

Communities of practice, interaction, and recurrent interaction patterns
A consistent analytical framework for studying knowledge processes in organizations

Markus C. Becker

University of Southern Denmark,
Department of Marketing,
Campusvej 55,
5230 Odense M,
Denmark,
Tel. 0045-65503350
mab@sam.sdu.dk

Academic Track

Third European Conference on Organizational Knowledge, Learning and Capabilities,
Athens, 5-6 April 2002

Abstract

The objectives of this paper are to review the most often used levels of analysis in researching how knowledge retrieval, utilization, integration, and transfer processes in organizations work, to clarify how these approaches differ, and to identify the most productive research approach for understanding the mechanisms and processes underlying knowledge retrieval, utilization, integration, and transfer in organizations. Three levels of analysis that are common in the literature on knowledge in organizations are firms, teams resp. groups, and communities of practice. In the literature, the latter are identified as the level of analysis that appears to be most comprehensive of those empirical phenomena important for understanding knowledge processes in organizations. The case studies drawn on support this finding and further support the notion that the key underlying process within teams seems to be interaction. It turns out that this idea is also strongly supported in early sociology. The paper thus proposes to (i) make the community of practice the most important level of analysis in research into knowledge processes in organizations – picking up but reinforcing researchers following Brown and Duguid (1991), and (ii) to make interaction the key definitional criterion of teams and thus a key analytical category. Following on from these proposals, a practical unit of analysis is proposed: If interaction is of analytical interest, and most of the interaction of interest is recurrent, then ‘recurrent interaction patterns’ will capture most of what is of interest for the present questions. Therefore, ‘recurrent interaction patterns’ can serve as a unit of analysis. As shown in the paper, ‘recurrent interaction patterns’ is also a more precise interpretation of the term ‘routines’ (Nelson and Winter 1982). The paper argues for a research program into the questions of knowledge retrieval and utilization, integration and transfer in organizations that focuses on communities of practice and interaction within such communities, applying ‘recurrent interaction patterns’ as units of analysis.

Communities of practice, interaction, and recurrent interaction patterns
A consistent analytical framework for studying knowledge processes in organizations

Markus C. Becker

As the themes of this conference reflect, one of the most pertinent open research questions with regard to organizational knowledge, learning and capabilities is: How do knowledge retrieval, utilization, integration, and transfer processes in organizations work?

The objectives of this paper are to review some of the most often used approaches in researching this question, to clarify how these approaches differ, and to identify the most productive research approach for understanding the mechanisms and processes underlying knowledge retrieval, utilization, integration, and transfer in organizations.

Interestingly, the literature concerned with these questions points to several different levels and units of analysis. Both firms (Grant 1996), and entities like teams, groups, and ‘communities of practice’ (Brown and Duguid 1991; Lave and Wenger 1991) have been said to play important roles in the knowledge processes mentioned above. The researcher interested in the questions mentioned above is thus confronted with a crossroads: Which level and unit of analysis to choose? Problem arise for two reasons. Firms, teams, groups, and communities of practice clearly are distinct levels of analysis. Which level of analysis is the appropriate one for what question? Furthermore, it is not clear whether the two levels of analysis are connected to each other or not. Can a researcher only choose one of the alternatives and then has to neglect the others? If this is not so, how can the analysis draw on several of these levels of analysis? How are they connected?

The paper is structured as follows. First, the various streams of literature that propose and apply the firm, the team, the group, and the community of practice in analyzing knowledge retrieval, utilization, integration, and transfer processes in organizations are briefly reviewed. The second part then draws on a multiple case study carried out in ten customer service centers in the Republic of Ireland, the third on sociological literature in order to put the empirical findings on a firm fundament. The concluding section develops implications for further research.

The roles of firms, teams, groups, and communities of practice in knowledge retrieval, utilization, integration, and transfer processes in organizations

This first part of the paper reviews the different levels of analysis that have been applied to conceptualize knowledge retrieval, utilization, integration, and transfer processes in organizations. We first review the role of firms, then turn to teams and groups, and finally to communities of practice. For each¹, we will carve out how precisely these levels of analysis differ from each other, and what the literature holds to be their roles in the above mentioned knowledge processes.

a) Firms

The literature constituting the so-called 'Knowledge-Based Approach' to the theory of the firm is the natural starting point for a review of the literature on the role of firms in knowledge retrieval, utilization, integration, and transfer processes. According to the overview in Foss and Foss (1999), the 'Knowledge-Based Approach' (KBA) looks at the research questions of the theory of the firm (existence of the firm, boundaries of the firm, internal organization of the firm, competitive advantage) through the lenses of characteristics of resources, routines and capabilities, bounded rationality, and learning. The starting point of this literature² is the explanation of why firms exist. One potential explanation – championed by the KBA – is that firms are more efficient than markets in producing, storing and utilizing knowledge, particularly tacit knowledge (Kogut and Zander 1992). By way of summary, the KBA sees firms as fulfilling the following knowledge-related roles:

- creating (Spender 1992, Kogut and Zander 1993),
- transferring (Kogut and Zander 1993),
- recombining (Kogut and Zander 1992, Kogut and Zander 1993),
- applying (Grant 1996), and
- integrating knowledge (Grant 1996; see also Grant 1991).

How do firms perform these knowledge roles, however? The knowledge process that the KBA provides most insights on is knowledge *integration*. We will therefore focus on

¹ With the exception of the firm.

knowledge integration in this paragraph. The KBA argues that what firms do to achieve integration of knowledge is to create the *conditions* for knowledge integration. According to Ghoshal and Moran (1996), firms have unique advantages for governing certain types of economic activities from a logic very different from that of a market. Grant (1996) argues that integrating the knowledge of many different individuals is precisely such a logic. Firms exist because they can create conditions under which multiple individuals can integrate their specialist knowledge. Such conditions include for instance incentives designed to foster coordination between individual specialists (Grant 1996). This argument can be extended to other knowledge processes, not just knowledge integration. According to Hodgson, firms can be seen as endowed with particular institutional capabilities which enable them to develop, bind, and protect organizational and individual competences and knowledge. In this perspective, the firm is an enclave 'protecting against the potentially corrosive forces of the market' (cf. Hodgson 1999b, 214; Hodgson 1999c, 89). Take learning as an example. The market – with its 'high-powered' incentives – is very good at *inducing*, motivating, triggering learning processes. These learning processes, however, subsequently have to be sheltered from the market that induced them, in order to be able to unfold. If the incentives are unclear, change fast, or concern various topics with regard to which learning is attractive, then the learning processes will either not be carried through fully, be interrupted, or will be abandoned. Further on in the learning process, learning results have to be retained. To the extent that it has been individual organisation members that have engaged in the learning process, the problem is one of knowledge integration, a problem to which – according to the KBA – the firm presents a solution in providing the conditions for knowledge integration.

