Chapter 19
Ontology-Based Virtual Communities Model for the Knowledge Management System Environment: Ontology Design

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ABSTRACT

Virtual communities are gaining attention in many organizations, particularly in Institutes of Higher Learning (IHL). The research communities in IHL have similar research practices and often form groups to collaborate in research activities. With proper Internet infrastructure, research communities form virtual communities to share knowledge and find the highest number of potential people to collaborate. However, studies to understand these research communities either in research activities or capturing changes in the communities are lacking. The study of virtual communities is crucial to properly manage group knowledge and enable social interaction using a tool to enable socialization. Ontology design of virtual communities can be used as a form to formalize research communities. Based on the Knowledge Management (KM) approach of finding the right knowledge and the right people to work, a model called the OntoVC-KMS is proposed. The main objective of this chapter is to address the following questions:

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**INTRODUCTION**

Organizational knowledge in an organization, such as an Institute of Higher Learning (IHL), produces a large number of knowledge artefacts (i.e. research products, publications, patents) from its research communities. In addition, the amount of knowledge artefacts will increase over time when the research activities of knowledge sharing, social interaction, and collaboration among research communities grow. Thus, research activities can become more complex when research communities are evolving in amount and volume. Many researchers who participate in research activities are using Internet technologies and the World Wide Web as a platform for communicating, sharing resources, and collaborating among each other. These research communities that use the Internet and WWW as a platform for communication and collaboration are also referred to as virtual communities.

Virtual communities are gaining attention among many organizational knowledge practitioners due to the advancement of Internet technologies and capitalization of know-how (Jabar, 2007). The IHLs face challenges in capturing and managing knowledge contents from virtual communities to maintain competitive. Moreover, finding the right knowledge is crucial, and working with the right people in collaborations (Schubert & Koch, 2002) will increase productivity. This is the Knowledge Management (KM) perspective that Holm (2001) has proposed and that we adopt in this study. KM manages organizational knowledge, but managing knowledge requires both social perspective and technical perspectives (Koh, Kim, Butler, & Bock, 2007) that are able to capture individual and group tacit knowledge (Mohamed, Lee, & Salim, 2004). The perspectives of individual and group tacit knowledge are often isolated when designing a KM system. In order to understand the virtual communities in IHL, the need to formalize virtual communities is crucial because virtual communities are complex social systems and a KM system can support these virtual communities.

Ontology may be used for different purposes in different communities. When KM uses ontology to enable knowledge sharing, then ontology can be defined as a specification of a conceptualization (Gruber, 1993). The specification of a conceptualization is used for making ontological commitments, which is an agreement to consistently use the shared vocabulary and understanding of the specified ontology (Jurisica, Mylopoulos, & Yu, 2004). Jurisica, Mylopoulos, and Yu (2004) stated that the study of ontology in KM benefits the ontology used in other fields such as the following:

- **Artificial Intelligence**: Representing knowledge in computational procedures and heuristics
- **Software Engineering**: Presenting knowledge in the form of software requirements, design decisions and rationale for a software system
- **Database Management Systems**: Supporting the representation and management of huge simple knowledge (i.e. data, information)
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