

## Chapter 8.6

# Semantic Knowledge Transparency in E-Business Processes

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### **ABSTRACT**

This chapter introduces a new approach named semantic knowledge transparency, which is defined as the dynamic on-demand and seamless flow of relevant and unambiguous, machine-interpretable knowledge resources within organizations and across inter-organizational systems of business partners engaged in collaborative processes. Semantic knowledge transparency is based on extant research in e-business, knowledge management (KM), and the Semantic Web. In addition,

theoretical conceptualizations are formalized using description logics (DL) and ontological analysis. As a result, the ontology will support a common vocabulary for transparent knowledge exchange among inter-organizational systems of business partners of a value chain, so that semantic interoperability can be achieved. An example is furnished to illustrate how semantic knowledge transparency in the e-marketplace provides critical input to the supplier discovery and selection decision problem while reducing the transaction and search costs for the buyer organization.

## INTRODUCTION

Business partners, in this digital economy, perform large numbers of transactions in open, dynamic, and heterogeneous environments. Inter-organizational information systems and communication technologies are considered as key factors for improving communication and reducing coordination costs among business partners in a value chain—we consider virtual organizations as an extension of a traditional value chain, where business partners must coordinate resources and activities to effectively achieve common goals. Emerging Internet technologies have led to e-business processes that aim to achieve business goals where information and knowledge exchange enables and facilitates the execution of inter-organizational business activities and supports decision making that is underlying these activities. Information sharing among partners in e-business is conceived to be the key to alleviate problems related to demand volatility and capacity planning and is critical for efficient workflows (Bellini, Gravitt, & Diana, 2001). Even more critical for achieving efficiency in e-business workflows is transparency in information (availability of information in an unambiguously interpretable format) through effective integration of information flows across a supply chain (Singh, Salam, & Iyer, 2005).

In executing processes across inter-organizational systems, human and software agents perform activities that require access to organizational knowledge resources. In this respect, cooperation in the form of knowledge sharing may increase each partner's knowledge base and therefore their competitiveness (Loebecke, Van Fenema, & Powell, 1999; Lorange, 1996). Knowledge is considered a source of competitive advantage (Drucker, 1992; Simon, 1992) and it has emerged as the most strategically significant resource of the firm (Grant, 1996). Knowledge sharing in the context of supply chain has been recognized to enhance competitive advantage of

the supply chain as a whole (Holland, 1995). We posit that in order to achieve such advantages *knowledge transparency* must exist. We define semantic knowledge transparency as the dynamic on-demand and seamless flow of relevant and unambiguous, machine-interpretable knowledge resources within organizations and across inter-organizational systems of business partners engaged in collaborative processes. Current systems integration models suffer from a lack of knowledge transparency (Singh, Iyer, & Salam, 2005). Integrating knowledge resources across collaborating organizations requires knowledge integration for global, inter-organizational, access to knowledge resources. A process view of semantic knowledge integration incorporates management of component knowledge and process knowledge for integrated inter-organizational systems that exhibit semantic knowledge transparency.

Nevertheless, to fully realize the benefits of semantic knowledge transparency several issues must be addressed. The main problem is how to determine how much and what knowledge should be shared, when, with whom, and under what conditions (Loebecke et al., 1999). The effective standardizations and adaptability afforded by integrative technologies that support the transparent exchange of information and knowledge make inter-organizational e-business relationships viable. This is increasingly prevalent through efforts such as ebXML ([www.ebXML.org](http://www.ebXML.org)), Business Process Execution Language (BPEL) ([www.oasis-open.org](http://www.oasis-open.org)) and the Web Services Architecture (WSA) standards. These allow for standardized content representation for enterprise applications integration by defining the standards for adaptability and standardization. These technologies provide businesses with great opportunities to integrate e-business processes throughout their value chain. Such integration creates inter-organizational information systems where participant firms integrate their information technologies in architecture with transparent information exchange (Choudhury, 1997). Implementing and

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