Providing the *conditions* for knowledge integration does not mean providing knowledge integration, however. What are the mechanisms underlying the integration of knowledge in firms? For Kogut and Zander (1992), firms apply a set of higher-order organizing principles (i.e., organizing principles not reducible to individuals). Grant (1991) specifies such organizing principles as the following mechanisms for integrating specialized knowledge:

- rules and directives,
- sequencing,
- routines,
- group problem solving and decision making.

² For instance Barney 1991, Conner 1991, Dosi and Marengo 1994, Grant 1996, Kogut and Zander 1992, Kogut and Zander 1993, Madhok 1996, Penrose 1959, Peteraf 1993, Spender 1996, Winter 1988; for an overview see Foss and Foss 1999).

This is about as far as the KBA has pushed the analysis of the roles of firms in knowledge retrieval, utilization, integration, and transfer processes. Going one level deeper to the mechanisms underlying the fulfilment of these roles, Grant, in a somewhat unfortunate choice, focuses on rules and directives as a knowledge integration mechanism, arguing that it is the only one of the integration mechanisms compatible with hierarchy (Grant 1996, p. 118). As it turns out, such a choice does not lead to providing the analysis with much depth. The reason is that the tacitness of (at least some) knowledge will elude the possibility of 'directing' knowledge to any meaningful extent. Furthermore, in the case of knowledge, rules and directives – i.e., coordination by authority – as an integration mechanism does not work very well.³ In the case of knowledge it is not possible to know *about* the knowledge that has to be integrated and coordinated for its utilization. As Arrow has pointed out, the reason is that knowing *about* knowledge means having the knowledge – knowing about it without possessing it is impossible. Under the assumption of limited cognitive capacity (Simon 1955, 1956), the possibility of integrating of knowledge in this way ('in someone's head') will be exhausted rather fast – it is not possible to at the same time have the expert knowledge of an engineer, accountant, strategist, marketer, salesman etc. In order to effectuate knowledge integration by authority, however, possessing the knowledge would be necessary, as knowing about something without possessing that knowledge is impossible. Therefore, the knowledge of a large corporation is neither integrated in the CEO's head nor through the CEO's directives. Grant seems to have chosen the mechanism that least opens the road to more analytical depth, and to better understand the processes underlying knowledge integration. We suggest to follow through on the other three mechanisms for knowledge integration listed by Grant: sequencing, routines, and group problem solving and decision making. We will come back to this point towards the end of the paper.

b) Teams and groups

What is the difference between teams and groups?

As the reader will have noticed, so far we have put the terms 'teams, groups, communities of practice' under one heading. Before we go any further, we should now clarify how are they

³ This is despite the fact that it works very well for integrating labour inputs. The difference between labour and knowledge is that in the case of labour it is possible to specify (at least within certain margins of error) the outcome of most processes, with the effect that one can then coordinate these outcomes. Note that the frequency

different and how they are similar. Let us start with 'groups' and 'teams'. What is the difference between 'groups' and 'teams'? Is there a difference? Different authors use these terms in different meanings. For some, 'team' connotes more than 'group' (Katzenbach and Smith, 1993), while for others the terms are interchangeable (Guzzo and Dickson, 1996). A useful definition of 'work group' is the following:

... a 'work group' is made up of individuals who see themselves and who are seen by others as a social entity, who are interdependent because of the tasks they perform as members of a group, who are embedded in one or more larger social systems (e.g. community, organization), and who perform tasks that affect others (such as customers or coworkers) (Guzzo and Dickson, 1996).

For Katzenbach and Smith (1993), groups become teams when they develop a sense of shared commitment and strive for synergy among members. We will have more to say on a distinguishing criterion later on in the text. Until then, we will follow Guzzo and Dickson's (1996) suggestion and use the terms interchangeably.

What roles do teams have in knowledge processes?

We will develop an answer to this question by two means: reviewing the KBA-literature, and reviewing the wider social sciences literature that refers to 'teams' and 'knowledge' (as identified in the ProQuest database). Let us see what the KBA has to say first.

The KBA identifies various mechanisms by which teams are supposed to have an influence on knowledge processes in organizations. These refer primarily to knowledge transfer and knowledge integration.

- *Knowledge transfer*: Within groups (and teams), the transfer of knowledge is facilitated by a common stock of knowledge (Kogut and Zander 1992). Groups therefore are the 'locations' in the firm where knowledge is transferred more easily.
- *Knowledge integration*: Groups are a mechanism for integrating specialized knowledge (Grant 1996). Furthermore, to the extent that teams are composed partly of outsiders, they are thought to offer the benefits of exposure to outside capabilities, but also to involve the costs of resources that are less specific and harder to redeploy within the firm (Conner

of repetition of a certain action plays an important role in the ability to specify outcomes with some probability

1991). This points to another aspect of knowledge integration, the introduction of outside knowledge into the organization.

Regarding the mechanisms underlying the fulfilment of these roles, the KBA indicates that *interaction in groups* plays an important role in the knowledge processes in organizations. For instance, the accumulation of small group interactions is said to facilitate the creation of shared coding schemes within functions (Kogut and Zander 1992). Teams thus provide a shared context and shared codes. Furthermore, the internal institutional context 'team' not only acts as a coordinating device, but more fundamentally influences the values and ambitions of employees (Ghoshal and Moran 1996; Ghoshal, Moran and Almeida-Costa, 1995; Foss and Foss 1999).

We now turn to the second body of literature drawn on to find out about the roles of teams in knowledge processes in organizations. This literature was identified by searching the ProQuest database⁴, thus giving a broader overview of the social sciences literature. The 58 entries identified in the literature search on ProQuest that connect the terms 'knowledge' and 'team' or 'group' show a remarkable overlap with regard to the role of teams in knowledge retrieval, utilization, integration, and transfer processes. Summing up this body of literature, teams there are seen to play a role in four knowledge processes in organizations:

- knowledge integration
- knowledge creation
- knowledge acquisition, exchange, sharing, and transfer
- enabling/supporting individual learning.

