

RESEARCH BRIEF

REQUIREMENTS ENGINEERING AND THE SEMANTIC WEB

The problem

In today's information-driven society, the Internet has become one of the fastest growing and most heavily used methods of information retrieval. However, the Internet's popularity and continual growth present a difficult problem for users searching through the multitude of web sites.

Currently, the most common way to search the Internet is to use the 'keywords' method employed by popular search engines such as Google and Metacrawler. The sole dependence on these keywords is a fundamental limitation of this approach, however. Due to its broad-based nature, keyword searching becomes increasingly inadequate as the Internet continues to expand.

The potential

A better search method obviously is needed. With the daily proliferation of Internet sites, automation is the only economically feasible approach to managing this complexity. Much of the current focus of Internet research is on the developing "Semantic Web," which offers much potential for supporting automated web-search services. These "inference services" could automate tasks such as logical search and automatic validation.

The challenge

A fundamental duty of engineering lies in understanding a problem or task, then designing a solution. In the case of developing better search methods, the task is aggravated by increasingly complex systems developed by teams that are both geographically and temporally spread out.

Requirements are an invaluable tool in enhancing communication among members of a design team. Unfortunately, requirements for the Semantic Web are so numerous that they need their own tools and techniques to be effectively managed.

The industry's current approach to implementing a requirements management system has been to build a monolithic database with an open architecture that permits access to external applications. For requirements management alone this approach is fine; however, it falls short of the needs of a requirements engineering system. Instead, formal model-based approaches are needed to manage requirements.

The research

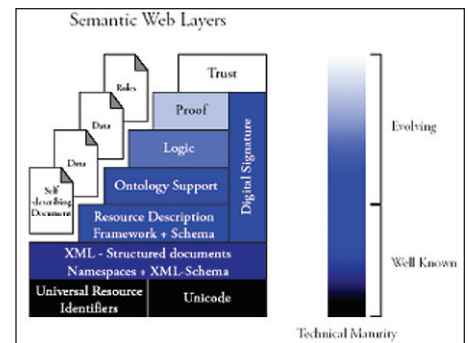
ISR Associate Professor Mark Austin and his colleagues have been studying this inadequacy.

Their study of requirements engineering—a branch of traditional engineering which concentrates on the meta-problem of requirements management—has given them a better perspective on the tools and techniques that will be needed to develop a more efficient and cohesive system of web searching.

For example, formal model-based approaches are needed to manage requirements. Austin and his team have identified requirements engineering and the Semantic Web as "systems of systems." This allows them to apply Semantic Web design strategies and solutions to current day requirements engineering problems. The approach has both immediate and long-term advantages over current industry tools.

The constituent systems should:

- Fulfill valid purposes in their own right and continue to fulfill those purposes if disassembled from the overall system
- Be separately acquired and integrated but maintain a continuing operational existence independent of the collaborative system.



Technical maturity of the Semantic Web

Austin believes formal model-based approaches are needed, such as:

- Developing standards for exchanging both textual and graphical requirements
- Developing model-based techniques for connecting various types of elements that contribute to the design

The second example focuses on global positioning management for requirements management tracability. It relies on the importance of including more than just requirements and design components. In particular, decisions and compliance verification procedures such as tests and simulations are crucial tracability nodes.

These standards and models open up the possibility of developing automated web-search inference services. As the Semantic Web becomes the future of the Internet, such services will be supported.

In addition, because both the Internet and requirements engineering are chaotic systems of systems, Austin's research into the Semantic Web also may be a source of solutions to requirements engineering problems in general.

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Web links

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