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THE USE OF SEMANTIC WEB APPLICATIONS IN A DIGITAL LIBRARY

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ABSTRACT:
The semantic technologies that will underlie the next generation of knowledge management systems. A key element of the project is to evaluate and assess the impact of semantic web technology in case study settings. The overall aim of the case study, described here, is to investigate how the semantic web technologies being researched and developed in the project can enhance the functionality of a digital library.

Keywords: Semantics Web, World Wide Web, Digital Libraries

INTRODUCTION:

The use of information technology and web applications is changing the libraries and their services. Libraries should adopt new applications to work effectively in a technological information environment . The best future of the library can only be achieved through effective technological change and social planning . Web 2.0 is offering new potential for researchers to harness the new technologies and offer limitless digital information content through a single package). The Semantic Web is useful for enhancing access to information and knowledge. There is a strong nexus between the mission and aims of libraries and the objectives of the Semantic Web. The Semantic Web is helpful to increase usability of digital data. It offers Semantic Web representation, semantic outreach and Semantic Web services and resources (Greenberg, 2009).

The new form of digital library will be the semantic digital library (Alotaibi, 2010). The use of Semantic Web and resource description and framework (RDF) technology in digital libraries will aid in managing metadata and digital contents, as well as offer new techniques for the discovery of information (Han, 2006). The Semantic Web will increase the usability of library material on a large scale. It is an important source to access information available in digital form. There is a need to investigate the uses of Semantic Web and web ontology language to develop a richer conceptual model to be shared on the web (Ferguson, 2007).

ORIGIN OF SEMANTIC WEB:

Many cognitive scientists have worked earlier on how to structure the knowledge semantically and enable the automated agents to access the web more intelligently and perform the work of the users on their behalf. Descriptive technologies such as XML, RDF, and OWL have been

developed to address the limitations in using HTML. XML (Extensible Markup Language) provides a method for transmitting structured documents. It do not impose any semantic constraints or meaning on the data it carries. RDF (Resource Descriptive Framework) is a simple framework / data model to refer the content in the object. RDF is often represented in XML format. RSS is an RDF object. The concept of Semantic Web was first coined by Tim Berners-Lee,[1] who had also developed Hyper Text Markup Language (HTML), Hyper Text Transfer Protocol (HTTP), Uniform Resource Identifiers (URI) and World Wide Web (WWW). He visualized Semantic Web as a platform where the intelligent software agents will analyze a particular given situation and present with the best possible alternatives to the users. Tim Berners-Lee has shown how the Semantic Web would work technically and explained about ontologies and as well as their importance in constructing the Semantic Web Companion Web site. He told that Semantic Web will act as an integrator across different applications and content in publishing, blogging and other areas, information applications and systems.

WHAT EXACTLY IS THE SEMANTIC WEB:

as an expansion of the current World Wide Web, the Semantic Web is a concept of a system that provides software programmers with mechine-interpretable metadata about the information and that has been published on web.to put it another way, we augment the data descriptoes that already exist in current material and data on the web. Therefour, computers, are capable of productingmenaningful interpretations in a manner comparable to the way people analyse information in order to accomplish their objectives. In addition to the traditional “web of documents”the world wide web Consortium (W3C) is assisting in the development of a technological stack to enable a “web of data” similar to the kind of data found in databases. The ultimate aim of the world wide web of data is to allow computers to do more valuable work while also developing systems that can support trustworthy interactions across a distributed network.

The phrase “semantic Web” alludes to the worls wide web consortium’s concept of a web of interconnected data. People may use semantic web technologies toconstruct data stores on the web define vocabularies, and set rules for how datashould be handled in various situations.RDF, SPARQL, OWL, and SKOS are some of the technologies that enable linked data to be used.

WHAT THE SEMANTIC WEB WILL LOOK LIKE IN FUTURE:

It may be devided into three categories: information retrieval automation, the internet of Things, and personal assistants .these three categories are the foundation of the original concept of the Semantic Web.

WHAT IS LINKED DATA, AND HOW DOES IT WORK:

There are dates and titles and part numbers and chemical characteristics and any other data that can be thought of on the Semantic Web; it is a Web of data, in other words. The set of Semantic Web technologies (RDF, OWL,SKOS,SPARQL, and so on) creates an environment in which applications may query data, draw conclusions from vocabularies, and so on.

However in order for the Web of data to become a reality, it is necessary to make the massive quantity of data accessible on the web available in a standard format that can be accessed and managed by semantic web tools. Not only does the semantic web need

access to data ,but it also requires access to connections between data, in order to build a web of data,which is not yet possible (as opposed to a sheer collection of datasets).Linked data is a term that refers to a collection of interconnected datasets that may be found on the web.

In order to accomplish and generate Linked data technologys for a common format(RDF) should be accessible, allowing for either conversion or on-the-fly access to existing databases to be performed (relational,XML,HTML,etc,) it is also critical to be able to configure query endpoints in order to make it easier to retrivev that information. To get access to the data, the W3C offers a variety of technologies (RDF,GRDDL, POWDER, RDFa, the forthcoming R2EML,RIF, and SPARQL) to choose from.

