Chapter 17
The Semantic Web: History, Applications and Future Possibilities

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ABSTRACT

The Semantic Web provides a common structure that allows data to be shared and reused across a variety of applications. The history and terminology of the Semantic Web, examples of STM achievements with semantics, an examination of semantic technology companies, and future possibilities for reference publishers are discussed and examined in this chapter. Cooperation between publishers will be imperative if we are to fully benefit from the advantages of the semantic technology.

INTRODUCTION

The promise of the Semantic Web needs to be balanced with patience, rules, freedom, structure, innovation, standards, creativity, and a sense of boldness. As there have been mini gains in the information industry, we are beginning to see gains in reference publishing with regard to the Semantic Web. This is an exploration of how semantic technology will not only enhance reference publishing but also put it at the forefront due to significant gains that will be achieved by researchers.

Since the publishing of Tim Berners-Lee's article on the Semantic Web in *Scientific American* in May 2001 (Berners-Lee, 2001, p. 3), the World Wide Web community has been holding its collective breath waiting for the big announcement—the announcement that would change the way that we conduct business, interact with one other, research for cures, and more importantly, how we put context into our search content.

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Tim Berners-Lee predicted that the Semantic Web, which "provides a common framework that allows data to be shared and reused across application, enterprise, and community boundaries," would connect all of the disparate pages from the Web and put the context in this vast sea of content. For example, imagine conducting a search for a specific disease to determine the latest research, top researchers, prestigious medical facilities that are known to treat the disease, and the doctors who are on the cutting edge of treating the disease. In today's world, several searches would have to be conducted to get the answers to these questions. However, in a semantic world, a single search can now accomplish this task due to the innovative tools and improved algorithms now available.

This chapter explores this capability and many more possibilities that the Semantic Web offers to the information industry, specifically to reference publishers. Included in the discussion is the history of the Semantic Web, an overview of semantic technologies, examples of publisher achievements in this area, an examination of semantic technology companies, and last but not least, the future possibilities.

BACKGROUND

The Semantic Web was conceived by Tim Berners-Lee, the inventor of the World Wide Web, in his landmark article "The Semantic Web" (Berners-Lee, 2001). Lee explored in the article all of the possibilities that the Semantic Web would be able to provide. While the Semantic Web advances have been painstakingly slow compared to other Web progress, there have been some key developments in many areas and industries. In his "Project 10X's Semantic Wave 2008 Report: Industry Roadmap to Web 3.0 & Multibillion Dollar Market Opportunities" (Davis, 2008), Mills Davis explored the development of the Semantic Web in four phases: Phase 1, "the Web"; Phase 2, "the social Web"; Phase 3, "the Semantic Web"; and Phase 4 (the future), "the ubiquitous Web." Phase 1 (the Web) is about connecting information and getting access to the Web. Phase 2 (the social Web) is about connecting people. As we have seen with the development and growth of social media sites like Facebook, MySpace, LinkedIn, Plaxo Xing, UniPHY.org, BiomedExperts.com and Naymz, connecting people from all walks of life and all parts of the world (i.e., Phase 2) has been accomplished. Phase 3 (the Semantic Web) is about connecting knowledge. Phase 4 (the ubiquitous Web) will allow us to connect intelligence.

Mills explains the three planes that have been developed over time to allow the Semantic Web to become a reality. The Operating Plane is the foundation layer of the three planes. It consists of the information, infrastructure, applications, and user interface. The second plane is the Internet. The third plane, the Knowledge Plane, is where the Semantic Web has its beginnings, developments, and breakthroughs. And a successful development of the Semantic Web requires the use of many tools, including, to name only a few, tagged collections, dictionaries, taxonomies, thesauri, and ontologies. These tools need to be understood fully to be able to navigate the semantic waters as they assist the algorithms in providing the accuracy in the result set.

In online computer systems terminology, a *tag* is a non-hierarchical keyword or term assigned to a piece of information (such as an Internet bookmark, digital image, or computer file). This kind of metadata helps describe an item and allows it to be found again by browsing or searching. Tags are generally chosen informally and personally by the item's creator or by its viewer, depending on the system (Tag, Wikipedia, 2010).

There are many definitions of *ontology*. Wikipedia defines it as the hierarchical structuring of knowledge about things by sub-categorizing them according to their essential (or at least relevant and/or cognitive) qualities. This is an extension of the previous senses of ontology, which has become common in discussions about the diffi-

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