Chapter 2.41
Knowledge Management Agents

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APPLYING AGENTS WITHIN KNOWLEDGE MANAGEMENT

The agent has existed as a concept for thousands of years. In the human context, an agent is a person that performs some task on your behalf, for example, a travel agent planning flights and accommodation for your holiday, or a real-estate agent helping you buy or sell a house, or someone arranging marriages. Some Biblical laws specifically refer to agents.

In the much more 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) as the target environment for application software has increased in complexity. 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

Optional characteristics of the agent paradigm, which emerge from broader considerations of agents than the above definition, include mobil-
ity in moving around a network and the ability
to reason.

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. Ex-
pected of a program being viewed as an agent is an
ability to sense and be aware of the environment
in which it is situated, an ability to communicate
with other agents, and an ability to take action in
its situated environment. According to these three
expectations, sophisticated e-mail programs such
as Microsoft’s Outlook and Qualcomm’s Eudora
can be viewed as agents. They are situated on the
Internet and sense various aspects of the Internet,
including 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,
or filtering messages according to rules.

We now connect with knowledge. Organiza-
tions operating in today’s software environment
need to represent, interact with, and above all,
maintain a large collection of knowledge, includ-
ing, 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. There
is out of necessity great diversity in the form,
content, and context of the knowledge. Most of
this knowledge is in unstructured or semistruc-
tured form. The problem of the representation
and maintenance of such knowledge 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 knowl-
edge 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 knowl-
edge management problem? As a running, con-
crete 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,
and media presentations. Let us particularly focus
on one component of the task, namely, maintain-
ing a Web site for the subject.

Several possibilities exist for enlisting the
help of agents. An obvious first task for agents
is to help with the acquisition of knowledge,
which is obtaining content and placing it on the
Web site.

What type of software agent might be useful for
the acquisition of knowledge? It is natural to en-
visage a custom Web crawler (http://en.wikipedia.
org/wiki/Web_crawler), Programs that trawled
specified Web sites looking for content were early
applications built to exploit the World Wide Web.
Building a Web-crawling agent immediately
raises important considerations. The agent should
be aware of important regulatory issues such as
the fact that downloading mp3 files is illegal in
some countries without the authorised permis-
sion of the copyright holder. The agent should
also be aware of conventions such as the robots.
txt_protocol) in which guidelines are given about
parts of a file hierarchy that should be ignored
by well-behaved agents. There are many similar
policies of which a knowledge-acquiring agent
would need to be aware. These policies demon-
strate some of the complexities that need to be
taken into account in building agents.

Search engines are based on exhaustive trawls
and efficient indexing of files using techniques
from information retrieval. Agents can also
be constructed using techniques derived from