

roughly differ between explicit and implicit / tacit knowledge where explicit knowledge can be easily externalized in documents or certain binary forms and implicit and tacit knowledge (expertise) cannot (Hinds and Pfeffer, 2003). Instead implicit knowledge (including experiences or practices) is closely bound to human actors. Hence IT supporting KM in terms of implicit knowledge includes groupware tools like recommender systems or yellow pages systems (YP) that focus on utilizing social and human capital rather than content¹. Examples of those systems are *Who Knows* (Streeter and Lochbaum, 1988) or *Yenta* (Foner, 1997), *Expert Finder* (Vivacque and Lieberman, 2000) or *Expertise Recommender* (McDonald, 2000 and 2001). All these systems create and store user profiles by interpreting certain artefacts like emails, Java source code or documents. Furthermore these systems focus on expertise rather than content which purely repository-based systems are not capable of (cf. Ackerman, 1998; Ackerman and McDonald, 1996; Pipek and Wulf, 2003).

As mentioned above, there are several problems in applying these technologies in practice, i.e. in a native organizational environment, in which a large amount of actors is expected to use a common system. Actors often have different skills, goals or cultural backgrounds which can lead to the failure of IT systems (Grudin, 1988; Grudin and Palen, 1995). Even the successful application of new technologies can have unexpected individual or organizational outcomes that are contrary to the initial goals as Orlikowski (1996) or Wulf and Pipek (1999) describe. As we still know little about the practice in those knowledge intensive processes, we claim that sufficient pre-studies within the application field are highly important for successful applications of KM strategies. In this paper we present the results of a field study that is part of a three year lasting project aiming on the application of KM strategies in a major European national industry association (NIA²).

Setting

The association NIA has almost 3000 member companies from technical branches in the broadest sense. Thus NIA is divided horizontally into 37 sections, each dedicated to companies of a certain sector³ (like “agricultural technology”, “lifts and escalators” or “pumps and systems”) and vertically into general departments (like “business administration”, “law” or “taxes”). Additionally, there are several spin offs and other subordinate units like forums, projects and regional offices. Member companies pay for their membership according to their size. These

¹ In literature the term ‘knowledge management’ is ambiguously used. Whether or not ‘information management’ should be covered by the term of KM is not a matter of this paper.

² “NIA” is not the real name.

³ In the following we will use the term “sector” in the sense of branch of industry, whereas “section” will refer to GIAs sectoral departments.

payments are the only source of income for NIA. Members in turn are welcome to request NIA's services, when they need them. NIA defines its core competencies as:

- *Networking* (Introducing member companies to each other for business transactions)
- *Technical or professional support*
- *Representation*: (lobbying at governmental (or other important) institutions – this kind of service is offered by NIA exclusively)

In the main department of NIA about 450 employees are working in one of the organizations' sections or departments. The project setting includes one of NIA's sector organizations, the agricultural department and one of its member companies (AGRAR⁴) representing a "typical" member company. AGRAR has about 280 employees. Its core competencies are municipal equipment and seeding technology.

The main goals of the KM project, in which our study took place, were (a little abstractly) defined as "improving the quality of services that NIA offers to its members". In a way the project can be seen as a reaction to an observed trend that members start to doubt about the meaning of their membership, which was a given in past decades. Nowadays managers are expected to justify expenses by giving some well defined 'Return On Investment' (ROI). This certainly is hard to calculate for the membership in an organization 'dealing' with *support, network* and *representation*. So one of the projects goals is to better define and present its services to the members and to make NIA and its members 'move closer to each other'. This shall be done by improving the mutual awareness of each other: The awareness of NIA's services on the members' side and the awareness of the members' needs on NIA's side.

An illustrative example should sharpen the projects vision. In short: When developing a new agricultural tractor, one member company fell into trouble as this machine – when the design phase was long ago – appeared not to be conform to certain regulations concerning its physical dimensions. This was very painful since the error could have been avoided by turning to the NIA who was in possession of this spatial information. In turn NIA was not aware of the company's intention of developing this kind of agricultural machine, and thus was unable to inform the company. KM strategies are now expected to connect both – NIA and its members – more efficiently to each other and may avoid situations like the one described.

⁴ "AGRAR" is not the real name

Methods

The methodological approach we made to the field follows the theoretical framework of *Integrated Organization and Technology Development* (OTD). Wulf & Rohde (1995) describe OTD as an evolutionary concept which tries to put technological, organizational, and human factors into consideration of observations in working environments. Not only does the introduction and establishment of novel technology influence particular work processes; even organizational structures and human habits are affected. Keeping that in mind, human and organizational needs have to be taken into account when new software solutions (as in the underlying field) shall support working processes. Practically we realized the OTD guidelines by employing the ethno methodological concept of “Studies of Work” to set personal and interpersonal stresses into focus (cf. Flick, 2002: 39ff, Bergmann, 2003: 129ff and Harper et al., 2000). Beside the observation of the setting – including workplace observations, investigations of the technical infrastructure and workshops on specific topics - our research included 16 semi-structured interviews (that were conducted within three cycles) with employees and managers of NIA. The majority of the interviewees were employees of the agricultural section; the others worked in several vertical units such as the staff-, IT- or standardization departments. The two managers headed the agricultural section and the IT department, respectively.

For each interview cycle we drew up a particular guideline. This allowed us to modify the guidelines evolutionarily as we assimilated those to our experience we gained in the interviews we had already done. These guidelines included questions concerned with issues like “everyday life on the job”, “working history within NIA”, “communication and cooperation among others” and “knowledge management and expertise sharing”.

