Leveraging Tacit Organisational Knowledge

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Abstract

Although tacit knowledge constitutes the major part of what we know, it is difficult for organisations to fully benefit from this valuable asset. This is because tacit knowledge is inherently elusive, and in order to capture, store, and disseminate it, it is argued that it first has to be made explicit. However, such a process is difficult, and often fails due to three reasons: (1) we are not necessarily aware of our tacit knowledge, (2) on a personal level we do not need to make it explicit in order to use it, and (3) we may not want to give up a valuable competitive advantage. During an empirical study of recommender system usage, it was noticed how such technology could be used to circumvent these problems, and make tacit knowledge, in form of our professional interests, available to the organisation as a whole. Using Polanyi's theories it will be showed how intranet documents can be used to make tacit knowledge tangible without becoming explicit, suggesting that tacitly expressed entities not necessarily are beyond the reach of information technology.

1. Introduction: A pluralistic epistemology

Ever since man first shared the knowledge of how to make fire with his fellow human beings, the managing of knowledge has been employed by masters training their apprentices and by parents teaching their children. In recent years, however, the importance of knowledge in business and

industry has risen dramatically, and shifted from being one resource amongst many to becoming the *primary* resource. Being able to effectively manage this resource has thus received the attention of many chief executives and Knowledge Management (KM) as a concept has become a hotly debated topic.

Without going too deeply into the philosophical debate of what exactly knowledge is, we may notice that most voices in the KM discourse have abandoned the positivistic view of knowledge as an objectified and monistic absolute truth. Instead, the KM community has adopted a pluralistic epistemology, acknowledging that there are many forms or types of human knowledge [27]. For example, Nonaka [19, chapter 3] distinguishes between tacit and explicit knowledge. Choo [7, p.111], based on Boisot's [5, p.145-147] typology, suggests a differentiation between tacit, explicit, and cultural knowledge, and Spender [26] suggests, in addition to tacit and explicit knowledge, individual and collective knowing. Blackler [4], elaborating on Collins [9], speaks of embodied, embedded, embrained, encultured, and encoded knowledge.

Though several other ways to classify knowledge exist and have been suggested, they all, more or less, build on the influential work of Polanyi [22] and his notion of tacit knowledge. Interestingly, the commonly used tacit-explicit distinction is not directly derived from Polanyi's work. Most commentators see explicit knowledge as knowledge that has been captured and codified into manuals, procedures, and rules, and is easy to disseminate. Tacit knowledge, on the other hand, is then knowledge that cannot be easily articulated and thus only exists in people's hands and minds, and manifests itself through their actions. In contrast, Polanyi does not make such a distinction. Instead, he envisions tacit knowledge as the backdrop against which all understanding is distinguished. Tacit knowledge is thus a cultural, emotional, and cognitive background, of which we are only marginally aware. This tacitness is a precondition for *focal* knowledge [23, 33]. Polanyi's view has sometimes been criticised for being overly concerned with the tacit aspects and thus becoming almost monistic. On the other hand, Polanyi's opinion that the tacit and the explicit are mutually constituted and should thus not be treated as two separate types of knowledge is supported by e.g. Tsoukas [32], who argues that trying to split these two inseparably related entities is to "miss

the point". While acknowledging the many nuances that exists between these two stances, the author shall use the terms "explicit" and "tacit" as normally understood. Polanyi's theories are however still useful for this paper since the purpose is to examine the tacit side of knowledge.

Organisational researchers have argued that research on KM has thus far been dominated by an IS/IT perspective, resulting in an overemphasis on codification of *explicit* knowledge, suitable for databases an other traditional IS solutions [31]. If all knowledge could easily be codified and stored, there would be no need for a new paradigm – good old-fashioned data and information management would have done the job. However, it is widely acknowledged that many things are tacitly expressed and understood. It can thus be argued that it is the very *inability* of the information systems to handle knowledge that has brought about much of the current interest in knowledge management. With this discussion in mind, the author suggests that instead of trying to identify, capture, and make explicit tacit knowledge we should design IT solutions that will help us locate and communicate with knowledgeable people. Expertise is a quality highly dependent on tacit knowledge, and it can often only be observed and recognised through its resulting actions. We should not look on technology alone as the solution to our problem with finding and sharing knowledge but, at best, as a facilitator that helps us initiate and sustain social interactions.

