

Supporting people in searching for information and expertise in an organisation

Introduction

For several years, researchers in a variety of communities have been engaged with questions of organisational knowledge. There are many strands to this interest. Some researchers regard the knowledge and skills of an organisation's members to be one of the prime resources of the organisation, yet one which is very hard to account for and manage. It is commonly pointed out that organisations lose valued assets as employees move on and some researchers have looked to technical means for externalising and recording members' knowledge (c.f. Ackerman & McDonald 1996). Others write about "organisational memory" and the management challenges there are once one takes the notion seriously (c.f. Walsh & Ungson 1991).

Within the field of computer supported co-operative work (CSCW) these topics have attracted a range of contributions, including critical analyses (c.f. Bannon & Kuutti 1996) and proposals for supportive technologies (c.f. McDonald & Ackerman 1999). Recently, research concerned to study empirically knowledge and expertise within organisations and documenting the methods used by members to find things out has emerged (c.f. McDonald & Ackerman 1998 and Fitzpatrick forthcoming).

We have conducted a similar study to the one presented by McDonald & Ackerman (1998) but in a different industrial sector (mechatronics) (Groth & Bowers 2001). We did this to extend the CSCW community's understanding of the observable methods that organisation members deploy to find things out. We have, for example, in our study observed methods other than those documented by McDonald & Ackerman and, when we observe similar methods, they seem to be deployed in ways which suggest another conceptualisation than that given in terms defined by McDonald & Ackerman.

The CompC study

The study at CompC was conducted as part of a longstanding program of research into organisational knowledge and specifying technologies for its support. A key theme of our work has been to avoid externalising and recording members' knowledge by technical means. Rather, we have been concerned to explore technologies which facilitate social contacts between individuals in such a way as to promote the exchange of knowledge and information. In this approach, technologies mediate social relations rather than act as a shared storage device for "organisational knowledge".

A central conclusion from the CompC study has been the situatedness of individuals' deployment of methods to find things out in order to get answers to questions or to solve problems. What people will do when searching for knowledge to solve problems is variable with respect to the character of the problem, but also depends on the nature of the situation she finds herself in as attempts to seek solutions unfold. There is also a clear ordering to persons' conduct as they try to find things out but exactly how their searches unfold, and exactly which method they will turn to next, is strongly contextually tied at each moment.

Another outcome of our study is how the availability of personnel impacts upon what can be done. At any moment who will and who will not be present at their workstation or in their project room is a highly contingent matter. While many features contribute to the situatedness and contingency involved in a person's attempts to get answers to questions or to solve

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problems, it is perhaps the sheer availability of people which most notably influences the course of persons' activities.

The document archives at CompC are not used as an externalisation of what people know such that they can substitute the embodied knowledge people have. Instead, it is organisational knowledge and skill which enable effective and appropriate use of the archives. For example, a person active in a project is more likely to be able to find what he/she is looking for in the project document archive than a person not involved in the project.

Weekly meetings and activities together with the office ecology enables members' of CompC to check on others' availability and activities. In a sense, it is the entire panoply of the office ecology, unexpected encounters, scheduled meetings, and training which—together with a varied family of information systems—constitute CompC's "knowledge system". Therefore, I believe that the field concerned with "awareness systems" rather than "knowledge systems" is most appropriately built upon when developing technical support for searching out information and knowledge in an organisation.

In all, searching for knowledge and information when solving problems worked quite well at CompC. There is no strong organisational reason to devote considerable resources to integrating systems at CompC, instead, considering light-weight approaches which add value to the existing systems might be a better strategy.

Future Work

As a natural next step I want to look at technical means for supporting the exchange of knowledge and information in an organisation. To continuously support people in knowing about others' availability and activities will make people more aware of what experiences and competencies others have and how and if others can be reached when a question or problem arises.

Based on the results from CompC I wish to develop and evaluate technical support for knowledge exchange between employees in an organisation. The conclusions from CompC point out two main design strategies. The first is that so called awareness systems can be more suitable than so called knowledge systems in helping individuals in an organisation to exchange knowledge and information. The second is that using "light-weight technology" is to be preferred so as to avoid that the bother exceeds the benefit of using the technology, e.g., time consuming handling when using the application. I feel that considering light-weight approaches which add value to existing systems would be a better strategy than extensive technical solutions with organisational redesign in turn.

There are three main activities in the design work: design of a set of applications supporting people's awareness of others' availability and activities, design of a "toolbox" for structuring already available and "in-use" information about others' availability and activities, and evaluation of how using a prototype including these two designs affects an organisation. The results from the first two activities should be a prototype that can be up and running in a real work situation and evaluated during the third activity.

