Encyclopedia of Knowledge Management

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Chapter 13
Contexts for Tacit Knowledge Sharing

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theory lacks a detailed account for how context emerges and transforms. Thereafter, we define context and based on the writings by the Austrian sociologist *Alfred Schütz* we put forward a theory of how context emerges and transforms. This theory is illustrated with an empirical case describing the Carbon Dioxide filtering problem, which occurred during the ill-fated Apollo 13 mission. We conclude by explaining how a theory of context helps us to understand the role of context in tacit knowledge sharing.

INTRODUCTION

When people solve complex problems they bring knowledge and experience to the situation, and they create, use and share *tacit knowledge*. Knowing how context emerges and transforms is of paramount importance if we want to understand how people create, use and share tacit knowledge. Consequently, this article poses three questions: What is context? How does context emerge and transform? What is the relationship between context and *tacit knowledge sharing*?

Taking our point of departure in how context is conceptualized in the theory of the firm as a knowledge-creating entity, we argue that this

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BACKGROUND: CONTEXT IN THE THEORY OF THE FIRM AS A KNOWLEDGE-CREATING ENTITY

Knowledge management scholars have put forward a theory of the firm as a knowledge

creating entity, and suggest that the firm can be conceptualized as a dynamic configuration of *ba*, roughly meaning place (Nonaka et al., 2000a). *Ba* is defined as the context shared by those who interact with each other, and *ba* is the place where they create, share and use knowledge (Nonaka & Toyama, 2007; Peltokorpi et al., 2007). Nonaka et al. (2000a) argue that putting knowledge in context is important as "knowledge creating processes are necessarily context-specific, in terms of who participates and how they participate in the process. The context here does not mean 'a fixed set of surrounding conditions but a wider dynamical process of which the cognition of an individual is only a part' (Hutchins, 1995, p. xiii). Hence, knowledge needs a physical context to be created, as 'there is no creation without place' (Casey, 1997, p. 160)" (ibid, p. 8).

The theory of the firm as a knowledge-creating entity has given many insights to knowledge-creation in organizations, and with the introduction of the ba-concept, a step towards a conception of context has been taken. However, it remains unclear what exactly *ba* is, how *ba* emerges, and what happens inside *ba*, as the definition of *ba* offered by Nonaka et al. (2000a) is rather ambiguous. On the one hand they note; "knowledge needs a physical context to be created, as 'there is no creation without place'" (ibid, p. 8). On the other hand they note that: "*Ba* does not necessarily mean a physical space. Rather, it is a specific time and space" (ibid, p. 9). Furthermore, *ba* appears to be a highly inclusive concept. According to Nonaka & Konno (1998, p. 40) "…*ba* can be thought of as a shared space for emerging relationships. This space can be physical (e.g., office, dispersed business space), virtual (e.g., e-mail, teleconference), mental (e.g., shared experiences, ideas ideals), or any combination of them." We thus think it is fair to ask: What is not included in *ba*?

Concerning the emergence of *ba* then it seems that on the one hand *ba* is created spontaneously. "*Ba* is constantly in motion. *Ba* is fluid, and can be born and disappear quickly" (Nonaka et al., 2000a, p. 9). On the other hand *ba* can be build intentionally (Nonaka et al., 2000b). Nonaka et al. (2000a, p. 12) note: "…building *ba* such as project teams or functional departments, and determining how such *ba* should be connected to each other, is an important factor in determining the firm's knowledge creation rate." In addition, it is worth noting that "the boundary for *ba* is fluid and can be changed quickly as it is set by the participants. Instead of being constrained by history, *ba* has a 'here and now' quality. It is constantly moving; it is created, functions and disappears according to need" (Nonaka et al., 2000b, p. 15-16).

Finally, regarding what happens inside *ba*, then Nonaka & Toyama (2002) provide the most elaborate explanation when they note: "…*ba* is still an open space where participants with their own contexts can come and go so that *ba* as shared context can continuously evolve" (ibid, p. 1002) Yet, to us this description is somewhat elusive, and therefore, we assess that although the concept of *ba* (Nonaka & Konno, 1998; Nonaka et al., 2000a) represents an attempt to define context, then we are still lack a good explanation of how context emerges and transforms, and thus, we have yet to understand what happens inside *ba*.