This literature, too, emphasizes the role of teams in integration of the various (individual) knowledge domains, leading to a shared model. Shared models develop by learning from each other, and this takes time and requires speaking the same language (for instance Paulus and Yang 2000; Walz, Elam and Curtis 1993). Such ideas are consistent with ideas found in psychological research, a stream of research that typically focuses on individual aspects of what takes place in groups. In this literature, teams are seen as enabling a cognitive division of labor for sampling information during discussion (Stasser, Stewart and Wittenbaum 1995), and as pooling unshared (that is, dispersed) information (Steward and Stasser 1995). Teams

⁴ The search terms were 'subject (knowledge) AND subject (group)' (59 entries) and 'subject (knowledge) AND subject (team)' (9 entries). The time frame was from the earliest available entries in ProQuest (before 1986) up to March 2001.

are also seen as the 'location' where cooperative learning takes place (Janz 1999). They provide links between team members to exchange, transfer and share knowledge and the occasion to do so. Thereby, they also contribute to creating new knowledge (Nonaka and Takeuchi 1995).

Let us pull together these two streams of literature on teams and groups. Out of this wider body of literature emerges the idea that the shared (cognitive) overlap between team members plays a particularly important role for the roles of teams in knowledge processes in organizations. The roles teams are credited with are quite comprehensive, as described above. To this, the KBA then adds the emphasis that *teams are an important mechanism underlying the fulfilment of the roles that firms have in knowledge retrieval, utilization, integration, and transfer processes*. This becomes especially clear on the example of knowledge integration. The KBA states that firms have the role to integrate the specialist knowledge of its members; that one mechanism for integrating specialized knowledge are groups; and that what gets knowledge integrated within groups is *interaction*; groups provide a shared context and support the development of shared codes (which, amongst others, are required in transferring and sharing knowledge). The conclusion we can thus draw from reviewing the literature on teams and groups is that the 'work' of knowledge retrieval, utilization, integration, and transfer processes seems to be done *inside firms* (and not on the market), *but not by firms, but by teams/groups*. Within teams/groups, *interaction* appears to play a key role with respect to such processes.

c) Communities of practice

As in the preceding section, let us first ask how communities of practice differ from teams, and then what their roles in knowledge processes in organizations are held to be in the literature.

What is the difference between teams and communities of practice?

The originators of the notion 'community of practice', Lave and Wenger, define a community of practice as 'an activity system about which participants share understanding concerning what they are doing and what that means in their lives and for their community. Thus, they are

united in both action and in the meaning that that action has, both for themselves and for the larger collective' (Lave and Wenger 1991, 98). Since the original formulation, communities of practices have been varyingly defined based on the following criteria, of which different authors choose different combinations⁵.

- *Regularity* of interaction between members of the community of practice, for example sharing and learning (Lesser and Storck 2001).
- *Goals* are set by members. In contrast, the goals of teams are often established by people not on the team. (Lesser and Storck 2001).
- *Members have common overlaps both in action and in cognitive frameworks* (Lave and Wenger 1991; Wenger and Snyder 2000).
- *Communities are only responsible to their members*, while teams are often responsible and reporting to someone not on the team. (cf. Lesser and Storck 2001).
- *Membership is voluntary*. Membership in teams, on the other hand, often is assigned by authority (cf. Lesser and Storck 2001).
- *Authority relationships are emergent*. Authority relationships within teams, however, are organizationally determined. Authority relationships in a community of practice emerge through interaction around expertise (Lesser and Storck 2001).
- *Legitimization through interaction, not formal roles*. In a team, legitimizing occurs principally through the assignment of formal roles and relationships (i.e., team membership and structure are defined external to the team). Members of a community of practice establish their legitimacy through interaction about their practice (Lesser and Storck 2001).
- *Processes defined from the inside*. Teams rely on work and reporting processes that are organizationally defined. Communities develop their own processes (Lesser and Storck 2001).
- *Relationships are emergent, not formal*. Team relationships are established when the organization assigns people to be team members. Community relationships are formed around practice. (Brown and Duguid 1991)
- *Communities of practice evolve, they are not created*. They are not a form of formal structure, like a team or a department (Brown and Duguid 1991; Liedtka 1999).
- *They are often not bounded and not recognized by the organization*, as opposed to groups as bounded entities that lie within an organization and that are organized or at least sanctioned by that organization and its view of tasks (Brown and Duguid 1991).

⁵ ProQuest database, 'community of practice' and 'communities of practice' in the body of the abstract. The

The main difference between teams/groups and communities of practice is thus that communities of practice are informal, emerging, and based on shared elements (context, activity, objectives, mindset) between its members. Considering the importance of tacit knowledge in organizations, their informal and emerging character strongly suggests that they might well be more comprehensive than teams in their roles in knowledge processes in organizations. What roles in knowledge processes do they have, according to the literature?

What roles do communities of practice have in knowledge processes?

In the literature communities of practice, communities of practice are linked to four organizational knowledge processes:

- knowledge creation,
- knowledge transfer,
- knowledge retention
- knowledge acquisition/learning.

Brown and Duguid, for instance, hold that 'a great deal of knowledge is both produced and held collectively (Brown and Duguid 1998, 91). Such knowledge is readily generated when people work together in 'communities of practice' (cf. also Lesser and Storck 2001). At the same time, 'community of practice' also denotes a group across which such know-how and sensemaking are shared (Brown and Duguid 1998). They are also able to decrease the learning curve of new employees (Lesser and Storck 2001). Finally, communities of practice also appear to be a means of developing and maintaining long-term organizational memory (Lesser and Storck 2001).

