FREIE UNIVERSITÄT BERLIN
Fachbereich Wirtschaftswissenschaft
Institut für Management
D-14195 Berlin , Garystraße 21

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Exploring Narrative Variety:

Narrative-Based Knowledge Sharing in the Oil Exploration Industry

Univ.-Prof. Dr. Georg Schreyögg
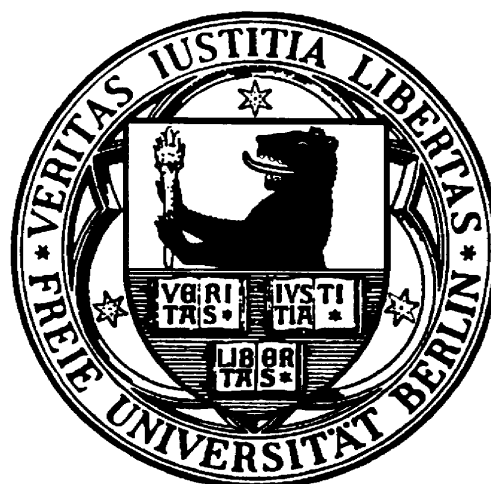**Dr. Daniel Geiger**

Freie Universität Berlin

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Abstract

This study extends theory and research on narrative-based knowledge sharing in organizational communities. An empirical case study examines the role of narratives and knowledge sharing in a virtual community of practice at Shell Int. Exploration and Production. The focus of analysis is on how engineers facing urgent drilling problems make use of narratives provided by peers in order to find solutions. Findings confirm on the one hand the importance of narratives for problem solving in this highly sophisticated and virtual context (former studies focussed exclusively on face to face interaction on the shop floor level). On the other hand, the results indicated that the narratives told do not represent a coherent entity but rather a complex variety which is likely to irritate and confuse users. The conclusion drawn is that organizations cannot refrain from qualifying narratives generated in their communities. It is necessary in order to get orientation out of narrative variety. Finally, suggestions for establishing evaluation procedures are provided. More generally, the findings of the paper stress the importance of reflecting on narratives.

Introduction

Narratives have come to the fore in knowledge management as a medium for sharing knowledge in organizations (Brown & Duguid, 1998; Patriotta, 2003a; Snowden, 2000). A couple of years earlier, organizational studies started to highlight the narrative side of organizations. Narratives proved to be a ubiquitous feature of organizational life. Some authors have thus even suggested to conceive of organizations as narrative entities ("story-telling systems" Boje, 1991). The discussion of narrations in organizational studies by now covers a broad range of ideas and approaches, such as storytelling and sense-making (Czarniawska, 1997; Gabriel, 2000), narrative discourse (Czarniawska, 1995), narrative skills, and narrative modes of thought as opposed to logico-scientific rationality (Bruner, 1986; Tsoukas & Hatch, 2001; Weick & Browning, 1986).

Recently, organizational storytelling has come to figure prominently in knowledge management (Orr, 1990; Patriotta, 2003a; Snowden, 2000; Swap, 2001). Storytelling is claimed to fulfill potentially multiple functions in knowledge management: in particular, distributing effectively un-codified ("tacit") knowledge and providing problem-solving competences (Pfeffer & Sutton, 1999; Swap, 2001). A major strength of narratives is seen in their complex character (Tsoukas & Hatch, 2001). As opposed to analytical thought , stories provide "thick descriptions" of contexts, thereby enabling actors to get a richer understanding of the complex nature of problem situations (Geertz, 1993; Orr, 1990; 1996). Furthermore, narrative descriptions evolve from action and thus keep close to action. In a way, they therefore represent actionable knowing. Many authors consider the problem-solving power inherent in stories and the narrative mode of thought more important for organizations than

codified knowledge and analytical thought (Nonaka, Krogh, & Ichijo, 2000; Tsoukas & Hatch, 2001).

Orr (1990) has pioneered in studying the role of storytelling in organizational knowledge sharing. In an ethnographical study he observed the working behavior of and the conversation between photocopier repair technicians at Xerox. Storytelling proved to be a crucial activity in everyday interaction; it fulfilled not only entertainment but also functional purposes (Orr, 1990: 177). Via stories, the workers shared critical experiences, skilled practices, and know-how for getting a handle on problems not specified in the company manuals. The major finding was that workers rely heavily on this type of narrative know-how as part of daily work conversation. In this way, they communicated informally well tried practices. Due to their situational character, in many cases the narrated practices did not become meaningful until the technicians experienced a similar situation (Orr, 1990: 170). The narratives proved to build part of the community memory.

Patriotta (2003b) observed in a more recent study the narrative-based knowledge sharing at a Fiat pressing plant. The narratives of this study focused primarily on social relations and practices on how to get a handle on critical issues such as transgressing hierarchical boundaries, errors and openly taking responsibility for one's own mistakes, attributing blame for breakdowns, sanctions, etc. Again stories proved to be important in collective sense making and in providing skilled practices for mastering the challenges of everyday working life. In contrast to Orr's findings, the Fiat stories did not focus so much on fixing technical problems as on well tried social practices relevant in successful teamwork and dealing with hierarchy.

In both cases, narratives were identified as being a valuable and important medium for knowledge transfer among peers (Orr, 1990; Patriotta, 2003b). The cases demonstrated convincingly that workers make broad use of storytelling and showed how these helped them to solve their problems. Their general conclusion is that workers would not be able to cope effectively with these complex problems without storytelling. Consequently, narratives are attributed a central role in organizational knowledge sharing.

