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Chapter VIII

A Framework of Intelligence Infrastructure Supported by Intelligent Agents

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ABSTRACT

In this chapter, we establish a conceptual framework for intelligence infrastructure, which is an indispensable foundation to intelligent enterprises. Intelligence infrastructure is defined as information technology based facilities, systems, and services that support effective and efficient decision making at all levels of an organization. Intelligent agents, or autonomous computer programs, have emerged in recent years as a key component to organizational intelligence infrastructure. We review intelligent agents research and applications, identify their role in intelligence infrastructure, discuss the concepts and issues behind the intelligent agent supported intelligence infrastructure, and point out future developments.

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INTRODUCTION

Jeff Bezos, CEO of Amazon.com and *Time Magazine*'s Man of The Year in 1999, is widely quoted as saying, "If I have 3 million customers on the Web, I should have 3 million stores on the Web." This statement epitomizes the arrival of a time when businesses have become increasingly customer and value oriented. Implicit in the statement is also the assumption that information technology will be sophisticated and cost-effective enough to support the learning of and adaptation to complex market dynamics and consumer behaviors. Although we are not there yet, the remarkable advancement of information and communications technology over the last 50 years has provided a large repertoire of tools, knowledge, and skills that empowers information-age businesses. Electronic commerce, for instance, has dramatically changed the way businesses operate, compete, and serve their customers, enabling them to streamline their operations and to become more effective in their quest for creating value for their customers (Singh & Thompson, 2001).

The Internet and the World Wide Web have fundamentally changed our society, offering both opportunities and challenges. Organizations and business enterprises must recognize and understand those opportunities and threats at "Internet speed"—an elusive measure that implies the need to evaluate the changing environment and respond more quickly and effectively than the competition. Today's enterprises must go beyond traditional goals of efficiency and effectiveness; they also need to be intelligent in order to adapt and survive in a continuously changing environment (Liebowitz, 1999).

An intelligent enterprise is a living organism, where all components and subsystems work coherently together to enable the enterprise to maximize its potential in its goal-driven endeavors. Stonier (1991) suggested that intelligent organizations must have not only intelligent individuals, but also "collective intelligence" that is created through integration of intelligence from subunits of the organization. Researchers have developed frameworks for building organizations around intelligence, as opposed to traditional approaches that focus on products, processes, or functions (e.g., McMaster, 1996; Liang, 2002).

Analogous to intelligent biological life, an intelligent organization has a life of its own. An intelligent enterprise understands its internal structure and activities as well as external forces such as market, competition, technology, and customers. It learns and adapts continuously to the changing environment. The learning and adaptation are achieved through real-time monitoring of operations, listening to customers, watching the markets, gathering and analyzing data, creating and disseminating knowledge, and making intelligent decisions.

Because an intelligent enterprise is comprised of highly integrated and coordinated organizational systems—such as organization control systems, management information systems, business intelligence systems, and so on—the building, operation, and support of an intelligent enterprise present even more challenges than creating and managing a traditional business. Although the business world has recognized the importance of intelligent enterprises, as evidenced by various research projects in market-leading companies such as IBM and Microsoft Corporation, the theoretical foundation of the intelligent enterprise is still in its embryonic stage.

Theories of organizational learning and organization design abound (Galbraith, 1977; Jones, 1996; Malone, 1997; Wang & Amed, 2003). The literature on integrating