In assessing the 'knowledge-process' profile of communities of practice as a level of analysis, the differences to teams as mentioned above are helpful. Although teams and communities of practice are credited with largely the same roles in knowledge processes in organizations, it seems to make an important difference that communities of practice are much more informal and emerging in character, thus qualifying them to be more comprehensive also with regard to tacit knowledge. That, we know, often is of particular importance in organizations. This argument is strong enough to out of the three levels of analysis 'teams', 'groups', and

'communities of practice' focus our attention on communities of practice, as it seems to be the most comprehensive one. More will be said on this below, however.

d) The knowledge-attributes of firms, groups/teams and communities of practice

We have now very briefly reviewed three different levels of analysis with regard to their roles in knowledge processes in organizations. In synopsis, how do these roles differ? The following table provides an overview.

	firms	teams/groups	community of practice
k. creation	X	X	X
k. transfer/sharing	X	X	X
k. retention			X
k. recombination	X		
k. integration	X	X	
k. application	X		
supporting individual learning		X	X

Figure 1: Knowledge-related roles of firms, teams/groups and communities of practice

The first result the table shows is that the three levels of analysis have each been credited with illuminating a different combination of knowledge processes. No one level of analysis captures all knowledge processes. However, neither does any of the levels of analysis seem to have an 'exclusive' access to particular knowledge processes, access that could not also be gotten through another level of analysis. This leaves us with primarily one question. In cases where several levels of analysis have been indicated: How do we decide which one to apply in

an analysis? Furthermore: How can we know whether underlying the knowledge-related roles of the various levels of analysis there are the same mechanisms, however, in different guises? In such a case, researchers would face the task to choose the level of analysis that brings out the mechanisms most clearly. The problem could also, however, be that different mechanisms could underlie the same knowledge-related role on the different levels of analysis. In this case, the researcher is faced with the problem of deciding what is the relationship between the two levels of analysis and thus between the two underlying mechanisms. For instance, are firms coordinating labour, while teams that are embedded in firms are transferring knowledge?

The literature review has shown that the evidence is inconclusive to the extent that it is difficult for a researcher interested in knowledge integration, transfer, utilization and creation in organizations to decide whether to apply the firm or the community of practice as the level of analysis. The evidence is also inconclusive with regard to the decision for what question each level of analysis is the right one – both firms and teams/communities of practice are considered to capture knowledge integration processes in firms, for instance. Where the evidence from the literature is inconclusive, one possibility is to turn to empirical studies and cast some light on the question from empirically grounded insights. This is what the next section attempts to do.

What is the best access to knowledge retrieval, utilization, integration, and transfer processes in empirical studies? Some indications from case studies

The question what mechanisms are underlying knowledge retrieval, utilization, integration, and transfer in organizations is an empirical question. It has to be resolved – at least partly – by empirical research. Therefore, the level of analysis chosen has to provide the most fruitful access to these process in empirical studies. Which of the levels of analysis yields interesting insights in empirical research? The answer to this question also means resolving the inconclusiveness of the literature.

This section reports on ten exploratory case studies of knowledge retrieval, utilization, integration, and transfer in customer service centers. They were carried out in customer service centers (also: 'call centers') in the Republic of Ireland in November 2000. These case

studies cut across different industries, including the airline, car rental, hardware, and software industries. A total of 38 interviews were carried out across the different hierarchical levels in call centers as well as with suppliers, industry associations, and trade unions. Customer service centers are a good empirical setting to study knowledge retrieval, utilization, integration, and transfer processes. Such centers are the firm's interface with the customer. Where the customer service center is centralized and there is only one phone number for customers to dial, it might even be the *only* interface between customer and firm. It is at this interface that knowledge flows between firm and customer: customers ring (or email) asking for information either directly (for example when their order will be delivered), or by requiring some problems to be solved (for instance complaining about delivery of the wrong merchandise). But they also – consciously or unconsciously – give information to their conversation partner at the other end of the phone line: this opportunity is pursued to different degrees by firms, somewhere between not at all and actively collecting as much information about the customer as possible. Likewise, the information collected is then retained and processed to different degrees and in different ways. However, the interface is crucial for the exchange of knowledge: if it is the only interface, it means that if knowledge is not exchanged here, it will not be exchanged at all. Their reputation to the contrary notwithstanding, call centers are a knowledge-intensive 'place'. What are the main findings of the customer service center cases?

Knowledge transfer. The case studies we carried out yielded some findings on knowledge transfer processes, so that we will focus on knowledge transfer. In the case studies, we found that the level of analysis that was important for knowledge transfer processes was the team – as it was termed by the people we interviewed. When asked whether teams were important, a telephone representant gave the following answer.

Oh, completely. That is so important. It's just important that, I mean ... it's quite busy, it's quite demanding, I mean people need to be able to turn over [to their colleagues] – it's a lot of products, a lot of information, and people need to be able to feel free to turn over and say 'do you know ...?', and you get that a lot, people turning over and asking peopleso it's very important from that point of view that it's a good atmosphere here and that people do not feel alone on their own dealing with customers, otherwise it would be quite difficult. (Phone representative, company A).

What seems to be going on here is that teams provide a way of transferring knowledge. As comes through in other interviews, too, this role of teams is particularly important for newcomers. Until they have got 'up and running', newcomers can have potentially harmful effects on customers because of the little specific (e.g. product- or company-related) knowledge they have. Turnover in customer service centers is very high. Having to build up this specific knowledge is not just an exceptional case but rather the norm. If colleagues are always willing to 'turn around' and help a new colleague, this makes a big difference – not just for the atmosphere in the team, but more importantly for shortening the time required for new team members to get 'up to speed', for decreasing the risk of negative customer experience because of a lack of knowledge on part of new hires, for the level of 'knowledgeability' of phone representatives and for the speed of access to knowledge.

One could object that transferring, or retrieving, knowledge could be sped up by means of appropriate database infrastructures. Somewhat surprisingly maybe, the case studies indicate that this does not seem to be as effective as direct inter-personal contact, however. Consider the following quote of a phone representative:

... we also help each other, in particular those that have been around longer. For example, when there are questions about customs, I mean, there are countries where questions are quite infrequent, and then – I mean, of course we have the systems to look it up – but if it has to be really quick ... (Phone representative, company B).

Although all the systems and databases are in place, *if it has to be really quick staff do not use them!* And mind you, in a customer service center environment, it always has to be quick: the customer is on the phone, you might put her on hold, and you might have 10 seconds to find something, but not even one minute. Time literally is counting by the second, rather than the minute. On top of that, in many customer service centers a fixed number of calls have to be made every day. This target is controlled and enforced, for example by being linked to rewards and remuneration. Speed, therefore, is crucial. Why is using the system too slow, even despite the high computing speed available today? It seems that asking your colleagues simply is *faster* than looking something up in a database.

