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2006 Semantic Technologies Conference

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Summary: *A summary look at the Second Semantic Technologies Conference.*

Is March 2006 a watershed for the Semantic Web?

While it is certain that February 2004 will always be seen as the strategic starting point for the Semantic Web as any kind of practical technology with the release of the W3C Web Ontology Language (OWL) Recommendations, it is less certain, two years later, whether March 2006 is also such a landmark.

My opinion is that it may, in fact, be more of a watershed, and it needs to be recognized.

We knew that OWL was coming, and regardless of your opinion of its usability or limitations, it gave us something to work with, and elevated the discussion and the Semantic Web development work from the realm of vaporware to early releases in the renewed, but ever-present, race to market.

However, who knew that the second annual Semantic Technologies Conference would feature such a range of application areas being addressed by developing products and services actually beyond the alpha stage?

In fact, as with the explosive birth and rapid development of the Web itself, we do see a bit of a race to make the most of a waiting infrastructure ready to be exploited, though perhaps without the wild and woolly, as well as overhyped, dot-com bubble riding atop an over-extended bull market.

The waiting infrastructure I refer to is the still relatively untapped broadband-enabled market in which keyword-based search technology seems a rather amazingly inadequate match to the power of both the broadband network and the current generations of multi-gigahertz CPUs powering n-tiered architectures. Additionally, we now see vendors sprouting SOAs (service-oriented architectures) as fast as their marketing efforts can spout hypersteam. Yet even these ambitious stratagems hardly come within sight of the performance horizon or envelope of the newest systems with their multi-gigabyte multi-media chipsets, let alone the advent of 64-bit processing.

However, March has also seen what might be the single most significant event in the short history of the Semantic Web, the Upper Ontology Summit held March 14, 2006 during "Interoperability Week" at the National Institute of Standards and Technology (NIST) in Gaithersburg, Maryland. [See Sidebar: [What is an Upper Ontology and What Do You Do at the Summit?](#)]

Let's take a summary look at the Second Semantic Technologies Conference and glean what we may from its broad outlines and a few samples of its sessions.

Is the cavalry riding over the hill?

Professor James Hendler, director of the Joint Institute for Knowledge Discovery, University of Maryland, noted as one of the inventors of the Semantic Web and as a

member of the World Wide Web Consortium (W3C) Semantic Web Coordination Group, and Ora Lassila, Research Fellow, Nokia Research Center, an elected member of the W3C Advisory Board and a co-author of the Resource Description Framework (RDF), gave the Opening Keynote: "SemWeb@5: Current Status and Future Promise of the Semantic Web."

As founders, they reviewed the Semantic Web effort five years after their initial article on it as two of three authors in a Scientific American paper. As usual, many unanticipated developments occurred, such as:

- Early corporate interest and moderate support even before OWL was released;
- Semantic Web technology companies starting and growing, including Cerebra, Siderean, SandPiper, SiberLogic, Ontology Works, Intellidimension, Intellisophic, TopQuadrant, Data Grid; and,
- Bigger players buying in - Adobe, Cisco, HP, IBM, Nokia, Oracle, Sun, Vodafone;
- SparQL (Sparkle) RDF Query Language to make OWL more effective; and
- Level of RDF Triple-Stores in tens of thousands and growing much sooner than expected.

There also were a number of anticipated, or advocated developments that have yet to be realized such as:

- Open Source Tools
- Open Source Datasets
- Open Source Harvesters
- Independent Semantic Agents

Additionally, Hendler and Lassilla identified new needs for which solutions will build new technological opportunities, such as using the emerging connections provided in Semantic Web Services and Semantic Web Services Rules Language as the "plumbing" for more "intelligent" semantic agents.

Dr. Deborah L. McGuinness, co-director, Knowledge Systems Laboratory, Stanford University, gave a mid-conference Keynote: "Making Web Applications Trustable."

