Chapter VI

Software Agents in Today's Digital Economy: Transition to the Knowledge Society

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"The future business culture will be one in which innovation is necessary, learning is constant, organizations need to act collaboratively, and work is its own reward…It will not be business. It will not be government. It is the social sector that may yet save the society." ——Peter F. Drucker

EXECUTIVE SUMMARY

One of the most discussed topics in the information systems literature today is software agent/intelligent agent technology. Software agents are high-level software abstractions with inherent capabilities for communication, decision making, control, and autonomy. They are programs that perform functions such as information gathering, information filtering, or mediation (running in the background) on behalf of a person or entity. They have several aliases such as agents, bots, chatterbots, databots, intellibots, and intelligent software agents/robots. They provide a powerful mechanism to address complex software engineering problems such as abstraction, encapsulation, modularity, reusability, concurrency, and distributed operations. Much research has been devoted to this topic, and more and more new software products billed as having intelligent agent functionality are being introduced on the market every day. The research that is being done, however, does not wholeheartedly endorse this trend.

The current research into intelligent agent software technology can be divided into two main areas: technological and social. The latter area is particularly important since, in the excitement of new and emergent technology, people often forget to examine what impact the new technology will have on people's lives. In fact, the social dimension of all technology is the driving force and most important consideration of technology itself. This chapter presents a

socio-technical perspective on intelligent agents and proposes a framework based on the data lifecycle and knowledge discovery using intelligent agents. One of the key ideas of this chapter is best stated by Peter F. Drucker in Management Challenges for the 21st Century *when he suggests that in this period of profound social and economic changes, managers should focus on the meaning of information, not the technology that collects it.*

INTRODUCTION

Although there is no firm consensus on what constitutes an intelligent agent, there are certain characteristics that intelligent agents (also referred to as software agents in this chapter) display. When a new task is delegated by the user, an intelligent agent determines precisely what its goal is, evaluates how the goal can be reached in an effective manner, and performs the necessary actions. It learns from its past experience in order to respond to unforeseen situations with adaptive, self-starting, and temporal continuous reasoning strategies. It needs to be not only cooperative and mobile in order to perform its tasks by interacting with other agents, but also reactive and autonomous to sense the status quo and act independently to make progress towards its goal (Baek et al., 1999; Wang, 1999). Software agents are goal-directed and possess abilities such as autonomy, collaborative behavior, and inferential capability. Intelligent agents can take different forms, but an intelligent agent can initiate and make decisions without human intervention and has the capability to infer appropriate high-level goals from user actions and requests and take actions to achieve these goals (Huang, 1999; Nardi et al., 1998; Wang, 1999). The intelligent software agent is a computational entity that can adapt to the environment, making it capable of interacting with other agents and transporting itself across different systems in a network. "The state of the running program is saved, transported to the new host, and restored, allowing the program to continue where it left off" (Kotz and Gray, 1999).

The following is a roadmap of this chapter. This chapter takes a closer look at the current state of research on intelligent agents by first examining the technological issues. This is followed by discussion of the transition to the knowledge society and the data lifecycle and knowledge discovery using intelligent agents, and then a proposal for an integrated framework in the form of a sense-making model of knowledge management for new business environments. Next, the social and ethical implications of intelligent agent software technology are discussed, followed by a summary and conclusion.

THE CURRENT STATE OF RESEARCH ON SOFTWARE AGENTS

Software agents were first used several years ago to automate repetitive behavior in simple tasks such as filtering and sorting information and making basic price comparisons (Maes et al., 1999; Kirsner, 1999). This first phase of software agents has been superceded by sophisticated software agents that keep a detailed profile of demographics and psychographics and can track interests and preferences in order to offer customized services in business-to-business, business-to-consumer, and consumer-to-consumer e-commerce based on some embedded mobility meta-data (Maes, 1999; Wong et al., 1999). In automated negotiation in retail e-commerce, electricity markets, manufacturing planning and scheduling, distributed vehicle routing among independent dispatch centers, and electronic

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