Our technique to work with an interview guideline which stimulated narrative responses offered the test persons to answer in a relatively open, free and talkative manner. By doing so, we were given the opportunity to reflect the interviews regarding an organizational and cultural environment, which is not described by certain personal attitudes. Much rather, we recognize our findings in an interpersonal, organizational context (cf. Randall and Bentley, 1994). Therefore, we tried to stir the interviews as little as possible. In order to guarantee solid and valid results we used a tape recorder to avoid note taking during the interviews, which would have influenced the fluency of the conversations negatively.

In order to manage the resulting empirical materials appropriately and not too time-intensively we decided to split the analysis into five specific steps (cf. Schmidt, 2003):

1. Orientated towards our written material, we built up certain ‘ex-post’ categories for the analysis. On the one hand, this categorization

followed the three important OTD supporting pillars (technology, organization, and human factors), but on the other hand - strongly geared towards the interviews - subcategories emerged.

2. We put together the analytical categories to a kind of coding guideline, which helped us to cluster the data in terms of meaningful units. Each unit built its own focus on a specific problem.
3. We coded the material in order to depersonalize and generalize the data.
4. We built up nodes of correlating units which provided a quantitative overview of the material. This also gave us a clue which questions and problems might be most prominent and urgent, and had to be reconsidered in any case in later steps of the project.
5. Finally, we thought about possible hypotheses which had been derived from the previous steps of analysis. On the basis of those we wrote the next guideline for the following interview cycle.

We employed the five steps mentioned above for each cycle. This shows some equivalence with the concept of action research (cf. Mills, 2003). By doing so, we believe to have realized two important needs: (1) participation of the persons and (2) consideration of the processes. Following OTD, both are considerable quantities as personal habits and organizational processes are affected by possible novel software solutions.

Empirical Findings and Results

After analyzing the interviews certain topics appeared to be central in terms of KM. These topics can roughly be assigned to the domains of organizational structure, work processes and knowledge management. As a result of the open styled interviews these topics were not identical with those of our guideline. Particularly those topics that were not addressed within our guideline but emerged during the sessions can be seen as highly relevant. For instance, participants independently addressed the complex organizational structure, organizational transparency, and coherence within NIA. These topics were not part of the initial guideline but emerged during the interview sessions. In the following sections we will have a closer look at the results in these domains.

Complex Organizational Structure

When asked to describe their starting time at NIA, several interviewees stated that they were overwhelmed by its organizational complexity: The association was judged to be very complex even by its own employees. As interviewees stated independently – but in accordance to each other – it took them about two years to learn “how NIA works” and to gain an appropriate view over the organizational

structure. In this domain experienced employees have an advantage over novices. As some of the interviewees claimed, this complexity is a result of NIA being a grown organization (see above), that was created by the fusion of several independent associations. Two of the interviewees described their image of NIA in a very illustrative way:

“If you are here for a while, you see: The structure of NIA is gigantic, you certainly need two years to look through it. There are really different companies. And those are for themselves. There is the incorporated society. Then there is the incorporation of science where Mr. W. is working. Then there is the publishing house, the assurance and so on...”

“We have managers for every unit. And they’re doing things on their own.”

In the latter quote another problem becomes obvious that is caught up below: The ‘organizational coherence’, which some participants are missing.

Organizational Transparency

The organizational structure that was felt to be very complex may have led to a loss of transparency that some of the interviewees felt as well. It was stated that it was sometimes difficult to find persons within the organization that were competent or responsible for certain issues. This was seen as very painful particularly in situations where requests of member companies were to be answered urgently (see also: *Social Networking*). So it was stated during the interviews that it was very useful to have a more transparent organization, and thus, to be able to find accountable and / or competent persons quickly. Participants described their expectations this way:

“If we had a rough idea of what everyone is doing [within NIA] – which of course is unmanageable for 450 people – then for us this would be a giant step forward”

“The goal is to create transparency. Responsibilities must be clearly defined and assigned unambiguously.”

The interviewees were aware of the fact that NIA’s ‘complex structure’ does not make it easy for member companies’ employees to get in contact with the right person in NIA, in case they do not know this person in advance. From their experience, they knew that member companies’ employees in general see NIA as one large entity without recognizing its substructures. Thus, when they request NIA for a service, they expect to be redirected to the ‘right’ person there, no matter to whom they call or mail to. When looking at problems of ‘complexity’ and ‘transparency’, it is not surprising that sometimes this redirection does not work properly. Situations occurred – as interviewees reported – in which requests of member companies were handed over from one colleague to the next several times as no one knew – or could find out – who was responsible for that request.

When discussing these identified problems during the interview sessions, the idea emerged to set up some kind of call centre within NIA that people can access to be directed to the right person quickly and liable. This idea was seen critically by some of the interviewees. First, for the employees at NIA – who in general are

experts in very special domains – it is very important to be directly requested. They fear that members could be directed to a “wrong” person at NIA and then receive wrong information, which would be more painful than to be redirected several times – but finally access the right person. Second, – as one person stated – there was already a switchboard which was working with a good “score rate”, i.e. it reliably connects to the right expert.