Having argued that there is tacitly expressed knowledge in organisations and that this knowledge is important and worth pursuing, the author shall in this paper apply Polanyi's [22] theory of tacit knowledge to interpret the findings from an empirical case study of recommender system usage. Three conclusions can be derived: Firstly, our interests as experts and professionals is an example of part of our tacit knowledge, secondly, web documents may be used to visualise and communicate this knowledge, and thirdly, information retrieval systems such as recommender systems can be used to exploit such tacit knowledge on an organisational level, without making it explicit. The result also shows that IT may be used to address knowledge that has not been made explicit.

However, the studying of (tacit) knowledge must be made with caution, since it is a valuable asset and often related to power. This ambiguity of tacit knowledge is discussed in the next sections, before

explaining the relationship between knowledge and professional interests. Section four accounts for the authors approach to information retrieval technology, while section five describes the research site and the research methodology used. The prototype is explained in section six, followed by the field results and the discussion. The conclusions in section nine finish the paper.

2. The ambiguity of tacit knowledge

An interesting but also troublesome property of tacit knowledge is the inherent tension between its value on the one hand and its elusiveness on the other hand. The high value stems from the fact that most of our body of knowledge is made up of things we know but are unable to express. With Polanyi's words: *"We can know more than we can tell"* [22, p.136]. Leonard and Sensiper go even further by stating that *"we can often know more than we realise"* [17, p.114].

Unfortunately, tacit knowledge is difficult for organisations to exploit. Since it only resides inside people, it cannot easily be sought for electronically. The problem of knowing who knows what grows with the size of the organisation. Tacit knowledge not being available in an explicit form makes it difficult if not impossible to quickly spread or share it within the organisation. This circumstance presents problems for today's organisations. In their widespread model of knowledge creation, Nonaka and Takeuchi [19] suggest that tacit knowledge becomes explicit through the process of *externalisation*, i.e. by sharing metaphors and analogies during social interaction. However, such a process is both difficult and costly, and the fact that the tacit knowledge must be externalised before it can be exploited limits its usefulness. It may even be questionable whether it is at all desirable to try to make (certain) knowledge explicit [15].

The troublesome aspect of tacit knowledge is its elusiveness, which derives from at least three reasons: we are ourselves not fully aware of it, there is no personal need to make it explicit on the individual level, and there is a potential risk of losing power and competitive advantage by making it explicit.

Firstly, Davenport and Prusak observe that tacit knowledge *"incorporates so much accrued and embedded learning that its rules may*

be impossible to separate from how an individual acts" [11, p.70]. A baseball hitter just knows how to hit but he cannot describe it explicitly enough for someone else to learn. Such knowledge cannot be represented outside the human body. Choo takes a similar stand and writes that "*tacit knowledge is distributed in the totality of the individual's action experience*" and that tacit knowledge is "*relying on tactile cues registered by the human body interacting with its environment*" [7, p.117]. In other words, our daily activities are informed by our tacit knowledge, without us thinking of it as, or recognising it as, knowledge. We know how to ride a bike without having to think. The knowledge resides within us, but we can neither document it in a manual, nor explain it in word to others. In fact, such knowledge would be useless to all who had not themselves experienced the activity. Tacit knowledge requires involvement of the knowing object, and to transfer such skills, the master and the apprentice must during periods of internship share experiences through actions.

Secondly, there is really no need for externalisation from the individual's point of view. Since we are able to use our tacit knowledge without thinking, we do not need to document it. Should we have to express our tacit knowledge in words, not only would it be a difficult and laborious task, but also a labour from which we would not directly benefit. It would be for the benefit of someone else in our organisation or for the good of our community. Grudin [14] has argued convincingly that situations where one is forced to do the work and someone else gets the benefit very often result in failure.

