Chapter 6
Reusing the Inter-Organizational Knowledge to Support Organizational Knowledge Management Process:
An Ontology-Based Knowledge Network

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ABSTRACT

Various types of Knowledge Management approaches have been developed that only focus on managing organizational knowledge. These approaches are inadequate because employees often need to access knowledge from external knowledge sources in order to complete their works. Therefore, a new inter-organizational Knowledge Management practice is required to enhance knowledge sharing across organizational boundaries in their business networks. In this chapter, an ontology-based Inter-organizational knowledge Network that incorporates ontology mediation is developed so that heterogeneity of knowledge semantic in the ontologies could be reconciled. The reconciled inter-organizational knowledge could be reused to support organizational Knowledge Management process semi- or automatically. The authors also investigate the application of ontology mediation that provides mechanisms of reconciling inter-organizational knowledge in the network.

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INTRODUCTION

Over the past two decades, a lot of efforts have been placed in order to integrate heterogeneous information systems. Although heterogeneity is an obstacle for system interoperation, the heterogeneity allows systems to be designed and developed according to the business requirements. This interoperation is essential because systems of different characteristics from organizations, companies or even individuals would be able to communicate, cooperate, exchange information as well as reuse knowledge and services with one another. Especially in the era of the Internet, a business transaction can hardly be completed without making use of others' data, information, knowledge and services. For instance, when customer is shopping in an online store, s/he may need to seek comments on the quality of a particular product from an external forum. Once s/he decides to purchase the product, the online store will have to contact related financial institutes for payment verification and confirmation. The online store is also required to arrange delivery service with shipping company. Such a simple online shopping transaction would involve interoperation of at least three heterogeneous information systems, the complexness could be imagined if it is a multi-million trade that involves the participation of more enterprises.

Artificial intelligence researchers first applied the concept of ontology in intelligence system development so that knowledge could be shared and reused among artificial intelligence systems. Ontology as a branch of philosophy is the science of what is, of the kinds and structures of objects, properties, events, processes and relations in every area of reality (Smith, 2003). Ontology can be further elaborated as a particular system of categories accounting for a certain vision of the world (Guarino, 1998). The term, ontology, was then borrowed by artificial intelligence community and Tom Gruber's definition was widely accepted within the community: an ontology is an explicit specification of a conceptualization while a conceptualization is an abstract, simplified view of the world that we wish to represent for some purpose (Gruber, 1993). Later on, Borst (1997) refines Gruber's definition by labelling an ontology as a formal specification of a shared conceptualization. Based on Gruber's and Borst's definitions, Studer et al. (1998) make the following conclusion: 1) an ontology is a machine-readable specification of a conceptualization in which the type of concepts used and the constraints on their use are explicitly defined, and 2) an ontology should only capture consensual knowledge accepted by large group of people rather than some individual. By representing knowledge with representational vocabulary in terms of objects and their interrelated describable relationships, inference engine and other application program from one intelligence system will be able to understand the semantic of knowledge in another knowledge base.

The popularity of the World Wide Web (WWW) further magnifies the importance of ontology. The Hypertext Markup Language (HTML)-based web content is solely designed for formatting and displaying information on the web and computers have no way to understand and process the semantics (Antoniou & Harmelen, 2004). The disadvantage of HTML-based web content is reflected completely when users attempt to retrieve information from the web using a search engine. It is very common for a search to return more than ten thousand results. The application of search operators may be able to narrow down the results to a few hundreds, but users still require extensive effort to locate the right information within a pool of results. It is due to the fact that application program resided in the search engine can only perform keyword search in the HTML-based document without understanding the actual semantic of the document, for example, searching the web with the keyword "bank" using Google search engine will return any webpages that contain "bank" or with "bank" as one of the indexes, regardless whether "bank" means a financial