This paper seeks to contribute to this research on organizational narratives and their role in knowledge management. It analyses a virtual community of practice and explores the occurrence of narratives and narrative-based knowledge transfer processes at a division of Shell International.

When starting, the case study initially focused on two questions:

1. The first question addresses the work level. The case studies conducted so far focused exclusively on the shop floor level. This raised the question of whether similar storytelling activities can also be observed among highly educated knowledge workers such as engineers or accountants (Alvesson, 2004, 2001; Newell, Robertson, Scarbrough, & Swan, 2002) facing more sophisticated work requirements and problem situations.

2. The second question addressed the social context. More precisely, it set out to explore whether story-telling is bound to highly cohesive groups and face-to-face communication. Or does it work in a locally dispersed community as well? This question gains high importance considering the fact that many firms nowadays encourage the building of net-based "communities of practice" among worldwide operations.

We therefore decided to analyze a sophisticated engineering task: onshore and off-shore drilling. The main focus was on engineers planning and surveying drilling activities at different production plants. Shell provided a web-based platform ("community of practice") to encourage worldwide knowledge sharing among drilling engineers. The research focused on the questions of if and how these engineers use narratives to transfer important knowledge and furthermore, what the benefits and problems are in using this narrative mode of knowledge transfer. Due to the regional dispersion in our case – as opposed to the others – the engineers do not have face-to-face contact. They are connected in a web-based ("virtual") community.

These surprising findings raised further far reaching research questions which are discussed in the second part of the paper. We felt the need to inquire more deeply into the complexities of narratives and narrative knowledge in communities of practice. It turned out that in all those cases where narratives do not offer a smooth, coherent picture, additional activity is required to get orientation out of the narrative variety. Questioners confronted with competing narratives have to run evaluations in order to reach a conclusion. The paper provides suggestions on how to handle narrative ambiguity through establishing evaluation procedures. A closer look at the Shell practices revealed that they have also already started to address this problem by establishing review committees. The concluding section contains some general considerations about the role of narratives in organizational knowledge management.

Theoretical framework: Narratives and narrative knowing

Organizational narratives are not in any way a new phenomenon they have rather been a ubiquitous feature ,a natural part of organizational life and its everyday communication (Boje, 1995; Czarniawska, 1998; Gabriel, 1995); they are told and re-told continually (Wilkins, 1984). By their very nature they evolve from events, extraordinary situations, successes and failures, etc. Organizations can be seen as being pervaded continuously by multiple streams of narrations told by organizational members Whilst potentially all organizational members are storytellers, some of them are, however, likely to figure more prominently in the story-telling process than others.

Narratives cannot be conceived of as well-defined entities getting stored in a kind of a virtual story warehouse. Rather, narratives are basically interactive. They are evolving dynamically, Narratives are imprinted by their tellers and their listeners with their cognitions, values, and emotions (Dyer, 1983; Buskirk v. & McGrath, 1992).

What is a narrative? Most often, the concept of story and narrative are used interchangeably (Orr, 1990, Patriotta, 2003b). However, if we go into more detail it seems preferable to draw a distinction, taking "story" as the more pretentious and narrative as the basic and more general notion (All stories are narratives but not all narratives are stories (Gabriel, 2000: 5). Stories are based on a plot organized along a dramatist grammar with a succession of actions, beginnings and ends (for a more detailed discussion see Czarniawska, 1997).

Stories are told to entertain audiences. Gabriel (2000: 10) draws on this entertaining side to distinguish stories from other narratives, in particular from legends or myths carrying sacral meanings and tradition. In Knowledge Management narratives are in the fore that focus on challenging and exciting problems in organizational settings and workable solutions. Orr, 1990: 175) suggests calling this type of narratives "war stories". Although the notion of "storytelling" figures most prominently in the context of knowledge management, in most cases reference is actually given not to entertaining stories with a complete plot but more to incomplete forms, such as terses or antenarratives (Boje, 2001). Our study focuses primarily on those incomplete narratives or "war stories" and not so much on entertaining stories without denying that entertaining stories may also transfer knowledge and meaning. To the contrary, as Orr´s ethnographic studies show, often stories have a double function, on the one hand they are told to entertain and on the other hand they carry indirectly and unconsciously important knowledge and practices for the copier repair technicians (reps) (Orr, 1990: 176

Narratives can serve multiple functions: Identity construction, sense making, socialization, etc. In knowledge management the major emphasis is on the knowledge sharing side of narratives. What can narratives actually transfer in terms of knowledge and practices? First of all, narratives represent more than pure facts. Narratives creatively weave singular experiences, events and narrative grammar into an entity which is supposed to make sense out of the situation for tellers and listeners. Thus, narratives represent a complex mixture of facts, experiences and contextual elements of a specific situation (Orr, 1990: 173). Many of them, in particular "war stories", report on mastering problematic situations, failures and flops. The narrated situation contains a causal sequence of events in affirmative way. Put differently, the

narrated context defines the situation under which the reported causal sequence of events is considered to be true.