A third, and final, reason for the evasiveness of tacit knowledge is brought up by Leonard and Sensiper [17], who argue that making knowledge explicit is not always beneficial at the individual level. If the tacit knowledge provides an important competitive advantage, there is little reason to share it with the rest of the organisation, they argue. Extensive knowledge sharing by externalisation may create a situation where an organisational member has "automated away" the reason for his or her existence in the organisation. This is however not only restricted to tacit knowledge. For example, it has been indicated that lack of a proper reward mechanism on the individual level may effectively hinder sharing of ideas despite potential organisational benefits [29]. This suggests that Leonard and Sensiper's argument holds for knowledge in general.

3. Professional interests and tacit knowledge

As noted above, tacit knowledge is closely related to actions, and a particular type of action of interest to organisations is *work*. There may be a significant discrepancy between the espoused image of organisational work and the actual reality. In his ethnographic study of how work is conducted at Xerox, Orr [21] describes how an organisation's view of how work is carried out contrasts sharply to what it really takes to get a job done. Though we have our formal job descriptions, these are seldom enough to account for the actions we perform during a working day. Instead, our interests as professional experts often make us elaborate within, and often even outside, our role definitions. Much of our daily office activity is thus governed by professional interests that dictate which reports we read and which documents we write.

The concept of interest is useful because it gives a motive and hence an incentive for actions. However, interest is too general a term to be useful in this discussion unless we narrow its scope to that of a corporate setting. Suchman [30] observes that tacit knowledge enables us to take actions that are situated in particular social and physical circumstances, and that tacit knowledge thus is contextually bound. In an office setting such as the one examined in this research, our interests, and the actions they give rise to, are limited to a professional context. If we could capture some of those activities and derive our underlying interests, we might be able to communicate part of our tacit knowledge. Such a possibility would be useful to an organisation, as it would enable this valuable resource to be shared, and help us find people who hold relevant knowledge.

Our (professional) interests are instances of tacit knowledge. Though we may be unable to produce an exhaustive definition of our interests, we usually have no problem in determining whether or not a given document is interesting. This ability is, like all tacit knowledge, highly situated. We may one week dismiss a document as uninteresting only to find that it has become very interesting a week later. Interests are typically ephemeral and what documents we are interested in is influenced by many factors beside sheer content, such as e.g. familiarity, novelty, importance, or

urgency [13]. However, it is generally assumed that *professional interests* are more stable over time [13, 20].

The reason why we intuitively know what we are interested in when we see it may be explained by applying Polanyi's [22] theories. Polanyi claims that tacit knowledge has two distinct properties, which he names its *proximal* and *distal* terms. The proximal term is the part that is closer to us, while the distal part is further away. In Polanyi's example he describes how the police help a witness who is unable to describe a suspect to create a photo-fit picture by selecting images from a large selection of human features such as eyes, noses and hair. By attending *from* the first, closer image that resides within, *to* the second, more distant picture collection, the witness is able to communicate her awareness of the face.

Similarly, Polanyi refers to an experiment where a person was presented with a large number of written nonsense syllables and after certain syllables, the person was given an electric shock. The person was able to anticipate the shock at the sight of the shock syllables but on questioning remained unable to identify them. Again, by attending to the distal term - the shock - the test person became aware of the proximal term - the shock association. Tacit knowledge is, argues Polanyi, the understanding of the unity that this proximal/distal pair together constitutes. We become aware of the proximal term only in the presence of the distal term but remain unable to communicate the former.

Applying Polanyi's notion of the proximal and distal terms, we see that when attending *from* our interests – the proximal term – and attending *to* the document – the distal term – we are able to recognise and express our interests. Through interesting documents, tacit knowledge may be communicated, despite the fact that it is not easily expressible in words. The fact that language alone is not enough does thus not stop tacit knowledge from being communicated [26]. Choo [7, p.117] suggests that rich modes of discourse including analogies, stories, and metaphors, should be used to reveal tacit knowledge. What we need now is an instrument to help us attend to this other, richer form.

