

An Activity Theory Approach for Studying the Situatedness of Knowledge Sharing

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Abstract

This paper proposes a methodology that enables to describe and analyze the situatedness of knowledge sharing within and between different organizational settings. By taking an activity system as the unit of analysis, an organizational setting within which knowledge sharing takes place can be described according to its emergent object of activity and its mediation of language and technologies, social rules and division of labor. Tensions and breakdowns, being inextricable aspects of activity systems, are consequently used as points of reference for studying knowledge sharing as an empirical phenomenon. By adopting an activity theory approach, the situated nature of the knowledge sharing process is stressed and a systemic analysis is ensured. Furthermore, the processual character of knowledge sharing is emphasized and the temporal interconnectedness is taken into account explicitly.

1. Introduction

Following the wider debate about the emergence of the information age and the knowledge society [17;36], the importance of knowledge (processes) within organizational settings is generally agreed upon. In recent years there has been an explosion of writing about knowledge and knowledge related processes from different disciplinary and theoretical perspectives (communication theory, learning organization, speech act theory etc.). Different research traditions have developed several typologies and classifications of knowledge and have distinguished a range of knowledge processes. This pa-

per focuses on a particular knowledge process that has been identified by most scholars and practitioners to be crucial within and between organizational settings: knowledge sharing. Despite the availability of a variety of relevant theoretical concepts, a fundamental understanding of the dynamics of knowledge sharing as a *situated process* is still lacking. The fact that theoretical development has not always been accompanied by sound empirical research might be a possible reason for the gap between theory and practice [38]. In order to fully understand why, when and how knowledge is or is not being shared, this process has to be described carefully in real organizational settings. This is in line with Brief and Dukerich [9] who encourage descriptive research and have challenged the idea that prescription is the appropriate end of organizational research.

However, it is rather difficult to study the dynamics of knowledge sharing as an empirical phenomenon. After all, one can not observe what knowledge *is*, but only to some extent what knowledge *does*. This paper proposes some practical methodological guidelines for empirical investigation of the situated nature of knowledge sharing within and between different organizational settings. Obviously, these methodological guidelines need to be epistemologically and ontologically grounded. The paper elaborates on the work of authors who stress the situated aspects of knowledge (sharing) [10;33;2;37;47;52;19].

In order to fully understand the situated nature of knowledge sharing, research should not be limited to analyzing single explanatory factors. Rather than focusing exclusively on particular characteristics of an individual, a social relation or a particular task influencing the knowledge sharing process (as is common in factor analysis research), the whole relevant context needs to be

included. The context within which knowledge is being shared (i.e. an organizational setting) comprises social, organizational and technical issues which can be analyzed at different levels of abstraction. Furthermore, the temporal interconnectedness needs to be taken into account explicitly [39], rather than analyzing random pictures of an organizational setting. In this respect analyzing processes, including knowledge sharing, is considered to be more valuable than focusing on entities [50].

An organizational setting within which knowledge is being shared is analyzed in this paper by adopting an activity theory approach, since it gives in to the requirements mentioned. The activity theory emphasizes the importance of a systemic analysis of an organizational setting by considering it as (a network of) activities. With the activity system as its unit of analysis, the activity theory avoids simple causal explanations of knowledge sharing by describing an organizational setting as an ensemble of multiple systematically interacting elements (e.g., social rules, mediating artifacts and division of labor). Furthermore, it explicitly perceives an activity as a dynamic phenomenon, in which not only stability and consensus, but also conflicts, discontinuities and breakdowns play a central role. Both the process of socialization (from novice to expert) and questioning of authority, criticism and initiation of change can be taken into account [20]. By taking the perspectives of different actors of an activity system, a system view is complemented with a subject's view.

The rest of the paper is structured as follows. First, the knowledge sharing process is described together with the difficulties of studying it as an empirical phenomenon. How organizational settings (constituting the context within which knowledge is being shared) can be described as activity systems is explained secondly. Third, the paper describes how such activity systems are situated in a wider context, and how knowledge sharing is situated within or between these activity systems. Fourth, the previous four paragraphs are combined and interrelated into some practical methodological guidelines for studying the dynamics of knowledge sharing as an empirical phenomenon within and between activities. The paper concludes with some summarizing remarks.

