

# Recommending Expertise in an Organizational Setting

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## ABSTRACT

This work explores how information systems can be augmented to assist users in finding other individuals who are likely to have specialized, expert information that they need. This paper describes a field study that considers the social and cognitive mechanisms that people use to find candidate sources of expertise. These mechanisms are the basis for a recommender system that can help users find expertise.

## Keywords

Expertise, qualitative research, field study, system design, recommender system, computer supported cooperative work

## INTRODUCTION

Expertise is a valuable organizational resource. Attempts to capture expertise in documents or information systems (e.g. organizational memories, FAQs and databases) often result in gaps and inconsistencies. Expertise is difficult to represent in an explicit form and information systems are only as good as the information they contain. Systems that make suggestions without an explicit representation of the content are one possible solution this problem.

Traditionally, recommender systems are an approach to solving problems of information overload. Social filtering systems [3, 4], collaborative filtering systems [2] and rating systems can all be considered recommender systems [6]. These systems highlight or deliver relevant items to the user. They maintain a profile of each user based on prior system utilization or information which the user supplies. In all of the recommender approaches an item can then be scored, ranked, highlighted or delivered to a specific user.

This work proposes a system that recommends to users other individuals in an organization who are likely to have specific expertise they need. The system is based on the everyday social and cognitive mechanisms which individuals use when they naturally attempt to find expertise in the workplace.

## THE FIELD STUDY

A field study was conducted to gain a better understanding of the information sharing characteristics of expertise<sup>1</sup> and expertise finding in the workplace. The study focused on the social and cognitive mechanisms which informants use to acquire the expertise necessary to solve their day-to-day work problems. People know when a problem outstrips their individual abilities and expend additional effort to find others who have the expertise that they need.

The field study took place at Medical Software Corporation (MSC), a company that builds, sells and supports medical and dental practice management software. Practice management consists of various “back office” processes including appointment scheduling, treatment planning, insurance billing and patient billing. MSC packages its software pre-installed on high-performance UNIX servers and sells them as a turnkey system.

MSC employees face problems that result from the complexity of their software and its expansive feature set. The software is in a relatively constant cycle of new feature development and maintenance. A customer is never forced to upgrade to a new version. When assisting a customer, developers and support staff must be particularly sensitive to the version and customizations at that customer's installation. These problems and the way employees work to solve them make MSC a particularly good place to study expertise finding and sharing.

I was on-site for 5 months and have continued contact and follow up during the last year. Data were collected through observation, participant observation, informal open-ended interviews and semi-structured interviews. In total, I conducted 37 formal interviews and more than 50 informal interviews. Additionally, I had access to a broad range of corporate and client oriented communications.

Analytically, expertise finding is an iterative, tightly coupled pair of processes: identifying expertise candidates

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<sup>1</sup> In this work the term expertise assumes the embodiment of knowledge and skills within an individual. This definition distinguishes expertise, which is a range, from expert. An individual may have different levels of expertise about different topics. Expertise can be topical or procedural and is arranged and valued within social and institutional contexts.

and then selecting a small number of candidates to approach for help. In the study, informants rely on numerous clues embedded in documentation, technical reports, design specifications and other on-line information systems to identify people with possible expertise. When artifacts and systems in the environment provide no clues or when the clues are unclear, informants go to key individuals whom they perceive as knowing who knows. These key individuals are a type of gatekeeper [1]. An informant described one key person as “like a concierge” because of how he directed others to good sources of information.

Simply identifying people who are likely to have the required expertise is not enough. The informants choose one or a small number of people who they identified to ask for help. This selection is guided by organizational norms, the personal and performance characteristics of the people identified, and the personal preferences of the informant. The process of selecting and asking for help does not always provide a complete answer. In some cases, only a partial answer is given which requires the informant to either make do or to find further expertise.

A detailed description and analysis of the field study are described in [5]. Current work centers around analysis of follow up data and translating the results into a set of requirements and a design of a recommender system.

#### **FROM FIELD STUDY TO DESIGN**

The best process for moving from a social result to a technical design is a difficult and open question. The approaches taken by designers vary from immersion in the site to “quick and dirty” ethnography. A qualitative field study and its results are dependent on the observer and the way she interprets the social setting. In turn, a technical design is a reflection of the designer and her interpretation of empirical results guided by some design methodology. Slight differences in technical design based on interpretive results are likely to have widely different impacts when the technology is introduced.

I have proposed to build a recommendation system which suggests individuals in an organization who are likely to have expertise in specific domains. The system will be based on a modular, toolkit architecture that can be integrated with existing information systems. The toolkit will provide components to assist designers in implementing the identification and selection processes of expertise finding. The toolkit working design consists of a set of cooperating agents and social filtering mechanisms.

In the system, each agent relies on domain specific heuristics to identify groups of people who are likely to have expertise in a given domain. An underlying assumption of the toolkit is the ability of a designer to describe new heuristics or reuse existing heuristics to solve new expertise identification problems.

The heuristics used by the agents in the proposed system are derived from the results of the field study. The cooperating agents identify groups of people in two phases. The first phase is a domain specific data consolidation. In the second phase an agent will identify candidates based on the user making the request and the domain of the request.

The toolkit will also provide assistance with selection. It will include a social filtering mechanism that attempts to balance several social aspects derived from the insights of the field study as well as the existing research literature. The mechanism will consult a representation of a social network, attempting to minimize social distance between the user and the expert candidates. It will also apply organizational norms, such as keeping problems within a department or crossing certain preferred organizational boundaries before others when seeking help.

The domain specific identification heuristics and the socially based selection criteria are expected to be areas of continued research.

#### **SUMMARY**

This work extends recommender systems in three ways. The proposed toolkit will facilitate systems that can make recommendations about individuals and the type of expertise they are likely to have. It will facilitate the use of heuristics which people commonly apply to expertise identification tasks. As well, it will facilitate the inclusion of social norms that guide recommendations based on the topic and the individual seeking information.

The translation of the study results into requirements and a design engages the issue of design methodology. By pursuing the work through all stages I hope to contribute to the body of CHI design methodology.

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