A key point of this keynote is that with the inferencing capabilities of the Semantic Web enabled by OWL comes a need to verify information context, such as recency of the data for some set of information that is used for decision-making. Thus, the parameters for "trust" extend beyond security as the Semantic Web develops. This requires IT thought leaders and early adopters to be mindful of this as they develop software in general, and for decision-support in particular.

Business development, strategic marketing and proposal development consultant, researcher, industry analyst and systems integrator, Mills Davis gave the closing keynote: "Semantic Wave 2006 - A Guide to Billion-Dollar Markets."

Mills pointed out that "The semantic wave will accelerate from vision and R&D to early adoption and mainstream markets valued in tens of billions of dollars by the end of this decade." This point is well documented and explained in a way that arms potential investors with a well-grounded starting point from which to explore the possibilities of this developing market.

Of particular interest to the nontechnical audience was the presentation by Dave McComb, "Semantics in Perspective," which gave a broad overview of the field and how it relates to other recent technologies such as XML, XML Schema, RDF and RDF Schema as well as emerging technologies such as the W3C's Semantic Web Rules Language (SWRL). Further, this presentation explored the application opportunities inherent in these developing standards. This presentation served as the layman's introduction to what might otherwise be utterly bewildering and wrapped it up with a summary of how and why it is important to business.

In a similar vein for the tech-savvy audience, Elisa Kendall of Sandpiper Software, Inc. teamed up with Dr. Deborah McGuinness on a joint presentation, "Ontology 101," which put the spectrum of current semantic technology standards and practice into a common perspective before giving her solo presentation on the OMG Ontology Metamodel Definition (ODM) effort.

ODM attempts to unify the realm of ontological metadata and is part and parcel of OMG's Model Driven Architecture (MDA). Because this fits into the now-well-known Zachman Enterprise Architecture (EA) Framework, it becomes a prime piece of IT real estate because it bridges the gap between standards, such as OWL and SWRL, and the more familiar realms of CRM (customer relationship management), HR (human resources), SCM (supply chain management), etc., for the business market.

This will allow tools using OWL and SWRL to help manage the enterprise IT infrastructure and policy as a unified whole. This places ontology and knowledge-base analysis at the service of management application integration (MAI) in a policy-based architecture. For the less technical reader, this means that major improvements are in store for practical enterprise-wide IT Integration, and that will cut down the cost of upgrading systems into the future.

Title sponsor Oracle was represented by several presentations, including the presentation by Dr. Susie Stephens, PhD, who joined Oracle in 2002 to lead the development of the Database, Application Server and Collaboration Suite. Her presentation was entitled: "The Semantic Web for Life Sciences."

This field is particularly important for pharmaceutical research and discovery and holds great promise, through the inclusion of the Oracle 10gR2 Database RDF Data Model in the Enterprise Edition, for taking advantage of the power inherent in semantic technologies as normal, accepted practice, accessible through standard interfaces (e.g., JDBC).

The field of health informatics was also represented by Mark Musen, M.D., of Stanford Medical Informatics, who gave a presentation covering two new nationally funded efforts which advance the science of ontology on which the Semantic Web rests - "New National Centers for Ontologies and Ontological Research: Growing a Network for Advanced Research in Semantic Technologies."

The new National Center for Ontological Research (NCOR), which Dr. Musen co-directs with professor Barry Smith of Buffalo University, and the National Center for Biomedical Ontology (cBio), which he leads, stand to bring the rigors and reliability of science to this field as it relates to IT. This means there is good reason to expect that however the shakeout shakes out, the toolsets we field into the future for Semantic technologies are more likely to provide sustained benefits and avoid the ignominies of the dot-com bubble's well known "bust."

Semantic technologies grounded in scientific principles and best practices promulgated by these new national centers will be soundly documented in measurable programs whose ROI can be clearly traced, or so we hope.

However, even with these very promising developments, the Semantic Web is still in its infancy, though perhaps a case could be made that it has become a robust toddler, since we have advanced to the point where we are seeing genuine applications after only two years from its birth with the release of OWL. Therefore, we must ask: Will the Semantic Web reach its potential?

