Chapter 2
Applying Agents within Knowledge Management

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Category: Technologies for Knowledge Management

INTRODUCTION

In our social world, an agent is a person that performs some task on your behalf. This concept of agent has existed for thousands of years. For example, some Biblical laws specifically refer to agents. Three modern examples are a travel agent planning flights and accommodation for your holiday, a real-estate agent helping you buy or sell a house, and a matchmaker arranging marriages.

In the recent software context, an agent is loosely a program that performs a task on your behalf. Agents have grown in popularity since the introduction of the PC (personal computer) due to the increase in complexity of the target environment for application software. Software systems must now operate robustly in a networked, global environment comprised of diverse, distributed technologies. Furthermore, the environment is dynamic, and frequent change is inevitable. Having automated help is almost a necessity.

Despite many attempts, there is no universally agreed technical definition of agents. An oft-cited reference by Franklin and Graeser (1996) gives almost a dozen different definitions. Let us consider a textbook definition given by Wooldridge (2002, p. 15). An agent is "an encapsulated computer system, situated in some environment, and capable of flexible autonomous action in that environment in order to meet its design objectives." Essential

characteristics of the agent paradigm that can be elicited from this definition are:

- The autonomy of individual agents, or their ability to act for themselves and to achieve goals
- The reactivity of individual agents in response to changes in the environment
- The modularity of individual agents and classes to allow the easy development of complex systems
- The ability of agents to communicate effectively and interact with legacy systems
- The purposefulness of agents whereby they are achieving goals demanded on them through the roles that they play

Optional characteristics of the agent paradigm, which emerge from broader considerations of agents than the above definition, include the ability to reason, mobility in moving around a network, and a capacity to adapt in response to evolving circumstances.

This article rests on the metaphoric view of agents as entities performing tasks on one's behalf. Agents are presumed useful for building software to interact with complex environments such as the Internet or within complex organizations such as universities and multinational corporations. A program being viewed as an agent is expected to sense the environment in which it is situated, become aware of changes in that environment, be able to communicate with other agents, and be able to take action in its situated environment.

According to these three expectations, sophisticated e-mail programs such as Microsoft's Outlook or the Mac mail program can be viewed as agents. The overall goals of a mail program are to manage email communication on behalf of people, including sending and receiving mail and filtering out unwanted messages. E-mail programs are situated on the Internet and sense aspects of the Internet such as when Internet connections are live and when new mail arrives. They communicate with other e-mail clients by sending and receiving messages. They take actions such as raising alerts when mail has arrived, sending mail that has been queued once an Internet connection is restored, filtering junk e-mail according to rules, and possibly sorting email into categories based on keywords.

We now connect with knowledge. Organizations operating in today's software environment need to represent, interact with, and above all, maintain a large collection of knowledge, including, for example, business practices, trade secrets, intellectual property, organizational hierarchies, promotional organizational descriptions, and knowledge of both its own policies and policies of relevant, external regulatory bodies. Out of necessity there is great diversity in the form, content, and context of the knowledge. Most of the knowledge is in unstructured or semi-structured form.

The problem of its representation and maintenance within an organization can be loosely called the knowledge management problem.

For the purposes of this article, there is no need to define the knowledge management problem or knowledge management, for that matter, more precisely. However, we note that the term knowledge management subsumes the term content management. Referring to knowledge rather than content suggests some concern with formalizing knowledge explicitly. How might agents be applicable to the knowledge management problem? As a running, concrete example, consider knowledge management issues related to the responsibilities of a university lecturer in charge of a subject. She or he must prepare, deliver, and maintain content in a variety of forms, possibly including lecture notes, papers, media presentations, and Web pages and resources. Note that 'subject' is a term used in Australia. In the United States, a subject is called a course, and in New Zealand, a subject is called a paper. The changing terminology in different contexts and cultures illustrates the ontology issue discussed later in the article.

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