

Ontology Summit 2011 Communiqué:

Making the Case for Ontology

(take 3)

Background

The theme of this year's Ontology Summit is "Making the Case for Ontology": how, where and why ontology can be effectively deployed. This communiqué summarizes the consensus of the participants in this year's summit on ways of making the case..

Introduction

Are you the kind of person who really 'gets' the value of ontology but have a hard time explaining it to others? This document is for you. The objective is to provide some tips and guidelines so that **making the case for ontology** to a variety of stakeholders is easier and more fun. To achieve this, we provide some strategies, highlight what you need to know to carry out these strategies, and show you where you can get that knowledge. Here are the basics:

Know who to target:

1. people who are early adopters and like the cutting edge
2. people with commonly arising problems that ontologies can help with.

Establish Relevance:

1. it is about value to the stakeholder, not the technology.
2. understand the different ways that an ontology can add value and how.
3. relate the possible benefits of ontology to the stakeholder's situation

Generate excitement and instill confidence:

1. The technology is mature and already being exploited by early adopters.
2. Be able to cite various real world cases where ontology has helped to solve a similar problem for other stakeholders.
3. Understand the difference between what is possible in the short, medium and long term.

Communicate clearly and with intent:

1. Start with concrete examples, not abstractions.
2. Tailor the approach to different stakeholders will require different approaches
3. Have some pithy one liners and elevator speeches at the ready.
4. Know what outcome you want from the interaction, tailor your approach accordingly.

Some of these points require little further elaboration, others require substantial bodies of knowledge. The main activity of the 2011 Ontology Summit activity has been to create this body of knowledge. The point of this communicate is to distill and communicate the key findings. The activities were divided up into five tracks, we introduce these next.

The core foundation is comprised of *Case Studies* which demonstrate the important uses of ontology that are already happening. They provide a set of common problems that ontologies can be used for and value propositions. This helps identify who to target for making the case and for establishing relevance with a particular stakeholder. They generate excitement and instill confidence because stakeholders can see that it can work for them too. They provide a wide variety of situations, making it possible to develop a variety of approaches suited to different stakeholders. To successfully make the case for ontology, you need to be familiar with a wide variety of case studies. Mills Davis and Mike Bennet headed up this track.

In order to better communicate case studies, we needed a good way to understand, classify, compare and contrast them. To this end, there was a track that created an *Ontology Usage Framework* (led by Michael Gruninger and Michael Uschold). For any given case study, you want to be able to summarize its key aspects. These include: what is the function of the ontology, target users, and the value that the ontology gave. See (link) for details. Some main categories of ontology use case studies are: integration, decision support, and knowledge management. It is important to not get too wrapped up in the categories and the framework itself, but to use it as a communication tool.

Because value is critically important to any stakeholder, a separate track was devoted to identifying various Value Metrics (led by Rex Brooks and Todd Schneider). Due to the diversity of functionalities and kinds of applications to be supported by ontology-based technologies, the value models and their metrics needed to make the case for ontology must be much more granular, less technically detailed and more case-specific than, for example, metrics already employed in software development. Metrics need

to be focused on the particular business problem(s) for which the ontologies are to be applied. This track sets out a value paradigm for those promoting the use of ontologies. Five key areas were identified: IT efficiency, Operational efficiency, Business Agility, Business Efficiency and Customer Satisfaction.

The above three focus areas address the here and now, what can be done in the near and medium term. A fourth track was devoted to exploring longer term idea that may require further research, but which are feasible nevertheless. This was the Grand Challenges track (led by Ram Sriram and ??).

Finally, there was an over-arching track for Strategy. How to put together all the materials gathered and present them in the most effective way to the appropriate stakeholder? I highlight two of the results that emerged from this track. First, the realization that the message needs to be adapted in different ways to different audiences. For example, the goal in talking to a budget holder is to get the work funded. Value is key. A more technical approach is required when talking to technologists. Next, one of the most interesting results of this track was a set of sound bites and elevator speeches gathered by the community. In analyzing all these, four themes emerged:

Ontology as a new paradigm -

"Ontology does for machines what the World Wide Web did for people." Steve Ray

Ontology as a way of clarifying meaning - "The secret to making a good movie is getting everyone to make the same movie." So it is with enterprises and that's what ontologies do.' Jack Ring

Ontology as a way to improve agility and flexibility -

"There are three main things that ontologies are good for: flexibility, flexibility and flexibility" Michael Uschold

Ontology as a way to improve interoperability and integration - "Ontology enables semantic interoperability by presenting information consistently across organizations and domains and machines" Cory Cassanave

In summary there were 5 tracks: Case Studies, Ontology Usage Framework, Value Metrics, Strategy and Grand Challenges. In the rest of the communique, we will highlight some of the more important conclusions from the tracks and email discussions. This will also elaborate a bit more on the four main themes above. In doing so, some of the tracks will be touched on more than others. Please refer to the track links for further information.

Key Themes

Where and how are ontologies already being applied and delivering value?