4. An alternative perspective on retrieval systems

Recommender systems may be seen as performing what Foltz and Dumais [13] refer to as personalised information delivery. Such systems are able to anticipate what items a user is likely to be interested in and can thus, in a hopefully intelligent way, recommend such items. How this "anticipating intelligence" is implemented varies from product to product and is not relevant to the discussion in this paper. Academic research, as well as the success of commercial products, has shown that such systems do work and we may safely assume this to be true in this particular case. For references to research on recommender systems, see e.g. [24].

While implementing and studying the usage of an agent-based web retrieval prototype the author observed unexpected but interesting user behaviour which led him to do further investigations. Based on these studies it is claimed that recommender systems can provide the mechanism that allows us to address the three problems mentioned previously; (a) it helps communicate tacit knowledge; (b) it presents a natural incentive to do so, and; (c) it does not involve externalising away the competitive advantage. By identifying certain documents as interesting, the user could tell an agent-based retrieval system to maintain a dynamic profile that represents a certain limited perspective on the user's tacit knowledge without requiring explicitly defined keywords or manually updated records. Since this profile is used to provide the user with information that is more accurate and search results that are more precise, a natural incentive exists for the user to give feedback and thus cultivate the profile. Finally, without being made available in explicit form, the resulting profile represents part of the user's tacit knowledge, which thereby becomes useable to the organisation as a whole.

Cohen *et al.* [8] take a similar but reversed approach in their Expert Browser, when they note that experts read web documents and that this is an indication that the document in question is relevant within a certain field. Others may follow the path of the expert to find useful information. A prerequisite is that the expert (or a group of possible experts) is *known*. In contrast, the approach suggested here is to instead *follow the interest* that the documents represent to find the otherwise unknown expert.

Research concerning agent-based retrieval systems has mainly focused on user-to-object or user-to-information objectives, but has

sometimes also addressed the user-to-user considerations. No one, however, has approached agent-based retrieval systems from a knowledge management perspective; i.e. discussed what knowledge governs the individual activities and how *tacit* knowledge may be put to use in the community. This work contributes to our understanding by proposing an interpretation that explains how tacit knowledge is activated, and how it may be made tangible in an organisational setting. The research described herein is thus not about recommender systems *per se*. The author has studied people *using* technology rather than the technology itself. However, the way in which the recommender system prototype was implemented helps to explain the findings, and some of the main features in the tool used will thus be briefly described. The choice of tool was however not significant for the research and will not be further discussed.

The aim of the initial research project was to examine how agent-based retrieval technology could be used in a new and innovative way and to speed up the development process existing software tools were used. While examining the commercial tools available at the time, the author came to realise that there were two different perspectives on how content was handled and what role the user or customer played. These two views may be labelled Push and Pull respectively.

Push-oriented products focus on the content providers and how the site owners can best deliver added value to the customers. Though being able to adapt to user behaviour and learn to recognise user preferences, this is primarily done in order to help the content provider. Since every server wanting to have this feature must have the appropriate software installed, this solution works best when a single web server is used. For example, when Amazon uses push-based technology to recommend books or music, it only recommends books and music from the Amazon site. It does not provide references to competitors. However, for an intranet, this approach is less useful.

A pull-oriented product, on the other hand, starts with the user's needs and pulls whatever information it can find that matches the user's interests, from any web server in the net, and delivers it to the user's browser. No modification to or restructuring of existing data is needed and no additional software has to be installed on the web servers. Given

the objectives of this research, the pull-oriented technology was considered more suitable.

5. Research site and method

The project described above took place at Volvo Information Technology during the autumn of 1998. The author spent four months implementing an agent-based recommender system and studying its usage at Volvo IT, which is an IT service company within the Volvo Group. At the time, Volvo's intranet consisted of some 450 web servers and had approximately 400,000 documents. Most of the content was official or semi-official information, such as department presentations, project reports, Frequently-Asked-Questions (FAQ's), and online help material.