2. Knowledge sharing

Although the notion of knowledge sharing is frequently used in everyday practice, defining this process is rather difficult. Obviously communication constitutes a crucial element of knowledge sharing. And although knowledge sharing requires a kind of learning, knowledge sharing constitutes just a restricted element of learning. In this section the epistemological starting-point of both 'knowledge' and 'sharing' is described, just like the

domain within which it is being analyzed. At the end of this section it is explained why it is so difficult to analyze knowledge sharing empirically.

The way the knowledge sharing process can be conceptualized depends on one's perspective on knowledge [7]. Different epistemological perspectives on knowledge exist among scholars and practitioners [49]. Frequently, knowledge has been perceived as an object, defined as "justified true belief". In this perspective it is assumed that knowledge can be codified and separated from the minds of people. When adopting this perspective on knowledge, knowledge sharing is generally conceptualized as "transferring knowledge-objects" in a similar way as information is being transferred in the conduit model (or sender-receiver model) inspired by Shannon and Weaver [43]. This kind of conceptualization of knowledge sharing is assumed within the codification strategy of Hansen et al [26]. Technologies that are considered to be important for supporting this kind of knowledge sharing comprise knowledge repositories and intelligent search agents [49].

A second perspective on knowledge stresses that knowledge could *only* reside in the mind of people and can be defined as "that which is known", i.e. knowledge being embedded in individuals [41]. Only people can 'know' and convert 'knowing' into action, and it is the act of thinking that can transform information into knowledge and create new knowledge [34]. When accepting this perspective on knowledge, knowledge sharing is usually considered to be "the exchange of information in order to yield knowledge". The personification strategy described by Hansen et al [26] assumes this kind of conceptualization of knowledge sharing. Technologies like e-mail, video-conferencing and knowledge maps are considered to support this kind of knowledge sharing.

Although the first two perspectives on knowledge still guide many practitioners and academics, a third perspective is gaining ground. This perspective defines knowledge as "the social practice of knowing", where knowledge is considered to be embedded in a community rather than just in one individual. It suggests knowledge to supersede any one individual and to be highly context dependent [10;33;37;52]. With such a perspective on knowledge, the sender-receiver model is not an appropriate conceptualization of the knowledge sharing process, since it is based on 'information processing images in which words point at things, meanings are not problematic, and the power of deductive logic is emphasized' [7]. A conceptualization is needed that is based on 'social constructionist images in which words gain sense only through actual use in a community, meanings are symbolic and inherently ambiguous, and the power of social processes, storytelling and conversation is emphasized' [7]. The language game model of Wittgenstein [55] is an example of such a conceptualization.

This paper accepts the third perspective on knowledge, being a “*shared* understanding plus the ability to transform this understanding into actions (skills), which yields performance”. Knowledge sharing should consequently be considered to be a “social process through which individuals try to establish a shared understanding about reality, by using diverse combinations of signs (e.g., language, gestures, illustrations) and tools (e.g., physical objects, communication technologies, mental models)”. This conceptualization of knowledge sharing emphasizes that knowledge has only meaning within the context of interacting actors. Technologies that are considered to support this kind of knowledge sharing include discussion groups, chat rooms and white boards [49].

Besides choosing the epistemological perspective on knowledge sharing, one also needs to define the domain within which knowledge sharing is being analyzed. As already has been mentioned, this paper tries to empirically investigate knowledge sharing within or between *organizational settings* (e.g., industries, organizations, business units, project teams, functional departments, communities, informal networks). An organizational setting, whether it has been purposively created or has evolved over time, in general comprises a group of actors that try to realize a particular outcome together which none of them could have realized individually. Due to the increased complexity of producing many products and services, people have specialized their knowledge according to a particular division of labor. Somehow the knowledge of different specialized people has to come together, thus has to be shared in order to establish the desired outcome. The nature of the knowledge sharing process depends on the dependency between the (group of) actors involved. When actors are sequentially dependent on one another, knowledge is being shared differently than when the actors depend on one another as a team. To put it simply, in the first situation knowledge is being transferred whereas in the second situation knowledge is being integrated.

Difficulties in defining knowledge sharing is one of the reasons for why it is hard to study knowledge sharing as an empirical phenomenon. After all, when one does not know what one is looking for, it is almost impossible to find anything. There are other factors, however, that complicate an empirical analysis of knowledge sharing. First, knowledge sharing is a process with no clear moment of initiation or ending. Second, an important part of the knowledge that is being shared has become tacit. Third, much mental activity related to knowledge sharing takes place in people’s mind, which is not directly accessible by observation. It is not unambiguous how knowledge sharing relates to one’s behavior.

