



Chapter 10

Information Retrieval Using Collaborating Multi-User Agents

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INTRODUCTION

Informal channels for the exchange of information have long been recognised as important (Menzel, 1959; Wilson, 1981; Kuhlthau, 1991; Root, 1988; Kraut and Galegher, 1990). Typical examples of informal information exchange activities are conferring with peers and consultation with a subject librarian (Taylor, 1968; Kuhlthau, 1991; Fox, Hix, Nowell, Brueni, Wafe, Heath and Rao, 1993). If Information Communication Technologies (ICTs) are to become truly user-centred then they must support such informal collaborative activity. The recent interest in knowledge management has, in part, been stimulated by the recognition that valuable information is transferred during informal collaborations (Nonaka & Takeuchi, 1995). To bring some formality to the process organisations are investing in document management software, intranets and groupware technologies (Kiesler, 1997). However, these technologies rely largely on the user actively searching out information and assume that the user can formulate their information needs into an appropriate query. Additionally, such systems tend towards failure in the longer term if users are not motivated in augmenting the knowledge base (Skyrme, 1999).

As stated by Schrage (1990, pp.111-112): "*We need to shift away from the notion of technology managing information and toward the idea of technology as a medium of relationships*". Technology should be proactively supporting the user in their query formulation and information retrieval activities and facilitating the social interaction processes that have resulted in serendipitous information retrieval. Bates (1979a, b) identified a number of, usually collaborative, infor-

mal interactions undertaken during information gathering that promoted serendipity. These can be summarised as:

- *consultation* whereby a specific colleague is asked for help. With reference to ICT retrieval this can be equated to emailing a specific colleague
- *wandering* whereby a range of information sources are consulted in an unplanned manner. This can be equated to the computer supported browsing activity where information searching is opportunistic, reactive and unplanned the aim of which may be uncertain and evolve during the browsing process (Marchionini, 1995);
- *brainstorming*, in ICT retrieval terms this is synonymous with discussions that ensue as a result of queries posted to discussion groups or special interest mailing lists;
- consulting a bibliography, referred to as *bibbling*. With reference to ICT retrieval this can be compared with consulting on-line bibliographies (e.g., the Endnote libraries that are being placed in the public domain).

Such informal collaborative information exchanges are important, yet few systems have been developed to support said activities. Indeed information technology can be seen as a barrier to such exchange processes, hampering social interaction, hindering initiative and creativity (Mantovani, 1996). Additionally, due to the amorphous nature of network communities it may be difficult to establish information exchange relationships between users (Kautz, Selman and Shah, 1997).

This paper recognises the importance of serendipitous discovery via informal collaborations during information retrieval. A model which supports collaborative information retrieval from a range of information sources is presented. The model has an agent-based architecture which is founded on the principles of connectionist information retrieval but with the advantages that it does not require explicit training and is not influenced by individual user use (Belew, 1989). The system consists of a set of co-operating agents which provide both a technical and psychological solution. From the technical perspective the agents manage user interests, engage in information searches and provide a uniformed interface to disparate datasets. From the psychological perspective the agents adopt an anthropomorphic role acting as a user facilitator, they can proactively co-operate to identify additional subject areas, sources and other users with similar interests. Additionally they actively augment and refine search criteria based on their derived knowledge of previous successful searches (Berney & Ferneley, 1999). The system, known as CASMIR, has been implemented as a set of co-operating Java agents communicating in KQML. This paper uses the definition of a software agent as proposed by Huhns (1998):

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