The case studies therefore indicate that teams play important roles in knowledge transfer and retrieval, confirming the impression emerging from the literature review. Regarding the level

of mechanisms underlying this role, the case studies further indicate that interaction is indeed involved and crucial in knowledge transfer and retrieval processes. The interview quotes chosen what is underlying the capacity to get knowledge to someone who has to answer a question of a customer who is on hold – by 'turning around' to her colleagues, that is, by interaction within the team. The case studies thus support the idea emerging from the literature review that interaction is underlying knowledge transfer and retrieval processes – and maybe others – in teams.

This empirical insight allows us to come back to the question, raised at the beginning of the paper, how teams are distinguished from groups. It seems to make a lot of sense to make interaction between team members the key defining characteristic of teams. If there is no interaction between team members, you do not have a team – at least not in practice, maybe on paper. You have a collection of people that are somehow grouped together (they have at least one characteristic in common, e.g. have a certain age, sell a certain product etc.) but that work independently of each other – what we from now on would like to call a group. The big difference is that the team fulfills a role in knowledge processes like knowledge transfer and retrieval, while the 'group' does not.

With this sharpened distinction between teams and groups in mind, we can indeed see how often, the difference does not seem to be perceived in practice. Consider the following quote by a call center manager:

People always talk about teamwork, but there is not a huge amount of interdependency. ... When you're in this job, you're one on one on the call, you're really your own boss. Your supervisor can help you, but you're not gonna really deal with three or four people in a chain to deal with one customer. You deal with the customer. It's a one-stop shop. (Customer service center manager, company C).

Contrast this with the following quote by a team leader:

No person here can work as an island. (Team leader, company D).

While we know from quotes like the ones quoted before of the perception of teams by team members ('turning over'), for some managers, teams are just an administrative solution for a

large-number problem.

Because there are so many people we break it down into teams, and we have team leaders, to make it more manageable, to motivate the staff, to get performance out of them, and give the phone representative a point of reference, a contact ... they build up a relationship with these people, instead of a relationship with more people (Customer service center manager, company C).

Moreover, in company C, that is, the one of the customer service center manager quoted above, we actually spent some time sitting with a telephone representative, listening to phone conversations. Almost every single call during that time involved interaction with team members, either using a chat system, email, or 'turning over'. This is an impressive example of how management can come to neglect knowledge processes in firms. One gets the impression that managers mainly perceive the 'external' aspects of teams; for example, teams are used for measuring performance because in some cases it is difficult to account for individual efforts. When that is done, managers perceive just the one team instead of the 12 persons that constitute it; they will take a perspective on the outside of the team (what it produces) – not the inside (how it does so). This is the team leader's responsibility. Each team becomes 'visible' only as team, the persons constituting it retreating into the background. Of course, this is a basic phenomenon of hierarchies. By definition, hierarchical levels are also aggregations of underlying levels, and the working principle is precisely that a higher hierarchical level does not have to engage with all the details of the lower level. It is important to note, however, that in the customer service center cases, this aggregation also involves a further difference: when managers take a perspective on the outside of teams, they focus on results, on performance. They abstract from what goes on *inside* the team. They abstract from the *processes* that lead to the results. As it turns out, this is what matters from a knowledge-management perspective. Therefore, the managers in the case study in fact overlooks the knowledge-related aspects of teams.

This leads us to the conclusion from the case studies. They contribute an important point to be recognized. What was described just above is in parallel with the definition of 'team' – based on formal criteria. This can easily result in missing out on, not capturing, knowledge processes themselves and what is underlying them. In order for that to become 'visible', be captured by the analytical framework and thus accessible for analysis, a definition of teams

that is based on interaction is necessary. 'Communities of practice' represent such a definition. As described in the previous section, they encompass the informal aspects and the processes, what really is taking place.

A number of conclusions emerge from the case studies. First, *teams fulfill extremely important roles regarding knowledge and learning in organizations*. In the case studies drawn on above, this becomes clear when imagining that teams were absent (or that management is not aware of them, and managing 'against' them). This leads us to the conclusion that indeed, teams cannot be ignored in analyzing knowledge and learning in organizations (see also Becker 2002 forthcoming a). While this conclusion has of course been reflected by wide parts of the literature, the next point has not. This point is – and that is the second conclusion from the case studies – that *teams capture most of the phenomena important for knowledge and learning in organizations when they are defined based on interaction*. Otherwise, phenomena that are important for understanding knowledge and learning in firms slip through the researcher's fingers unnoticed. Again, remember the case of the manager who was of the opinion that there were no teamwork in his customer service center. The third conclusion emerging from the case studies presented here is that *if the definition of teams is based on interaction, teams and communities of practice become virtually identical constructs* (cf. the differences between teams and communities of practice spelled out above). This resolves one part of the question what is the relationships between these different units of analysis – teams and communities of practice are virtually one level of analysis if the definition of teams is based on interaction. The case studies have made a strong case for doing so. In this context, it is interesting to note that in contemporary definitions of teams, the defining criterion 'interaction' does not necessarily appear – it seems that the notion of 'community of practice' has come to occupy this position. Fourth, going beyond this question, we are left with the strong and much supported impression that *interaction holds a central key* to understanding knowledge retrieval, utilization, integration, and transfer processes in organizations.

The role of interaction for understanding knowledge retrieval, utilization, integration and transfer

So far, we have reviewed several streams of literature on knowledge processes in organizations and have reported on case studies on the question. In both cases, interaction has

emerged as a central key to understanding knowledge retrieval, utilization, integration, and transfer processes in organizations. Both from the literature reviewed and from the case studies carried out, interaction comes out as the most promising lead for a mechanisms underlying knowledge processes in organizations. The present section explores this lead further by attempting to provide it with a solid fundament. It turns out that there is a solid sociological fundament, to be found for instance in the writings of sociologists Charles H. Cooley and George C. Homans, on which an interpretation emphasizing the importance of interaction for knowledge processes in organizations – and of defining teams by interaction – can be based.

