For more information: May 1, 2010
Dan Anderson, Director, Elon University's Office of University Relations
(336) 278-7415 or andersd@elon.edu

Those who understand the semantic web are split on its future:
Experts expect online information to be organized in smarter, more useful ways in coming years, but there is a dispute about whether the improvements will match Sir Tim Berners-Lee's first-proposed, visionary ideals of a fully functioning semantic web

Sir Tim Berners-Lee, the inventor of the World Wide Web, has worked along with many others in the Internet community for more than a decade to achieve his next big dream: the semantic web. His vision is a web that allows software agents to carry out sophisticated tasks for users, making meaningful connections between bits of information so "computers can perform more of the tedious work involved in finding, combining, and acting upon information on the web." The concept of the semantic web has been fluid and evolving and never quite found a concrete expression and easily-understood application that could be grasped readily by ordinary Internet users. Nevertheless, it has inspired many technologists and Internet experts to improve the performance of the web and it is a topic of great interest in the high-tech world.

Some 895 experts responded to the invitation of the Pew Research Center's Internet & American Life Project and Elon University's Imagining the Internet Center to predict the likely progress toward achieving the goals of the semantic web by the year 2020. Nearly half of the respondents said Berners-Lee's original vision is unrealistically broad and unattainable. Most said, however, that online information will continue to be organized and accessible in smarter and more useful ways in coming years. *(Details: http://www.elon.edu/e-web/predictions/expertsurveys/2010survey/future_semantic_web.xhtml)*

Asked to think about the likelihood that Berners-Lee and his allies will realize their vision, often called Web 3.0, these technology experts and stakeholders were divided and often contentious.

> **Some 47% agreed with the statement:** "By 2020, the semantic web envisioned by Tim Berners-Lee will not be as fully effective as its creators hoped and average users will not have noticed much of a difference."

> **Some 41% agreed with the opposite statement, which posited:** "By 2020, the semantic web envisioned by Tim Berners-Lee and his allies will have been achieved to a significant degree and have clearly made a difference to average Internet users."

While many survey participants noted that current and emerging technologies are being leveraged toward positive web evolution in regard to linking data, there was no consensus on the technical mechanisms and human actions that might lead to the next wave of improvements – nor how extensive the changes might be. Many think Berners-Lee's vision will take much longer to unfold than the 2020 timeline posited by the question. Critics noted that human uses of language are often illogical, playfully misleading, false or nefarious, thus human semantics can never be made comprehensible to machines. Some 12% of those who responded to the survey did not venture a guess about the future of the

semantic web – itself a sign that there is still a good deal of uncertainty and confusion about the topic even among those who are quite connected to the tech world.

The Wikipedia entry on the semantic web elaborates the idea this way: "The semantic web is a vision of information that is understandable by computers, so computers can perform more of the tedious work involved in finding, combining, and acting upon information on the web." In his 1999 book "Weaving the Web," Berners-Lee said: "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 concept is so revolutionary that people have difficulty describing it in just so many words and its proponents self-consciously struggle to describe the "killer app" for the semantic web that will make users understand its power – and support its creation. Berners-Lee describes it as "getting one format across applications" so the semantic web standards can enable people to gain access to the information they want and use it any way they want, for instance, being able to mesh data from a personal bank statement and a personal calendar. He has said he would like to see a future web that allows people to connect their ideas with the ideas of others, building a system for people to share parts of ideas in a way that can make them whole.

Following are a few of the major themes that emerged in the answers to the survey (for more depth of detail, go to: http://bit.ly/a9qoKM

Too many complicated things have to fall into place for the semantic web to be fully realized.
• "It's been a decade and everyone still says 'semantic what?' Do we really need another decade to figure this out?" —*Stuart Schechter, Microsoft Research*

• "I don't like answering this question in the negative, but I understand Berners-Lee's concept of the semantic web as being more structured than the various collections of folksonomies and APIs that we have today, and I don't foresee us progressing far in that direction in the coming 10 years. A more structured web can be enabled by enhancements to HTML, for example, but getting people to adopt those enhancements and use them consistently and regularly is another matter. There are also the issues of human language to be considered; linkages across languages will remain problematic. Even if a semantic web emerges for the English-language web, what about everyone else?" –*Mindy McAdams, Knight Chair in journalism, University of Florida*

• "Just as it is impossible to prevent slang, argot, and creoles from forming, so we will continue to demonstrate polymorphous perversity in our expression and knowledge production." –*Sandra Braman, professor at University of Wisconsin-Milwaukee*

• "The semantic web concept disregards the fundamental fuzziness and variability of human communication. It may allow us to cope with the huge quantity of information available in electronic form and may provide some initial order, but the latter won't be any more effective than earlier knowledge organization systems have been. The proliferation of agents coupled with the lack of authority may indeed lead to much less effective results." –*Michel J. Menou, Ph.D, information science, consultant in ICT policy*

• "There is too much work involved on the part of website owners for the semantic Web to work. Various efforts to put more meta-data on web pages have not worked. It's hard to see why the SW

should be different." **–Peng Hwa Ang**, *dean of the School of Communication and Information, Nanyang Technological University, Singapore*

• "The key problem with the semantic web is the problem of false data and trust. I think it is a great idea in theory, and many of these principles of the semantic web will be more deeply integrated into the services we use, but an automated web-for-machines that automatically make better decisions for us because of the data they export is a pipedream." **–David Sifry**, *founder of Technorati and CEO of Offbeat Guides*

Forget the skeptics. The semantic web will take shape and launch an "age of knowledge." Early successes will build momentum.