Handling Members’ Requests

In the interviews we were told that there were no guidelines or standardizations for handling requests or sending newsletters to member companies. Although most of the interviewees would find this useful, they pointed to severe problems occurring when applying such general guidelines. These problems are a result of NIA being an entity of self-determined sections (see below). As participants stated self-critically, members sometimes were treated ‘careless’ in one of the following ways:

- Information is arbitrarily sent to members without a request or indication of interest.
- Response times for handling (given) requests are too long – or requestors are left unaware about the time it takes to handle their requests.
- The catalogue of services is not well defined, so members sometimes do not know which service they can access.

Another problem that was reported by the interviewees is an “inappropriate understanding of responsibility” that some employees turned out to have (in some isolated cases). Examples were given in the interviews about persons at NIA who had not realized at all that in the end the member companies pay their wages with their membership subscriptions. So it should be perfectly natural for NIA’s personal to handle the customers’ requests with the highest priority, which sometimes is not the case. One interviewee found that:

“...some have an attitude that they should take care of.”

What she was talking about was an insufficient motivation to carefully handle members’ requests, particularly in cases when these requests had to be directed to another of NIA’s employees or even to another section.

Some participants on the other hand uttered that it was difficult to avoid delays when handling requests because this would often collide with other urgent tasks. So in cases of conflicting tasks, employees naturally prioritize those tasks that are given to them by their boss in order to avoid troubles. One participant stated it this way:

“When I’m told to work off that position paper by my boss, it would be pretty stupid to work first on those ten requests.”

An ‘exemplary’ way to handle users’ requests when colliding with other tasks was described by one participant. Whenever she was unable to directly answer a request – which simply cannot be prevented – she first let the requestor know how long it would take her to answer that request. This way she gave herself the time to solve or delegate that request without leaving the customer “in the dark”. Finally, when the request was ready to be answered she (or some colleague) called the customer. Such a pattern of behaviour does not seem to be always followed. However, the idea of applying some kind of standardization or guideline for handling requests is hard to apply as we see below. Furthermore, we are given some interesting examples for peoples behaviour when faced with ‘guidelines’ (below within ‘knowledge sharing’).

Organizational Coherence

In one of the citations above another problem is addressed that must be seen apart from the insufficient motivation that some employees show – which certainly is a common problem many organizations have to deal with. We can outline this problem as an insufficient *organizational coherence* that itself is likely to be another result of the “wild-grown” organization. Some of the participants feel that there were no uniform goals and directions by which NIA as a whole would be defined and can be identified. Instead in a subtle way several sections have an own political attitude according to the sector they serve for. For example the attitude NIA as a whole stands for is to ‘avoid subsidizations by the state at all’. This attitude is not very useful with regard to the agricultural sector as it is one of the major receivers of subsidies. So according to the assessment of another participant the sections still are...

“...highly self-determined and this certainly has many advantages, but sometimes effects of friction occur.”

Another participant said it this way:

“Each section, each department, each corporation within NIA is a story of its own.”

A third participant added some interesting reasoning for NIA having a ‘lack of coherence’: She assumes that after the break down of the USSR in the early 90s “major questions concerning strategies and visions” came up, since one of NIA’s previous predominant tasks was to keep alive connections with the eastern economy. She felt that there was no vision for NIA as a whole. In her words:

“[...] so there is missing [...] a major vision, and this must be given from the top. From there it can be broken down to each single section for orientation and it must be repeated and communicated continuously till the message arrives and is understood everywhere in the organization.”

Although the majority of interviewees stated that colleagues of different sections “of course” would cooperate well, some of them conceded that there was a subtle competition between those sections that serve for similar or related branches. This subtle rivalry is likely to additionally increase the loss of transparency and the

willingness to cooperate. Even it makes it more difficult to set up common guidelines for interaction with members.

Work Processes

The work of NIAs' employees (especially those of the agricultural sector) is dominated by providing services to members (*technical support, representation*), preparing for certain events (exhibitions, standards committee meetings) and projects which are peripherally done. As exhibitions mean a lot of work in advance and members' requests cannot be anticipated, the workload of the colleagues varies highly according to these events.

As the application of novel technologies often enforces changes within work processes (see above) it is necessary to justify these changes. Many of the participants also emphasize this phenomenon. Changes of established processes would only be accepted and persistently applied if the executives behave competently and are "sent from above" supporting an overall strategy. Support on one hand eases the introduction, whereas competence and good reasons enable acceptance and lasting impact on work processes.

Operating on projects is seen as highly innovative within NIA. Therefore, working in project teams appears to be a challenge for employees. Additionally, there is no standardized and integrated organizational concept for the initiation of projects. Our empirical findings clearly show that several attempts to standardize project work have been conducted, but have always been declined and prevented by particular decision-makers – seemingly for reasons of keeping power and influence. "This hampers innovation" is one participant's observation. The organization hinders itself in further development and assimilation to market conditions.

The same applies to other innovation proposals which employees suggest to improve the organizational growth. Technology is just one example, also non-technical "ideas of innovative working very often just peter out". One interviewee reported a very characteristic and typical example about her attempt to establish a 'virtual notice board' for handling sticky customers' requests. This tool should help employees to get in contact with particular experts – "this idea just seeped away into some filing cabinet". One possible reason for this phenomenon is the absence of a specific central office for innovations, which exclusively would be concerned with working on innovations and changing processes. As a result, innovative ideas would not simply get lost anymore. The idea of the notice board was discussed in detail during the interviews and is described below within the section of 'knowledge management'.