Patriotta and Pettigrew [38] suggest three methodological lenses for studying knowledge processes as an empirical phenomenon that copes with these difficulties:

time, breakdowns and narratives. Each of the three lenses can be used to direct the attention towards specific aspects of knowledge sharing; they are characterized by distinctive ontological statuses. *Time* looks at the dynamics of social becoming, which underlies the processes of knowledge sharing in organizational settings. It points to the cultural nature of knowledge and to the deep structures that govern daily practices in the work setting. *Breakdowns* focus on discontinuities in action. They call into question the patterns of routinization underlying the smooth functioning of organizational activities (see also [54]). Finally, *narratives* refer to discourse. The focus on narratives allows the researcher to gain an insight into how organizational actors represent and make sense of their everyday coping with the world. In this regard, organizational action is treated as a text that the researcher attempts to decode and to reconnect to general interpretative patterns. As will become clear, these methodological lenses fit in very well with an activity theory approach.

3. Activities as social context

The main contention of this paper is that knowledge sharing behavior should be studied within the *context* in which it is deployed. Just like words get their meaning by their linguistic and perceptual context, the meaning of knowledge sharing also originates from its relevant circumstances, its context. The question then arises what is and what is not considered to be relevant context and how this context can be described. The next section addresses the context relevance by describing different contextual levels of analysis. This section illustrates how the context of knowledge sharing, i.e. different organizational settings, can be described according to the activity theory.

A diversity of organizational settings can be distinguished within and between which knowledge is being shared, like in and between informal networks, formal work groups, project teams and communities of practice, regardless of the actors involved being co-located or geographically distributed. In order to describe knowledge sharing (or other human behavior) within such a variety of organizational settings, a framework is required that includes useful analytical concepts that can be applied in the variety of organizational settings and gives in to the situated nature of knowledge.

Activity theory, having its origins in the ideas of the Russian psychologist Vygotsky [48], examines collective mediated behavior directed towards an outcome, by taking activities as its units of analysis rather than individual actions. Investigating individual actions, or just two individuals sharing knowledge is only useful when it is studied within the context of an activity. Activity theory provides a way to analyze the relationship of practical activi-

ties to the broader cultural, social and physical contexts of whom they are part [4].

Engeström's interpretation of activity theory provides a model for describing and analyzing activities [18]. This model features the processes through which both language and technologies mediate the relationship between a worker (subject) and his or her object of activity, social rules mediate the relationship between the subject and the other actors involved, and the division of labor mediates the relationship between all the actors involved and their shared object of activity [4]. Together these factors constitute the infrastructure through which people achieve their knowing and doing [3]. Figure 1 illustrates an adapted version of Engeström's model of an activity system.

The *object* refers to the 'raw material' or 'problem space' at which the activity is directed and which is molded and transformed into an outcome with the help of mediating artifacts (e.g., a patient who is being treated or a software program that is being developed). 'Objects of activity are partly given and partly emergent [5]'. *Mediating artifacts* refer to physical and symbolic, external and internal instruments, including both tools and signs, which are used to transform the object. They can have many manifestations, like language, visual representations, cultural means, procedures, tools, machines and ICT. The *subject* refers to the individual or sub-group

whose agency is chosen as the point of view in the analysis. The researcher can also be the subject of the activity system, but only when he or she actually partici

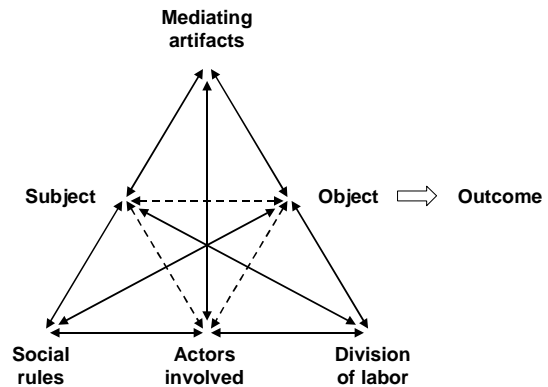


Figure 1 Model of an activity system
(Adapted version of Engeström's model [18])

pates in the activity under investigation. The *actors involved* comprise multiple individuals and/or sub-groups who share the same general object of activity and who construct themselves as distinct from other groups. *Social rules* refer to the explicit and implicit regulations, norms and conventions that constrain actions and interactions within the activity system. They 'organize' the rela-

Table 1 Overview of the relations between the components within an activity system

Mediating artifacts – Subject

This relation deals with the availability and applicability of artifacts to the subject and the subject's utilization of these artifacts; can an individual work with a particular technology or speak a particular language? Are technologies adopted to the individual needs and available to the subject?