The short answer is just about everywhere you look. In addition to the twenty reference case examples, the summit explored a broad range of consumer, social, enterprise, and systemic applications where ontologies are being used, for example to:

- Provide and secure dynamic infrastructures where information of very different kinds is being combined from different sources on a large scale
- Augment knowledge worker insights and decision-making as well as application-relevant semantics and business rules in off-the-shelf commercial software
- Understand speech, written and visual language, and inter-semiotics of different kinds of information
- Add intelligence to the user interface to provide new capabilities and enhanced user experience
- Apply machine-learning, data-mining and other scale-based automatic techniques for the semantic document processing and advanced analytics in fields such as law, medicine, science, defense, and intelligence
- Enable high-productivity, knowledge-driven collaborative work processes
- Accelerate knowledge-intensive activities such as modeling & simulation, acquisition, design, and engineering
- Power mission-critical processes in energy, financial services, logistics, manufacturing, and transportation.
- Manage networks providing diagnostics, logistics, planning, scheduling, cyber-security, and event-driven process orchestration
- Support adaptive, autonomic, & autonomous processes such as robotics, intelligent systems, and smart infrastructure
- Assess risk and compliance in policy-driven processes such as exceptions, fraud, case management, predictive analytics, and emergency response,
- Build systems that know, learn, adapt & reason as people do such as e-learning, tutors, advisors, cognitive agents, and smart social games.

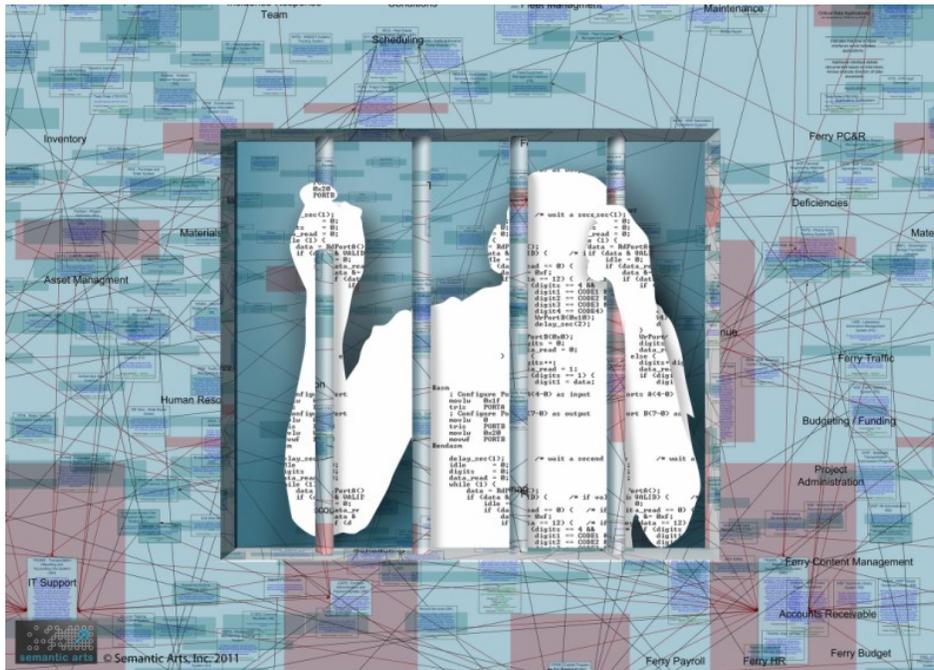
It is important to know about this variety, but it is perhaps more important to realize that most of it all boils down to three simple things:

1. getting everyone on the same page,
1.  flexibility/agility
2. interoperability/integration

Fundamentally, ontology is about getting agreements on what things mean. In an enterprise, it represents a radically different way to express meaning. The usual way is for meaning to be scattered randomly throughout the organization in people's heads, in email, in no-longer-maintained requirements documents, in conceptual models etc. In computational artifacts, a lot of meaning is in the names used to refer to things: code, variables, data base schema. Ontology

both forces and enables an organization to be clear about what things mean and in doing so, gets everyone on the same page.

Clarifying meaning is one important vehicle for achieving interoperability and integration, which in turn, is a key vehicle for achieving flexibility. When no-one knows on what anything means and there are so many systems that are in production, you are stuck like the man in the figure. Ontology is the key to freeing this man, the key to flexibility, the key to enabling a company to do the same things more efficiently, and the ability to do entirely new things that were never possible before. It all goes back to ontology as a way to clarify and agree on meaning.



May Ontology Set you Free!

Conclusions

We note that the discussion during this year's Summit has focussed on making the case for ontology projects within a business context where there is a financial justification for the use of ontology. However, there is also a case to be made for ontology research and the determination and pursuit of research goals for a case to be made for. The Grand Challenges track may address this, but it has not generally been addressed elsewhere. Generally, the approach in this summit has been pragmatic, emphasising the need to "put food on the table" but, as emphasised above, a fundamental benefit of adopting ontological approaches from the outset is that frameworks can grow to keep up with the reasoning and interoperability demands being made of them.

Acknowledgements

EXTRA SOURCE MATERIAL - NOT PART OF COMMUNIQUE

Elevator Pitches and sound bites: key elements.