In one of his later works, Charles H. Cooley established a link between the development of knowledge and communication (interaction⁶). He there distinguished two types of knowledge, 'personal' or 'social' knowledge and 'spatial' or 'material' knowledge. The latter kind of knowledge is knowledge of things, and is developed out of 'sense contacts' (Cooley 1926). For example, sight gives knowledge about the shape of a cup, tactile perception gives knowledge about its surface, and so on. 'Personal' or 'social' knowledge, on the other hand, is knowledge that enables us to understand other people. The way in which this is achieved is by sharing states of mind (Cooley 1926). What is crucially important for 'personal' or 'social' knowledge is that it is developed from contact with the minds of other people. Such contact with the minds of other people takes place in communication, or more generally, in interaction. Therefore, interaction can be seen as a prerequisite for the development of 'personal' or 'social' knowledge. Cooley also provides us with a more specific understanding of interaction. Two characteristics of interaction shall be pointed out here. First, interaction (or 'communication') does not have to be 'actual' interaction in the sense that it takes place in the same point of time, as for example when two persons have a conversation at a table. For Cooley, interaction leading to 'social' knowledge could also include reading a historical text. If I read Aristotle, I am in interaction with Aristotle's ideas (Cooley 1897). In fact, *all* influences reaching a person from another person qualify as interaction capable of leading to 'social' knowledge. Second, interaction does not have to be physical interaction but could also be imaginative interaction: 'It is not to be inferred that we must go through the same visible and tangible experiences as other people before we can sympathize with them. ... Social experience is a matter of

⁶ Developing Cooley further, Homans later expressed the relationship between interaction and communication as follows: 'interaction' includes both verbal and nonverbal communication, that is, it is wider than the term 'communication' (Homans 1950). Important about interaction is that it also means that stimuli are involved: Interaction means that 'some unit of activity of one man follows, or, if we like the word better, is stimulated by some unit of activity of another' (Homans 1950, 36).

imaginative, not of material contacts' (Cooley 1902, 95).

For Cooley, interaction was therefore central for the definition of groups⁷. Later, the idea was carried on and expressed in even stronger form by Homans. For him, groups are defined by interaction (Homans 1947, 17):

The only essential criterion is the interaction of members with one another (Homans 1974, 95).

Homans also developed more precise criteria: that the team members interact with each other often, and that they do so face-to-face (or at least they have the possibility to do so). These two conditions translate into a small team size:

... a number of persons who communicate with one another often over a span of time, and who are few enough so that each person is able to communicate with all the others, not at secondhand, through other people, but face-to-face (Homans 1950, 1).

Later, Homans added further precision to this condition. In a group, members are to be in contact with each other more often than with outsiders.

... a small group ... a number of persons, defined as its members, participate in a closed network, when during a given period of time ... each of its members is in contact with each of the others more often than he is with outsiders, or at least is able to be thus in contact (Homans 1974, 4).

This very strong emphasis on interaction in the definition of teams in sociology raises the question why 'interaction' between team members is not a defining criterion in many definitions of teams in the economics and management literature. In order to avail of the benefits of the analysis of interaction and the knowledge-related processes in teams, the definition of teams should be based on interaction.

Cooley's and Homans's notion of interaction is thus consistent with what we know from

⁷ By primary groups I mean those characterized by intimate face-to-face association and cooperation (Cooley 1909, 179).

empirical findings. It is not only possible to get an idea – to learn something – from a book, to be inspired by it and to connect it with other knowledge held already. Learning from books and other written documents is also a very important and common mechanism for transferring knowledge and for learning. The qualification of the notion of interaction as made above therefore is an important one. By including (i) interaction between not temporally co-located interaction partners and (ii) mental, not physical, interaction, we are provided with an analytical perspective that is consistent with what we know from empirical studies, and that seems to allow us to capture the gist of the phenomenon in question here, the use, transfer, retention, creation of knowledge. Note that if the notion of interaction includes solely physical interaction at the same point of time (as for example in the transaction cost economics definition of a transaction as occurring 'when a good or service is transferred across a technologically separable interface', Williamson 1985, p. 1) many phenomena – and in particular many phenomena related to knowledge – will be outside the theoretical reach of the theory built on this notion. It is therefore crucial to adopt a wider, more encompassing notion of interaction, like the one presented above. The advantage of such a move is that it builds on a solid sociological fundament.

In conclusion, first, the idea that interaction is a crucial prerequisite for using knowledge is clearly established in early sociology and is provided with additional support from there. Second, from this follows that in the endeavour of identifying and understanding the mechanisms underlying knowledge retrieval, utilization, integration and transfer, it seems that (i) concentrating on *interaction*, attempting to (ii) empirically capture interaction in the most comprehensive way, and to (iii) analytically penetrate it as deeply as possible, is the most promising way ahead. For the first task, a shift of focus is needed where such a focus is not in place already, for the second, units of analysis that capture interaction in and between organizations in all their richness, and for the third, theoretical frameworks that connect these units of analysis to causal relationships that allow developing and (potentially) testing meaningful and relevant hypotheses. This is the more precise specification of the research program emerging from this paper.

Towards a unit of analysis based on interaction

We have just postulated that what is needed is to (i) empirically capture interaction in the

most comprehensive way, and to (ii) analytically penetrate it as deeply as possible be taken. How can this be done? This concluding section sketches an outline for developing a unit of analysis based on interaction.

One of the objectives set out at the beginning of this paper was to identify the most productive research approach for understanding the mechanisms and processes underlying knowledge retrieval, utilization, integration, and transfer in organizations. We have so far identified communities of practice as the level of analysis that appears to capture more of knowledge processes in organizations than the alternatives proposed in the literature, firms, teams, and groups. We have also identified interaction as what is underlying these processes. Describing, analyzing, and understanding interaction in communities of practice therefore holds the central key to understanding knowledge retrieval, utilization, integration, and transfer processes in organizations. This is as far towards understanding the mechanisms and processes underlying knowledge retrieval, utilization, integration, and transfer in organizations as we have come until now. In order to progress further, we now need to propose answers to the question ‘What unit of analysis will empirically capture interaction in the most comprehensive way?’, to which we turn in the section that follows, and to the question ‘How to analytically penetrate it as deeply as possible?’, to which we turn in the next section.