Mediating artifacts – Actors involved

This relation deals with the availability and applicability of the artifacts to the other related (groups of) actors and their utilization of these artifacts; This relation is of a similar nature as the former relation.

Mediating artifacts – Object

This relation deals with the availability and suitability of artifacts for transforming the object into the expected outcome; are there effective procedures to tackle a problem? Is there an adequate terminology to describe a phenomenon? Can the object be transformed in the desired outcome with the current technologies?

Division of labor – Object

This relation deals with the way in which labor is either divided in parts or integrated in a whole, in order to achieve the expected outcome; does the transformation of the object require a multi-disciplinary approach? Can the object be transformed in the desired way with the current division of labor?

Division of labor – Subject

This relation deals with the role that the subject plays in the overall activity, as being an individual link; what knowledge does the subject contribute to the transformation? To what extent is the subject restricted in his or her behavior by the division of labor?

Division of labor – Actors involved

This relation deals with the way in which the labor is divided among the (groups of) actors of the activity; this relation is of a similar nature as the division of labor – subject relation. How many (groups of) actors are involved? How many tasks are executed by a single group of actors?

Social rules – Subject

This relation deals with the extent to which the subject has internalized the rules and the extent in which the rules take into account the subject's interests; how does the subject contribute to the development of social rules? To what extent is the subject restricted in his or her behavior by the social rules?

Social rules – Object

This relation deals with the social rules that have been created for achieving the object and the effect of the object towards rules; how does the object of activity dictates the social rules? In what way is the object of activity influenced by the social rules?

Social rules – Actors involved

This relation is of a similar nature as the social rules – subject relation. It deals with the different (conflicting) rules within and between the different group of actors; to what extent do the rules of management fits with the rules of the people in the field? How tolerant are people towards different rules?

Note

The relations between subject and respectively the object and the communities involved and between the communities involved and the object are not mentioned here separately, since these are considered to be indirect, mediated relations.

tion between the subject and the other actors involved in the activity, by collective traditions, rituals, norms and values. The *division of labor* refers to both the horizontal division of tasks between the actors involved and to the vertical division of power and status.

It is the researcher who constructs the activity system as if looking at an activity from above. However, at the same time the researcher must select a subject, a member (or better yet, multiple different members) of the local activity, through whose eyes and interpretations the activity is constructed. Defining the activity system together with taking the perspective of different subjects calls for complementarity of a system view and a subject's view. This dialectic between the systemic and subjective-partisan views brings the researcher into a dialogical relationship with the local activity under investigation. The study of an activity system becomes a collective, multi-voiced construction of its past, present, and future zones of proximal development [20].

Different subjects, due to their different histories and positions in the division of labor, construct the object and the other components of the activity system in different, partially overlapping and partially conflicting ways. There is constant construction and renegotiation within the activity system. Tasks are reassigned and redivided, rules are bent and reinterpreted, identities and roles evolve. An activity system is therefore always heterogeneous and multi-voiced requiring some interpretative flexibility (existence of different interpretations of a particular phenomenon at a certain moment [40]). To ensure continuous operation and achieve progress of the activity, some coordination between different versions of the object and other components must be achieved. Knowledge needs to be shared in order to achieve this kind of coordination. The interpretative flexibility has to be solved, resulting in consensus or in (hidden) conflict. This solving process is called closure [40].

The preceding paragraph indicates that organizational settings (activities) should not be perceived as entities statically structured, but as a set of processes. Instead of describing an organizational setting as a *fait accompli*, this paper emphasizes the process of organizing, in order to capture the *in fieri*, the emergent character of organizational phenomena [14]. Organizing rests upon the dynamic interactions between order and disorder, routines and breakdowns, steady states and controversies [13]. The activity theory approach emphasizes that incoherencies, inconsistencies and tensions are inextricable elements of activity systems. Indeed, activity systems are perhaps best understood as *disturbance producing systems* [4]. The incoherencies, paradoxes and conflicts that feature within and between activity systems provide both the motive and the possibility for collective development. The activity system is constantly working through tensions within and between its components (see figure 2).

As has been mentioned before, these tensions and breakdowns are consequently used as points of reference for studying knowledge sharing as an empirical phenomenon.

