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Conceptualising organizational knowledge as collective tacit knowledge: a model of redescription

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Conceptualising organizational knowledge as collective tacit knowledge: a model of redescription

The complexity of the concept of organizational knowledge is reflected in the diversity of its intellectual roots as well as the intricate management challenges implied by this burgeoning body of literature (von Krogh, Nonaka and Nishiguchi, 2000). However, theories of organizational knowledge are often difficult to translate into practice. As a result, various scholars have created taxonomies of organizational knowledge in order to address its complexity (Daft & Weick, 1984; Spender, 1996, Nonaka & Takeuchi, 1995), whereas others have argued that taxonomies create illusive divisions and that the true challenge lies in understanding the nature of organizational knowledge (Brown & Duguid, 2001; Polanyi, 1967; Tsoukas, 1996; Weick & Roberts, 1993). Following the latter argument and drawing specifically on Polanyi's (1967, p. 195) thesis that all knowledge is rooted in tacit knowledge, this paper makes a case for understanding organizational knowledge through an appreciation of collective tacit knowledge (CTK).

Our case is developed from extensive fieldwork in an international retail bank with organizational teams facing novel situations where, over a 12 month period, we used a variety of research methods to generate insight into the use and development of tacit knowledge in practice. The paper first describes some of the background theory and context to this study, exploring tacit knowledge and collective tacit knowledge. We then go on to present our model of CTK as a triple helix, grounded in practice. By interweaving three key strands of representation, creative dialogue and collective practice, we propose that CTK can best be understood as a process of 'redescription' (drawing on the terminology of Karmiloff-Smith, 1992), in which:

- *representation* encompasses 'pictures of action' which embody both patterns of interrelation and their spatial dimensions, i.e. creating a 'map of the organization', built up through interaction and experience of how responses fit together. This notion corresponds with the envisaging of a complex social system (Weick & Roberts, 1993, p. 361) that is constructed through action within this social system;
- *creative dialogue* comprises an iterative process of active reflection (both personal and collective) and reshaping of representations held; and
- *collective practice* as the enactment of representations finally captures the action-orientated approach to the conceptualisation of organizational knowledge.

A core characteristic of this model is that representations are continually shaped (and either changed or reaffirmed) through dialogue and practice: this shaping of what is pictured is identified as 'redescribing CTK'. This notion challenges contemporary views on tacit knowledge in practice (Nonaka & Takeuchi, 1995). In particular, we elaborate the value (both academic and practical) of exploring the 'spatial dimension' – the relationship between 'local' and collective level knowledge - together with the importance of time in this analysis. From this, we conclude that organizational knowledge is best appreciated as CTK and outline the implications of our model for both research and practice in advancing understanding of the use and development of tacit knowledge in organizations.

Conceptualising organizational knowledge as collective tacit knowledge (CTK): a model of redescription

The complexity of the concept of organizational knowledge is reflected in the diversity of its intellectual roots as well as the intricate management challenges implied by this burgeoning body of literature (von Krogh, Nonaka and Nishiguchi, 2000). However, theories of organizational knowledge are often difficult to translate into practice. As a result, various scholars have created taxonomies of organizational knowledge in order to address its complexity (Daft & Weick, 1984; Spender, 1996, Nonaka & Takeuchi, 1995), whereas others have argued that taxonomies create illusive divisions and that the true challenge lies in understanding the nature of organizational knowledge (Brown & Duguid, 2001; Polanyi, 1967; Tsoukas, 1996; Weick & Roberts, 1993). Following the latter argument and drawing specifically on Polanyi's (1967, p. 195) thesis that all knowledge is rooted in tacit knowledge, this paper makes a case for understanding organizational knowledge through an appreciation of collective tacit knowledge (CTK).

Tacit knowledge (TK) is 'messy' and intangible (Leonard & Sensiper, 1998), complex and illusive. Hence, in the first section of the paper, we review TK literature more strongly influenced by Polanyi which regards *TK as being complementary to explicit knowledge* (i.e. the two forms of knowledge co-exist), such that the value of TK lies in its meaning-enhancing qualities. In terms of this latter approach, explicit knowledge (EK) only has meaning through the TK within which it resides. The second section goes on to sketch briefly the background to how we explored TK in the field, introducing our empirical project, our methodology and multiple methods as well as the process used to analyze data.