Approximately 80 users were invited, of which 48 agreed to participate in the study, which ran from August to November 1998. The incentive to participate came from the assumption that the prototype being tested would be able to provide them with more targeted information for a lower user effort. The interested users were invited to a 2-hour introduction meeting, where the author explained the purpose of the research, the concept of agent-based systems, the design of the application and how to operate it, how to register and login, and how to set up and run individual agents. The participants were also asked to keep informal records of particular incidents that they considered worth noting, and informed that they were going to be contacted during or after the test to collect their viewpoints. Seven users were unable to attend either of the three introduction meetings, and did instead receive the above information via email. Most, but not all, of the 48 users who registered and participated in the test were Volvo IT employees and their job descriptions varied from technicians and system developers to content providers and administrators. All were experienced computer users with access to personal intranet-connected PCs.

The author subscribes to a grounded theory-inspired approach, meaning that instead of starting by forming hypothesis that may later be tested, the field is approached in an exploratory way letting the empirical findings form the hypothesis on which the analysis is built. This is an iterative process during which the empirical findings are re-interpreted until a theory that comprises all observed cases has been formed.

Although approaching the field with an open mind, the author does not claim to be free of theory. On the contrary, *without a theory, there is nothing to research* [25, p.1]. Sometimes existing theories may prove useful in accounting for the observed results, while on other occasions, the findings cannot be adequately explained by existing theory and the researcher must discover the theory hidden in the empirical findings. In this particular case, the theory "discovered" was that of and Polanyi [22] and Argyris and Schön [1], and the findings were interpreted using their frameworks to construct an understanding of the observed phenomena. This approach is thereby very similar to what Klein and Myers calls "interpretative case study" [16].

User experiences as well as hard data have been collected in several ways including interviewing, questionnaires, and web server log file analysis. First, all users were invited to a group interview but only eight showed up. Certain emerging patterns could however be noticed and a first tentative theory was formed. The remaining 40 users were then sent an email questionnaire, which again only some (12) answered. After re-looping the analytic phase, based on the so far received answers and the application log files, seven semi-structured qualitative interviews were conducted, which shaped the final conclusions reported herein. The interviews were open-ended and lasted between 28 and 66 minutes.

6. Prototype features and design decisions

The prototype application used in this research, described in more detail elsewhere [28], was based on a commercially available agent-technology tool that used neural networks and advanced pattern-matching techniques to identify text patterns in profiles and to look for similar patterns in other profiles or web documents. The system spidered Volvo's intranet each night and synthesised each found web document to a 0.5K digital representation. This "fingerprint" contains the characteristics of the document. Once the fingerprint signature was created, the reasoning part of the system could perform concept matching (e.g. finding documents relevant to each other), agent creation (e.g. setting up agents that can find relevant documents), and agent retraining (e.g. adapt the agent to a set of relevant documents). Please see the vendor's white paper for details [2].

New users were supposed to create a user profile in which they were to describe their job role or work responsibilities in a free text fashion. If a user already had a CV stored elsewhere, it could be copied into this field. The profile, once saved and stored, was then converted to a digital signature. The system provided a Community feature that was intended to enable users to locate colleagues with similar assignments and organisational roles by matching these signatures. A list of users with matching profiles was displayed and the user could now display the email address or the profile of any found user by clicking the corresponding hyperlink, and had the opportunity to contact him or her. The intention with this feature was to make the users aware of each other's presence and thus facilitate the emergence of online communities.

The prototype system offered individual agents that could be set to find intranet documents based on what Rich define as an implicit profile [20], i.e. a richer representation of an interest than merely a keyword-based query. To achieve personalisation, the users were required to identify themselves by logging in. Once given access, the users could create agents, name the agents, and assign them tasks. A task corresponded to a search engine query, but was expressed in natural language and the best results were achieved when the users cut and pasted (a large chunk of text from) a relevant document and asked the agents to find more similar documents.

For each agent the users had four options; delete it, edit it, find similar agents, or check the result. The search results from the agents were displayed in a simple list, similar to those generated by most search engines, and by clicking on the associated hyperlinks the documents were retrieved. When the user had read and verified that one or more of the returned documents were indeed relevant, the user could provide the agent with explicit feedback by marking the document(s) and clicking the retrain button. The digital signature of the agent was then merged with the signature(s) of the selected document(s) and the result became the new agent signature, replacing the previous one.

