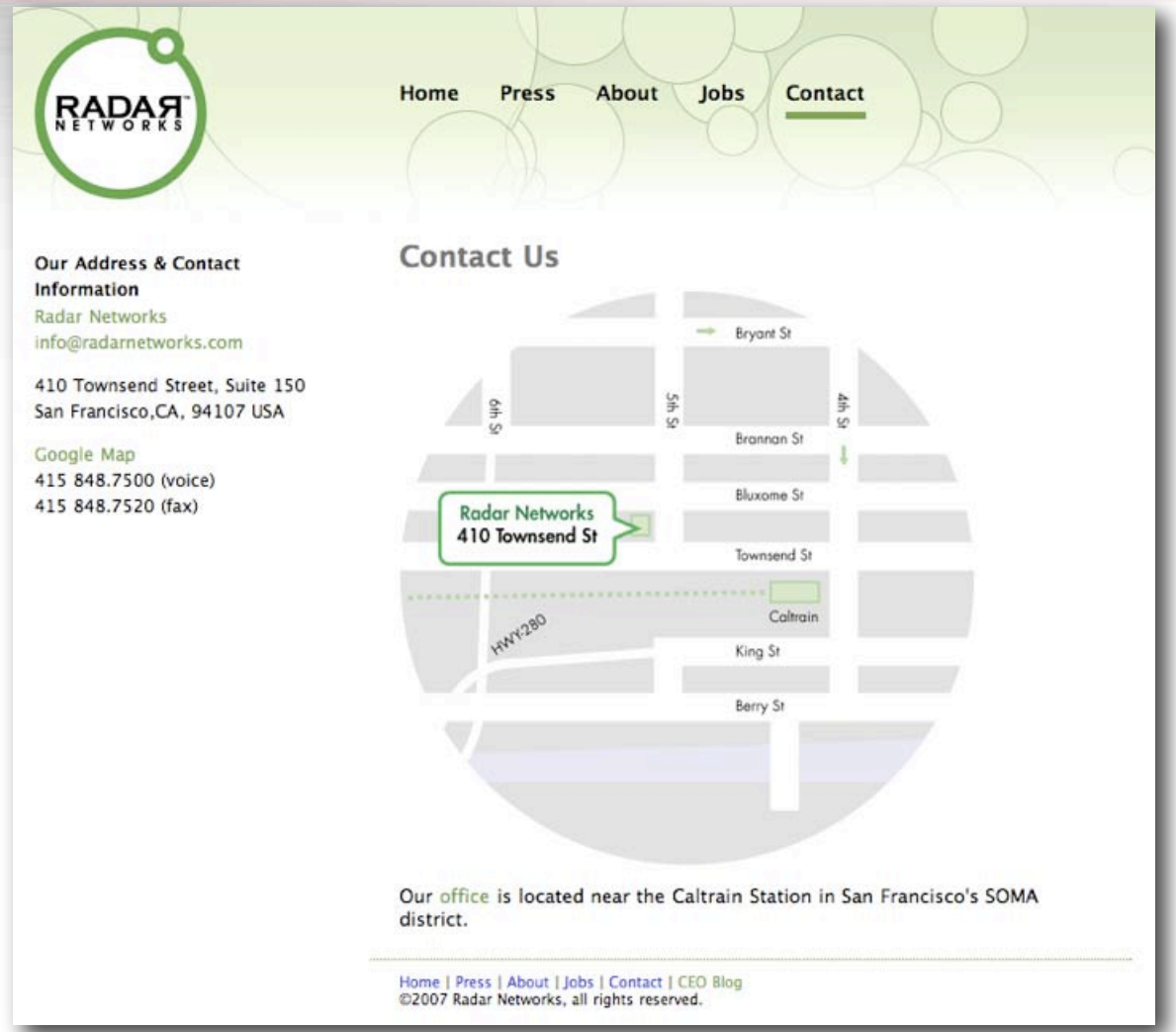
Source: Project10x

Using semantic technologies, we can manage knowledge at the level of concepts across documents, models, software systems, and infrastructure.