This self-affirmative dimension gains more depth if we look at it from an epistemological point of view. Narratives represent a specific form of knowing, the so called narrative knowledge. According to the French philosopher Lyotard (1991: 68), narratives are a "rich medium" which embraces all kind of statements, emotions and expressions: mimic, gesture etc. All these features coexist within one narrative in an intertwined way. The most distinguishing feature of narratives however, is, in Lyotard's view, their self-legitimizing character (Lyotard 1991). Self-legitimization is achieved through implicit affirmation by telling and retelling the narrative or the story. The narrative content gets accepted simply by passing it on. The criteria that validate a narrative are part of the narrative itself and therefore become more or less implicitly accepted. Narrative knowledge does not explicitly raise the question of its truth– it becomes accepted through its own implicit narrative practice. That is not to say that narratives do not have to meet any validation criteria. They have, indeed - but the process of validation is not in any way consciously discussed or reflected. It is rather an implicit part of the narrative practices of a community, that is: they apply tacitly. The listeners simply accept, i.e like or dislike the story.

The narratives tell something about success or failure, effective or failed solutions to problems, about good luck, justice, beauty, etc. Through listening to the narrative, the audience is (aside from entertainment functions) supposed to accept the inherent validity claims (Lyotard, 1991). Narratives thus carry at least two different dimensions simultaneously (Lyotard, 1991): On the one hand experiences, know-how, etc., and on the other hand, the

justification of the implicitly transported validity claims. In other words, narratives communicate a specific content and its affirmation at the same time. It is important to recognize this specific character of narratives, which is both descriptive and prescriptive at the same time. Such processes of acquiring know-how, norms, standards, assumptions and so forth, and simultaneously justifying them as true and fair are also well-known from cultural studies (Kluckhon & Strodtbeck, 1961; Schein, 1985). In a sense, culture – like narratives - is always affirmative and descriptive at the same time.

By implication, narratives are deeply embedded in the social life-world of their telling. A closer look reveals that this embeddedness holds true for various dimensions. Narratives are at least *triply situated*:

- Firstly, they are *situated in the context of their origin* (Orr 1990:175). They evolve from a specific situation (specific event, specific problem, specific time, etc.) and mirror this situation. The claimed validity of the narrated sequences is thus bound to the context of its origin. By implication, narrative knowledge is only valid in the context where it originates from and as such does not allow for any generalization (Tsoukas & Hatch, 2001).

- Secondly, narratives *stick to the context of their telling* (Brown & Duguid, 2001; Orr 1990). Narratives use a special language or jargon, they refer to implicit norms or to historical events of the community in question (as part of the community's history), and reflect the characteristics of the tellers, etc (Czarniawska & Joerges, 1990). Therefore narrative knowing is only understandable for the members of a specific community, outside of this community it is simply not understood (Brown & Duguid,

2002). One can therefore say that narrative knowing "sticks" to a specific community (Brown & Duguid, 2001: 206).

- Thirdly, narratives are *situated in the implicit mode of validation* used by the community in question (Cook & Brown 1999). As already mentioned, this third dimension of situated self-legitimization is in Lyotard's view the most distinguishing feature. Narrative knowing is therefore simply accepted as valid knowledge within the community where it originates from and is told. This explains the common-sense nature of narrative knowing (Patriotta, 2003b: 354).

These three characteristics of narratives build the general framework for our case study at Shell International.

The case of Shell International

Shell companies have been exploring and producing hydrocarbons for over a century. In 135 countries around the world, Shell owns companies or joint ventures operating in a number of divisions, such as "Exploration and Production", "Downstream Gas and Power", "Oil Products", "Chemicals", "Renewables and others". Each sector is run as a separate business. With about 30,000 employees altogether, Shell International Exploration and Production operates in 45 countries in the so called "upstream business" of the industry, which ranges from the search for hydrocarbons to the delivery of oil and gas to a refinery for further processing. The main areas of activity are, however, the search for oil and gas reservoirs, drilling wells, running and maintaining the production of crude oil and gas reserves and, ultimately, the decommissioning of operations which have run their course. Naturally, the business has a very strong technological focus and is highly complex. The development and

quick implementation of superior technology are critical in achieving a competitive advantage as there are no differentiation options in the products, which are commodity goods: oil and gas. The application of drilling techniques involves high costs and time is a major factor; mistakes and downtime cause interrupted production and quickly become expensive. This makes knowledge on drilling techniques, skills and experiences highly valuable and explains why Shell invests considerable funds in knowledge sharing activities. What makes such sharing activities difficult is that the different production sites are scattered around the world and thereby face very different local conditions. Drilling activities significantly differ, for example, from an off-shore site in Brazil to a production plant in Dubai. Because the production sites are locally dispersed and the techniques might differ from place to place, all knowledge sharing activities involving direct face-to face contact like informal conversation during coffee breaks or the lunch hour, regular meetings or even common practice on the shop-floor are *not* an option in this case.

As a reaction to these conditions, Shell decided to launch "Global Networks", which are web-based communities-of-practice (see Lee & Cole, 2003; Wenger, McDermott, & Snyder, 2003) designed for global knowledge sharing. They developed out of informal networks, which exchanged information first by mail and fax, and later by e-mail. Although the benefit of these networks was hard to measure, the company decided to support those previously informal communities with a special infrastructure to make the exchange easier and many informal communities soon joined the web-based forum. The "Global Networks" are organized around three different technical activities: "subsurface", "wells" and "surface". "Subsurface" looks after the exploration activities, discovering reservoirs and developing drilling plans. "Wells" is concerned with the actual drilling process and well maintenance, as well as keeping up the

production level. "Surface" is responsible for platform building, maintenance and finally deconstruction of production sites. Today, more than 4,000 users are connected in each of the three big networks, while altogether, more than 15,000 users are registered since some users are members of more than one network.

The Global Networks are open to any engineer in the company who applies for membership. People log on to the networks with their name and password. In this way it is possible to track the contributors within the network, they can be identified by an underlying profile, stating their position in the organization, their contact data and a picture.