The argument for how to empirically capture interaction in the most comprehensive way is a simple one. That interaction that is *repeated most often* is the one that characterizes the organization to the highest degree. It is what is typical, what is usually taking place. It is what represents the bulk of organizational activity. If one captures that interaction that is repeated most frequently, one captures what characterizes the organization *as an actor*. For instance, one captures a large multinational with a strong brand *as constantly reinforcing its brand image through the activities of its marketing department*, or captures the fact that a car manufacturer has a high reputation for quality *as the constant (i.e., frequently repeated) interaction in quality circles and other forms of interaction focused on upholding and improving quality*. The advantage of such a perspective is that one has a dynamic analytical perspective on – in our examples – phenomena like brands and reputation (or corporate culture or ‘knowledge management’). It allows us to understand the organization as a bundle of processes. Such a dynamic perspective then allows to draw on analytical frameworks that have a good chance of covering angles not covered in the frameworks used so far. More on

this below when we approach the second question, that of analytical penetration. The proposal is therefore simply to concentrate on analyzing those interactions that are recurring frequently. Frequently recurring interaction typically forms patterns. Some aspect of the interaction stays invariant over the recurrences. The same participants or the holders of the same formal positions participate in meetings, or the interaction follows the same sequences (cf. the notion of ‘scripts’), to give just two illustrations. The recurrent interactions are recognizable as patterns. We can therefore usefully term them ‘*recurrent interaction patterns*’.

At this point, we would like to come back to the literature review. There, we noted that Grant (1991) identified four organizational mechanisms for integrating specialized knowledge: rules and directives, sequencing, routines, and group problem solving and decision making. Of those four, he chose to pursue rules and directives in his own analysis. The argument made above leads us to take the other route and advocate pursuing the investigation into sequencing, routines, and group problem solving and decision making. In our understanding of teams defined by interaction – which in turn can be captured as recurrent interaction patterns – Grant’s three mechanisms are connected nicely. ‘Group problem solving and decision making’ refers to interaction in a community of practice, in our terms. This is best captured focusing on recurrent interaction patterns, a term that captures (and also specifies more closely) what is often connoted with the term ‘routines’ (see below). Recurrent interaction patterns being patterns of interaction over time, they involve sequences. In our interpretation, the four mechanisms listed by Grant therefore fall into two groups of constructs that can be used to empirically capture them: rules and directives, and recurrent interaction patterns. The latter one appears to not yet have been applied to the study of knowledge processes in organizations to the extent that it could usefully be.

We now turn to the second question, 'How to analytically penetrate interaction as deeply as possible, in order to understand knowledge processes in organizations?' In the previous paragraph, we just mentioned that recurrent interaction patterns capture what is often connoted with the term ‘routines’. In a systematic way, this term has appeared in the social sciences in the 1920s, partly driven by the Scientific Management movement (see Becker 2002 forthcoming b). Broad attention has been drawn to it by Sidney G. Winter and Richard R. Nelson in their 1982 book ‘An Evolutionary Theory of Economic Change’ (Nelson and Winter 1982). Since then, the notion of organizational routines has inspired several streams of literature, amongst which evolutionary economics and organizational theory. Now, one of the

problems with the term ‘routines’ is that different authors use it in different ways, namely to refer to the level of action (routines as recurrent interaction patterns or recurrent activity patterns), or to the cognitive level (routines as rules). This conflation of levels is a problem that plagues the term ‘routine’ and is the source of some confusion. It is therefore preferable to distinguish the two levels and use more precise labels for them. Obviously, the term ‘recurrent interaction patterns’ refers to the level of action. However, this weakness of the concept as such also bears some attraction for our context here. Namely, if recurrent interaction patterns are *one part* of what has been called ‘routines’, then there might well be some kind of systematic connection between that part and the other part – the action level and the cognitive level – that the literature employing the term ‘routines’ might have something to say about. By specifying that we talk of recurrent interaction patterns (the ‘action level’ aspects of routines), we can then draw on the body of ‘routines’ literature and use what it has to say on the link between the action level and the cognitive level. It can serve as a framework for conceptualizing and understanding the link between interaction and cognitive processes.

Conclusion and Implications for further research

The paper has started by reviewing the literature in attempting to clarify how the most often used approaches in researching how knowledge retrieval, utilization, integration, and transfer processes in organizations work differ. It has been found that firms, teams, groups, and communities of practice are all seen to be involved in knowledge processes in organizations. However, it is not clear precisely what of these entities fulfills what role in integrating, transferring, creating, and utilizing knowledge. As the most productive level of analysis for understanding the mechanisms and processes underlying knowledge retrieval, utilization, integration, and transfer in organizations, the community of practice has been proposed. On the level of underlying mechanisms, interaction between members of the community of practice was identified. This notion – that the most productive analytical approach to understanding the working of knowledge processes in organizations is to look at communities of practice and analyze the interaction between its members – also has been shown to be on firm sociological ground. The focus for further research proposed here is therefore clear: communities of practice and the interaction between its members. As a unit of analysis capable of capturing what is of interest here, and capable of providing analytical depth, the concept of recurrent interaction pattern has been proposed. It links – in a very specific way –

to the research that has been carried out on the concept of 'organizational routines' (in the wake of Nelson and Winter 1982). Drawing on that body of research, while contributing to it a more specific focus (on the action-level, rather than mixing up the level of action and the level of cognition) and specific insights into the knowledge-related aspects of routines, seems a cross-fertilization that, albeit advocated and implemented in a few cases, still awaits large-scale realization. The gains it holds seem great indeed.

Bibliography

Barney, Jay (1991): Firm Resources and Sustained Competitive Advantage. *Journal of Management*, Vol. 17, No. 1, 99-120

Becker, Markus C. (2002, forthcoming a): What is the role of teams in Knowledge Management? *International Journal of Information Technology and Management*.