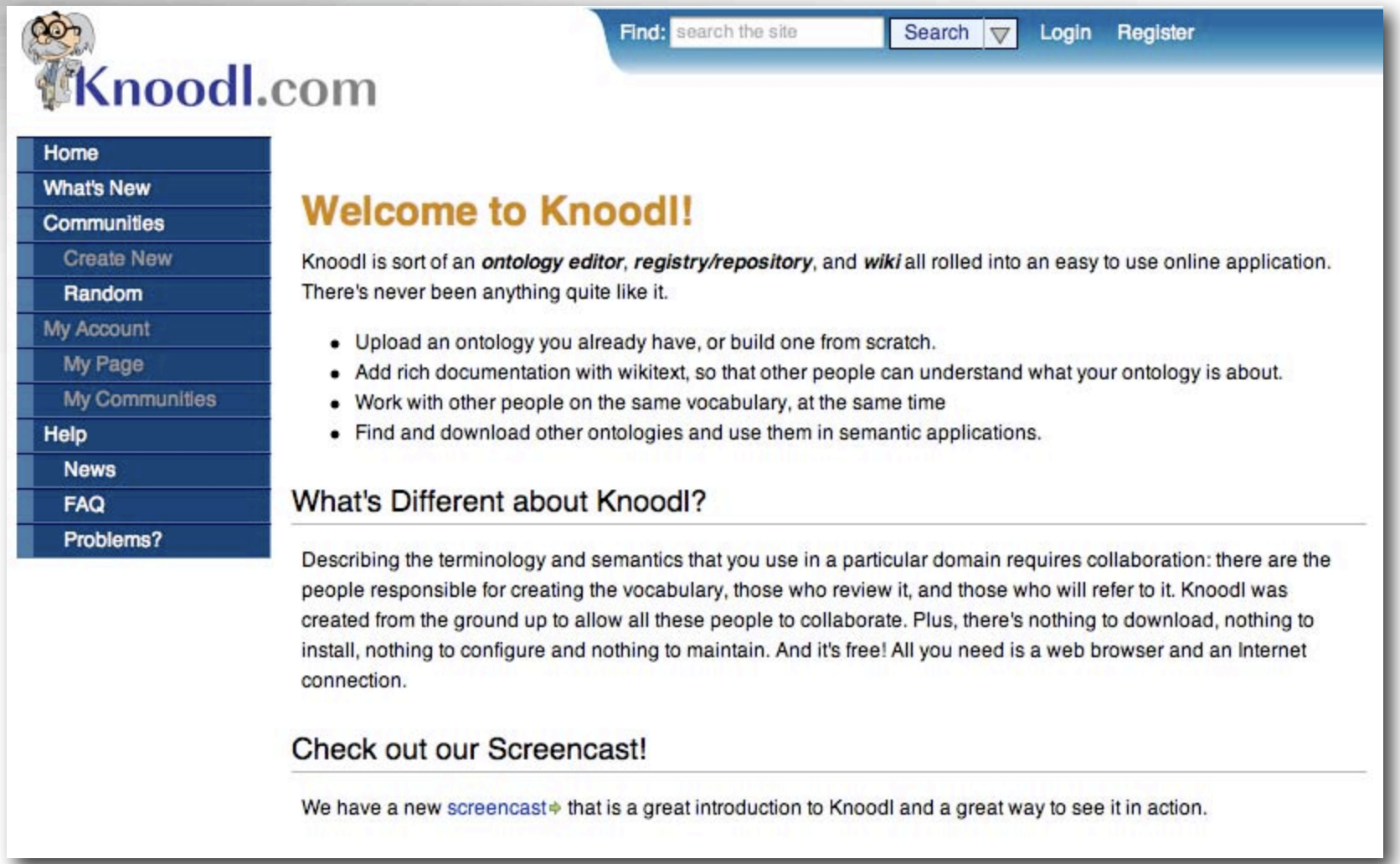
RADAR NETWORKS

Web 3.0 collaborative knowledge platform

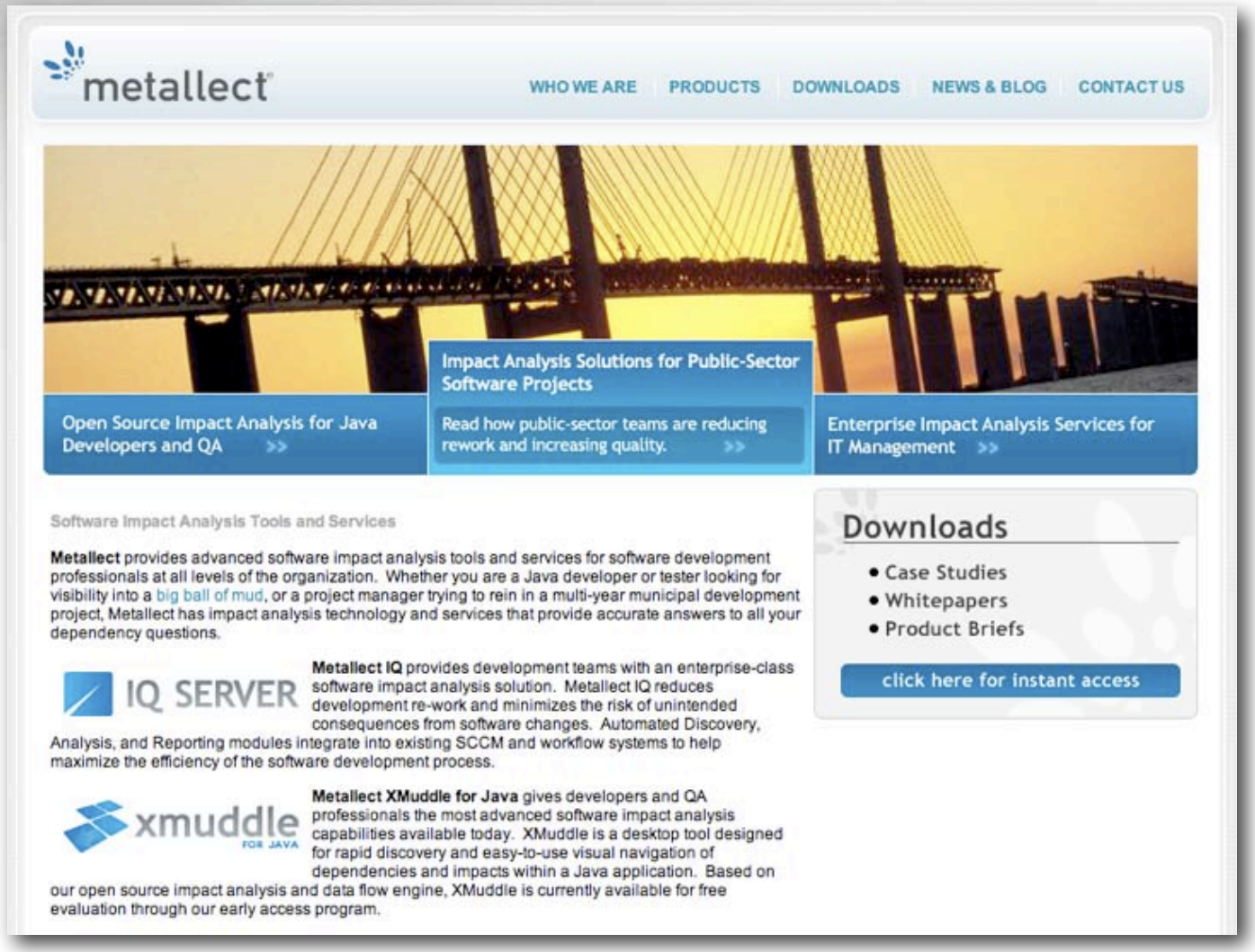


REVELYTIX “Knoodl”

Semantic wiki for collaboratively managing vocabularies & ontologies using OWL



METALLECT
Semantic discovery of IT artifacts.



PRAGATI RESEARCH
Clustering technology for semantic analysis.

SCHEMALOGIC
Business Semantics Management.

VISUAL KNOWLEDGE
Web 3.0 semantic agent wiki development environment.

DIGITAL HARBOR
Semantic application platform.

Questions?