

: Is the semantic web vision relevant to DSS?

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Semantic web describes a vision and design guidelines and tools to let software applications read and understand Web page content. Semantic refers to the study of the meaning of words. Clarifying words and data so a software program can infer our meaning will be difficult. **IF** Tim Berners-Lee's vision can be realized, decision support applications will become more sophisticated and decision automation will be more powerful.

The semantic concept itself suggests the difficulties people have in effectively communicating. The term is little used in every day discourse and the meaning is abstract. Also, we all know the meaning of words can change based on context. In a spoken language exchange, we have even more subtleties of meaning. So is it reasonable to expect that computer software will ever "understand" natural language content on a Web page?

According to Tim Berners-Lee, the inventor of the World Wide Web, the Web can and should be a universal medium for data, information, and knowledge exchange among people and software. A Web page is a broadly structured document, and semantic Web guidelines can provide two things: 1) identifying data as data on a Web page; and 2) allowing people to write (or generate) files that explain to a machine the relationship between different sets of data (cf., W3C FAQ).

According to the W3C FAQ, semantic Web technologies can be used in a variety of application areas, for example: 1) in data integration, where coded data in various locations and formats is integrated in one, seamless application; 2) in resource discovery and classification, using better coding to provide domain specific search engine capabilities; 3) in cataloging, especially for describing the content and content relationships available at a particular Web site, page, or digital library; 4) by intelligent software agents, to automate and facilitate knowledge sharing and exchange; and 5) in content rating, especially in describing collections of pages that represent a single logical "document".

Wikipedia provides an example of a decision support application that would be possible once

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the semantic Web is fully implemented. The example is that "a computer might be instructed to list the prices of flat screen HDTVs larger than 40 inches with 1080p resolution at shops in the nearest town that are open until 8pm on Tuesday evenings." The user would enter a natural language query "list the prices and so on" and the software would understand and perform a search and return the requested results. Or a user might instruct "Who are the 10 customers with the most purchases in 2007?" and the software would return a list.

This vision is very powerful, but is it realistic any time in the near future? Berners-Lee (1999) wrote "I have a dream for the Web [in which computers] become capable of analyzing all the data on the Web – the content, links, and transactions between people and computers. A 'Semantic Web', which should make this possible, has yet to emerge, but when it does, the day-to-day mechanisms of trade, bureaucracy and our daily lives will be handled by machines talking to machines. The 'intelligent agents' people have touted for ages will finally materialize."

The semantic web currently uses 6 major standards and tools: XML, XML Schema, RDF, RDF Schema, OWL and SPARQL. Extensible Markup Language (XML) has not been adopted as rapidly as some anticipated in 1999. Resource Description Framework (RDF) helps create simple data models and has apparently found some uses in knowledge management. Web Ontology Language (OWL) can describe relations among instances of object in a knowledge domain. Achieving agreement on ontologies seems almost impossible. SPARQL is a query language for Web pages in RDF data format.

Much of the focus of the semantic Web revolves around creating ontologies. Ontologies can be very powerful tools to implement machine reasoning. Wikipedia includes the following example of an ontology describing families, it "might include axioms stating that a 'hasMother' property is only present between two individuals when 'hasParent' is also present, and individuals of class 'HasTypeOBlood' are never related via 'hasParent' to members of the 'HasTypeABBlood' class. If it is stated that the individual Harriet is related via 'hasMother' to the individual Sue, and that Harriet is a member of the 'HasTypeOBlood' class, then it can be inferred that Sue is not a member of 'HasTypeABBlood'." This example suggests how difficult and time consuming it will be to create meaningful ontologies that are agreed upon and then to code data using the ontology so machine inference is even possible.

IT Managers, and really any manager, should be sceptical about the basic feasibility of a complete or even partial fulfillment of the semantic Web vision. Semantic Web is Tim Berners-Lee's dream and vision.

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Fortunately or unfortunately, no one can mandate the creation of the semantic Web and impose reasonable ontologies for content coding. The practical hurdles seem immense for implementation across the Web. Nonetheless, within companies document-driven DSS can make use of semantic web tools. Knowledge-driven DSS built in narrow domains may be able to implement the concept of ontologies too. Data-driven DSS may be more powerful if within a company or an industry an XML standard is created and imposed. For example, data sharing for decision support with suppliers or among divisions may be enhanced with XML coding.

Perhaps as technology moves to Web 3.0, managers in organizations will identify benefits of implementing an internal semantic Web. Berners-Lee (2006) sees Web 3.0 as "an overlay of scalable vector graphics - everything rippling and folding and looking misty - on Web 2.0 and access to a semantic Web integrated across a huge space of data, you'll have access to an unbelievable data resource." Many managers are still uncertain about the benefits of Web 2.0 and social networking. Web 3.0 must seem like a fantasy that won't be realized in the foreseeable future. The existing design guidelines and tools do have the potential to enhance decision support applications.

As always your comments, suggestions and feedback are encouraged and welcomed.

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Last update: 2008-02-20 05:03