SEMANTIC WEB AND DIGITAL LIBRARIES:

Libraries are a key component of the information infrastructure which underpins Further and Higher Education. They provide an essential resource for students and researchers for reference and for research. And they are increasingly converting themselves to Digital Libraries.

A key aspect for the Digital Library is the provision of shared catalogues which can be published and browsed. This requires the use of common metadata to describe the fields of the catalogue (such as author, title, date, publisher), and common controlled vocabularies to allow subject identifiers to be assigned to publications.

By publishing controlled vocabularies in one place, which can then be accessed by all users across the Web, library catalogues can use the same Web-accessible vocabularies for cataloguing, marking up items with the most relevant terms for the domain of interest. Then, search engines can use the same vocabularies in their search to ensure that the most relevant items of information are returned.

The Semantic Web opens up the possibility to take such an approach. It offers open standards that can enable vendor-neutral solutions, with a useful flexibility (allowing structured and semi-structured data, formal and informal descriptions, and an open and extensible architecture) and it helps to support decentralized solutions where that is appropriate. Thus RDF can be used as a common interchange format for catalogue metadata and shared vocabulary, which can be used by all libraries and search engines across the Web.

METADATA:

Metadata is a key component of the provision of online catalogues that are searchable across the Web. In order to use the Semantic Web to its best effect, metadata needs to be published in RDF formats. There are several initiatives involved with defining metadata standards in the library and publishing community, including:

- Dublin Core Metadata Initiative which provides a standard set of machine readable fields and guidelines for their use. This now has a well-established RDF vocabulary.

- MARC. The well known MARC format from the Library of Congress has an XML representation.

• ONIX. The ONIX for Books Product Information Message is the international standard for representing and communicating book industry product information in electronic form XML representation.

• PRISM. The Publishing Requirements for Industry Standard Metadata specification defines an XML metadata vocabulary for magazine, news, catalogue, book, and journal content.

Such standards can be used across the Web in that they provide a common metadata vocabulary in XML or RDF which can be used to mark up and share library catalogues on the Web. PRISM and Dublin Core are usable now in the Semantic Web. MARC and ONIX require further work, but could be used as a source to enrich the metadata provided on the Web.

THE FUTURE OF THE SEMANTIC WEB:

We have seen in this paper that there has been significant and enthusiastic effort over the last few years to explore and develop the technology, shared vocabularies and ideas which are turning Tim Berners-Lee's vision into a reality. There is a long way to go until it is a standard part of the Web infrastructure but, nevertheless, there has been startling progress in the last few years, with UK research groups amongst the leaders.

BARRIERS TO ADOPTION:

There are inevitable barriers to the Semantic Web that still need to be addressed. We have mentioned the slow progress on certain features, particularly ontology and reasoning support, due to the development community not coming to a consensus. This does not mean that progress cannot be made immediately using the simpler tools for RDF and RDF Schema available now.

Some of the larger IT companies are hanging back, waiting to spot the opportunity and waiting for the research community to settle on standards. Thus the main impetus is coming from communities themselves – it is an opportunity to profoundly affect the way that the world talks to each other.

There is a good deal of RDF data giving semantic descriptions already on the Web, both from website owners publishing their own annotations as RDF files and from sites such as rdfdata.org which provide portals for RDF data. However, before the Semantic Web can become globally usable, there does need to be more, and it needs to be more easily available. There is a distinct overhead to using the Semantic Web in terms of establishing shared vocabularies and ontologies, and in providing the appropriate annotations to resources which make them visible to the Semantic Web. This is a non-trivial task and often users will either not have the time to include this, or the expertise to do it well. A missing component of the Semantic Web is a simple means to support this, similar to the editors and tools for the conventional Web. Undoubtedly the simplicity of the HTML language used within the current Web was a major influence on its success and in order for the Semantic Web to break out from narrow communities to universal use it needs to address the issues of making it easy to use and accessible to all.

Otherwise, the Semantic Web is likely to require particular effort and expertise. This is expensive, and so it may well be confined to particular domains on the Web which see a strong

advantage in its use, although over time as the expertise becomes more commonplace it should become cheaper. Also, the 'network effect' can work as both a barrier and an incentive. One of the main advantages of supplying Semantic Web annotation is that is can be shared and can gain advantage to others, so when there is little data to share, then there is little incentive to take the extra expense in sharing; however, once the ball starts to roll, there is an exponential advantage in combining your own data with others'.

These problems may be less of a disadvantage in the HE and FE sectors, which has well-integrated communities with stronger control over their resources. Information science professionals in libraries are available to help with the task of cataloguing and publishing annotations. Thus it is likely that this sector will be in the forefront in the use of this technology.

CONCLUSIONS:

The semantic web provides exciting potential for extension of library web services but with a high overhead of time and resources for the creation and maintenance of metadata and taxonomies. A key criterion for future success is the ability of the projects to generate metadata and ontologies automatically for scalable solutions. Librarians have considerable expertise in the key components of the semantic web: cataloguing and classification. Their skills include understanding the complexity of information resources, and experience in developing and implementing metadata standards and controlled vocabulary. The development of authority control faces new challenges in the Semantic Web. The need for increasing interoperability capabilities between software applications and information stored in heterogeneous structures is a promising area.

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