Managing expertise:

The fundamental importance of trust in people's assessment and choice of information sources

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Introduction

The information-seeking behaviour of engineers has been studied extensively over the last 30 years (see King et al., 1994, for an excellent review). Though Pinelli et al. (1993) say that "the literature regarding the information-seeking behaviour of engineers is fragmented and superficial" it is generally agreed that:

- Internal communication of any kind is generally more critical in engineering work than is communication with sources external to the organisation. Furthermore, engineers tend to rely on their own information and on colleagues before the library and other internal sources.

- The cost associated with the use of an information source is the most important determinant of its use. That is, in selecting among information sources engineers seem to follow a law of least effort and thus counter any assumption of information quality as the single criterion upon which source selection is based.

It is my position that these studies undervalue the importance of trust in people's assessment and choice of information sources. Thereby, the studies end up depicting engineers as acting in a manner intended to minimise the effort involved in getting information, rather than to maximise the quality of the acquired information. Quality is, however, neither an objective property of information nor readily available to the engineer who considers making use of a

piece of information. The engineer has to assess information sources based on their *perceived* quality, i.e. based on his/her trust in them.

Trust

Trust is a fundamental aspect of co-operative work and at play whenever people exchange information (Jones & Marsh, 1997; Marsh, 1992). In relation to human-human interaction trust is mostly defined as an emotive issue or based on moral responsibilities toward the trusting party. Computers as such cannot feel the moral responsibilities that humans do, so a more general definition of trust is required to encompass human-computer interaction. To this end Marsh (1992) extends the definition of trust to one relying also on an expectation of rationality on the part of trusted agents. Trust is not an either-or, people place trust in each other to varying degrees, they know their sources to be reliable in some domains but not in others, they collect multiple sources of evidence to safeguard themselves against agents with inadequate capabilities or deceiving intentions, and they engage in a lot of communication to build and maintain a network of people they can turn to for advice and inside information.

In co-operative work trust can be seen as an essential way of reducing complexity in that it allows people to use the results of other people's work, as opposed to a need for experiencing everything themselves. From this perspective organisational efforts to manage knowledge or expertise are critically dependent upon providing access to this accumulation of experience in ways that allow the users to assess its trustworthiness. To accomplish this we need detailed studies of what different groups of people attach importance to in assessing the trustworthiness of potential information sources.

Two examples

The two examples given below are drawn from an ongoing, interview-based study of a large product development company. The purpose of the examples, which concern an engineering designer and an information specialist, is to illustrate the markedly different ways in which people seek to ensure that the information they rely on in their work is trustworthy.

The engineering designer – trust rooted in practical experience

The engineering designer is employed in one of the company's product development groups, which devise new products and plan their production. When he needs information or inspiration about how to accomplish a new design, for example about how to manipulate a stainless steel tube in a certain way, he turns

to his close-by colleagues or walks up to the R&D lab and talks to the people there. The people in the R&D lab may have hands-on experience with the material from the development of previous products, they may have worked through similar problems though on different materials, or they may know from other recent enquiries that another engineering designer is working with the same material or faces similar problems. In addition, the engineering designer will engage in experiments to get a feel of how the material behaves in practice, what happens when a manipulation is performed at a higher temperature than the one customarily used etc. The engineer does keep and consult a handful of textbooks and a select number of internal reports and other documents but he finds that in general he makes more use of product specification sheets than of actual text.

In conducting his work the engineering designer constantly strives to get beyond theoretical ('textbook') knowledge about principles and properties of materials and, instead, rely on his own and his colleagues' applied knowledge about how the involved materials behave when manipulated in certain ways. Thus, in this case trust is primarily rooted in practical experience, reached to a large extent through experiments, and in knowing the relied-upon people beforehand, i.e. having a network.

The information specialist – trust rooted in dialog engagement

The information specialist is employed in the company's information centre, which performs information retrieval and knowledge management tasks for the product development groups. The information specialist can, for example, be asked to find a couple of industry branches where it seems promising to introduce a new kind of technology originally developed for, say, fork-lifts, trucks and the like. Looking for this kind of information inside the company is made prohibitively difficult by a complete absence of tools that support such searches. The available knowledge/expertise management systems operate at a considerably lower level of abstraction, registering for example who to contact with questions regarding chemical sensors, programming in Turbo Pascal, and calibration of flow metres, as opposed who possesses general knowledge about the aerospace industry. External sources are however available, with trade associations as the single-most important point of entry. Consequently, the information specialist spends hours on the phone and constantly finds herself in situations where she has to judge the trustworthiness of people's utterances and advice solely on the basis of a phone conversation. This places high demands on her communicative competencies, including her ability to get people involved in a problem they would not spent time on unless she talked them into taking an interest in it. In this case trust, and progress on the task, is primarily rooted in creating dialogues that triggers the other person's attention and gets him/her constructively involved and in collecting evidence from a number of sources.

Conclusion

Organisations have a strong interest in storing information in less person-dependent ways than simply relying on the memory and personal files of their employees. However, engineers seem reluctant to spend significant amounts of their time documenting their work and furthermore prefer to obtain a lot of the information they need from people, rather than from documents (Hertzum, 1999; Hertzum & Pejtersen, 1999). Given the immense practical importance of searches for people there seems to be a large need for systems that support this activity, i.e. systems that focus on managing expertise rather than on recording knowledge.

Expertise is, however, not an objective property of people but something we ascribe – to varying degrees – to people we trust. Thus organisational efforts to manage expertise must ensure that the expertise is made accessible in ways that enable people to assess its trustworthiness. This presupposes an understanding of how actors with different roles in a co-operative work arrangement rely on quite different means for assessing the trustworthiness of the information they obtain. It is my working hypothesis that such an understanding will reveal, among other things, that engineers' preference for internal sources such as personal files and colleagues is just as much a preference for sources with a known or easily determinable trustworthiness as it is a preference for information that is easily accessible. If this holds true it emphasises the fundamental importance of trust in people's assessment of information and choice of information sources.

References

Hertzum, M. (1999): 'Six roles of documents in professionals' work', to appear in S. Bødker, M. Kyng and K. Schmidt (eds.): *ECSCW'99: Proceedings of the Sixth European Conference on Computer Supported Cooperative Work*, Kluver, Dordrecht.

Hertzum, M. and Pejtersen, A. M. (1999): 'The information seeking practices of engineers: Searching for documents as well as for people', submitted for publication.

Jones, S. and Marsh, S. (1997): 'Human-computer-human interaction: Trust in CSCW', *ACM SIGCHI Bulletin*, 29, 3, pp. 36-40.

King, D. W., with Casto, J. and Jones, H. (1994): *Communication by engineers: A literature review of engineers' information needs, seeking processes, and use*, Council on Library Resources, Washington, DC.

Marsh, S. (1992): 'Trust and reliance in multi-agent systems: A preliminary report', in *Proceedings of the MAAMAW'92 Workshop on Modelling Autonomous Agents in a Multi-Agent World*. Available from: http://ai.iit.nrc.ca/~steve/Publications.html

Pinelli, T. E., Bishop, A. P., Barclay, R. O. and Kennedy, J. M. (1993): 'The information-seeking behavior of engineers', in A. Kent and C. M. Hall (eds.): *Encyclopedia of library and information science*, vol. 52, supplement 15, Marcel Dekker, New York, pp. 167-201.