The Similar Agents feature was a rather late idea added more or less because it was easy to implement. The initial plan was to let the users be able to search for and find similar agents to have them cloned by copying them to their own private area. In this way, new and inexperienced users would receive help to get their agents to a decent quality level more

quickly. However, this functionality was not implemented in time for the study and the only feature offered to the users during the test was the option to find other users with similar agents.

7. Field results

The week immediately following the initial 2-hour introduction, at which all participating users were provided with user-id, password, and the URL of the prototype, the usage was high. During the following two weeks, usage declined slightly before settling on a stable level. This level was then maintained throughout the rest of the test. The users typically used the application frequently, sometimes heavily, during a couple of days and then stayed away from it for a while before returning for the next session. Since the test site used Dynamic Host Configuration Protocol (DHCP), by which each user receives a dynamically generated ip-address at each logon, the number of unique addresses in the log file was higher than the number of actually registered users. It was therefore not possible to determine exactly how many individuals had accessed the prototype on any given day. However, the pattern described above was easily identified.

7.1 Creating and maintaining agents

Overall, the user reactions were positive. All 27 responding users claimed the prototype to be useful or at least potentially useful. However, eight users did not consider the prototype useful in its *current state*, but they believed that a future version would probably be able to deliver. The respondents said they believed in this technology and considered it to be "an extremely important asset" with a "great potential". One user put it this way:

> *"It's not exactly perfect you know, but I think it has potential... We will eventually be forced to have something to help us, I mean, in the future we're gonna be bombarded with even more info and this may be the only way to stay ahead".*

By automatically monitoring the search index, the agent could detect relevant intranet updates and thus off-load the user from manual searching. This was an appreciated feature since it "saved time not

having to search". Besides the time-saving aspect, the most frequently reported reason for these beliefs were that it was easier to construct queries. Seven users explicitly expressed their appreciation of not having to come up with descriptive keywords, since they considered selecting keywords problematic. One of the respondents explained:

"Like, if I use a word, there's no guarantee the author used the same word. And if he didn't, I find nothing. Or worse – I get a lot of crap. So trying to be clever, figuring out the best keywords is usually just a waste of time since they do never fully contain the meaning you have in mind any way".

The process of retraining the agents was conceived as non-trivial and despite the general claims that these sorts of retrieval agents were welcomed and appreciated, many users had experienced mainly negative actual results. A majority of the users (15 of 27) reported what they referred to as "strange" or "unexpected" document matches, as indicated by the following quote:

"You don't know what triggers a match, and sometimes you get suggestions that really makes you wonder. They seem totally off track… And that makes it hard to get something useful out of it. After retraining it with relevant documents it comes up with nothing".

However, some users tended to blame these bad results on their own inability rather than on the application. One user having received very little useful information said:

"I don't know, maybe it's me. I'm not at all sure what I'm supposed to write here. I don't think it's obvious. That's a problem. The rather shallow results may depend on me not using the right words. Otherwise, I like the idea. Keep improving!"

7.2 Facilitating networked communities

The Community feature was intended to enable users with similar job profiles to learn of each other's existence. However, not many users exploited the Community feature. The reasons given were that the users already knew enough people doing similar jobs or that most users with similar profiles worked at the same department as the respondents. The

respondents were not too interested in finding like-minded colleagues. As one user put it:

> *"What's the use of hooking up with people doing the same stuff I do? If I want to talk to those guys, I go talk to them. They sit over there. But take, eh… databases – SQL server or something – where I don't have a clue. I wouldn't know where to start. It would probably be better to team up with those who know stuff I don't know."*

Those who actually did try the Community feature used it only once or, in one case, twice. All interviewees but one considered the Community feature to be working, or to use their words; it delivered what it was supposed to. One user, however, claimed to have been connected to people with whom he had nothing in common. This was not what he had expected and his reaction to it was rather negative. "*This was clearly a bug*" were his words.

