

# ABCD: AGENT-BASED COLLECTION DEVELOPMENT

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*By linking electronic sources of information about course content, faculty publications, research interests and personal or departmental homepage, it is possible to develop a collection development system which is maintained by electronic agents, software packages designed to perform the tasks associated with the selection, acquisition, recording and dissemination of information.*

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Agent: (n.):

1. a person or thing that acts or brings about a certain result.
2. one who is empowered to act for another.

## **There's no place like home**

At universities and colleges world-wide, it is becoming standard practice for academic departments to create Web pages that, among many other purposes, serve to inform enrolled as well as prospective students about course offerings and the research interests of the department. Likewise, it is also becoming common practice for academic faculty to prepare personal homepages that include details of their individual research interests, most notably a full description of their current and prior projects and a list of significant journal articles, conference papers, and funded grants. In many instances, a faculty member will also provide a comprehensive curriculum vita that includes a complete publications list. In more and more cases, faculty are providing a link to the full-text of their work and to that of their collaborators.

In late summer 1997, we undertook a systematic review of the departmental and faculty homepages of selected engineering departments at Iowa State University, with the intent of identifying the general and specific research interests of these departments and their affiliated faculty. This survey was conducted to assess the specific information needs of this user community, in order to facilitate the selection and purchase of materials for the Iowa State University Library collection.

To gain a more detailed understanding of the relative importance of these collective interests, we initially planned to build a spreadsheet that represented the expressed research interest of each departmental faculty member. Using this spreadsheet, we hoped to develop an in-depth knowledge of these interests, in the belief that such information could further enhance the selection of materials having the highest potential value to support current research and teaching responsibilities. While we did discuss such a project with our library support staff, we quickly realized that such an

undertaking would require an additional commitment as well as associated training for all involved. The layout of the spreadsheet, preparation of formulae, and the analysis and input of departmental and faculty Web page data and information was subsequently postponed in the hope that the project could be resumed later in the academic year.

While the project was pending, we had an opportunity to revisit a previously established Web clearinghouse devoted to the potential application of Intelligent Agent Software to library services<sup>1</sup>. This review inspired us to consider the use of Agent technology rather than the spreadsheet for data analysis and to speculate on new ways to gather and use data from institutional Web pages and other information sources for collection development.

### The Magnificent Seven

As defined by Gordon<sup>2</sup>, an Intelligent Software Agent is:

*[A] software object empowered to represent someone and carry out some action. An agent might send a message, filter and deliver information, make a purchase, or interact with other agents. An agent generally has a purpose, destination, conditions on which to act, and a set of actions it is capable of executing.*

Currently, few software agents have been developed expressly for library services, but many existing Agent technologies do carry out procedures and actions similar to those provided by library vendors or performed by bibliographers. One could envision the creation of a Multi-Agent System that would carry out the routine functions associated with the identification and selection of candidate resources for a local collection. This cluster of agents might include:

1. A Profile Agent
2. A Citation Agent
3. A Search Agent
4. An OPAC Agent
5. A Feedback Agent
6. An Interlibrary Loan Agent
7. An Acquisitions Agent

#### Profile Agent

Using appropriate text and semantic algorithms<sup>3</sup>, the Profile Agent would analyze the content of

individual departmental and faculty homepages. The agent would scan these pages to identify areas of interest or topics as conveyed by statements of research projects, teaching responsibilities, grants received, and course entries described or linked from within a departmental homepage or a Web version of the university's General Catalog. A core Interest Profile for a department and each of its affiliated staff would be constructed from this analysis by the Profile Agent.