The networks are designed to serve two major functions: first, knowledge sharing in order to solve an actual, pressing problem with the help of peers and secondly, they are knowledge repositories as discussions of the past are archived and can be found with the help of a special search engine. Discussions within the virtual networks are open for anyone logged on to the system and engineers at Shell are expected to check the discussion groups on a regular basis. Discussion and knowledge exchange can take place in three ways: first, members can actively *post* information which they consider to be relevant for their peers as well. Secondly, and this is the form used most often, members can post a *query* ("urgent request") which means they request help from their peers in solving an actual pressing problem they are facing. And thirdly, peers *reply* to the query by providing their experiences or naming further experts within the company who they think could contribute on the issue in question.

Data Collection and Findings

For our research project, the "Wells" Global Network provided the basic unit of analysis and observational setting. Researchers had access to the discussions going on in the web-based "Wells Network". The company opened the system to the research team so that it became possible to observe the discussions between the engineers all over the world for a six month period. This observing activity was supplemented by some interviews with special senior experts in order to clarify and explain the issues discussed, since the research team had not sufficient expertise in the field of drilling technologies. The main interest, as inspired by the study of copier technicians conducted by Orr (1990), was to find out whether engineers make also use of narratives when discussing web-based queries from their peers. And if so, in which form narratives are told in virtual networks.

During this six months period, hundreds of queries and replies were recorded within the "Wells Network", dealing with different problem issues. Usually, a query evoked several reactions. The intensity of discussion activity significantly differed from issue to issue: while some problems gained only little attention and received just one or even no replies, some issues were discussed in great length often with more than ten contributions. *High traffic on a certain subject obviously is an indicator of the relevance attributed to the issue* addressed, and this was most often the case when relatively new technology was applied. Interestingly enough, this demonstrates that although only few experiences existed with that new technology (which would at first glance point to low traffic in the network), new issues in particular stimulated the liveliest discussions. This can be explained by the fact that the network observed was a community of experienced experts in the field of drilling technologies, and no training facility for inexperienced newcomers who could ask experts, an

issue that was taken care of in the Shell Corporate University. Although the network was intended to be open to all engineers, it had actually become an expert community; questions from beginners often remained unanswered; they were obviously of no interest to the experts. It was interesting to learn that the discussions were never formally closed but drained away slowly, with fewer and fewer replies coming in on a specific query. As a rule, the engineer who started the query did not feed her/his experience back or state how s/he finally had solved the problem.

It turned that the mode of communication was essentially a narrative one. The formal education of the interaction partners and the virtuality of the communicative context did not change the basic finding of previous shop level research: knowledge sharing among peers occurs primarily in the narrative mode. In any case, the community we observed shared its knowledge via terses and antenarratives, or to put it in Orr's term: they primarily told "war stories" on problem-solving events. Opposed to the previous studies the engineers did however not in any way tell entertaining stories. This may be due to the virtual communicative context which is quasi-public and thus much more controlled than an informal face-to-face-interaction. Communication in virtual communities of practice can be observed and is therefore likely to become subject of self-monitoring and self-restriction. It may well be that the observed engineers tell their war stories in an informal face-to-face context in a much more entertaining way. The following section provides an example of how the communication in the web-based community worked.

A narrative episode in the Wells Network

The following example represents a typical query coming from one of the engineers and being answered by her/his peers. We chose this example because it represents a kind of prototype for the many discussions conducted in the Wells network. Although it is not necessary to fully understand the subject matter of the rendered narratives – it is highly specialized narrative knowledge and one needs an engineering background to get a full grip on it – some explanations should nevertheless be given to make the essence comprehensive.

The starting point is an engineer looking for information to help her in a special drilling situation under difficult conditions in Brunei. The background is that a previously productive reservoir of hydrocarbons is becoming depleted. In order to fully exploit the reservoir, there are usually two techniques at hand: one is to generate overpressure in the reservoir (here called 'overbalanced drilling') by pumping a special fluid into the well or, the other way round, to generate underpressure (here called 'underbalanced drilling'). The problem she is facing is that she expects "formation damage" to happen when applying an overbalanced drilling technique, meaning that when the pressure is too high, the surrounding rock stratum might collapse, possibly causing severe loss of drilling fluid and later loss of production. Although she is aware of the "underbalanced drilling technique" she does not consider it suitable at these drilling hole conditions. Her question therefore addresses the point, how much pressure (overbalance) is necessary in the described drilling situation in order to exploit the reservoir and avoid formation damage. The header of the query states the general issue that the query is about, similar to the subject heading in an email.

Initial query: *How overbalanced are people successfully drilling depleted reservoirs?*

We are planning a 1.5 km horizontal well to target remaining oil reserves. However the reservoir is significantly depleted at half hydrostatic (5.3 kPa/m) at 3000 mtvdss. If we drill with oil based mud (inc. Solids control) we could get mud weight to circa 9.6 kPa/m. This still gives us 130 bar overbalance. My concern is formation damage to our 20md to 100 md formation, which will only have 40 to 70 bar draw down on production. What/how are other people drilling depleted formations, which would see similar overbalance magnitudes? N.B. We are currently scoping up underbalanced drilling, but may not be able to instigate due to shale instability issues.

With her note, she shows that she is aware of and has already considered the possibility of underbalanced drilling, she tries to direct the replies in a certain direction, stating that she does not want advice on that possibility. She does not go into technical details that much, but tries to describe the situation as well as possible for her peers. Beside technical advice she also asks for someone who has experience with her problem possibly hoping to contact them directly.