The experts' work in a specific section of the association is composed of dynamical constituents as well as 'regular' and recurring tasks. The dynamic components of work mainly consist of handling costumers' inquiries. As the amount of these questions can hardly be anticipated in advance, it is very arduous

to organize them in time tables. Most utterances in the interviews clearly show that handling with inquiries is mostly reduced to “finding the right expert”. In the first instance employees try to find internal experts. In particular cases, with regard to specific topics, even contacts to member firms or ministries are utilized to answer certain questions (see below). Furthermore, a few queries demand further inquiries or are delegated to other work units within the association. A common way to organize queries – as was uttered in the interviews – was to sort these open questions according to their “importance” for NIA. This importance is defined by two major criteria. Firstly, the actual size of a member company is of significance, as the membership subscription is based on size. As participants stated this ranking is further influenced by the engagement of a member company and its employees for ‘NIAs’ interests’, e.g. external experts who work in the association voluntarily.

Other ‘dynamic’ components are exhibitions and trade fairs. These are dated in advance for certain times in a year – mainly in spring and autumn. During these periods the working day is primarily determined by preparations for these events, whereas other tasks are handled with less attention.

Recurring tasks are tasks of routine. For instance the work in the section of standardization, i.e. ISO and DIN, appears to be routine. Here “bureaucratic processes” mainly determine work and working load. The impact and importance of this work is enormous. In the “guiding committee”, for instance, experts work out goals and future topics in the area of standardization. However, it is very hard to justify this effort for member companies, as this work is kept in the background and is done continuously, i.e. not on a member company’s demand.

Moreover, the training period for new employees seems to be problematic. Most of our interviewees found it difficult to familiarize themselves with the new subject they had to work on. “I felt to be thrown in at the deep end” is a typical utterance we could gather. Additionally, some reported that their new position was vacant for some considerable amount of time, namely in the dimension of several months. Thus, a great deal of work “waited impatiently for the newcomers” as nobody else was responsible or had the time to handle the work coming up.

Social Networking

As we have already seen in the previous paragraph, in NIA building and maintaining social networks is a task of central importance: It is essential to have good contacts to persons in influential positions like ministries or standard committees but to member companies, as well. The interviewees reported situations in which a good relation led to success when drafts of laws or standards were to be adjusted to better fit certain members’ interests or when some delicate information was needed. Building up one’s social network was reported to take years. As social networks cannot be simply transferred to another person, it is

very painful for NIA when colleagues leave the organization – either when they retire or are wooed away. This is another issue concerned with knowledge transfer that is described below. Actually for many of NIAs' employees *social networking* indeed is a major part of their job.

Yet, there is some kind of catalogue in written form, which lists contacts for specific topics. In response to the question whether this booklet eases the search for experts within NIA⁵ appropriately, some interviewees uttered that very often it was pure chance to find an expert with support of the booklet. One participant was missing the opportunity to seek for experts by 'outlining his/her skills', as there is no such feature in the booklet. "The catalogue is too arbitrary" as each expert is allowed to "write whatever s/he likes to be in the booklet". However, as we see below ('Knowledge Management') there is evidence for 'expertise finding' to be very important in particular situations.

Knowledge Transfer

In this section issues concerned with knowledge transfer are being discussed. The term 'knowledge transfer' might have multiple meanings: It can be used in the sense of 'saving as much information, experience, practice or even reputation as possible' when employees leave the organization. It can otherwise be used to describe a 'common' documentation of the everyday work for the case of sudden fall out by illness to make it easier for colleagues to temporarily take over ones work. A third way to define knowledge transfer might be a 'desired awareness of the colleagues' activities' to have a broader view over the ongoing activities within the organization.

As we saw in the sections above when employees leave the organization, not only the work power of that person (that can be replaced by any person with similar skills) gets lost. Moreover the entire person's organizational knowledge, practices, experiences and social network get lost. These properties cannot simply be replaced by employing another person. Asked for possible solutions to that problem the staff departments' member suggested that it was a good practice to merge young and old employees within their departments to have a better information exchange among each other. Furthermore, a long term staff planning should be applied that includes some 'training period' (see above). In this phase – as far as possible – employees, who are going to leave the organization, should introduce their successors to the job, share their knowledge and link them to their social networks. Finally continuous know-how transfer among colleagues should be elicited in some way (i.e. periodical meetings).

Beyond dealing with leaving personnel, knowledge transfer has been identified to be useful in general during the interviews: As mentioned above it should be

⁵ These experts may work in certain horizontal sections (the agricultural section, for example, as in our project) or in vertical sections (the IT or standardization department, among others).

possible for employees to stand in for a colleague who suddenly is unavailable. On the other hand this kind of personnel planning is said to be highly expensive as it recommends occupying two people to do one job over several weeks. Probably the monetary effects of covering one job by two people are easier to calculate than effects of knowledge transfer that does not take place. In ‘real life’ the colleagues in the office of the leaving person try to “train the new arrival”, as those became familiar with the work of the leaving expert over the time.

Additionally when discussing issues of knowledge transfer within the interviews it appeared to be very hard to find suitable ways to realize it. The idea of periodical meetings was not new to one of the interviewees: He told about the “Friday-meeting” that took place once a week some time ago, but was declined after a while. A short extract taken out of the interview may outline why this kind of knowledge transfer has failed in the end, even though the interviewee felt that some kind of meeting in general was still important.

“[...] well, that Friday-meeting in my opinion is [stops] *very* [stops] improvable [felt slightly uncomfortable]”

“Shall we turn off the recorder [joking]?”

