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Chapter XIV

Component Framework Supporting Agent-Based Electronic Data Interchange

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In this chapter, we present an approach to a component (application) framework supporting agent-based intercompany communication and coordination. By using the extensible markup language (XML) as an important cross-section technique, together with common business communication standards, we show how the border of heterogeneous (distributed) application systems can be overcome. With this, a business communication protocol is set up. Taking this protocol as a basis, we further present a component framework, which is implemented using the JavaBeans technology to support an efficient intercompany communication. In addition, we show how this approach may further develop to a means for intercompany coordination. Thus, we come to multi-agent systems that support innovative business strategies in e-commerce settings, which rely on automatic coordination of complex business transaction within virtual enterprises.

INFORMATION INFRASTRUCTURES FOR INNOVATIVE COMPETITIVE STRATEGIES

Business processes have been stretched across organizational borders to gain competitive advantage through the combination of individual core competencies, or solely because individual organizations lack specific knowledge. Nowadays, organizations worldwide are faced with growing competitive pressure through open markets and the movement from seller markets to buyer markets. Therefore, they seek to replace their (legacy) application systems with better, network-based architectures. The constant spreading use of network technology (like the Internet) involves new possibilities and adds a new quality to inter-organizational cooperation. Companies may now cooperate not only locally, but also globally with any company offering needed assets (knowledge as well as products) at best quality and lowest costs to gain competitive advantage.

This is especially necessary when competitive strategies, like *mass customization* (Pine II, 1993) are succeeding. A network of manufacturers, suppliers, and retailers has to be established to put mass customization into action (Kotha, 1996, pp. 447-449). Mass customization enables businesses to offer individual products at prices comparable to mass production, and comparable short shipment times. Tighter integration of suppliers and the coordination of inter-organizational production processes are critical success factors for mass customization (Moad, 1995, p. 35).

In order to provide the necessary flexibility in such alliances, the partnership should be as loose as possible, i.e., it should be formed for a limited period of time and a limited product palette. From a customer's viewpoint, who buys such a product, the alliance seems to be a single company. In fact, it is a *virtual enterprise*. The concept of virtual enterprises has its origin in the idea of the *agile enterprise* (Nagel, Dove, & Preiss, 1991, pp. 8-9). It is a temporary network of independent companies or natural persons, who have the same rights and cooperatively produce a specific good or service. The collaborators particularly bring in their core competencies. Further, there is no institutionalized common management. The virtual enterprise appears to others as a single company and is coordinated using a suitable information system (Arnold, Faisst, Härtling, & Sieber, 1995, p. 10). However, it is possible that over time the virtual enterprise becomes a conventional group or fusion of companies. Especially, if it is successful with its mass customized products in the market for a longer period of time. In this case, the period in which a virtual enterprise exists is a preparation phase for establishing a steady cooperation of companies. In such cooperations, the companies are connected through conventional supplier-producer relationships. The process of changing a virtual enterprise to a steady cooperation can be incremental. It may start with a core group of the members of the virtual enterprise, which is extended by adding more members over time. This does not exclude the case that some companies stay loosely coupled, particularly, if their products or skills are only demanded sporadically.

Figure 1. Component Framework Supporting Agent-Based EDI