The first reply then comes along not with advice, but with people who might have experiences with such overbalanced drilling. The replier operates as a kind of intermediary in order to help her. Brent is a production site in Britain. In a way the reaction operates on the logic of a transactive memory: A knows that B has detailed information.

Reply I: *Some sources of information*

Brent is depleted at the moment and drilling with significant overbalance, at least in excess of 3,000 psi with high angle wells. Productivity from the zones is essential. The main people to contact would be Steve and Ray.

Onshore South Texas, Mike is the person to contact – drilled severely depleted gas reservoirs with overbalances exceeding 10,000 psi. They have to fract the formations for production so the LCM mix they use is not that much of an issue.

I've attached a copy of a paper that was written on drilling the depleted Brent reservoir.

The following second reply does not comment on the first replier, but instead reports her/his thoughts because s/he is facing a similar problem on a production site in the Netherlands (NAM). This is not an actual experience since they have not yet carried the solution out, but s/he reports how they are planning to try and tackle the problem.

Reply II: *Next month NAM will attempt to drill through a highly depleted reservoir with up to 372 bar overbalance. We will be going through the existing 5" completion and extending an existing well into deeper reservoir. The current reservoir has depleted from 366 bar down to 54 bar but the lower reservoir could still be virgin pressure.*

We will be using a novel MI drilling fluid called Aphrons that will hopefully prevent formation breakdown by creating an internal pressure seal of micro bubbles. In addition we will be running a real-time hydraulic modeling software called Press Pro RT that will aid us with ECD management. I will let you know if we succeed or not!

Further information: Marathon have been drilling formations with up to 500psi overbalance successfully with water based D90 (engineered size distribution based upon permeability) of calcium carbonate.

This second narrative obviously provides a different solution; it even comes up with a suggestion for a new technology that might possibly be applied. The experiences stem from conditions that are different from the situation the asking engineer is confronted with. Any application abroad this context might be possible, but for sure never in an identical manner. Replier II seems to be aware of that problem.

Still another problem solution is suggested by the following "war story" of replier III, who reports from her/his personal experience at a drilling site in Venezuela. As opposed to replier II, s/he reports from his/her past experiences and tells her/his "success story" how s/he has solved a comparable problem. Instead of suggesting a new drilling fluid technology, as replier II did, replier III proposes setting the casing deeper, which is a different drilling approach and not an issue of drilling fluid:

Reply III: *Experiences in Venezuela*

We are drilling vertical wells (up to 16,800ft) to reach our primary target reservoir (Rio Negro – sandstones), but we have to drill through the Collogo (cretaceous), which is a fractured carbonate reservoir. Both reservoirs are partially depleted. The simpler solution is to case out the fractured reservoir (with high pressure, some 0.38psi/ft, drilled with a 0.68 psi/ft mud), and reduce the mud weight to 0.546 psi/ft to drill the more depleted Rio Negro

(some 0.328). We exercise much care to keep this mud weight below fracture gradient of the rock, so losses are not induced. Although we have been lucky in avoiding losses in the Cogollo (due to fractures), the Rio Negro has been relatively easier. This means that you may consider setting your casing deeper, so the mud weight can be reduced. This can also solve your stability problems.

The conditions are very much at variance: they are drilling vertically, not horizontally, they are confronted with the problem of drilling through a reservoir before reaching their main target reservoir, which is not the case in the initial problem situation and they are confronted with different rock formations, cretaceous and sandstone, while the problem occurred within a shale formation.

Engineers talk as self-legitimizing narratives

In conclusion, the reported conversation among the drilling engineers first of all clearly represents a narrative structure. They contain the major features: facts, experiences, causal sequences and situational descriptions all referring to successful problem solving activities. A closer analysis reveals that the war stories clearly exhibit the three characteristics of situatedness outlined above:

- *Firstly*, they are situated in the context of their origin, they evolved from very specific situations and experiences on different drilling sites. Consequently, the narrated knowledge is only valid for the concrete experience reported. The engineers provide via their terses context-rich information so that the listeners can get a more complete picture.

- *Secondly,* they stick to the very context of their telling, the language and abbreviations used are only understandable for members of that community and therefore the narrative knowledge sticks closely to that community. Due to this specific language, we hardly understand the quoted narratives. The possible application is thus restricted to the drilling community.

- *Thirdly,* the narratives told are situated in the implicit mode of evaluation used in the drilling engineers' community. The validity of the narrated problem solutions was never questioned, not in the examples quoted above and also not in all other narrated episodes either. As is usually the case in narrative communities, the narrative wisdom was simply taken for granted by the Wells community. This easy acceptance may be driven by two factors: Firstly the members of the community seem to see themselves as experts in their respective field, which is legitimized by their extensive drilling experience. Due to this commonly and reciprocally attributed expert status it appears that no one in the community dares to even think of questioning the experiences of expert peers. The general impression is that the identity the community has constructed is that of an expert community (see Czarniawska, 1997 for identity construction through narratives). It would therefore come close to an offence against the implicit norms of the Wells community to call the experiences of another expert into doubt. Secondly, the narratives of the engineers are suitable for fulfilling the self-legitimizing function since they all represent success stories or reports of failure. The way they are narrated clearly connects the activities and their effects; the claimed causality seems to be accepted implicitly because of its successfulness. One can also see why it is important to differentiate between narratives and stories: The narratives told among the engineers are obviously neither entertaining, they do not consist of jokes, anecdotes etc., nor do they follow any literary plot with a

clear beginning, certain protagonists and an end. They are terses or antenarratives, but not stories.