MAJOR FOCUS I: DEFINING CONTEXT

We maintain that contexts are not 'just there' as static entities, they are emerging phenomena. A similar perception is put forward by Erickson & Schultz (1997), who describe context as a mutually constituted, constantly shifting, situation definition emerging through the interaction of the involved individuals. "Contexts are not simply given in the physical setting … nor in combinations of personnel… Rather, contexts are constituted by what people [do and where and when they do it]. As McDermott puts it succinctly (1976), 'people in interaction become environments for each other'" (Erickson & Schultz, 1997, p. 22).

Dilley (1999, p. 19) agrees when noting: "Context is both constitutive of social action and itself the outcome of social action, it is both a generative principle and a resulting outcome." Yet, neither of these authors explain if they perceive context as a collective or an individual construct. Based on Polanyi's (1962) statement that all knowledge is personal knowledge, and Johnson's (2007) observation that tacit knowing is personal, we suggest that context is an individual construct. Furthermore, we suggest that context emerges when an individual encounter a situation, including others and artifacts, as it is the individual's interpretation of a situation that results in a context. After its *emergence* the context transforms as the situation evolves, for example, as a result of the acting of the individual and the others involved.

By claiming that an individual's interpretation of a situation results in a context, we imply that the context emerging for an individual in a specific situation is based on that individual's previous experiences. As two individuals never have fully similar experiences the contexts emerging for two individuals can never be similar, yet, similarities among individual experiences might result in contexts with many similarities. Another implication of our context definition is that if individual X encounters situation Y in both t=1 and t=2, then the contexts emerging for individual X at these two points in time will differ as individual X brings different sets of experiences to the two instances of situation Y.

By defining context as an emergent and individual construct we are in agreement with Rapport (1999, p. 190) who noted: "Context is determined by the questions which people ask of events… Just as many questions can be asked of events, so there will be many contexts; just as different people can ask different questions of events, so different people will determine different contexts; just as people can ask a number of different questions of events at the same time, questions of which other people may or may not be aware, so different people can simultaneously create and inhabit multiple contexts whose commonality is questionable." As well as with Ackerman & Halverson (2000) who emphasize that "To reuse a memory, the user must then recontextualize that information. The information, if not supplied by the same individual, must be reunderstood for the user's current purposes" (ibid, p. 63). Hence, assuming that the questions individuals ask of events are determined by their experience then there can be little doubt that contexts emerge and transform during acts of interpretations. In the following section we therefore take a closer look at acts of interpretations.

MAJOR FOCUS II: INTER-SUBJECTIVITY, TYPICALITY, IDEAL TYPES AND CONTEXT

We use Schütz (1962; 1964; 1967) as a major focus in his research was on how cooperation evolves among actors who are more or less anonymous to each other (Ebeling, 1987). Thereby, his research provides insight into the emergence of contexts for sets of individuals with different degrees of similarities among their experiences. Schütz explains (Augier, 1999, p. 158-159):

"... that our 'life world' consists of a multitude of others, with whom we live and interact, although our knowledge about them is scarce. That is, we are more or less 'anonyme' to each other, despite the fact that the life world in which we are both is full of structures containing inter-subjective knowledge (see Schütz & Luckmann, 1973; 1989). This knowledge is used by imputing 'typical' 'course of action-types' and 'personal ideal types' to the individuals to analyze what happen if he/she follow particular 'roles' (personal ideal types) or pursue certain ends ('course of action-type')."

Ideal types are used when we act and interpret events in the social world. Ideal types are abstractions from the particulars and the idiosyncrasies

of the world, and thus, they produce statements of general validity. Ideal types can be "… arranged according to the degree of increasing anonymity of the relationship among contemporaries involved and therewith of the context needed to grasp the other and his behavior. It becomes apparent that an increase in anonymity involves a decrease in fullness of content. The more anonymous the [ideal type] is the more detached is it from the uniqueness of [other individuals involved],... If we distinguish between (subjective) personal ideal types and (objective) course-of-action types we may say that increasing [anonymity] of the construct leads to the superceding of the former by the latter" (Schütz, 1962, p. 17-18). In addition to our ideal typical knowledge we possess more specialized information about particular kinds and groups of others. If we formerly had direct experience of the particular other facing us now, we can use the specialized information extracted in these experiences (Schütz, 1964, p. 30).