“Oh no, just keep it running. [pause] Well, I mean what I say. The point is, and this may sound a bit old-fashioned, but it’s just the way it was that we had that Friday-meeting where everyone was given a few minutes to report what it [his actual work] was about. And then we have an agenda as some kind of checklist, that surely is reasonable and correct, but my impression is that people are scared to address certain topics. Maybe there is some kind of inner threshold: ‘well, what I’m doing surely is not important, compared to what others are doing and then it’s better to say nothing’. This is what I believe. Or they’re looking around while someone else is reporting [...] and then one seriously reflects about, whether or not to report the next time. Well, I think there certainly is a need for further improvements in communication.”

Later within the same interview, these meetings were addressed again⁶. It turned out that the section leader took part to give a short introduction followed by the other colleagues who then had the opportunity to shortly report about the past week. Another interesting detail came up:

“[...] and I had the impression: If you had nothing to say this was quite suspicious. And then – and this again is my personal view – this turned around completely: If you said something everyone was looking at you thinking ‘oh no, not again wasting time, or whatever’”

In the end this institutionalized meeting got cancelled as it was judged to be a waste of time. From this case we see that sometimes it is not easy to set up a quasi institutionalized kind of knowledge transfer since seemingly little ‘frictions’ obviously have led to the failure of the Friday-meetings. Some factors are likely to be a source of problems: Maybe it was not a good idea to have the section leader take part. This may have led to situations in which employees felt uncomfortable. The meetings mode may have an influence, as well. A formal set

⁶ At this point the earlier “Monday-meetings” were addressed. They were cancelled and later on replaced by the “Friday-meetings” which were discussed above.

up might turn out to be too formal (making participants feel uncomfortable) while an informal one can be too informal (leading members to a 'chat' instead of a serious discussion).

Information Management

When discussing about ways and strategies to inform and keep the employees of member companies up to date, it is certainly not surprising, that during the past few years email has become the medium of choice for sending out information. One of our interviewees was responsible for the 'newsletter' of the agricultural section. This is sent out to the members via email every second week. Its claim is to aggregate the most important actual information in a way that "if [members] read this, they do know everything that is important" as he told us. The newsletter was primarily directed towards the management. For developers and designers (technical) 'working groups' were a better way to receive important information. Besides the newsletter there is no other medium that is sent out periodically. The major part of information is sent out on demand.

To manage the large amount of addresses a proprietary system is used by all of NIAs employees. "AIM" (address information system) is a central database containing every known address of all the member companies (and its employees) and NIAs personnel as well. As the IT manager stated during the interviews, no "ordinary" CRM system was capable to fulfil the very special requirements defined by NIA. Here the main requirement was to have multiple entries for one person as one person (in the context of the work for/with NIA) was likely to have more than one well defined role. For instance – as the IT manager told us – members of NIA's technical staff often are also members of the standardization committee and the national institute of standardization, and even cover positions in European associations. Additionally, they were employees of NIA. This should be reflected by an address information system. AIM was implemented by a service provider and is redesigned and extended in an ongoing process.

The work with AIM, as a central database, is obligatory for NIAs employees. Sometimes, it is not without problems, as this is likely in case a common system is to be used by all the members of a large organization (see above). The employees' requirements of different departments are sometimes too high or simply too different to be realized within one application. For instance, as one participant stated, she would like AIM to be capable for seeking persons within the organization carrying certain competencies or responsibilities. But she assumed, that this would "break all dimensions" to have keywords stored which described the tasks of each of the employees. And the danger was too high, that certain keywords still were missing (this person later uttered an idea to overcome this problem, which is discussed below). Another participant stated that sometimes he was in doubt about the correctness of the database. He suggested,

for the sake of reliability, the system should be checked periodically to verify whether the addresses are still correct.

Knowledge Management

The final part of the interviews was reserved for ‘brainstorming and discussing KM solutions’. Since we were in the beginning of the KM project, we had only a very coarse vision of which KM strategy we should apply within NIA. So, almost any kind of KM solution or strategy was thinkable. In later interview sessions we focussed on KM solutions with respect to problems which had already been identified. The main ‘problem’ within NIA and thus – as we assume – the main opportunity for KM to be successfully applied was the ‘transparency problem’ that is described above. In short: Several of the interviewees uttered in some way that in NIA it was unclear who is responsible and who has skills or competencies within specific topic areas. As one participant expressed it:

“The plain information ‘who’s responsible for what?’ is simply missing”

There was one basic idea of KM that was phrased by several interviewees in different ways: The most illustrative definition was given by one of them as “Google for NIA”. This person had a vision of a YP system that supports finding people in NIA (rather than contents) based on personal attributes, such as *activities, interests, experiences, or responsibilities*. One of the participants explained his vision in the following way:

“It would be heaven, just to enter a keyword and then to get back exactly those ten experts [that I am seeking for].”

Another person gave a concrete example how the “Google for NIA” would improve his work:

“Just one example: I’m organizing our overall members meeting, that takes place from 1st to 2nd October in Weimar. So it would certainly be helpful to know, ‘who has already been there?’, ‘who has organized meetings there?’, ‘which were the experiences?’ and so on. And I would surely benefit from that.”

An interesting remark was thrown in by another interviewee when discussing the ‘Google idea’:

“... that it becomes transparent, who’s responsible for what, would be surely helpful. And this might be some kind of compliment for certain people; they can see themselves in a leading position within the organization (...). This can even be motivating.”