Considering our first research question, we can conclude that the narrative mode in peer communication is obviously not restricted to the shop floor level. The highly educated drilling engineers also relied heavily on the narrative mode of knowledge sharing. The use of this type of narrative in communities clearly confirms the previous findings of Orr and Patriotta who also identified narratives pivotal in communication among peers and as crucial for carrying out daily tasks. The engineers clearly rely on narratives to get problems solved that are not specified in drilling manuals and where general company guidelines are of limited use. Each drilling condition is different and therefore causes specific problems that need a new, innovative solution which is not specified in any handbook. The company and the engineers are therefore very interested to learn what the experiences of their peers are. The knowing of their peers seems to play an indispensable role in their effort to cope with pressing problems that occur as a usual part of their work. And the major way of transferring this knowing seems to be telling and listening to "war stories". They bridge the gap between the general knowledge provided in their handbooks and the local and specific knowledge they need to deal with their problems on the production site (Tsoukas & Hatch, 2001). Sometimes – especially when new technology is used – simply no record exists within the companies drilling manuals that addresses the problem at hand, so that the engineers can only rely on the experience of their peers. Aside from their gap-bridging function war stories appear to be so convincing because they reflect the realistic working conditions of the engineers and it is validated by skillful practitioners.

Furthermore, the virtuality of the Wells Network communication proved not to be a barrier to narratives. We expected engineers to refrain at least partially from the narrative mode because of the semi-official character of net-based communication. But this obviously is not an issue for the community in question. The expert status of the community seems to provide sufficient familiarity so that the members feel free to use the narrative (non scientific) mode.

The most interesting finding in our study is not however – at least from our point of view – this confirming evidence; much more exciting is the fact that the narratives could not fully serve the functions usually attributed to them. Opposed to the predominating thought narratives did not really mounted up to a clear orientation. Actually they did not serve as sense making vehicles and, most importantly, they did not reduce complexity in any easy way. Rather, the narratives told brought about irritation and confusion. The various narratives turned out to be competing in character and they therefore could not serve the expected orientation and sense making functions. Knowledge sharing via narratives proved to be much more complicated than assumed. Our analysis therefore had to face a new situation and we set out for a second stage, addressing the surprising variety of the narrative situation and its implications for the actors. The next section discusses these issues in more detail.

Knowledge sharing in a world of narrative variety

As has already been mentioned, the Wells network is highly valued by the drilling engineers who sometimes work far away from their home base and are suddenly confronted with severe problems. They all know that a failure might cause losses of production or might be dangerous in terms of safety or environmental pollution. They are therefore in need of quick help from peers within the company to reach the best decision. An urgent request therefore

was expected to provide the best solution available in the company to this type of problem situation. Based on former studies and the literature on the power of the narrative mode, we expected smooth narrative-based knowledge sharing among peers. To a certain degree, it actually worked this way. But the knowledge sharing reality turned out to be much more complicated than expected. The narrative episode presented above shows that all three replies contain competing strategies on how the pressing problem might be solved. While the first one provides no specific content but rather suggests contacting people who may have experience with similar problems in their context, repliers two and three provided *different* possible solutions from their experience.

Seen this way, at least *two competing narrations* coexist in this case: replier II has completely different suggestions as to how the problem could be solved than replier III and the contact suggested by the first replier may have added a third diverging suggestion. The engineer who initially asked the question is confronted with a confusing picture: She might feel more uncertainty than before asking the question since she got many possible alternatives instead of just one workable solution. The result is irritation and not orientation, rising complexity instead of complexity reduction. In contrast to previous findings, narrative knowledge is not always ready at hand and easy to apply (Orr, 1990: 175; Patriotta, 2003b: 351). In our case, the narratives mount up to a decision problem, it is up to the engineer to decide, which – if any – of the competing narrated problem solutions should best be applied, while taking the specific contextual settings of the narratives into account. The narrated knowledge did not enable her to decide which of the narrated solutions might best help her to address the problem of overbalanced drilling.

How to explain this discrepancy in the findings? In our view, a possible explanation comes from the much more complex task environment the drilling engineers are confronted with. Exploiting reservoirs is a highly complex and very specific business; conditions are always different – at least to some extent. Furthermore, highly complex and sophisticated problem situations are in general likely to evoke more than one approach to mastering them. It is well known that ambiguity and ill-structured problems (March & Olsen, 1979) require first of all a definition of the problem, i.e. the construction of a workable understanding of the situation. Complexity allows, however, for more than one interpretation of the situation (Daft & Weick, 1984; Luhmann, 1995). Seen this way it should not be so surprising that – as opposed to the less complex problem situations in the former cases of Orr and Patriaotta – in our case we observed different competing - or even worse, *conflicting* – narrations addressing the problem in question.

There are, however, other possible explanations for the discrepancy as well. For instance, one explanation could be the different type of conversation under observation. A net-based community expands considerably the scope of potential contributors as compared to dyadic or small team communication. It is therefore likely to evoke a broader set of reactions and viewpoints. The broader the set, the higher the likelihood of competing narratives.

Still another explanation may come from the virtuality of the communication in our case. Virtuality may encourage more heterogeneity because there are less social pressures for convergence and certainty as compared to socially cohesive face-to-face interaction (Lee & Cole, 2003; Orlikowski & Yates, 1994; Orlikowski & Schultze, 2004).

