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Chapter 12

Intelligent Software Agents in Electronic Commerce: A Socio-technical Perspective

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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

INTRODUCTION

Although there is no firm consensus on what constitutes an intelligent agent (or software agent), *when* a new task is delegated by the user should determine precisely what its goal is, evaluate how the goal can be reached in an effective manner, and perform the necessary actions by learning from past experience and responding to unforeseen situations with its 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 infer-

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ential capability. Intelligent agents can take different forms, but an intelligent agent can initiate and make decisions without human intervention and have 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 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 or 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 This first phase of software agents has been superceded by sophisticated software agents that keep a detailed profile of demographics and psychographics. They 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 metadata (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 trading of financial instruments; computational agents find and prepare contracts on behalf of the real world parties they represent (Sandholm, 1999). Gloshko et al. (1999) believe that over time, most merchant web sites will provide agent-searchable catalogs that supply product descriptions and information about price and availability. The stage is set for applications that can benefit from the mobile agent paradigm, such as personal assistance by monitoring and notifying/information dissemination, secure brokering, distributed information retrieval, telecommunication networks services, and workflow applications, and parallel processing (Lange & Oshima, 1999; Hauk & Chen, 1999).

Much research and many articles have been devoted to this topic, and software products billed as having intelligent agent functionality are being introduced on the market every day. The articles and research, however, do not wholeheartedly endorse this trend. A growing number of computer information professionals recognize that there are certain problems and issues surrounding intelligent agent terminology and technology that must be resolved if agent technology is to continue to develop and mature.