In the latter quotation, another issue is addressed, namely the interviewee is giving a subtle reasoning for employees to take part in that system: People might feel some kind of ‘glory’ when being assigned as an expert for a certain topic area. Such a feeling may improve their motivation to keep their profiles up to date and to share their knowledge with others. As we see below the willingness to share knowledge must not be seen as naturally given in NIA.

A sticky question with regard to YP systems in general is how to create and update the user profiles (cf. Ehrlich, 2003; Pipek et al., 2003). Since most of the

interviewees typically worked under time pressure and high work load, it seems to be unlikely that they would update their profiles periodically. On the other hand it became clear that a YP system would not be used in case the stored user profiles appeared to be outdated or simply erroneous. In the words of one participant:

“It would surely be interesting, but it has to work properly. That would be a great thing if a system like that would exist and work properly.”

Moreover, as another participant stated, employees feel “stressed by pointless questions” if they were erroneously recommended as an ‘expert’ for a certain topic area. This has already happened in the past when using the contact catalogue as described above.

An alternative suggestion that was made by one of the interviewees was a ‘virtual notice board’. In her assessment NIA was too complex and too manifold to be effectively covered by a YP system. So her idea was to simply turn from a ‘pull’ to a ‘push’ concept: By having such a virtual notice board the system was no longer required to seek for people– which she judged to be erroneous – but the users themselves could react to requests of which they thought they were qualified for. We believe no one could explain this idea as illustrative as she did:

“[...] it’s like at the airport. Think about the luggage, that’s exactly what I mean! ‘This is my suitcase!’ I can recognize mine out of a set of 50 black suitcases! [...]. Which system is able to assign the suitcases to the people?”

By the way: Afterwards she told us that she had already written down this idea and “officially” suggested it as an innovative approach several times, but was never given any feedback. Even though the ‘virtual notice board’ approach has obvious advantages over the Google idea, it is expected to lead to problems when urgent requests were to be handled. As one participant stated, it was impossible for him to wait for “someone who is willing to accept a request”. Maybe a combination of both approaches – push and pull concepts – would be suitable for NIA.

Another requirement was expressed by two of the interviewees working in the agricultural section: KM should make it possible to provide frequently requested information to members via the internet. Such a system should reduce the efforts of answering the same (or similar) requests again and again. It would additionally enable members – as they often desire – to independently seek for information instead of “bothering” NIA employees for simple information. Members should be given an efficient way to seek for information while NIA’s employees were responsible for that content. Technical aspects of presenting the content on the website should be left to “specialists” who particularly care for that. The idea was certainly not, to get rid of taking care of the member companies. “We still are the ones to take care” but only in those cases where interactive advice is necessary – and wanted. As we think, this concept is very similar to Ackerman’s answer garden (Ackerman, 1998) which then might become a part of a large-scale KM strategy.

The same concept might be applicable internally: One participant described his way to manage requests by means of his personal archive of contacts. He had built up this archive continuously over the time by adding contacts and skills every time a new expert has proved to be 'useful'. His archive now allows seeking for certain skills and appropriate experts.

Expertise Sharing

When discussing KM strategies during the interview sessions, we primarily focussed on the management of human resources rather than content. The concepts of a YP system ("Google for NIA") or a 'virtual notice board' certainly require the employees to actively take part, i.e. *share their knowledge/expertise* – which they must be willing to and ready for. At this point the statements of different interviewees diverged. Several of our interviewees found it perfectly natural to share their knowledge with others and expected others to do so, as well. Others however expressed good reasons for themselves – and others – not to do so. Additionally some participants stated that the 'potential of knowledge sharing' was highly overestimated.

As one participant assumed, KM was primarily required by the younger employees having little experience. Those could profit the most by 'sharing' knowledge. In contrast older personnel will tend to reject the idea of KM as it would endanger their status by 'making their unique knowledge accessible for others'. So he suggested that it could be a good idea to create incentives for sharing knowledge in the sense of monetary rewards. According to his assessment...

"[...] everything inside my head is mine. And I must keep it to myself, just like the winning lottery numbers, to increase or to keep up my market value."

Besides this obvious reason not to share their knowledge, other impeding factors of organizational or cultural nature were brought up by the same participant. As he stated, it was a typical behaviour of some of his colleagues to "strut in borrowed plumes". They would solve certain problems with the help of colleagues within NIA, and thereafter, declare it to be their own work. So colleagues with lower qualification appear as 'experts' who will be requested in the future instead of the real expert. This phenomenon leads to a loss of liability. Furthermore, as a result, it reduces the colleagues' willingness to share their knowledge. Finally, with respect to this behaviour, there would only be one way to make colleagues share their knowledge and this would be by paying them money. Asked whether standardizations or guidelines (mandating colleagues to share knowledge as part of their work) were capable to increase the colleagues' willingness to share knowledge, he spontaneously responded that "guidelines are to be avoided" which is redundant to comment.

It is still unclear to us whether there is a majority of people working in NIA thinking this way. If so, KM certainly cannot help. Some other arguments this

interviewee stated surely are worth thinking about: As he explained there were several distinct kinds of knowledge⁷: Those that any person was able to utilize and those that only specialists could effectively use. For instance, a chemist would not be in danger of losing his status as a specialist, if “all his formulas” became visible for others. Only specialists were able to understand them. This is different when knowledge was easily applicable by others. So owners of non-specialized knowledge would be much more careful than those of specialized knowledge.