• "Within the next 10 years, the semantic web will take us from the age of information to the age of knowledge. Simple tools and services will allow individuals, corporations and governments to quickly glean meaning from the vast amounts of data they have compiled. This move from a 'World Wide Web' to a 'world wide database' will allow for hidden relationships and connections to quickly surface, driving both innovation and (unfortunately) exploitation. The impact of the semantic web will be substantial. It will help create new industries, influence campaign strategies and lead to ground-breaking discoveries in both science and medicine." **–Bryan Trogdon**, *president of First Semantic*

• "Yes, but we won't call it that... and, as in the second option, no one will notice." **–Esther Dyson**, *founder and CEO of EDventure, investor and commentator on emerging digital technology*

• "It may not be implemented fully as envisioned, but the value of a semantic web will become transparent. Early successes will demonstrate its value leading others to experiment with semantic technology." **–Robert Cannon**, *senior counsel for Internet law at the FCC*

• "The establishment of the Web Science Trust is a key aspect of what is going on here. The web is coming of age, and the need for a new science is well understood. Tim [Berners-Lee] is driving this. It is a logical and evolutionary step that is being taken today, and builds upon the work he's driven as well as catalysed in the semantic web and in Linked Data." **–JP Rangaswami**, *chief scientist, BT*

• "Developments continue all the time in finding ways to associate online content and retrieve patterns from them. Meaning will be increasingly extractable." **–Ron Rice**, *Ph.D, Center for Film, Television and New Media, University of California-Santa Barbara*

Improvements are inevitable, but they will not unfold the way Tim Berners-Lee and his allies have sketched out. They will be grassroots-driven rather than standards-driven. Data mining, links, analysis of social exchanges will help drive the process of smartening the web without more formal semantic apps.

• "Artificial intelligence will certainly accomplish many if not all of the goals of the semantic web, but I do not think that the semantic web is the right mechanism for helping computers truly understand the Internet. The idea behind the semantic web is too artificial and makes too many false assumptions about the inputs." **–Hal Eisen**, *senior software engineering manager for Ask.com*

• "Semantic technologies are already having a huge impact, and will continue to develop and improve a host of areas in IT. However, the vision of Tim Berners-Lee and other SemWeb evangelists has often been unrealistic – not because of the tech but because of the human logistics and desires for control. Much of what they talked about (e.g., the dentist appt. example) will be addressed more effectively

through social computing as much as semantic tech, and the two will be incrementally improved and integrated into IT workflows in such a manner that most users will never notice the improvement – it will just 'work better' and be seen as a natural evolution, rather than as a result of some particular technology." *–Patrick Schmitz, semantic services architect, University of California Berkeley*

• "I think some form of next generation meta-web is inevitable, but it will probably take directions not envisioned by Berners-Lee or his cohorts. Evolution tends to be characterized by chaos, which trait makes it well nigh impossible to predict with any degree of certainty. Future technology has never really been very deterministic." *–Robert G. Ferrell, information systems security officer for the National Business Center of the U.S. Department of the Interior*

• "Many will not bother to code their web pages the way the semantic Web proponents would like us to. Some sites may do this; others won't bother. The Internet will still be a wild west with a wide variety of content and quality and searchability." *–Peter Timusk, webmaster and Internet researcher, statistical products manager at Statistics Canada*

Creating the semantic web is a difficult thing that will depend on machines that can straighten out the massive confusions and complications that humans create.

• "The truth is that the semantic web is a *hard* problem, and won't be solved until/unless we have 'sentient' or 'conscious' Turing-capable computers – which I don't expect by 2020. On the other hand, a combination of better ontologies and just greater computing capacity will allow more information to be pre-computed and searchable, so 'search' and what I call 'online computer-assisted reasoning', like Wolfram|Alpha, will be much more powerful." *–Charlie Martin, correspondent and science and technology editor, Pajamas Media*

• "I may be wrong on this one, but people are busy and lazy, and the applications, like text search, that succeed tend to be ones that require no extra work by those entering data – they are by-products of the work we do for ourselves. We include links in documents because they help us and those using our services, not to help Google better estimate the relevance of the document to a query. It might turn out that a centralized approach, where the mission of organizations like WolframAlpha is to add semantic value, will lead to the 'Web of data.'" *–Larry Press, professor of information systems, California State University, Dominguez Hills*

Many additional thought-provoking responses to the question on institutions and to the first five survey questions can be found at **http://www.pewInternet.org** and **http://www.elon.edu/e-web/predictions/expertsurveys/2010survey/default.xhtml.**

The Imagining the Internet Center (www.imaginingtheInternet.org) is an initiative of Elon University's School of Communications. The center's research holds a mirror to humanity's use of communications technologies, informs policy development, exposes potential futures and provides a historic record. Among the spectrum of issues addressed are power, politics, privacy, property, augmented and virtual reality, control and the rapid changes spurred by accelerating technology. Imagining the Internet has teamed with the Pew Internet Project to complete a number of research studies under the direction of Janna Quitney Anderson, associate professor of communications.

The Pew Research Center's Internet & American Life Project (http://wwwpewInternet.org) is a nonprofit, non-partisan "fact tank" that provides information on the issues, attitudes and trends shaping America and the world. It produces reports exploring the impact of the Internet on families, communities, work and home, daily life, education, health care, and civic and political life. It is one of seven projects of the Pew Research Center, a nonpartisan, nonprofit organization.