7.3 Finding similar agents

The Similar Agent feature was implemented using the same mechanisms as in the Community feature, and although the Similar Agents feature generated exact the same output as did the Community feature, the Similar Agents feature was much more frequently used, and received much more interest. One user commented:

> *"Sometimes you think you're alone and then you find out you're not. And it's not… I mean, it's all kinds of different people. It's really interesting to see who else is searching for these sorts of things".*

Six respondents reported that they were surprised to find certain people sharing their interests, and another four said that the Similar Agents feature returned users whom they had not expected to be interested in a particular topic. However, these comments were not uttered in a negative way, as was the case with the remarks on the Community feature. On the contrary, the users regarded these unexpected results as useful new insights and no one questioned the correctness of the results.

8. Discussion

Rather than having to invent clever keywords to describe their interests, the users preferred to provide examples by pointing to relevant web documents. This is because the act of recognising an interesting document utilises tacit knowledge while the task of selecting descriptive keywords requires a (non-trivial) translation to explicit knowledge. However, to many organisational members the use of keywords is the established way of searching and they have difficulties trying to re-think. Despite the instructions to use entire documents as query input they continue to type in (a few) keywords. This suggests that the system should more actively encourage and facilitate the use of documents rather than keywords - possibly by letting the user enter a URL instead of text. This would prevent the user from entering keywords only.

By drawing a parallel to Polanyi's account of the face description and the shock association, we can see that our interests constitute the proximal term of our tacit knowledge. In the presence of the distal term - here represented by the document as previously the picture cards and the syllables - we are able to attend to the proximal term; our interests. Polanyi explains: "*This is how we come to know these particulars, without becoming able to identify them*" [22, p.138]. The documents on an intranet can thus be used to communicate the tacit knowledge of our interests.

8.1 Espoused theory

This distinction between tacit and explicit knowledge is parallel to the differences between Similar Agents and the Community features, and explains why the Community feature, which is based on explicit knowledge, was not used much whereas the Similar Agent feature, which relies on tacit knowledge, was more deeply explored.

People are often viewed as performing their jobs according to their formal job descriptions though everyday practice provides evidence of the opposite, as shown by Brown [6]. Browns account is consistent with the findings of Argyris and Schön [1] who refer to the worldview and values that people believe their behaviour is based on as "espoused theory" as opposed to "theory-in-use". The organisational structure and the department descriptions, that are not only already known to the

members but also experienced as fictitious, depict the espoused theory of work. The Community feature was built on static profiles provided by the users themselves to mirror the official responsibilities placed upon them by the organisation. The users rightly or wrongly assume that they already know the explicit knowledge that the Community feature will return and they dismiss it as of little interest. Baumard [3, p.57] suggests that organisational members are unaware of this behaviour due to the cognitive gap that exists between the explicit knowledge we believe we use when making decisions and the tacit knowledge that we really employ. In our post-rationalisation we instead explain our behaviour using completely different knowledge from that which we initially used.

8.2 The relevance of practice

The Similar Agents feature is different from the above in that it does not rely on static profiles provided to describe an official role. Instead, Similar Agents relies on the tacit knowledge of our interests, made tangible through dynamically retrained agents created with a totally different purpose than the static profiles. If the prompt "Enter your profile" connotes a question equivalent to "what is your official job description?" the agents are instead created for personal benefit only and no official considerations are taken into account. True and real interests govern the choice of topics, which makes these search profiles more "believable" than the previous job describing ones. The most notable observations from the interviews are that when comparing job profiles, which are built on explicit knowledge and espoused theory of work, the user being linked to colleagues not expected referred to the result as "strange", in the negative sense of the word. At the same time, the users matching agents that built on tacit knowledge and practice commented similar results as "interesting", in the positive sense of the word. The tacit theory-in-use is obviously regarded as more trustworthy.

8.3 Avoiding the explicit

Nonaka and Takeuchi's [19] model of knowledge creation and sharing largely ignores the fact that knowledge is a competitive resource not only on the organisational level but also on the individual level. People do not share knowledge without a strong personal motivation, and they would

certainly not give it away without concern for what they may gain or lose by doing so. This problematic circumstance may be avoided by the approach suggested in this work, where knowledge does not have to be externalised.