Themes:

major paradigm shift, new foundation for IT and computing

"Ontology promises to be the driver for the next paradigm shift. If you think personal computing, and the Internet have been disruptive, wait and see what Ontology can bring about." Peter Yim

"Ontology does for machines what the World Wide Web did for people."

To a computer, a normal web page is just a collection of meaningless symbols (text). It has no idea how to extract meaning from it. What computerized systems, such as business systems, need is information structured in such a way that it can be reasoned with and where definitions of terms are clear and unambiguous. Computers, after all, are very pedantic, and very stupid, compared to people. That's what formal knowledge representation can do for us, and an ontology is just such an artifact.

Steve Ray (interoperability)

These maturing technologies are about defining the language of work at the core of our business - the deep genetics of our business and what we do for a living.

Everything in IT up till now has been about technology first and business a distant second. But semantic and ontological technology are different - there are explicitly, fluidly and directly about the core of our business - which is the work of our business. No other technology has ever really been primarily about the work of business. [JohnMorris](#)

Interoperability / Integration

"Ontology enables semantic interoperability by presenting information consistently across organizations and domains and machines"

CoryCassanave

Our ability to share, manage, analyze, communicate and act upon information is at the foundation of the modern enterprise. Information sharing is essential for enterprise supply chains, fighting terrorism and integrating enterprise applications. Yet, this essential capability has remained difficult in information systems which are frequently isolated, stove piped and difficult to integrate. The inability of our systems to share information hampers the ability of our organizations to collaborate - for our processes, services and information resources to work together. Some estimate that more than 1/3 of our information technology budgets are consumed overcoming this "semantic friction" in our systems and that the costs to society from our failure to share and collaborate is many times the systems overhead.

Mainstream tools for information and data modeling are effective at defining a particular data model for a particular application in a particular technology to solve a particular problem. But they suffer when applied to multiple applications for multiple purposes over multiple technologies to deal with unanticipated needs and opportunities. Most mainstream modeling techniques are challenged when faced with federating independently conceived models.

Semantic technologies can serve to define and connect the meaning of data, processes and services as ontologies. Contrast this ontology approach with just static data structures identified with tags names as are the foundation of classical data modeling and data schema. Ontologies offer the potential for making a substantial contribution to solving the "data problem" though better understanding of the meaning behind the symbols we use in our data and data schema. By better understanding we are able to achieve improved data sharing and federation. This is not just theory, there are multiple proof points where ontologies are providing real solutions today, yet there is still substantial opportunity to develop and leverage these technologies further.

The tone of this message is best directed to:

*(i) Policy Makers / Strategic Decision maker ... convincing them that this is the strategic direction to go

*(iii) Technology Decision Makers (CIOs, Architects, etc.) ... convincing them that this is the approach (at a higher level)

Flexibility -- Taming Complexity

The real world is complex and changing, you need a solution that can cope with that complexity and adapt with the changes. That's what ontology does for you
Deborah MacPherson

Ontologies can help you tame increasing complexity. - Brian Lucas

Mainstream tools for information and data modeling are effective at defining a particular data model for a particular application in a particular technology to solve a particular problem. But they suffer when applied to multiple applications for multiple purposes over multiple technologies to deal with unanticipated needs and opportunities. Most mainstream modeling techniques are challenged when faced with federating independently conceived models. [CoryCasanave](#)

Awareness - What do things mean? Mastery of Information, being on the same page

"The secret to making a good movie is getting everyone to make the same movie." So it is with enterprises and that's what ontologies do.' Jack Ring

"Ontology is like the air we breathe. In information systems it is all around us, but we often do not notice it. However, if there are problems with it, it can choke us."
Matthew West

"Ontology is the science of information in this sense: its semantic theories provide a unified account of how human thought and machine data can be united into a Web of meaning." Mark Musen, Pat Hayes, Peter Yim

"Our ability to share, manage, analyze, communicate and act upon information is at the foundation of the modern enterprise. " ...

[Ontologies] can serve to define and connect the meaning of data, processes and services. [CoryCasanave](#) [much room for improvement.

Ontological Analysis on its own helps, even if ontology not go into production per se.

Awareness leads to Interoperability/Integration Interoperability/Integration leads to Agility

What's new?

1. new way of thinking about meaning
2. new way of thinking about structure (of information)

- (i) **Policy Makers / Strategic Decision maker** ... convincing them that this is the strategic direction to go (20WF)
- (ii) **Budget Holders / Business Decision Maker** ... to get the work funded (20WG)
- (iii) **Technology Decision Makers** (CIOs, Architects, etc.) ... convincing them that this is the approach (at a higher level) (20WH)
- (iv) **Technology Implementers** (engineers and developers) ... convincing them that this is the approach (at the implementation level) (20WI)
- (v) **Users/consumers of the technology** ... create the trust and the buzz, as they will be driving the needs (20WJ)
- (vi) **Educators** ... to produce the people with the right skills to actually do it (when the market is there) (20WK)

Tip from Michael Brodie: spend more time understanding the problem than on the technology.

Ontological analysis can also help.