

# Chapter 3.13

## An Intelligent Knowledge-Based Multi-Agent Architecture for Collaboration (IKMAC) in B2B e-Marketplaces

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### ABSTRACT

This chapter presents an Intelligent Knowledge-Based Multi-Agent Architecture for Collaboration (IKMAC) in B2B e-Marketplaces. IKMAC is built upon existing bodies of knowledge in intelligent agents, knowledge management, e-business, XML, and web service standards. This chapter focuses on the translation of data, information, and knowledge into XML documents by software

agents, thereby creating the foundation for knowledge representation and exchange by intelligent agents that support collaborative work between business partners. The realization of the proposed architecture is explained through an information-mediated Marketplace prototype in which agents facilitate collaboration by exchanging their knowledge using XML and related sets of standards. Use of such systems will provide collaborating partners with intelligent knowledge management (KM) capabilities for

seamless and transparent exchange of dynamic supply and demand information.

## **INTRODUCTION**

This chapter presents an Intelligent Knowledge-Based Multi-Agent Architecture for Collaboration (IKMAC) in B2B e-Marketplaces. IKMAC is built upon existing bodies of knowledge in intelligent agents, knowledge management (KM), e-business, eXtensible Markup Language (XML) and web services standards. IKMAC incorporates a consolidated knowledge repository to store and retrieve knowledge captured in XML documents, to be used and shared by software agents within the multi-agent architecture. The realization of the proposed architecture is explicated through an infomediary-based e-Marketplace example in which agents facilitate collaboration by exchanging their knowledge using XML and related set of standards. This chapter focuses on the translation of data, information, and knowledge into XML documents by software agents, thereby creating the foundation for knowledge representation and exchange by intelligent agents that support collaborative work between business partners.

## **CONTEXT**

Rapid growth in Internet technologies has tremendous impact on business processes in the Digital Economy. As the reliance on electronic information sources grows — fuelled by the growth in the Internet and the global Digital Economy, the relevance and pertinence of information become critical for effective use of scarce resources and time. As businesses discover new ways of using the information-sharing and process-enabling features of the Digital Economy, greater demands are placed on goal-oriented problem-solving activities. The growing complexity in information sources and business processes requires an alli-

ance of human analysis, intuition, and judgment aided by intelligent agent support for the range of information processing tasks. Companies, in the current Digital Economy, are forced by intense competition to develop innovative strategies and solutions to optimize the transfer of goods, information, and services from suppliers to business customers and, ultimately, to consumers. The integrated value chain extends beyond a single company and encompasses all related trading partners, thereby extending the focus of integration outside the organization's walls.

Emerging Internet-based technologies, such as XML and related sets of standards (<http://www.w3c.org>), ebXML (<http://www.ebxml.org>), web services, the Semantic Web, and intelligent multi-agent technology provide businesses with great opportunities to not only develop solutions that streamline and integrate business-to-business (B2B) transaction processes, but also to create intelligent electronic marketplaces (e-Marketplaces) throughout their value chain (Singh et al., Forthcoming). There is a significant first-mover advantage that a company may be able to capture if it integrates the emerging Internet-based technologies within a strategic competitive vision for the Digital Economy. Realizing the potential benefits of emergent technologies is dependent on the effective sharing and use of business intelligence and process knowledge among business partners to provide accurate, relevant, and timely information and knowledge. This requires system models to support and enable information integration, knowledge exchange, and improved collaboration among business partners. Such systems must provide collaborating partners with intelligent knowledge management (KM) capabilities for seamless and transparent exchange of dynamic supply and demand information. Implementing and managing such integration over distributed and heterogeneous information platforms, such as the Internet, is a challenging task; yet, realizing this task can have significant benefits for organizations embracing such collaborations.

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