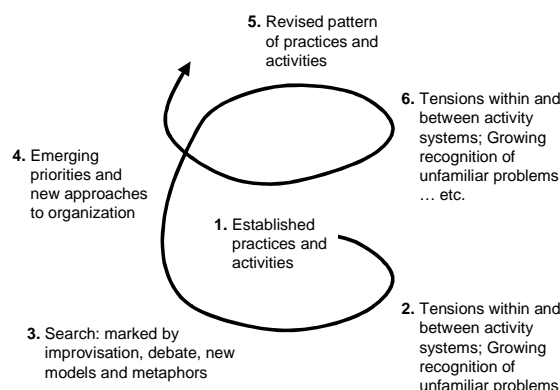


Figure 2 Tensions and possible development within activity systems (Adopted from [4])

4. Situatedness of activities

The previous section has described how an organizational setting can be described as an activity system. This section describes how a particular organizational setting (activity system) is situated in a broader context. After all, an activity system does not exist in a vacuum, it interacts with a network of other activity systems. For example, a project team (activity system) receives rules and instruments from management activity, its members are trained by educational activity and it produces outcomes that are being used for activities in other organizational settings.

Besides the fact that an activity is situated in a network of influencing activity systems, an activity is also situated in time. An activity is never constructed *ex nihilo*, since it relies on the lore of language, equipment, institutions and conventions [32]. In order to understand the activity system under investigation, one therefore has to reveal its *temporal interconnectedness* [39]. History is not just an event in the past but is alive in the present and may shape the future. Rather than analyzing an activity system as a static picture of reality, the developments and tensions within the activity system need to be described and analyzed (see figure 3).

Activity systems with their tensions that inevitably occur over time can be defined at different contextual levels of analysis [39]. When analyzing an activity system at a particular contextual level, one should also take into account its relations with activity systems at other contextual levels (e.g., economic system, industry, supply chain, organization, department or production process). Processes at different contextual levels of analysis

are often observed to have their own momentum, rates, pace and trajectory. An activity system should be studied in the context of these processes. For example, when analyzing knowledge sharing within an organization (activity system at middle contextual level), one could also define the industry within which this organization operates as an activity system at a higher contextual level of analysis or entitle different departments within the organization as activity systems at a lower level (see figure 4).

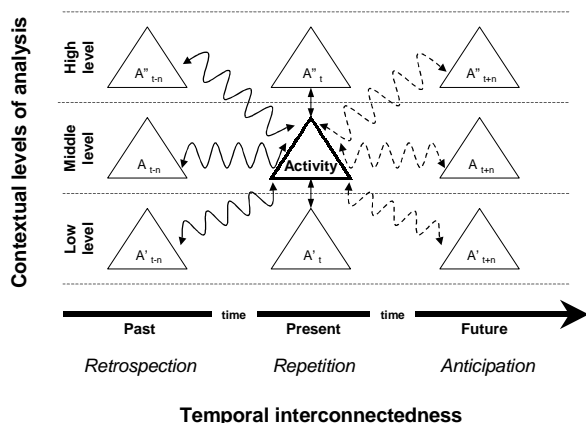


Figure 3 Situatedness of an activity
(Inspired on Pettigrew [39])

The activity system under investigation is not only affected by activity systems at other contextual levels, it also exerts influence on them itself (bi-directional twisted arrows in figure 3). This is in line with Giddens' theory of structuration [23] which assumes that on the one hand human action is restricted by institutional properties of social systems, while on the other hand these institutional properties are the product of human action. Although figures 3 and 4 only distinguishes three contextual levels of analysis, more levels can be determined depending of the research objective.

By embedding the activity system under investigation in an activity system at a higher contextual level of analysis and by splitting it up in a network of activity systems at a lower level (see figure 4), one avoids to perceive the context of an activity just as individual influencing stimuli. One frequently talks about 'the business' that is regulated by 'the government' or about 'the organization' that worries about 'the labor market'. In these situations one considers the entities as black boxes as did they not consist of human actions. This process is called *reification* and refers to situations where an independent 'materialized' existence is ascribed to a concept that is actually abstract and only can exist as an abstraction [30]. In order to truly understand knowledge sharing one needs to 'bring in the interacting actors' and identify the concrete relations between activity systems. By describing the context as a network of activity systems at differ-

ent contextual levels of analysis, the negative effects of reification can be decreased.

