Chapter 5

Discovery Process in a B2B eMarketplace:
A Semantic Matchmaking Approach

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ABSTRACT

In the context of a customer-oriented value chain, companies must effectively address customers changing information needs during the process of acquiring a product or service to remain competitive. The ultimate goal of semantic matchmaking is to identify the best resources (supply) that fully meet the requirements (demand); however, such a goal is very difficult to achieve due to information distributed over disparate systems. To alleviate this problem in the context of eMarketplaces, the authors suggest an agent-enabled infomediary-based eMarketplace that enables semantic matchmaking. They extend and apply the exact, partial, and potential match algorithms developed in Di Noia et al. (2004) to show how partial and potential matches can become full matches. Specifically, the authors show how multi-criteria decision making techniques can be utilized to rank matches. They describe mechanisms for knowledge representation and exchange to allow partner organizations to seamlessly share information and knowledge to facilitate the discovery process in an eMarketplace context.

INTRODUCTION

In the context of a customer-oriented value chain, companies must effectively address customers changing information needs during the process of acquiring a product or service to remain competitive. In order to satisfy those information needs, companies must integrate heterogeneous and dispersed information and knowledge resources that span across multiple organizations, it is essential that integrative technologies supply effective standardizations and adaptability to support the transparent exchange of information and knowledge in a value chain.

Implementing and managing the integration of value chain activities over distributed and heterogeneous information platforms such as the Internet, is a challenging task with large potential benefits. Although technical integration of systems is essential, a common language to express context specific constructs and relevant business rules to assist autonomous system entities and decision makers to solve specific business problems is essential (Stal, 2002). Disparate technical systems need the ability to share data, information, and knowledge. A common and shared understanding of the domain-specific concepts and the relations between them is critical for creating integrative views of information and knowledge in eBusiness processes. However, there is paucity in research on distributed information and knowledge sharing that provides a unifying process perspective to share information and knowledge (Oh and Park, 2003).

In this context, the Semantic Web vision provides the technical foundation to support the transparent flow of semantic knowledge representation to automate, enhance and coordinate collaborative inter-organizational eBusiness processes (Singh et al., 2005). The Semantic Web vision comprises *Ontologies* for common semantics of representation and ways to interpret ontology; *Knowledge Representation* for

structured collections of information and inference rules for automated reasoning in a single system; and *Intelligent Agent* to collect content from diverse sources and exchange data enriched with semantics (Berners-Lee et al., 2001). This vision provides the foundation for the semantic framework proposed in this research. Semantic technologies incorporate knowledge representation and intelligent software agents to integrate heterogeneous systems across organization.

The ultimate goal of semantic matchmaking is to identify the best resources (supply) that fully meet the requirements (demand); however, such a goal is very difficult to achieve due to information distributed over disparate systems. To alleviate this problem in the context of eMarketplaces, we suggest an agent-enabled infomediary-based eMarketplace that enables semantic matchmaking. In this article, we use a process perspective to integrate knowledge of resources involved in a process with process knowledge including process models and workflows used in process automation. We develop theoretical conceptualizations using ontological analysis that will be formalized using description logics (DL). The ontology will support a common vocabulary for transparent knowledge exchange across inter-organizational systems. DL forms the basis for developing machine interpretable ontologies and knowledge representation using standardized knowledge representation languages such as OWL-DL. We describe mechanisms for knowledge representation and exchange to allow partner organizations to seamlessly share information and knowledge to facilitate the discovery process in a B2B eMarketplace context. We extend and apply the exact, partial, and potential match algorithms developed in Di Noia et al. (2004) to show how partial and potential matches can become full matches. In this context, it is important to note that ranking of exact matches involves the use of multiple criteria and selecting a satisfying solution (Ramesh and Zions, 1997). Although multi-criteria decision

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