Let's return to the apparent mismatch between the level of our digital technology and the level of our technological tools.

One would think that sheer power of our computing technology might be useful beyond pharmaceutical research and the hypersophisticated graphical video and audio overkill of today's multimedia shoot-em-ups. This means no derogation to either pharmaceutical research or videographically and aurally sophisticated games. This assertion points out that the sophistication of these uses shows the capability of the technology and suggests that it might also be used for less purely profit-based endeavors

Of course, that is a gross oversimplification, but it serves the purpose of pointing out how much more we can be doing, and the benefits that await us once we do, using the tools of the Semantic Web.

While CRM suites, HR toolsets and inventory management packages including supply chain management (SCM) applications have made use of the advances in computing power and bandwidth, they hardly make a dent in the sheer power available except at peak load times for computationally intensive operations.

It seems rather a shame that the increase in power of our computing technology serves little purpose beyond simply performing the same old operations a bit faster. Now, without a doubt, that is an improvement and we would not willingly give that up, but the fact remains that we can do better.

With the advent of practical semantic technologies as shown in this conference, we will, in fact, do much better by orders of magnitude, provided we can short-circuit a few of the vendor/shareholder-enforced turnover cycles of CPU and Chipset generations. To be specific, we need to find a way to pull the plug on the dairy business model, which requires that we allow business to milk each generation of technology dry. Wouldn't it be better to view these stages as stepping stones on which we only briefly pause, not as a plateau whose every nook and cranny must be explored? Haven't we seen enough of these technological waves to start viewing them as wavelets? The point here is not that they are, have been or will be insignificant, only that they are part of a progression, and not major ends in themselves. One hopes we will quickly reach the point where we will view these initial stages in the development of the Semantic Web as the stepping-stones they should be.

While we are seeing a clear advance in rapid prototyping in the speed to market, we know that as soon as the early market share returns determine a set of top contenders, those innovators will be absorbed into the largest fins in the tank, with its attendant return to carefully dribbled out features in future releases which can be made obsolete in a regulated income stream. The fact is, with Semantic Web toolsets matched to 64-bit processing and megabit Ethernet in IPv6, we can, on the software side, see magnum improvements in record time in software operating systems and software productivity applications which have heretofore, in real terms, only reiterated previous application generations without improving the breed.

With the Semantic Web, we can realize fully integrated enterprise architectures; however, I won't be holding my breath for this event.

Imagine if there was a space race going on, might we not jump straight to 128-bit technology without ten years of milking the 64-bit cash cow? Are we not in danger of using our electronic digital computing abilities about as much as we use our biological computing abilities - a relatively small percentage of our brain's raw capacity? With all this capacity, and the fact that it is slated to grow exponentially just to keep pace with the inevitable movement to 64-bit computing and Ipv6, one is tempted to ask yet again where's the KillerApp?

This dreaded dinosaur of earlier technological wavelets, the KillerApp Syndrome, remains with us much like the albatross around the Ancient Mariner's neck. The fact is, despite the disaster of the dot-com bubble bust, we are again seeing the impatience of investors and to- tier IT Megasaurs for that elusive chimera. It begs the question of why our software doesn't improve in real terms alongside the improvements in computing power and bandwidth.

How can the major software vendors who market products which have, in recent generations been largely characterized as "more of" or "faster than" insist that the very entrepreneurial community of developers they tend to discourage provide what the top tier apparently does not really want?

Consider the offerings we have seen recently and the behavior of merging into more centralized, increasingly larger corporate entities at the expense of knowledge-worker jobs lost in wholesale consolidations. Oddly enough, this does not seem to be generating a lot of entrepreneurial activity.

In the meantime, we have seen only the first few attempts at what is called grid computing and intentionally adaptable and self-diagnosing and self-adjusting systems. Without more of these efforts, trying more than the few models we see, the advances in semantic technologies will not have the particular kinds of enterprise level infrastructure needed to take advantage of the advances we can expect in "knowledge-based" decision-support, and operational flexibility to adapt to changing circumstances.