The individual brings ideal typical knowledge and more specialized information about others, artifacts and situations, to a situation. Here these constitute the basis for the individual's interpretation of the situation, including others and artifacts, and thereby, for the individual's conception of context. Consequently, specialized information and *ideal types* are the basic elements from which context emerges.

We, Thou and They Relations

When we encounter others in the social world they do not appear to us in identical perspectives, and our relations with them have different degrees of intimacy and anonymity (Schütz, 1964, p. 22). It is possible to distinguish among three types of relations; *they*, *thou* and *we relations* (Schütz, 1967). In we relations individuals are aware of each other and of the awareness, and they are able to obtain understanding of each other's motives. In thou relations no such reciprocal awareness exist and understanding involves more anonymous types of meaning. Finally, in they relations individuals use ideal types in order to impute 'typical' motives into each other and thereby understand each other's actions.

In we relations we experience others directly, we and they share a common sector of time and space, and thus, we and they age together. The sharing of a common sector of space implies that we and others appear to one another in person as ourselves and nobody else (Schuütz 1964). "In the ongoing experiences of the we-relation I check and revise my previous knowledge about my partner and accumulate new [specialized] knowledge about him. Thereby my general stock of knowledge also undergoes a continuous modification" (ibid, p. 30).

In they relations our partners are not concrete and unique individuals, but types, and "the experiences of contemporaries appear to [us] more or less anonymous processes" (ibid, p. 43). As a result we obtain relatively little specialized information about their motives and actions. Also, in they relations my experience of my contemporaries is not continuously modified and enriched. "Each new experience of contemporaries adds, of course, to my stock of knowledge; and the ideal types by which I am oriented to others in a they relation do, indeed, undergo modifications …. But these modifications remain minimal as long as a given situation and my interests in it - which have determined the original application of a given typifying scheme - remain constant" (ibid, p. 55).

Even if the ideal typical knowledge and the more specialized information that we obtain in our relations with others enable us to interpret and give meaning to the behavior by others, then these meanings may not correspond to the meanings of the others, as "the subjective meaning of another person's behavior need not to be identical with the meaning which his perceived external behavior has for … an observer" (Schütz, 1967, p. 20).

In we relations we can assign our meaning to others with greater confidence, as the world within their reach coincides with ours. In they relations

this reciprocity of experiences is replaced by acts of reflection on the typifying scheme, which presumably orients the conduct of both they and us. The validity of our assumption that they share a given typifying scheme with us cannot be verified, since they are not present (Schütz, 1964, p. 54). "I cannot presuppose, for example, that my partner in a they relation will grasp a nuance of a word or that he will place a statement of mine in the proper context unless I explicitly and 'objectively' refer to that context. The direct evidence that I have been understood, which I have if my partner is present in the community of space and time, is lacking in a they relation" (Schütz, 1964, p. 55-56).

From above it follows that individuals who have ¨prior experience from a range of we relations with each other are likely to establish contexts with many similarities. In contrast, individuals who have little prior experience from we relations with each other are likely to establish contexts with few similarities. Therefore, as a group begins *problem solving*, the members of the group are not necessarily in the position to understand one another. Yet, as individuals we assume that everybody takes the world around us for granted in essentially the same way as we do ourselves, and thus, we orient our actions towards other people, assuming that they will behave in a 'typical' manner. Consequently, it might take time before we register that this is not the case, and thereby, register that little common understanding has emerged.

MAJOR FOCUS III: PEOPLE SOLVING COMPLEX PROBLEMS

We illustrate the *emergence* and *transformation* of context with a case where a complex problem is solved within a constrained timeframe, as we believe that emergence and transformation of context are most visible in such situations. We build this belief on Ciborra's suggestion that "people improvise when they are overwhelmed by the world, and are forced to read the world in a different way".[1] Lack of time to solve complex problems leads people to engage in *improvisation*, which "is purposeful human behavior which seems to be ruled at the same time by intuition, competence, design and chance" (Ciborra, 1999, p. 78). Furthermore, improvisation is grounded in memory of the past (Weick, 1998, p. 547), and thereby, in the ideal typical knowledge and more specialized information that individuals bring to the situation.

Complex Problem Solving During the Ill-Fated Apollo 13 Mission

The Apollo 13 mission was on schedule when the message "*we've got a problem here*" came to the NASA Mission Control in Houston from the Apollo 13 Command Module (Rerup, 2001, p. 37). An oxygen tank had exploded, damaged the Service Module, and left the Command Module without power and air. After a health assessment of the spacecraft it was decided to abandon the mission, move the three astronauts to the Lunar Module, and attempt a loop around the moon in order to get the spacecraft back to the planet earth.