Instead, the *whereabouts* of the knowledge may be identified and made known within the organisation. In this way the users' value will increase, both for themselves - as they are identified as having certain knowledge - and for the organisation - which can use the knowledge. When the users no longer risk having their knowledge tapped and replaced by a database, their reluctance to contribute is reduced. Davenport *et al.* [10] reason along these lines when they suggest the introduction of information politics: that collective knowledge of the organisation is worth managing, but not necessarily worth capturing. Hansen *et al.* [15] take a similar stance when they conclude that the management strategies for knowledge should be informed by the nature of the business. When mainly tacit knowledge is used to solve problems, the face-to-face approach to communicate knowledge should be used, rather than any attempt to store it. Trying to externalise tacit knowledge can lead to serious problems since the nuances and details that are exchanged in physical interactions are lost.

To be able to find this sort of knowledge is, however, only a first step; it only helps identifying experts within the organisation - it does not prevent these people from leaving the organisation nor guaranteeing that they will have time or willingness to share their knowledge on request. Davenport and Prusak observe that "*mapping who knows what in an organisation creates an essential knowledge inventory, but does not guarantee the ongoing availability of knowledge*" [11, p.81]. To foster an environment that appreciates, encourages and rewards active knowledge sharing, other measures that fall outside the scope of this text must be deployed.

8.4 Limitations

However, the approach suggested here has certain shortcomings that need to be addressed. McDonald and Ackerman [18] point out that many recommender systems do not distinguish between different levels of knowledge. There is no way of telling whether a user with an interest is an experienced expert or just a curious novice. Indeed, the approach

suggested in this paper suffers from this weakness. Further, interests are in themselves rather elusive. Interests may shift over time but that does not imply that the knowledge is gone. A senior C++ programmer with a corresponding interest may develop an interest in Java programming, and eventually focus entirely on this new field. Since the agent would evolve with the programmer's shifting interest, it would then not be possible to identify this user as a C++ expert.

Although the author had pre-knowledge of the working conditions at the studied site, no systematic usefulness or usability measures were taken. For example, Davis' Technology Acceptance Model [12] could have been used to ensure the implementation of the features most likely to be perceived as useful. Such an analysis might have resulted in the removal of the some feature and the addition of others.

Finally, the fact that the participants were volunteers might have biased the outcome. These interested individuals may be somehow different from the rest of the employees, thereby generating a result different from what had been obtained with a randomly selected test group. We remain ignorant of whatever hidden agendas impelled these individuals to participate. The difficulties the author experienced trying to gather the post-study responses can be an indication of motives other than the objectives of the study.

9. Conclusions

Most of the research done in the KM arena has an IS/IT background, and despite the fact that making tacit knowledge explicit is difficult, costly, and not always desired, this is the prevailing approach. The work described above suggests a novel attempt to utilise IT in order to exploit tacit knowledge, but without making it explicit and thereby rationalise away the people in whom the knowledge resides.

The author has argued that the professional interests of users in a corporate setting are examples of tacit knowledge, and that this knowledge governs many of their daily activities. Focusing on a subset of the organisational environment – the intranet – it has been shown that web documents and information retrieval technology can act as a facilitator in the knowledge managing process by leveraging tacit knowledge on an intra-organisational web. On the whole, the approach

has three benefits: Firstly, the otherwise hard to solve problem of being able to produce an exhaustive definition of one's interests is replaced with the much simpler task of determining whether or not a given document is interesting. Secondly, since a good profile results in more accurate information, a natural incentive to maintain the profile by giving feedback exists. Thirdly, the knowledge is not externalised but allowed to reside within the users, and therefore no loss of competitive advantage is experienced. The main point made here is that though some things in organisations are tacitly experienced it does not imply that they are outside the reach of information technology support.

Apart from these system-specific implications, we can also deduce a more general conclusion that may influence the design of future KM systems. The discrepancy between the espoused theory and the explicit knowledge that we like to think we use and the tacit knowledge that we really employ in practice has been demonstrated by the empirical evidence and explained. From this it can be concluded that *profiles based on tacit knowledge that are identified by practice are considered more trustworthy than the espoused theory-based job descriptions.*

10. Acknowledgement

11. References

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