Becker, Markus C. (2002, forthcoming b): Routines - A brief history of the concept. Ioannides, Stavros and Nielsen, Klaus (eds.): *Economics and Social Sciences: Complements, Competitors, Accomplices?* Edward Elgar, Cheltenham

Brown, John Seely and Duguid, Paul (1991): Organizational Learning and Communities-of-Practice: Toward a Unified View of Working, Learning, and Innovation. *Organization Science*, Vol. 2, No. 1, 40-57

Brown, John Seely and Duguid, Paul (1998): Organizing Knowledge. *California Management Review*, Vol. 40, No. 3, Spring 1998, 90-111

Conner, Kathleen R. (1991): A Historical Comparison of Resource-Based Theory and Five Schools of Thought Within Economics: Do We Have a New Theory of the Firm? *Journal of Management*, Vol. 17, No. 1, 121-154

Cooley, Charles Horton (1897): The Process of Social Change. *Political Science Quarterly* 7, No. 1, 63-81. Schubert, Hans-Joachim (ed.): *Charles Horton Cooley: On Self and Social Organization*. University of Chicago Press, Chicago, 63-78

Cooley, Charles Horton (1902): Sympathy or Understanding as an Aspect of Society, ch. 4 of *Human Nature and the Social Order*. Schubert, Hans-Joachim (ed.): *Charles Horton Cooley: On Self and Social Organization*. University of Chicago Press, Chicago, 93-99

Cooley, Charles Horton (1909): *Social Organization: A Study of the Larger Mind*. Chapter 3: Primary Groups, 23-31. Schubert, Hans-Joachim (ed.): *Charles Horton Cooley: On Self and Social Organization*. University of Chicago Press, Chicago, 179-184

Cooley, Charles Horton (1926): The Roots of Social Knowledge, *American Journal of Sociology*, Vol. 32, No. 1, 59-79. Schubert, Hans-Joachim (ed.): *Charles Horton Cooley: On Self and Social Organization*. University of Chicago Press, Chicago, 110-127

Dosi, Giovanni and Marengo, Luigi (1994): Some Elements of an Evolutionary Theory of Organizational Competences. England, Richard (ed.): *Evolutionary Concepts in Contemporary Economics*. University of Michigan Press, Ann Arbor 1994, 157-178

Foss, Kirsten and Foss, Nicolai (1999): The Knowledge-Based Approach and Organizational Economics: How Much Do They Really Differ? And How Does It Matter? *DIES WP 99-1*

Grant, Robert M. (1991): The Resource-Based Theory of Competitive Advantage: Implications for Strategy Formulation. *California Management Review*, Spring 1991, 114-135

- Grant, Robert M. (1996): Toward a Knowledge-Based Theory of the Firm, *Strategic Management Journal*, Vol. 17, Winter Special Issue, 109-122
- Guzzo, Richard A. and Dickson, Marcus W. (1996): Teams in Organizations – Recent Research on Performance and Effectiveness. *Annual Review of Psychology*, Vol. 47, 307-338
- Hodgson, Geoffrey (1999a): *Economics and Utopia - Why the Learning Economy is Not the End of History*. Routledge, London.
- Hodgson, Geoffrey M. (1999b): *Evolution and Institutions – On Evolutionary Economics and the Evolution of Economics*. Edward Elgar, Cheltenham.
- Homans, George C. (1947): A Conceptual Scheme for the Study of Social Organization. *American Sociological Review*, Vol. 12, No. 1, 13-26
- Homans, George C. (1950): *The Human Group*. Harcourt Brace & World, New York.
- Homans, George C. (1974): *Social Behavior – Its Elementary Forms*. Revised edition, original 1961. Harcourt Brace Jovanovich, New York
- Janz, Brian D. (1999): Self-directed teams in IS: correlates for improved systems development work outcomes. *Information & Management*, Vol. 35, No. 3, 171-192
- Katzenbach, Jon P., and Douglas K. Smith (1993). The discipline of teams. *Harvard Business Review*. March-April, pp. 111-120.
- Kogut, Bruce and Zander, Udo (1992): Knowledge of the firm, combinative capabilities, and the replication of technology. *Organization Science*, Vol. 3, No. 3, 383-397
- Kogut, Bruce and Zander, Udo (1993): Knowledge of the firm and the evolutionary theory of the multinational corporation. *Journal of International Business Studies*, 4th quarter 1993, 625-645
- Lave, Jean and Wenger, Etienne (1991): *Situated Learning*. Cambridge University Press, Cambridge
- Lesser, E.L. and Storck, J. (2001): Communities of practice and organizational performance. *IBM Systems Journal*, Vol. 40, No. 4, 831-841
- Liedtka, Jeanne (1999): Linking Competitive Advantage With Communities of Practice. *Journal of Management Inquiry*, Vol. 8, No. 1, 5-16
- Madhok, Anoop (1997): Cost, Value and Foreign Market Entry Mode: The Transaction and the Firm. *Strategic Management Journal*, Vol. 18, 39-61
- Nelson, Richard R. and Winter, Sidney G. (1982): *An Evolutionary Theory of Economic Change*. Belknap Press of Harvard University Press, Cambridge/MA
- Nonaka, Ikujiro and Takeuchi, Hirotaka (1995): *The Knowledge-Creating Company*. Oxford University Press, Oxford.

Paulus, Paul B. and Yang, Huei-Chuan (2000): Idea generation in groups: A basis for creativity in organizations. *Organizational Behavior and Human Decision Processes*. Vol. 82, No. 1, 76-87

Penrose, Edith (1959/1995): *The Theory of the Growth of the Firm*. Oxford University Press, Oxford

Simon, Herbert A. (1955): A Behavioral Model of Rational Choice. *Quarterly Journal of Economics*, Vol. 69, 99-118. Reprinted in Simon, Herbert A. (1982): *Models of Bounded Rationality*, Vol. 2: Behavioral Economics and Business Organization. MIT Press, Cambridge/MA, 239-258

Simon, Herbert A. (1956): Rational Choice and the Structure of the Environment. *Psychological Review*, Vol. 63, No. 2, 129-138. Reprinted in Simon, Herbert A. (1982): *Models of Bounded Rationality*, Vol. 2: Behavioral Economics and Business Organization. MIT Press, Cambridge/MA, 259-268

Spender, J.-C. (1996): Making Knowledge the Basis of a Dynamic Theory of the Firm. *Strategic Management Journal*, Vol. 17 (Winter Special Issue), 45-62

Stasser, Garold, Stewart, Dennis D. and Wittenbaum, Gwen M. (1995): Expert roles and information exchange during discussion: the importance of knowing who knows what. *Journal of Experimental Social Psychology*. Vol. 31, 244-265

Stewart, Dennis D. and Stasser, Garold (1995): Expert role assignment and information sampling during collective recall and decision making. *Journal of Personality and Social Psychology*. Vol. 69, 619-628

Walz, Diane B., Elam, Joyce J., and Curtis, Bill (1993): Insided a software design team: Knowledge acquisition, sharing, and integration. *Communications of the ACM*, October 1993, Vol. 36, No. 10, 62-77

Wenger, E. and Snyder, B. (2000): Communities of practice. *HBR*, Vol. 78, No. 1, 139-145