Example Semantic Web Applications

Introduction

Other lessons address what the Semantic Web is, what are key characteristics of a Semantic Web application, and where its strengths lie compared to most traditional technologies *(coming soon!)*. This lesson presents several specific, successful examples of Semantic Web applications in order to bring these lofty ideas down to reality.

As more case studies come up across the Web, we will try to collect some of the best on this page. Let us know if we are missing one!

Prerequisites

- What Makes a *Good* Semantic Web Application?

Case Studies

- Supply Chain Management—Biogen Idec
- Media Management—BBC
- Data Integration in Oil & Gas—Chevron
- Web Search and Ecommerce

Today's Lesson

When possible, the specific case studies illustrated here pertain to specific corporate projects. Generally speaking, well-known companies are not willing spend money on newer technology unless older, more established techniques either will not work or are outside of their budget for a specific problem. Therefore, these specific corporate use cases tend to highlight applications of Semantic Web technologies that have proven themselves to be of value.

The following high-level summaries include links to further details about each case study discussed.

Supply Chain Management – Biogen Idec

Biogen Idec—a pharmaceutical maker best known for its manufacturing of drugs used to treat multiple sclerosis—manages its global supply chain using Semantic Web technologies. As a class of problems, supply chain management includes many features that make it ripe for applying Semantic Web Technologies, specifically: {C}{C}

- The data being managed changes constantly.
- The required views on those data (e.g., calculations, KPIs, etc.) change constantly.
- A great deal of cross-organizational collaboration takes place, with large volumes of data being conveyed between suppliers at every level of the supply chain.

Furthermore, Biogen's specific industrial requirements make the use of traditional technologies for supply chain management particularly challenging.

- The types of material that a high-tech company such as Biogen Idec ships change over time, and as a result, the properties of these materials are also constantly changing.
- The Key Performance Indicators (KPIs) currently being optimized by high tech companies change very quickly.
- Rules and regulations change, requiring different kinds of data to be captured over time.
- Supply Chain Managers are not IT professionals, so they need to be able to see, understand, and manipulate the data being tracked directly, without having to traverse an additional level of organizational indirection. Keep in mind that the term Semantic in

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Further Reading

- Discuss this Lesson in its Forum
- The Semantic Web Has Gone Mainstream! Wanna Bet?—in this article, Juan Sequeda includes an amazing number links to Semantic Web successes to bolster his argument that it has, in fact, gone mainstream.
- W3C-curated list of Semantic Web Case Studies and Use Cases
- Case Studies on SemanticWeb.com

Latest Content

- Semantic Web Design Patterns—Application Patterns
- Semantic Web Design Patterns—Data Publishing Patterns
- Semantic Web Design Patterns—Data Management Patterns
- What is Linked Data?
- What is JSON-LD?
- Semantic Web Design Patterns—Modeling Patterns
- Semantic Web Design Patterns—Identifier Design Patterns
- RDF vs. XML
- SPARQL vs. SQL - Intro
- SPARQL Nuts & Bolts

Semantic Web means that by definition, the data model is transparent to subject matter experts, not only technologists.

- Suppliers change over time and are located in new regions and countries, possibly requiring new language localization, currencies, etc., and often requiring new data connectivity to new third party systems.

Semantic Web technologies give supply chain managers and officers the ability to manage all of this complexity reliably and efficiently.

To read the full case study, see the original article in American Laboratory.

Media Management—BBC

By far the most public usage of Semantic Web technologies is the website for the British Broadcasting Corporation (i.e., the BBC). In 2010, their entire World Cup website was powered by Semantic Web technologies, as was reported on ReadWriteWeb and SemanticWeb.com. Even today, large portions of their public website are run on Semantic Web technologies.
The BBC is not the only media company that is using Semantic Web technologies. Time Inc., Elsevier, and the Library of Congress all also have production systems built using Semantic Web technologies.

The process of storing, sorting, and presenting media has many qualities that benefit from the utilization of Semantic Web technologies:

- Unstructured information.
- Significant cross-document relationships and annotations. Documents have authors, which have written other documents; documents include citations; they have multiple revisions. Managing these relationships using traditional relational databases can get very messy. They in fact do not even attempt to solve this problem, and CMS systems do very poorly at searching on large corpuses.
- Constantly changing usage patterns. Websites have to change to stay fresh in their designs. Links between pages, relationships between videos and pages, links to blogs, etc. will all change over time.

To read the full case study, see the original article at the W3C website. Furthermore, SemanticWeb.com keeps an active list of BBC activity, including links to presentations and press releases related to the Semantic Web.

Data Integration in Oil & Gas—Chevron

For many years, Chevron has been experimenting with Semantic Web technologies in a range of applications.

100 years ago, drilling oil was little more complicated than sticking a pipe in the ground. These days, however, everything from discovery to production is incredibly data intensive. Every day, a single offshore rig will produce terabytes of data containing critical information that can help predict mechanical failures and other anomalies. Every time an error disrupts production on an active rig, costs can soar to tens of millions of dollars a day. Understandably, operators in this field are under an enormous amount of pressure.

Semantic Web technologies enable engineers and researchers to combine arbitrary data in arbitrary ways in an attempt to better understand and predict daily oil field operations. Some of the many high-level considerations that are not handled well by traditional technologies include:

- A lack of well-defined results. By their very nature, many activities throughout the energy industry are experimental. When the end goal state is undefined, it might become necessary to change direction at any point.
- A lack of industry data standards. All data integration is basically ad hoc.
- A massive turnover of technology. Every new device emits new parameters that must be tracked alongside existing data.

To be sure, certain activities in the industry are predictable in a manageable way, but many are not.

The following key business drivers were specifically identified by Chevron (as excerpted directly from the case study):

- "There are a million miles of spaghetti eaten every day!" The same can be said about data in the oil and gas Industry. A large amount of data is generated every day from multiple sources such as seismic measurements, well records, drilling figures, transportation numbers, and marketing statistics. Integrating these heterogeneous data to capitalize on their information value has so far proven to be complex and costly.

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- These data exist in a structured form in databases, and in semi-structured forms in workbooks and documents such as reports and multimedia collections. To deal with both the flood of information as well as the range of heterogeneous data formats, a new approach was needed for information searching and access.
- For the major capital projects (see application examples below) in the industry, information needs to be standardized and integrated across systems, disciplines, and organizational boundaries. This information integration will enable better decision-making within collaborations, as high-quality data will become more accessible in a timely fashion.

To read the full case study, see the original article on the W3C. Also, a key practitioner from that project, Roger Cutler, gave an exceedingly frank and lucid interview which is well worth a read.

Web Search and Ecommerce

Search engines genuinely benefit from having access to extra metadata in order to return more relevant results. In fact, the biggest players in the industry are investing heavily in standards that encourage companies to annotate their web pages with significantly more structure, which was one of the original intents of the Semantic Web vision in the first place. RDF itself can even be embedded into web pages via RDFa.

Facebook developed the Open Graph Protocol, which is very similar to RDF. Microsoft, Google, and Yahoo use Schema.org, which has an RDFa representation. The Ecommerce Industry has GoodRelations, which also uses RDFa. These frameworks are all now actively being used to bring users a better web experience.

An excellent and specific case study on this usage of Semantic Web technologies is Best Buy. They adopted GoodRelations for their website and saw an unbelievable increase in hits and conversions. Jay Myers has presented at numerous conferences, and his work on the subject can be found all over the web.

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