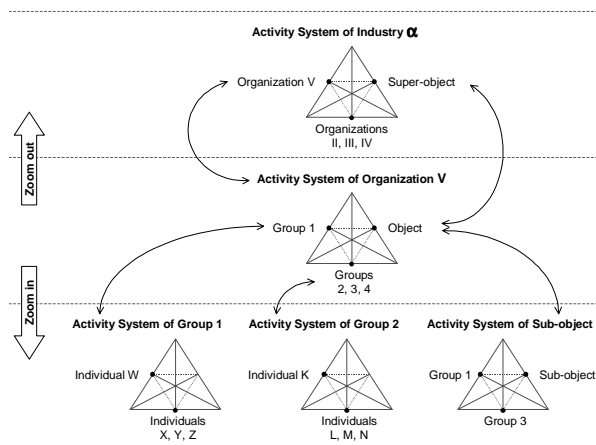


Figure 4 Relations between different levels of analysis

5. Situatedness of knowledge sharing

Whereas the previous section has described the situatedness of an activity, this section explains how knowledge sharing is situated within and between activities. Although knowledge does not appear as a separate category in Engeström's model of an activity system, it permeates all its components and relations (see table 1). In fact, an activity can be conceived as a *system of distributed cognition* [29]. Such a unit of analysis permits to describe and explain the cognitive properties of an activity system that is composed of the people involved and their informational environment.

Knowledge is being constructed and is meaningful within a particular community, whether this is based on professional specialization, organizational membership or family ties. Within such a community a shared understanding or collective mind is developed over time. The collective mind provides a bridge from the individual cognitive constructs to the collective level. A collective mind is formed when people in close relationships enact a single memory complete with differentiated responsibilities for remembering different portions of a common experience [51]. The division of labor plays an important role in developing the collective mind [46].

Depending on the contextual level of analysis and the objective of the research, some additional theories need to be chosen in order to describe the mediating processes of an activity system and to link these processes to knowledge sharing. Some suggestions for theoretical concepts are now briefly described.

Mediation of artifacts

In the tradition of the *information richness* theory [15], much has been published about the application of

different information and communication technologies (ICT) or knowledge management systems (KMS) for supporting knowledge sharing. These technologies are supporting (a)synchronous communication, the storage of information (knowledge repositories and knowledge maps) or other special-purposes [8]. Although several technologies have created many possibilities to support different ways of knowledge sharing, McDermott [34] assumed that the difficulty in most knowledge sharing efforts lies in the issues beyond technology, such as changing organizational culture and people's work habits.

Rather than focusing on technologies, one can also focus on the analysis of language. *Speech act theory*, for example, links the use of language to action by considering utterances as simultaneously being several kinds of acts at once. What a speaker actually says is called the locutionary act. The force of what is said is the illocutionary act, and the intended effect is the perlocutionary act [42]. Searle distinguishes the following illocutionary acts: assertives, directives, commissives, expressives and declarations.

Whether one focuses on technology or language as mediating artifact, the concept of *indwelling* is interesting in both situations. The process of indwelling plays a central role in Polanyi's epistemology [41], and describes the dynamic interaction between focal and subsidiary awareness (respectively explicit and tacit knowing). Since people's attention can only hold one focus at a time, they are either focally aware or subsidiary aware of something. For example, an experienced native speaker who is communicating, is focally aware of the message he or she wants to convey, while being subsidiary aware of the meaning of the words (transparency of language). The meaning of the words have been dwelt in, or interiorized by the speaker. When he hears a word he is not familiar with, it would arrest his attention and make him focally aware of the word. Besides language (being an intellectual tool just like schemata, symbolic systems, e.d.) also physical tools like ICT can be dwelt in, and therefore become to function as extensions of people's bodily equipment. The process of indwelling has major implications for the knowledge sharing process, since people know more than they can tell.

Mediation of social rules

In order to describe the 'being together' of the (group of) actors involved in an activity, one can describe their level of *cohesion* [31] or *groupness* [23]. The more developed and refined the knowing of a group of actors becomes, with an increasingly elaborate and detailed perspective, the more nearly incommensurable it becomes with others. In this respect the distinction between the processes of perspective making and perspective taking is interesting [7]. *Perspective making* refers to communication that strengthens the unique knowledge of a group of actors and *perspective taking* refers to communication

that improves its ability to take the knowledge of other groups of actors into account. Blackler [5] adds *perspective shaping* as a third process referring to assumptions about context, achievements and possibilities. *Boundary objects* play an important role in perspective making and taking. 'Star [45] coined the term boundary object to describe objects that serve to coordinate the perspectives of various constituencies for some purpose'.