#### Citation Agent

A separate Citation Agent would be designed to identify citations to individual or faculty publications. These could be available from a separate departmental publications page, from within a faculty member's homepage, from a hotlinked curriculum vita, or from records within relevant licensed bibliographic databases (e.g., *EiCompendex Web*). Among its many roles, the Citation Agent would identify the specific publications as well as the topics of these publications. This and similar information identified by the Citation Agent would be used to enhance a department's Interest Profile as well as those of individual faculty. Using these data and information derived from the original analysis of departmental and faculty homepages, the Profile Agent would construct an augmented Interest Profile that in turn could be sent to one of several other agents, with a Search Agent among the most important. The Citation Agent might also track citations to the work of departmental faculty to identify the publications of other authors whose specific subject coverage might also enhance individual faculty Interest Profiles, or serve as a component of a current awareness service. The Citation Agent might also analyze the topics of the works cited by a faculty member in his or her linked full-text publications.

#### Search Agent

The Search Agent would be responsible for constructing a search statement that would be executed against one of several candidate resource databases to identify works relevant to the research and teaching interests of academic faculty. Candidate resource databases could include *Amazon.com*, publishers' electronic catalogs, or publicly-accessible e-journal

collections, and with approved licence agreements, such important collection development tools as *WorldCat*, and electronic forms of *Books-in-Print*<sup>®</sup>, and *Ulrich's*<sup>™</sup> *International Periodicals Directory*. In addition to managing the preparation of search queries, the Search Agent would also be responsible for managing the organization and display of the results of such queries, notably the ranking of retrieved documents by relevance using appropriate algorithms. This agent could also be responsible for organizing records of greatest potential interest to individual faculty. Such organized sets could be reviewed directly by a designated bibliographer, or forwarded to the appropriate faculty member for assessment prior to a librarian's review.

#### *OPAC Agent*

Among its many potential roles, the Online Public Access Catalog Agent or OPAC Agent would be responsible for checking the local OPAC for availability of candidate titles identified by the Search Agent, including titles *on order* or *in process*. The OPAC Agent could also be used to monitor the use of materials from the local library collection by individual and departmental faculty as conveyed by circulation data. The subject coverage of materials borrowed by such users would be analyzed and transmitted to a Feedback Agent.

#### *Feedback Agent*

The primary role of the Feedback Agent would be to manage data derived from user behavior<sup>4</sup>. The Feedback Agent would continually refine the Interest Profile of an individual or department based upon feedback from various sources, with materials borrowing and interlibrary loan among the more important. The Feedback Agent would also interact with the Citation Agent to identify newly-published or newly-cited work of departmental faculty.

#### *Interlibrary Loan Agent*

With libraries now routinely complementing and supplementing their formal acquisitions program with just-in-time document delivery and interlibrary loan services, it would be beneficial to have an Agent to monitor user activity in this area.

While not all requests are submitted electronically by patrons, or transmitted in this format, more users are requesting materials from library Interlibrary Loan departments using Web-based forms and more libraries are using record management software to manage and monitor such requests. Here the Interlibrary Loan Agent would analyze requests submitted by departmental faculty, and like the OPAC Agent and Citation Agent, determine the subject coverage of these requests. Information collected by the Interlibrary Loan Agent would be fed to the Feedback Agent for integration within its database of user behavior.

#### *Acquisitions Agent*

After candidate works are formally reviewed by a bibliographer, an Acquisitions Agent would have the responsibility of preparing the necessary electronic acquisition forms for submission to co-operating vendors and subscription agents. It would extract all the necessary ordering data for the selected work from the source itself or from one of several associated utility databases (e.g., Web-based vendor databases). Ideally, one could expect that a local library's Acquisition Agent would submit the necessary data to the Receiving Agent of selected providers. Among the major roles that an Acquisition Agent might play would be the identification of the least expensive or most expeditious source for a given item. The Acquisitions Agent could also provide appropriate bibliographic data to an associated Cataloging Agent.

#### **The Age of Agents**

We have described several scenarios and interactions among a number of possible Agents that could behave in ways that replicate some of the routine and not-so-routine procedures and actions used in the collection development process. Although we are aware of but a handful of applications of Intelligent Agents for the library environment at present, the extensive and growing use of such software by business and industry for a wide variety of services similar to those carried out within libraries can be expected to have a significant impact on the way libraries conduct their business in the future. By the beginning of the next millennium, Agent-based