Another question gained importance when discussing KM strategies: Is there really much potential for sharing knowledge? One of the interviewees was doubtful about that. In his opinion different sections (for instance) were so distinct that there was no ‘common ground’ to share knowledge. This seems to be true at least for sections that primarily stand for *representation* – as these sections mostly work with highly specialized content – rather than *support* or *networking*, which more often have to link several specialized expertise (see above).

However, as we saw in the sections above there still seems to be a sufficient potential for ‘knowledge sharing’ and thus cooperation with each other. This leads to another question that was discussed with the interviewees: If we assume that some YP system in the sense of ‘Google for NIA’ would really be working, then colleagues are expected to spend time helping each other. Taking the workers’ heavy workload into account, cooperation among colleagues could be fostered by creating a balance sheet to bill internal services. Some of the interviewees argued that such a balance sheet would make it easier to legitimate the amount of time spent to help or cooperate with colleagues which otherwise might have been labelled as “lost time”.

Conclusions

In this section we will discuss technical and organizational implications derived from the empirical findings. Certainly it is not possible to overcome each of the identified problems by some technical solution and / or a ‘simple’ organizational adjustment. According to the OTD approach introducing IT should be accompanied with (and cause) certain organizational changes. Additionally – according to Orlikowski (1996) – emerging organizational changes and outcomes should be expected. However, we believe that both, well chosen KM technology and appropriate organizational changes may play an important role in creating transparency, in improving services and in balancing the employees’ workload. In the following, requirements are derived from the empirical findings and promising KM concepts are discussed in more detail.

The very special situation in NIA is defined by a complex organizational structure accompanied by a lacking transparency of the competencies and

⁷ The term ‘knowledge’ here is meant to include ‘information’ as well.

responsibilities. Additionally we must assume to face subtle refusal of ‘expertise sharing’ as a result of the actors’ heavy workload and a (subjective) necessity to keep up their ‘market value’. The lack of coherent visions for the whole association (organizational coherence) makes it difficult to implement changes of technical and organizational nature within the organization. With regard to YP systems, we cannot expect the employees to keep their expertise profiles up to date (cf. Ehrlich, 2003; Pipek et al., 2003). In certain cases ‘pull’ concepts (e.g. virtual notice board) seem to be more promising than ‘push’ concepts (e.g. YP).

However, based on the statements of several participants we believe that there is a high potential for the ‘Google idea’ including some ‘virtual notice board’ functionality to be successfully applied. Even though the answer garden approach should be seen with some reservation in complex organizational settings – as Pipek and Wulf (2003) argue – it can be fruitful within a simple and well defined environment. Such a context could be given when providing frequently requested information to member companies. As NIA’s employees are dealing with a large number of different software systems, it is highly risky to bother them by introducing yet another complex system on mandate which has to be learned first. Hence, ‘Google for NIA’ should appear as an ‘offer’ for the employees that they are welcome to use. Additionally the Google-metaphor refers to the ease of use that is required. An implementation of the Google-idea should be as easy to use as the original system. Furthermore the way of introducing the system should be well thought-out by the management to allow for an active participation of as many actors as possible.

In realizing the “Google for NIA” approach, we plan to draw on the *Expert Finding Framework* (Becks et al., 2004). The system supports finding co-learners and experts within an e-learning platform. However, it needs to be extended for organizational contexts where structured data describing the users’ interests, skills or abilities is missing. E-learning platforms generally keep structured data such as a user’s educational background and qualifications, a classification of content, a history of interaction (click stream), or test results. This information is typically kept up to date within the platform and thus provides accurate user profiles for algorithms to find appropriate actors. In contrast this kind of information cannot be assumed to exist within a ‘typical’ organizational setting. So we focus on developing an algorithmic framework which makes use of other users’ artefacts that reflect users’ actual interests, abilities and working context. This might be text files, emails, newsgroups entries, slides, or bookmarks. The tool should include a ‘virtual notice board’ functionality. However, introducing the tool within the organization is a matter of the next steps to be accomplished within the KM project.

In summary, in this paper the results of a case study are presented that was conducted within a unique organizational environment. Social and human capital – knowledge, experience, practice, social networks and the like – is the matter to

be offered, utilized, ‘sold’ and exchanged. These actions take place within the association as well as between the association and its member companies. Our results and findings both confirm and extend or even disagree with assumptions that were made in the literature:

- As McDonald (2000 and 2001) states, when applying KM in terms of expertise sharing in an organizational context, it is necessary to have a detailed impression of the internal situation concerned with organizational culture, IT and coherence. This finding is fully confirmed by our results.
- Both push (i.e. YP systems) as well as pull concepts (i.e. virtual notice board) for expertise finding/sharing can complement one another and be alternatively used to create transparency in a complex and highly dynamic organizational field.
- The concept of Answer Garden is likely to be helpful in a certain, well defined context that we have described above. Nevertheless this concept is not likely to be successful as a large scale KM solution, as bilateral discussion is often the only way to handle sticky problems.

Acknowledgments

Our very special thanks go to all employees of NIA which have been involved in the KM project. We thank Andrea Bernards and Edith Faust who supported us finishing this paper. We are indebted to Volker Wulf who generously provided advice in writing up this paper.