From social network research, the concepts of strong and weak ties can be adopted [24;11]. Hansen [25], for example, argues that weak inter-unit ties help a project team search for useful knowledge in other subunits but impede the transfer of complex knowledge, which tends to require a strong tie between the two parties to a transfer.

Besides the frequency of contact, the nature of how the actors socialize with one another is also relevant. Fiske [21] argues that human social life may be based largely on combinations of four psychological models (types of sociality). In communal sharing, people treat all members of a category as equivalent; knowledge is being shared as a public good. In authority ranking, people attend to their positions in a linear order; the higher one's rank, the more and better access to resources. In equality matching, people keep track of the imbalances among them: I share knowledge with you if I get something similar in return. In market pricing, people orient to ratio values; knowledge is being shared when they are being rewarded for it proportionally (see [6] for a further analysis of the implications of different models of social relations for understanding knowledge sharing).

Mediation of division of labor

In order to describe the mediation of division of labor within activity systems, concepts like complexity, interdependence and uncertainty can be used. The information processing theory, first formulated by Galbraith [22], considers organizations as information processing systems. The central hypothesis is that organizations coping with much uncertainty have to process more information. When the information processing capacity is restricted, the complexity needs to be reduced. The transformation of the object of activity into an outcome can be decomposed in different subtasks. Some of these tasks can be carried out by individuals, whereas other tasks require interaction between more people. When these tasks are interdependent, the tasks have to be coordinated in some way. This process of coordinating can be carried out as a collective endeavor of the people, or can be assigned to some kind of leader. Different ways and means of coordinating influence the need for and ways in which knowledge is being shared.

Although the amount of theoretical concepts included in the analysis depends on the objective of the research, all the components of an activity system need to be ad-

dressed in order to fully understand knowledge sharing in practice.

6. Methodological approach

Up to this point, the knowledge sharing process has been broadly defined and some difficulties of studying it as an empirical phenomenon have been explained. How an organizational setting can be analyzed as an activity system and how knowledge sharing is situated within and between such activity systems has been described. In this section, the insights of the previous sections are combined and integrated into five practical methodological 'steps' that can be followed in order to study knowledge sharing as an empirical phenomenon in actual organizational settings (see table 2).

Having adopted an activity theory approach has direct methodological implications. First, the theory recognizes that a number of subject views in an activity needs to be taken into account and interpreted. Second, these various views need to be brought together and reconciled. This can not be done through traditional quantitative research but require qualitative research within an interpretivist paradigm.

Step one

Choose within what organizational setting knowledge sharing is being investigated. This organizational setting can be made up of an industry, an organization, a business unit, a community etcetera. The lowest level on which an activity system can be defined is the organization of a specific production process whereas the highest level depends on whether a collective object of activity there can still be defined.

Translate the organizational setting into an activity system by entitling its collective object of activity, the different (groups of) actors who are involved in the organizational setting, the way in which the labor has been divided among these actors, the mediating artifacts which are being used by the actors and the 'social' rules that apply between the actors involved (see figure 1). The components of the activity system are initially described from the perspective of one of the (groups of) actors within the organizational setting who is appointed as the subject of the activity system by the researcher.

Step two

The organizational setting that has now been described as an activity system can be decomposed in a network of several more detailed activity systems (unless it has already been described at the lowest contextual level of analysis). This decomposition can be realized by describing the groups of actors within the original organizational setting as separate more detailed activity sys-

tems themselves and/or by subdividing the original object of activity in more detailed objects of new activity systems and by entitling the other components accordingly (see figure 4). Just like one can zoom in on (decompose) the original organizational setting, one can also zoom out on it. By defining a new broader object of activity that incorporates the original object of activity and/or by taking the entire organizational setting as one of the actors of a new activity system, the organizational setting can be examined in its wider context (see figure 4). The zooming in and out needs to be continued, till a level of detail is found in which the relevant issues for understanding knowledge sharing are addressed. Besides entitling all the activity systems individually, the relations between these activities need to be explained.

Step three

In the first two steps a whole arsenal of activity systems at different contextual levels of analysis has been entitling. Whereas in these steps the activity systems have only been described in a rather broad way by just entitling all their components, step three sets out the selected activity systems in detail, by accurately describing the mediating processes between the six components of each activity system (see figure 1) and by indicating how these have developed and changed over time and might develop in future (see figure 2). This way, the temporal interconnectedness is made explicit. The components and their accompanying processes of each activity system can be described according to concrete theoretical notions such as those suggested in the previous section. Furthermore an indication is needed for what kind of tensions exist, have existed or are expected to occur shortly within and between the activity systems.