"Soon after the explosion, the assessment of life-support systems determined that although oxygen supplies were adequate, the system for removing Carbon Dioxide in the Lunar Module was not. The Lunar Module was designed to support two men for two days and was being asked to care for three men nearly four days. Thus, removal of Carbon Dioxide in the Lunar Module became a concern. The system in the Lunar Module used canisters filled with Lithium Hydroxide to absorb Carbon Dioxide as did the system in the Command Module. Unfortunately the canisters were not interchangeable between the two systems, so the astronauts were faced with plenty of capacity for removing Carbon Dioxide but no way of using it."

Facing this potentially fatal problem a ground crew team at the NASA Mission Control in Hous-

ton brought into a room all the items available on board the spacecraft, including the space suits originally planned for use during the visit to the moon. Using these items the team worked on a solution and constructed a device it believed could be implemented by the astronauts. After a test in the spacecraft simulator the solution was verified and the instructions were transmitted to the astronauts on board the spacecraft. The astronauts succeeded in assembling the two carbon dioxide removal devices:

"There was, of course, a fix; and it came in the form of an ingenious combination of suit hoses, cardboard, plastic stowage bags, and Command Module canisters - all held together with a liberal application of gray duct tape. As was usual whenever the Apollo team had to improvise, engineers and astronauts on the ground got busy devising ways around the problem and then checked out the new procedures. A day and a half after the Apollo 13 accident, the ground team had designed and built a filtering device that worked to their satisfaction. They promptly radioed instructions to the crew, carefully leading them through about an hour's worth of steps. As Lovell wrote later: 'the contraption wasn't very handsome, but it worked.'"

Emergence and Transformation of Context During the Apollo 13 Mission

We draw three inferences about the emergence and transformation of context during the Apollo 13 mission. We show how the need for problem solving by improvisation emerged, we interpret how the ground crew responded to the problem, and finally, we discuss the conditions for their success with *problem solving.*

The explosion on board the spacecraft created a novel problem and forced the NASA Mission Control Team into action. The team was overwhelmed by the urgency of the crises, as the challenge was to create a solution that could be implemented using items available on board the spacecraft. Hence, the ground crew had to move beyond their ex ante knowledge, and include and create knowledge useful in the present situation.

In our interpretation of the ground crews response, we claim that as soon as the Carbon Dioxide filtering problem was known, each of them produced a personal interpretation of what it meant and how it could be solved. As a result a context emerged for each of them, with their individual contexts including their knowledge about how each of the other ground crews could contribute. This knowledge being based both on *ideal types* of these others and on more intimate experiences from past we relations with them.

Realizing that the solution could not be found within the potential solutions available on ground, but should be created from the items available on board the spacecraft, the ground crew experienced a transformation of their contexts. As now they had to perceive their knowledge about Carbon Dioxide filtering within the permutations of possibilities that existed within the scope of items available on board the spacecraft. By acknowledging this as a constraint they adapted their contexts to the complexity of the problem situation. We assert that when adapting their contexts they took into account what they knew about the fellow team members' knowledge about Carbon Dioxide filtering and the possibility of applying it within the constraints imposed by the situation. Consequently, they experienced that knowledge previously irrelevant to the Carbon Dioxide filtering problem might be relevant in this particular situation.

Reviewing the Carbon Dioxide filtering *problem solving* process we suggest that the ground crew experienced that none of them held sufficient knowledge to solve the problem on their own. Hence, they realized that *knowledge sharing* was necessary for creating a solution. We assert that knowledge sharing required that the problem solvers took on we orientations towards each other, and thereby, established we relations in the

problem solving process, as otherwise they could not obtain verifications of similarities in typifying schemes among themselves and their partners, and had not been able to solve the problem.

