

Web 3.0 - The Semantic Web Cometh

What Happens When the Read-Write Web Begins to Think?

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From Info Tease to Info Overload

When the web first appeared at my university I used a very early browser to search for the word “education” and received only a few pages of hits. It seemed like such a tease. As with many of my colleagues at the time, the question on my mind was, “When will the World Wide Web actually get here?”

As the saying goes, be careful what you wish for. We have gone from information tease to overload in two short decades. Now the questions on everyone’s minds are the same questions that Credo the Mentor asked in, *Then What?*:

<p>Is having too much information better than having too little?</p>

What happens when we ask a simple question and get so much information that we can’t sort through it, let alone evaluate its trustworthiness? What happens when we get so much information that we can’t understand it well enough to figure out how to recast our question in ways that might make the response more manageable? What do we do when we realize that having too much information is no better than having too little since neither allows us to act more responsibly? ¹

Enter the Semantic Web

Enter the Semantic Web, often called Web 3.0, which will bring the web much closer to Tim Berners-Lee’s original conception of it as a universal network in which computers adapt to humans rather than the other way around.

To understand what the Semantic Web offers, consider a simple search example. Currently, if you want to know my phone number you need to go to my web page and root around until you find it. That’s because the current coding system used to build web pages,

largely HTML, displays information without identifying it in any meaningful way. That is, my phone number is not coded as “a phone number.” It simply appears as a series of characters on the screen, requiring a human being to recognize what it is. Contrast this with a database about your friends that contains a specific column called “phone number.” Even if your database includes millions of entries, locating a specific phone number is an easy task.

The Semantic Web converts “display only” information to meaningful information by tagging it with descriptors like “phone number.” Further, it allows users to find relationships between tagged information (like phone number and mailing address) using inference rules and data organizational tools called “ontologies” that provide logic and structure to the information embedded in web pages. Taken to its extreme the Semantic Web becomes a heavily tagged, relational database on steroids that connects all technologies, from book chapters to cell phones to Second Life. As a result, computers can do a good deal of the information grunt work that is currently reserved for humans. When it comes to a web search, for example, the Semantic Web will do a reasonable job of collating, cross-referencing and synthesizing the results for you. It does this in part by employing software agents that can find, distill and exchange information with other agents to build meaningful information collages.

Web 3.0: the read, write, think web...

As Tim Berners-Lee pointed out, the ultimate goal of the Semantic Web is data integration.² Because the Semantic Web understands my phone number, it can relate it to another semantically defined term, such as my address. It can then relate that to other semantically defined concepts like walking distance, postal rates, climate, or driving directions to the nearest airport. In practical terms, it can then help me plan for a vacation, chart driving

directions, and plan activities while I am en route. It is the use of common definitions, inference rules and ontologies, as well as proactive tools like web agents, that will turn the web from a thicket of superficially connected information containers into an ecosystem in which the parts of the web are truly interrelated. In so doing it will give the web the appearance, but not yet the reality, of being able to think. The reality will come much later.

Using the Semantic Web in Education

Let's consider the potential impact of the Semantic Web on three basic areas within the educational arena: knowledge construction, personal learning network (PLN) maintenance, and personal educational administration.

Knowledge Construction

Currently, Googling a term like “global warming” returns a minimum of a gazillion hits, most of which link to complex data resources that are themselves linked to other resources and so on. Unless a topic is important to us, there is a very good chance we won't explore much beyond the first page or two of hits returned by a Google search. The presumption of knowledge in this approach to information gathering and evaluation is presumptuous, faulty and potentially dangerous.

Web 2.0 searches for pages; Web 3.0 searches for information.
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In one vision of a well-developed semantic web, a search returns a multimedia report rather than a list of hits. The report draws from many sources, including websites, articles, book chapters, blog dialogue, YouTube presentations, cell phone memory, virtual reality resources—anything that is accessible by the rules of Web 3.0. The information in the report – which may be very wiki-like in structure³ - would be compared, collated³ and synthesized in a basic way, presenting points of agreement and disagreement, and perhaps evaluating these in light of political positions or

contrasting research. The information would also be personalized, alerting us to personal and even local resources based on our profiles. Ideally, the Semantic Web reduces the amount of time we spend searching and sifting so that we can spend more time thinking and participating.

Personal Learning Network Maintenance

Each of us spends far too much time searching the web, trolling blogs, wading through long podcasts and so on just to find the few nuggets we can use for our personal learning networks. Besides being inefficient, this approach to managing our own educational resources can often lead to inaccuracies simply because we run out of the time or motivation to do a thorough job.

One of the primary shifts under Web 3.0 is that PLNs could be built around subjects and information relationships rather than tools and services. Personal learning agents would identify relevant information from any source that is semantically accessible and provide an information synthesis tailored to a personal learning objective.

Personal Educational Administration

Universities and other educational institutions tend to be isolated entities that don't play well together. But even if the economic and turf concerns that cause this were to disappear, developing a student-centered multi-institutional approach to education would still be logistically impossible because education providers typically do not share common languages to describe course or degree requirements. Students who transfer between universities will bear witness to how difficult it can be to do something as basic as try to transfer credit for Sociology 101 from one institution to another.

Semantic Web technologies have the potential to challenge institution-centric education with the same force that distance

learning technologies challenge place-centric education. At some point institutions will describe courses and degrees semantically to help their own internal functioning. This will have the secondary effect of making many of the components of education somewhat comparable across institutions. The result will be that students may be able to identify comparable coursework from several education providers and, in the process, even meet the graduation requirements of yet another. Smart schools will get out ahead of this now.

Will it happen?

The short history of digital age education is a study in reactive planning. What is truly unique about the Semantic Web is that it constitutes a major shift in technology that we can see well in advance of its arrival. This allows us not only to prepare for it, but also shape it, which includes addressing the many biases that are sure to creep into its basic structure. We can already see glimpses of the Semantic Web's arrival. Educators would do well to jump into the Web 3.0 discussion now to help ensure that it can serve education in the best possible ways.

Will the Semantic Web fully arrive? Absolutely, not due to forces of digital determinism, but because of what MIT computer scientist Michael Dertouzos called "the ancient human in each of us."⁴ As ancient human beings, we want to develop tools that help us connect, develop relationships, and explore and understand the world around us, regardless of how technologically advanced we become. Those in the 1980s who told me e-mail would never catch on ignored the ancient human, as did those who told me just a few years ago that the world would come to see blogging as superfluous. The Semantic Web will happen. The ancient human will see to it.

The "ancient human" will make sure the Semantic Web happens...

Endnotes

1. Jason Ohler, *Then What: Everyone's Guide to Living, Learning and Having Fun in the Digital Age* (Juneau: Brinton Books, 2001).
2. Paul Miller, "Sir Tim Berners-Lee: Semantic Web Is Open for Business," *The Semantic Web*, posted February 26, 2008, <http://blogs.zdnet.com/semantic-web/?p=105>.
3. Note that Web 3.0-type search engines are being developed just for Wikipedia to intelligently access the massive amount of interconnected information it provides.
4. Michael Dertouzos, *The Unfinished Revolution: Human-Centered Computers and What They Can Do for Us* (New York: Harper-Collins, 2001).

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