Whatever the explanation the questioner in our case was confronted with, she had to reduce complexity –the narratives did not. The *competing and conflicting narratives* confronted her

with a decision problem: In order to solve the problem, she had to make a choice. This means that she had to prefer one narrative over the others or to reject them all. It would appear that this holds true not only for the presented case but for all circumstances where the narrative mode is used in ambiguous contexts: Which narrative should be taken? Can we accept the entire narrative or just some aspects? And if so, which aspects should be better ignored? Etcetera. The user – in our case the engineer – has to decide which narrative knowledge best fits the specific problem s/he is confronted with.

This short discussion raises a new problem in knowledge management. The listeners are no longer grateful recipients of provided valid narratives, they rather are supposed to take an active role: In order to reach a decision they have to make up their mind by comparing and evaluating the narratives told.

In other words, an appraisal is due in checking the narrative experiences provided by organizational members. The recent literature on narratives and knowledge management does not address in any way these questions of evaluating narrative wisdom. Actually, many of the authors may refrain from dealing with those questions, seeing them as too "modernist" an approach. Our case study demonstrates that participants in the narrative conversation occasionally have to face those questions in order to find an actionable basis. Is there, however, any acceptable way to conceive of such an evaluation procedure? The closing part is devoted to provide some first suggestions.

Reflecting Narrative Knowledge

First of all, it seems quite obvious that finding a way to effectively handle competing or conflicting narrative claims, requires a switch to another mode of thought, the implicit

dimension has to be brought to a meta-level,. Due to its triply situated character, narratives are natural part of the *Lebenswelt* (literally "everyday-world,": Habermas, 1989; Schütz & Luckmann, 1989). The narrative, situated mode of communication and of knowledge sharing represents the natural way of sense making in the *everyday world* (Habermas, 1989; Weick, 1995). It is used in a basically unproblematic way, actors rely unconsciously on the narrative mode of communication thereby taking the narrative knowledge for granted. This unproblematic and unreflective mode does not, however, always provide a smooth platform for acting (as shown above) Orientation problems emerge in the case of conflicting claims carried along by narratives and other media of everyday world communication; claims that cannot be solved on the basis of the standard procedures of the Lebenswelt. It seems plausible that in those cases a different mode of thought (on a meta level) is needed – a *reflexive mode of communication* (Habermas, 1984).

How could such a reflexive mode be made operational in the context of organizational knowledge sharing? The following provisional suggestions draw on basic insights from argumentation theory.

The first step in any evaluative processes is the explication of the narrative and the surfacing of its underlying claims. It is simply the precondition for reflecting on the implicit practices. Such explication may turn out a complicated endeavor as narrative wisdom represents – as already pointed out – an entangled entity with affirmative traits; it does not explicitly pose the question of validity. This non-reflexive mode of thought and practicing contrasts with discursive forms of knowledge, where the question of justification is at the core (Lyotard, 1991). As opposed to the narrative mode, the operating rules on this discursive level are

supposed to be explicit and consciously used; assertions become accepted if they meet the agreed criteria. Within a discourse, assertions, propositions, hypotheses, etc. are examined according to agreed procedures designed to determine whether they can be accepted (validated) or not (falsified) (Toulmin, 1958). Assertions that have successfully passed this discourse are accepted as discursive knowledge – at least as long as no other assertion emerges that can prove to the contrary. Having passed successfully an agreed examination procedure, these assertions are distinguished from other propositions.

All reflective discourses are supposed to have some basic characteristics in common, which distinguish them as being discursive:

1. The most fundamental characteristic across all kinds of discourse is communication, i.e. any reflection is based on some kind of proposition or assertion.

2. Statements or assertions cannot, however, be reflected upon unless they are given reasons in whatever form. Since any assertion puts forward a claim, the proponent must provide reasons that support the claim (Toulmin, 1958: 11). In other words, discourse demands reasons.

3. Reasons can be good or bad. Discursive knowledge therefore builds not only on reasons, but on *good reasons*. Discursive knowledge settles issues by appeal to *arguments*. A position that is accepted without the support of good reasons, without an argument, is a prejudice or bias, the idea of discursive knowledge requires examining the reasons given. Reasons are considered as good if they have successfully passed the agreed examination procedure. As there are no universal standards for justifying all kind of knowledge; discourse communities develop their own standards. The

examination criteria for knowledge are *community-dependent and in so far, self-referential* (Lyotard, 1988; Toulmin, 1958).

This procedure for assessing claims may provide a platform for developing a solution to our problem. The basic idea is to transfer unconscious narratives and their implicit wisdom into the "discursive world" in order to create the opportunity for checking implicitly narrated claims. Narratives and discursive knowledge are not as separate as it might appear. Both are communicative in nature, and this provides the opportunity to make the boundaries permeable between the narrative mode and discursive reasoning (Habermas, 1984: 17). The implicit validity claims of narratives can be surfaced and made subject to a discursive reasoning. Such discursive evaluation procedure is in essence a learning process (Habermas, 1984: 18) with striking similarities to double-loop learning (Argyris & Schön, 1978). More often than not, reflecting narrated practices might induce a change of the underlying basic assumptions in terms of double-loop learning.

In our view, this general procedure is likely to amount to an interesting avenue for dealing with the confusing situation of competing narratives. Its practical design will be briefly outlined in the concluding section.

Review Procedures

The suggested switching from a narrative to a discursive level does not simply occur; it has to be deliberately brought about. The following suggestions briefly outline how this switching process might actually work. It will be shown later that Shell has already come up with similar solutions for getting a handle on competing claims.