It is probably not necessary to analyze all activity systems described in step one and two. Make a selection out of these activity systems depending on the research objective in order to make the data collection feasible. After all, for each activity system different actors need to be interviewed and/or observed and the temporal interconnectedness needs to be revealed. During the analysis one might come to the conclusion that additional or other activity systems need to be included. In this situation this and the following steps needs to be repeated for these activity systems.

Step four

Up to this point, the context within which knowledge is being shared has been made explicit. One finally needs to explore how knowledge sharing reveals itself within and between the activity systems. The distinction between knowledge sharing *within* and *between* activity systems is relative, since it depends on the contextual level on which it is being analyzed (e.g., compare knowledge sharing within an organization with knowledge

sharing between departments).

From an organizational point of view, the main reason for sharing knowledge is to enable the transformation of the object of activity into an outcome. The different actors involved are working together, since none of them can do the job individually. Furthermore, the tensions and breakdowns that have been identified in step three provide a way for empirical investigation on knowledge sharing. After all, knowledge is expected to be shared in order to put existing tensions aside. Depending on the research objective, one can focus on one or more knowledge sharing processes within or between activity systems and try to understand its situatedness and dynamics.

Table 2 Methodological steps for studying knowledge sharing

1. Choose the organizational setting within knowledge sharing is being studied and translate this organizational setting into an activity system (see § 3);
2. Define activity systems at other contextual levels of analysis in order to zoom in or zoom out, till a level of abstraction is found which addresses the intended issues for understanding knowledge sharing (see § 4);
3. Describe the mediating processes between the components of each activity system by indicating the development of each component and the (potential) tensions within and between these components. Specify how the different activity systems are interrelating (see §3 and §5);
4. Explore how knowledge sharing reveals itself within and between the activity systems by relating it to the transformations of their objects and to existing or potential tensions (see §2 and §5);
5. Repeat the previous steps by taking the perspective of different subjects and reconcile the different perspectives. Relate the findings to the original activity system.

Step five

In the previous steps, the activity systems have only been described by one actor. The steps one to four need to be repeated by taking other actors as the subject of the activity systems. This way, different perspectives are described. Individual differences between the interpretations of the activity systems can result in tensions. One has to analyze how these differences in interpretations are reconciled. Eventually the findings of the different activity systems at different contextual levels of analysis need to be related to the original activity system described in step one. After going through the previous steps (describing activity systems at different levels, indicating their tensions and their relation with knowledge sharing), an understanding can be obtained about the situated nature of knowledge sharing.

All five steps require data that need to be collected. The suggested data collection combines naturalistic observation with open interviews and document analysis.

7. Conclusions

The paper starts with posing that studying the situatedness of knowledge sharing as an empirical phenomenon is rather difficult and that this might be a reason why much theoretical development has not been accompanied by sound empirical research. The objective of this paper is to provide some practical guidelines for empirically studying knowledge sharing in order to cope with methodological difficulties, like capturing the time dimension, the tacit and situated nature of knowledge and the social character of knowledge (sharing). Different ways of conceptualizing the process of knowledge sharing are distinguished and it has been illustrated how three methodological lenses, i.e. time, breakdowns and narratives, can be used in order to empirically investigate knowledge sharing.

Consequently a description is given how different organizational settings at different contextual levels of analysis (industry, organization, project team, community of practice, work process etcetera) can be modeled as (networks of) activity systems. Such activity systems are considered to constitute the context within or between knowledge is being shared. By adopting an activity theory approach the situated character of knowledge sharing is emphasized and a systemic analysis is ensured. The interaction between (groups of) actors in an activity system is mediated by the object of activity, by artifacts (language and tools), by a division of labor and by social rules. Some theoretical notions have been suggested in order to describe these different components in more detail and relate them to the knowledge sharing process. The components of an activity system and their mutual relations are neither static nor harmonious but are characterized by ambiguity and change. The tensions and breakdowns which inevitably occur within activity systems can be used as points of reference for studying knowledge sharing as an empirical phenomenon.

Finally, in line with the objective of this paper, some methodological guidelines are described that are assumed to procure an epistemologically and ontologically grounded research. The authors are currently working on some case studies where the methodological guidelines are applied. These guidelines will hopefully enable and stimulate other researchers to empirically investigate how knowledge is or is not being shared in real organizational settings. Only by solid empirical research about knowledge sharing a fundamental understanding can be established about this social phenomenon that plays a crucial role in many organizational settings.

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