Establishment of we relations in problem solving is however not sufficient to give way for effective knowledge sharing. Also, the intimacy of we relations is important, that is, how easy problem solvers experience it is to follow each other's lines of thoughts. We suggest that the intimacy of we relations is a result of the extent to which the context emerging and transforming for each of the problem solvers exhibits similarities with the contexts emerging and transforming for the other problem solvers. In turn the emergence of contexts with many similarities requires that problem solvers have shared many common sectors of time and space prior to the problem solving in situ. Consequently, the less anonymous problem solvers are to each other the fewer obstacles to tacit knowledge sharing they will experience. These preconditions existed during the Apollo 13 mission as the ground crew and the astronauts held similar experiences from prior training and collaboration. Had this not been the case then we assert that the ground crew had experienced difficulties in following each other's line of thought and in gaining a common ground for problem solving.

In sum, we find problem solving during the Apollo 13 mission to be conditioned on: (a) the ability of the ground crew to register the world and form novel views of the available resources (the suit hoses, cardboard, plastic bags, tape, etc.) as possible components of a new Carbon Dioxide filtering devices. (b) the establishment of we relations, which allowed for the emergence of contexts with many similarities and thereby for *tacit knowledge sharing*. Accordingly, it is the ability to create contexts with many similarities as well as the possession of in-depth knowledge about the items available for the creation of a solution that enables people to solve complex problems within constrained time frames.

CONCLUSION AND FUTURE TRENDS

In the introduction we asked: What is context? How does context emerge and transform? What is the relationship between context and tacit knowledge sharing?

First, using Polanyi (1962) we defined context as an individual construct, which emerges as an individual encounters and interprets a situation, and therefore, contexts are not "just there" as static entities.

Second, building on the theories of Schütz (1962; 1964; 1967) we argued that an individual's interpretation of a situation happens as that individual bring his experience in the form of ideal typical knowledge and more specialized information to the situation. Subsequently, his context transforms over time, as he is confronted with other problem solvers and constraints imposed on the problem solving process.

Third, we argued that sharing of tacit knowledge in complex problem solving requires the emergence of contexts with many similarities, as otherwise the problem solvers cannot obtain verifications of similarities in understandings. We also argued that contexts with many similarities solely emerge if problem solvers have shared many common sectors of time and space prior to the problem solving in situ.

Having established the relationship between context and tacit knowledge sharing we argue that the salience of context will become increasingly important to problem solvers as they face compressed timeframes for problem solving while at the same time the complexity of problems to be solved requires bringing together knowledge from experts in several specialized domains. For success with such problem solving the possibility of establishing intimate we relations is of paramount significance, and therefore, organizations must consider if there are areas for which it makes sense for them to invest in preparation for emergence of contexts with many similarities, as only such

contexts allow for tacit knowledge sharing. For these areas we relations among experts should be fertilized as only these, and for example not they relations, will breed the ground tacit knowledge sharing.

In the present article we showed that contexts are not just there, and even more important we have moved beyond the highly general conceptions of context and provided insight into the processes that result in the emergence of contexts, which allow for tacit knowledge sharing. Now returning to the initial discussion of the context concept *ba* provided by Nonaka and peers, we remember that they acknowledged the importance of context, because knowledge creating processes are necessarily context specific. Yet, from their writings, for example Nonaka & Konno (1998) and Nonaka & Toyama (2002) it is unclear what context is and how it emerges. The present article addressed and answered these two questions, and thus, it provided new insights of significance to knowledge management research.

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KEY TERMS AND DEFINITIONS

Ba: Nonaka and peers concept for context. Yet, they lack a concise definition of what ba is, and therefore, it remains unclear what exactly *ba* is, how it emerges, and what happens inside it.

Context: An individual construct, that emerges as an individual encounter a situation, including others and artifacts, as it is the individual's interpretation of a situation that result in context.

Ideal Types: Abstractions from the particulars and the idiosyncrasies of the world, which produce statements of general validity, and we know some part of the world because of its character as ideal typical knowledge.

Tacit Knowledge: Based on Polanyi (1966), Nonaka (1994) defines tacit knowledge as knowledge that has a personal quality, which makes it difficult to formalize and communicate. Tacit knowledge may be embedded in routines and mental models.

They Relations: Relations where our partners are types and not concrete and unique individuals. We experience then in more or less anonymous processes, and thus, we obtain relatively little specialized information about their motives and actions.

Thou Relations: Relations where no reciprocal awareness exist among us and our partners, and therefore, understanding involves more anonymous types of meaning.

We Relations: Relations where we experience others directly, we and they share a common sector of time and space, and thus, we and they age together.

ENDNOTE

[1] From talk given by Claudio Ciborra at the Academy of Management Meetings in Toronto 2000.