Awareness of people's availability and activities

There are, today, several applications that can support people's awareness of other's availability and activities in a variety of ways. One kind of awareness applications are those where notifications about specific activities can be sent to people in a distributed environment, e.g., when people log into and out of their workstations, when there is a meeting and what it is about, when people are going for lunch or coffee, and so on. Through the notifications people send to each other, people will continuously get informed about others

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activities. Examples of such applications are the Elvin system (Fitzpatrick, Kaplan, Mansfield, Arnold & Segall 2001) (<http://elvin.dstc.edu.au/index.html>) developed at the Distributed Systems Technology Centre (DSTC) in Australia, and another is the Zephyr system (<http://web.mit.edu/olh/Zephyr/Zephyr.html>) developed at the Massachusetts Institute of Technology (MIT) in USA. Such applications may not originally have been developed for collaborative activities, but some have proved to be useful for collaborative awareness and interaction support. These kind of light-weight approaches can be suitable platforms to use as a base for the system design in this project.

Another kind of awareness systems are those where people explicitly enter information into the system about their general activities, such as if they are in or out of the office, on a meeting, and so on. This approach, that can be compared to a sign-inboard (a whiteboard, usually located at the entrance of the office, on which people can mark when they enter or leave the office) that is commonly used in Swedish companies, requires people to actively search for information about people's activities. One such application is the @Work system (Tollmar, Sandor & Schömer 1996) developed at KTH. @Work enables users to set availability information viewed by others in a variety of simple ways. The essential design emphasis of @Work is to capture awareness information from existing sources and allow easy access to awareness setting mechanisms which do not require special hardware or complex applications to be used.

I want to explore several techniques, especially light-weight technology that build upon systems and routines already in place in people's work, for how to support people in knowing about others' activities and availability. One technique to use when collecting data about people's activities and availability, that can be mixed with an awareness application, is different kind of sensors, for example, detecting if there is activity in a room, if someone is sitting on a chair and so on. One example is the active badges developed at Xerox Parc about ten years ago, that through electronic devices on each individual and on strategic places in the office provides information about people's whereabouts in the office. Harper (1992) conducted a study of two research labs using the active badges, and he found differences between the two labs in how they accepted the badges, and in reasons for using them. Another technique to use is mobile phones. For example, notifications about activities on people's mobile phone can be sent to others in the organisation using wap technology, and notifications about others can be sent to the mobile phone using wap technology. A third kind of technique to use is the computer system and network used in the organisation. In Unix, scripts can be written to detect whether a person is logged on to the system or not, how long time ago a person was last active on the computer, and so on. In the @Work system, for example, the telephone switch board sent a notification when a person's phone was programmed. Using the kind of technology described above to capture information about people's activities and availability can be combined with problems, e.g., regarding integrity and privacy. People might not want others to know about their whereabouts all the time. What kind of technology to use when designing the applications also depends on the organisation in which it is supposed to be used. In my case the organisation is the same as in our ethnographic field study, a consultancy firm developing mechatronics

Developing an information structure

One essential part when finding things out is to know about others' availability and activities and this can be supported by an awareness system as described above. Another approach is using information about people's availability and activities that is already available and "in-use" in the organisation for other reasons. Examples are the employee's CV, common project information, and personal home pages. It is important, though, to note that what kind of information to include needs to be carefully considered. The use of information to build a

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structured and searchable “information sphere” is one way to support people in finding out and learning about the organisation and its participants and activities. This in turn enhances the exchange of knowledge in the organisation. The information sphere can be compared to a soft infrastructure where information from different sources is made available for processing.

Such information that is stored in many different places and formats in an organisation may, because of that, be difficult to manage. By using the possibilities of XML and metadata the different information sources can be combined and the data used more effectively. In order to achieve this a suitable metadata model needs to be developed.

Based on findings from the CompC study requirements for an information structure expressed as a metadata set will be identified. Based on the requirements an evaluation of existing metadata models will be conducted. Based on the evaluation a suitable model will be chosen and/or adapted for the purpose of knowledge exchange within an organisation.

Once the information structure is established a collection of tools for storing, searching, presenting, and managing the information will be developed, conforming to the light weight approach discussed above. The tools will support activities such as collect and present information about, for example, a specific action, area, person or project.

Evaluation

Ethnographic field studies usually do not provide detailed ideas for design. However, they are important in order to understand the workflow in an organisation, and to identify strategies for design. In our ethnographic field study, we have identified design strategies that we feel are strong enough to build a system design upon. In order to confirm the results we reached in the field study, the system design based on these results also needs to be evaluated. It is very important to go through all these three steps, field study, design and evaluation, in order to come to any essential design conclusions.

The use of awareness applications and information models when supporting people in knowing about others’ activities and availability needs to be thoroughly evaluated within an organisation in order to verify the design results based on the CompC study. The results from this design work should be evaluated within the same, or a similar, organisation as the one in the CompC study. An ethnographic study, evaluating how the prototype developed in the first two parts is used, should be conducted, including observations and interviews. This part should be on-going for at least a year in order to give sufficient material on how the prototype developed is used.

Questions to discuss

I would like to mainly discuss the future work described above:

- The idea to build a design to support information and knowledge exchange using light-weight technology and focusing on awareness of others’ availability and activities
- Developing awareness applications built on, for example, the Elvin system, mobile phones, sensors etc.
- Developing an information application build on information items already in use in the organisation using XML and metadata.
- Evaluating the two designs both on short and on long term.

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