References

- Ackerman, M. S. and McDonald, D. W. (1996): ‘Answer Garden 2: Merging Organizational Memory with Collaborative Help’, in *International Conference on CSCW’96*, ACM Press, New York, pp. 97-105.
- Ackerman, M.S. (1998): ‘Augmenting Organizational Memory: A Field Study of Answer Garden’, *ACM Transactions on Information Systems (TOIS)*, vol. 16, no. 3, 1998, pp. 203 – 224.
- Becks, A., Reichling, T., Wulf, V. (2004): ‘Expertise Finding: Approaches to Foster Social Capital’, in M. Huysman and V. Wulf (eds.): *Social Capital and Information Technology*, MIT Press, Cambridge, 2004, pp. 333-354.
- Bergmann, J. R. (2003): ‘Ethnomethodologie’, in U. Flick, E. von Kardorff, and I. Steinke (eds.): *Qualitative Forschung: Ein Handbuch*, Rowohlt Taschenbuch Verlag, Hamburg, pp. 118-135.
- Cohen, D. and Prusak, L. (2001): *In Good Company: How Social Capital makes Organizations Work*, Harvard Business School Press, Boston.
- Ehrlich, K. (2003): ‘Locating Expertise: Design Issues for an Expertise Locator System’, in M. Ackerman, V. Pipek, and V. Wulf (eds.): *Sharing Expertise - Beyond Knowledge Management*, MIT Press, Cambridge, 2003, pp. 137-158.

- Flick, U. (2002): *Qualitative Sozialforschung : Eine Einführung*, Rowohlt Taschenbuch Verlag, Hamburg.
- Foner, L. N. (1997): 'Yenta: a multi-agent, referral-based matchmaking system', in *Proceedings of the first international conference on Autonomous agents*. USA, ACM Press, New York, pp. 301-307.
- Grudin, J. (1988): 'Why CSCW Applications fail: Problems in the design and evaluation of organizational interfaces', in *Proceedings CSCW '88*, Portland 26.-29. September 1988, pp.85-93.
- Grudin, J. and Palen, L. (1995): 'Why groupware succeeds: Discretion or mandate?', in *Proceedings of the European Conference in Computer Supported Cooperative Work*, Kluwer Academic Publishers, 1995, pp. 263-278.
- Harper, R., Randall, D., Rouncefield, M.: (2000): *Organizational change and Retail Finance: An Ethnographic Approach*, Routledge, London.
- Hinds, P. J. and Pfeffer, J. (2003): 'Why Organizations Don't "Know What They Know"', in M. Ackerman, V. Pipek, and V. Wulf (eds.): *Sharing Expertise - Beyond Knowledge Management*, MIT Press, Cambridge, 2003, pp. 3-26.
- McDonald, D. W. (2000): *Supporting Nuance in Groupware Design: Moving from Naturalistic Expertise Location to Expertise Recommendation*, PhD-thesis, University of California, Irvine.
- McDonald, D. W. (2001): 'Evaluating Expertise Recommendation', in *Proceedings of the 2001 International ACM Conference on Supporting Group Work*, 2001, ACM Press, New York, pp. 214-223.
- Mills, G. E. (2003): *Action research: a guide for the teacher researcher*, Upper SaddleRiver, Pearson Education, Inc, NJ.
- Orlikowski, W. J. (1996): 'Evolving with Notes: Organizational change around groupware technology', in C. Ciborra (ed.): *Groupware & Teamwork*, J. Wiley, Chichester et al., pp. 23 - 60
- Pipek, V. and Wulf, V. (1999): 'A Groupware's Life', in *Proceedings of the Sixth European Conference on Computer Supported Cooperative Work, ECSCW'99*. Netherlands, 1999, Kluwer Academic Publishers, pp. 199-218.
- Pipek, V. and Wulf, V. (2003): 'Pruning the Answer Garden: Knowledge Sharing in Maintenance Engineering', in *Proceedings of the Eighth European Conference on Computer Supported Cooperative Work (ECSCW 2003)*, Helsinki, Finland, 14-18 September, Kluwer Academic Publishers, pp. 1-20.
- Pipek, V., Hinrichs, J., Wulf, V. (2003): 'Sharing Expertise: Challenges for Technical Support', in M. Ackerman, V. Pipek, and V. Wulf (eds.): *Sharing Expertise - Beyond Knowledge Management*, MIT Press, Cambridge, 2003, pp. 111-136.
- Randall, D. and Bentley, R. (1994): Tutorial on '*Ethnography and collaborative systems development II: practical application in a commercial context*', CSCW '94, Chapel Hill, North Carolina, Sept, 1994.
- Schmidt, C. (2003): 'Analyse von Leitfadeninterviews', in U. Flick, E. von Kardorff, and I. Steinke (eds.): *Qualitative Forschung: Ein Handbuch*, 2003, Rowohlt Taschenbuch Verlag, Hamburg, pp. 447-456.
- Streeter, L. A. and Lochbaum, K. E. (1988): 'Who Knows: A System Based on Automatic Representation of Semantic Structure', in RIAO '88, Cambridge, MA, pp. 380 - 388.
- Vivacque, A. and Lieberman, H. (2000): 'Agents to assist in finding help', in *Proceedings in the Conference on Human Computer Interaction (CHI 2000)*, ACM Press, New York, pp. 65-72.

Wulf, V. and Rohde, M. (1995): 'Towards an integrated organization and technology development', in *Proceedings of the conference on Designing interactive systems: processes, practices, methods, & techniques*, 1995, ACM Press, New York, pp. 55-64.