In order to find orientation in a world of narrative variety, i.e. of competing and conflicting narratives, procedures are needed which discuss the narratives' claims and reach an evaluation of their underlying "lessons". The aim is to compare the competing war stories along agreed criteria, such as workability, cost effectiveness or profitability. The procedures therefore have to be designed in a way that facilitates assessing the validity of narrated problem solutions ("war stories"), selecting workable from misfitting suggestions, and discussing whether or not it is possible to generalize the suggestions beyond their original contexts.

The need for establishing evaluation procedures also figures prominently in the recent discussion on open source communities, such as Linux or Wikipedia. These communities are confronted with a similar problem as Shell's Wells Network. There are many participants (open source) providing contributions to the knowledge creation and distribution process. That means unavoidably variety and uncertainty, and the question arises as to how to achieve high quality in such nonhierarchical open source communities (Lee & Cole, 2003: 638). The Linux software development process relies primarily on peer review procedures to achieve high quality. The constant criticism of draft versions by peers has evolved as the key driver: "In the Linux development community we observe a peer review process as a structured approach to generating criticism of existing versions, evaluating those criticisms, and eliminating 'error', while retaining those solutions that cannot be falsified" (Lee & Cole, 2003: 639). A similar procedure for achieving high quality is used by the free online encyclopedia "Wikipedia" (http://en.wikipedia.org/wiki/Main_Page). Everybody is invited to change false or misleading descriptions, the corrections are laid open for further discussion. These processes of criticizing and reviewing openly match nicely with evaluation procedure

based on argumentation theory developed above. In light of our framework, the Linux and Wikipedia knowledge evaluation process can be interpreted as a way of transforming first level knowledge into discursive, consented (high-order) knowledge through peer-review processes.

On a more operational level, the question arises of how to organize such *review processes.* It seems that we can profit from practical experience here. A remarkable number of organizations have pioneered in experimenting and establishing knowledge review committees, these include Xerox (Brown & Duguid, 2000), NASA (Jordan & Putz, 2003), PwC and McKinsey. Shell International has also pioneered in setting up *review committees* designed to assess the quality of narratives generated in their virtual communities of practice. The establishment of these committees has been triggered by the need to get orientation in face of narrative variety. The committees consist of acknowledged experts in the field in question who are expected to meet on a regular basis. The idea is that these experts discuss the surfaced narrated problem-solutions along consented criteria and decide whether or not they are likely to work. The experts agreed to run evaluations along the following five criteria:

- *Health, Safety and Environment*: Here, safety risks for the staff and the impact of a solution on the environment were given major importance.

- *Cost estimation*: These are very general, but very important criteria. What are the long- and short term costs of applying the solution, what is the proportion of fixed to variable costs?

- *Quality/Risk*: This category refers to the performance potential of a practice. Questions on the reliability, durability and transferability were taken into consideration here.

- *Alignment with other processes*: This issue highlights the interdependence with other processes, and this can be positive or negative. Salient questions were: Does the reported solution fit with already existing related processes or not? Is the narrated solution really new or are there already existing equivalent processes? Are the costs of integrating the narrated solution into already existing processes too high? Does the narrated solution falsify an already existing solution so that this has to be changed?

- *Implementation time*: How urgent is the narrated solution for improving our practices? Can we speed up the process? etc.

Drawing on the insights from argumentation theory it is quite clear that different communities require different criteria, the ones used by the Shell drilling division cannot be expected to apply universally. The basic lesson to be learned is that review-committees must first of all find an agreed canon of criteria considered to be important for evaluating narrated practices in their field. Once these criteria are set up, a committee of experts should meet regularly to discuss all those narrated practices which need clarification. The results of the evaluation should be made available for all community members, especially for those who are confused by narrative variety. An additional outcome of this clarification process can be the identification and distinguishing of "best practices". Furthermore, less effective narrative practices may be deleted.

Conclusion

Certainly these are only preliminary suggestions on how to provide orientation in a world facing confusing narrative variety. These proposed features of the evaluation procedure have to be explored further and in more detail, as well as being tested for workability in different communities. But there seems to be a basic conclusion: Organizations cannot refrain from qualifying narratives generated in their communities. It is necessary in order to get orientation out of narrative variety and also to avoid missing the chance to develop more general best practices from local narrative knowledge.

More general conclusions can be drawn on both a theoretical and practical level.

On a theoretical level, the discussion raises further questions on the relationship of narrated practices and discursive knowledge. Our findings have shown that a clear distinction has to be drawn between these two modes of thought. As opposed to the predominant thinking in knowledge literature, however, these two modes cannot be treated as two totally separated worlds of thought. There are interconnections and these can be used to bridge the two modes. Elements of the everyday-world, such as narratives, can in principle be critically reconstructed (surfaced and explicated) and thereby opened to reflection and the meta-level of double-loop-learning. It should, however, be pointed out that the idea of reconstructing narratives for evaluating purposes only applies to a minority of narratives, in particular to those creating confusion in problem solving. There are many others which are able to support everyday practice smoothly without any necessity of critical reconstruction.

On the practical level, the findings of this study may point to new directions in knowledge management. The generation and sharing of knowledge in and between organizations are by now issues which have attracted a lot of research activities. The role of narratives is, however,

not yet well explored. It seems to be a promising avenue for future knowledge management research. The issue of evaluation is likely to play an important role here since narratives not only reduce complexity – as is often assumed – but can also increase complexity and ambiguity. In order to reach action, evaluative procedures are needed. Further research is needed to substantiate the practical models of evaluation and the running of effective review processes.

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