Chapter 8
Maximize Collaboration Using Topic Maps–Based Ontology

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ABSTRACT
Enhanced information organization is more critical than ever in the digital world where ill-structured information is increasing because of the rapid growth of intranets, the Internet, and user-created content. This chapter discusses limitations of current information organization approaches in the digital age and incorporating ontology into information organizations, thus enhancing collaboration possibilities. This chapter compares the two ontology languages, RDF and Topic Maps, addresses the selection guidelines between the two ontology languages, and then presents user performance using a Topic Maps-based ontology.

INTRODUCTION
Through both voluntary and enforced means, massive and varied types of information have been created and used in the digital space. Web 2.0 innovations allow people to be more productive than ever before. According to a study by Miniwatts Marketing Group (2008), the Internet usage growth between 2000-2008 was 305%. If we can effectively search and reuse or share this massive quantity of information, we can save our resources to reinvent wheels. However, the problem lies with searching.

The enormous amount of information available on the Internet is mainly searched using search engines; however, search engines often return irrelevant and lengthy information. In order to find relevant information, users evaluate a lengthy list of irrelevant results, often resulting in information anxiety (Wurman, 1989) and cognitive overload. Cognitive overload occurs when users feel the burden of having to make decisions as to which links to follow and which to abandon (Conklin, 1987).

Even though users spend their resources to filter massive amount of irrelevant information, they agree that collaboration is inevitable in the digital space.
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Due to the main activities of collaboration, reusing and sharing digital resources over the World Wide Web, effective information retrieval must be an imperative part of collaboration.

As an effort to improve information retrieval, researchers have endeavored to find more efficient information organization methods. Their efforts can be summarized into three major categories of methods: term lists, classification/categorization, and relationship groups (Zeng, 2005). With the realization that these three groups of information organization methods did not significantly improve information retrieval (Smeaton & Berret, 1996; Voorhees, 1994), a few newer information organization methods that focus more on relationships among the information units have been recently studied.

One noticeable method is the Semantic Web. The Semantic Web emerged as a dynamic web for sharing data on the current static web in 1998 (Berners-Lee, 1998). The Semantic Web Architecture was released in 2000; however, there is little penetration into current web and information systems. There are criticisms (Ian Horrocks, Bijan Parsia, Peter Patel-Schneider, & Hendler, 2005; Patel-Schneider, 2005) of the Semantic Web, and those problems will be examined in this chapter.

This chapter introduces an alternative data model to cope with some criticisms of the current Semantic Web Architecture and presents a study that explored the alternative data model to measure user performance.

This chapter is organized as follows: In Section 2.1, we address criticisms of two Semantic Web Architectures and describe the two data models. In Section 2.2, we discuss the differences between the two data models. In Section 2.3 we provide guidelines for choosing appropriate data models. Section 2.4 presents user performance using a Topic Maps-based ontology system; Section 2.5 concludes with future directions in the context of collaboration.

TWO SEMANTIC WEB ARCHITECTURES AND TWO DATA MODELS

Problems of the First Semantic Web Architecture

According to Patel-Schneider (2005), the current architecture (See the left-hand side of Figure 1) for the Semantic Web has problems when expressive Semantic Web languages such as RDF are integrated. The Resource Description Framework (RDF) is a language for representing information about resources in the World Wide Web. World Wide Web Consortium supports RDF; however, RDF is not suitable for the Semantic Web (Patel-Schneider, 2005). Patel-Schneider criticizes that RDF is not sufficient to encode complex syntactic information in triple form.

Due to the limitations of RDF and first-order logic, ontology engineers and domain experts are concerned about the difference between users and domain experts. There is a similar issue between users and indexers. When an indexer chooses a term that a user does not utilize, the user has a hard time finding relevant resources.

The burden of knowing what could link to what information should be removed from both domain experts and users (Holm, 2001). The system must present and process the information without requiring it know the complicate and non-agreed relationships between the data. Instead, the system can show built-in relationships to users and let them navigate and decide the relevance of information. Topic Maps (TM) explicitly show the structure and relationships among digital resources.

In order to resolve the issue of RDF triple for the current Semantic Web Architecture, different data models such as Topic Maps can be used. Topic Maps do not have triple issues or rules issues. Users can see explicit relationships among resources. Recent change of the first Semantic Web Architecture (the right-hand side of Figure
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