It is too early to say how successful these systems will be in terms of the metrics we can track with some measure of confidence. This is an area ripe for Semantic

Web-based automated decision-making for dynamic provisioning (adjusting the number of CPUs and attendant systems detailed to handle specific load volumes at critical times).

Reconfiguring large-scale computing resources according to rules engines augmented by Semantic Web toolsets on the fly is one area where technology use could match technology capacity in enterprise-wide systems.

While this could be a positive development, it is occurring in tandem with the policy of merging out competition combined with rampant offshore outsourcing. We are also seeing the wholesale buy-up of the few seemingly important innovator companies alongside the merging-out of competition.

These policies have created decades of post-secondary classes graduating ever fewer computer scientists and engineers. We are rapidly seeing that industry turn into an industry of service technicians graduated from technical schools with MCSE certificates rather than traditional diplomas tied to curricula in which the ability to learn, think and solve problems is required instead of memorizing and parroting technical cookbooks.

So, where will the next true generation of KillerApps come from? More pertinently, is there likely to be a next generation of that KillerApps?

While it would be nice, or, at least, some folks believe so, it is unlikely. Consider the ever-present effort to fit all computing and communications and entertainment features into a single handheld device. Even though we see that the market is not there for the mondo-handhelds or the logical extension of that concept in mondo-wearables, with such stunning successes as the iPod, the leprechaun's pot of gold at the end of the rainbow ever beckons.

One suspects that KillerApps depend more on actual demand than the analysis of pundits or the creative concepts of engineers and marketing experts.

What the Semantic Web offers is much more a general uplift than a sudden, stunning explosion. This also begs the question of whether the KillerApp Syndrome is actually counterproductive in the longer term. Would we not be better served by harvesting an entire generation of Semantic Web-augment applications that are both more specialized and more adaptable than we currently see? Would it not be better if this generation of applications fit into any model of an enterprise-wide integrated IT system and worked in concert cross-platform and cross-vendor much better than now?

The burgeoning market of Semantic Web toolsets, based on OWL and the Resource Description Framework Language (RDF and RDF/Schema) as well as XML and XML/Schema are poised to provide a set of loosely coupled applications, services and suites capable of highly-focused specialized services that fit into the service-oriented architectures that are becoming ubiquitous across the IT landscape.

While the issues surrounding SOA are clouded by competing articulations of the infrastructure necessary to assemble and deliver services, the concept itself has already become an accepted methodology and IT architectural principle. Thus, while we can expect the usual period of rapid prototyping and rush to deployment in the race to gain market share, this is equally certain to be followed by the usual feeding frenzy and shakeout. Expect to see the quick absorption of these market share-leading paragons.

One can also expect to see with these acquisitions that they are broken up into tidy little perpetual income center flows added to enterprise IT integration suites, each with its own upgrade cycle or subscription fee. How well received this variation of the dairy business model will be.

Apparently, the paradigm of the ever-new, whether it goes by the name Semantic Web or SOA, or Y2K or Web Services, will never fail to capture us up in another typical tech wavelet. That seems a bit counterproductive for semantic technologies, which really do stand out for this reporter, as a critical innovation in the movement from data management to knowledge management in the enterprise and in the larger world of digital information as well.

This brief overview only scratches the proverbial surface of the range and depth of the presentations given in this second Semantic Technologies Conference, organized and mounted by Wilshire Conferences, Inc.

It is strongly suggested that you visit <http://www.semantic-conference.com/default.html>. For a more comprehensive view of the field, purchase the CD of the presentations - it is a gold mine of the most current information and the visions required to fuel development of the Semantic Web.

These last few specific presentations mentioned above and the efforts behind them are called out for special recognition because they represent a field of major importance - healthcare and health informatics - which is clearly taking semantic technologies to heart and which we can monitor to check our progress along the road to a Semantic Web as it can serve us all.

If semantic technologies can help bring the economically troubled arena of healthcare out of its spiral of cost inflation, then as a whole they will prove a great deal more than a tech bubble or wavelet.

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