The following section of the paper addresses our core findings by presenting our triple helix model as a framework for understanding TK. This model focuses on the socially-constructed nature of TK and captures how knowledge is re-described through action. The helix consists of three strands:

(i) *representation* which encompasses 'pictures of action' which embody both patterns of interrelation and their 'spatial' dimensions, i.e. creating a 'map of the organization', built up through interaction and experience of how responses fit together. This notion corresponds with the envisaging of a complex social system (Weick & Roberts, 1993, p. 361) that is constructed through action within this social system;

(ii) *creative dialogue* comprises an iterative process of active reflection (both personal and collective) and reshaping of representations held; and

(iii) *collective practice* as the enactment of representations finally captures the action-orientated approach to the conceptualisation of organizational knowledge.

The nature of each strand is discussed in this section by referring to core themes identified though our analysis. Here we pay attention the how the model works in practice and discuss its value for framing research. We then go on to focus on one particular dimension of the model which we call the spatial dimension where we consider in greater depth, the tensions between individual and collective re-description as well as the pictures held at local (team) and organizational levels. We conclude by highlighting the need to reframe organizational knowledge as collective tacit knowledge and emphasize the value of the triple helix model in understanding this process.

Tacit knowledge literature

Debate about TK usually starts from the work of Polanyi (1967) who identified a form of knowledge known as the tacit dimension, suggesting that we can know more than we can tell (1967, p. 4). His initial example of TK was that of the recognition of a human face amongst a million other faces without being able to say how we go about this recognition: that is, we can tell *what we know* (recognise the face) but we cannot tell *how we know* (the process that we use in this recognition), therefore we *can know more than we can tell* (1967, p. 4). In this early example, the concept of TK is used synonymously with that of human knowledge. It is only later that Polanyi

differentiates between tacit and explicit knowledge by referring to these two forms of knowledge as distinct parts of our perceptual processes (ibid., p. 10).

Since its origins in Polanyi's explanation of perceptual processes (Polanyi, 1967), personal knowledge (Polanyi, 1964) and integration of scientific communities (Polanyi, 1969), the concept of TK has informed research on innovation and core capabilities (Leonard-Barton, 1995), knowledge creation (Nonaka, 1994; Nonaka & Takeuchi, 1995, Nonaka, Toyama& Sasaki, 2000) and knowledge management (Allee, 1997; Davenport & Prusak, 1998; O'Dell & Grayson, 1998, Leonard & Strauss, 1998, Seely Brown, 1998). The heightened interest shown in TK during the last decade has also lead to a variety of theoretical explanations about the epistemology and ontology of this somewhat illusive concept: resource-based theory values its inimitable qualities, economists argue for its codification and specificity, organisational learning theorists focus on how TK drives learning and social constructionists build upon the meaning enhancing qualities of TK.

Given the diversity of theoretical foundations and historical origins of TK, our aim in this section of the paper is to focus on the original approach taken by Polanyi rather than describing a comprehensive review of TK: that is, TK co-exists with EK and one form of knowledge is therefore seen as being 'complementary' to the other. We label research which follows this logic, complementary approaches, and we review their origins, characteristics and the manner in which the relationship between TK and EK is dealt with in the following section.

Complementary approaches

Leonard and Sensiper (1998) draw our attention to the fact that business theorists have, for the sake of convenience, contrasted TK with EK as if they were distinct categories by pointing to Spender's definition of TK as 'not yet explicated' as well as Nonaka and Takeuchi's knowledge spiral (1995, p.113). They argue for a messier approach to TK where the tacit elements of knowledge are subjective, experiential or practical know-how (Wagner, 1987, p. 1236) and created in the 'here and now'. (Leonard & Sensiper, 1998, p, 113). This 'messier approach' includes qualities such as action-orientation awareness as well as the meaning enhancing 'work' that TK does

by co-existing with EK. Furthermore, theorists who ascribe to these characteristics value the social origins of TK together with the active manner in which TK is acquired.

Ancori, Bureth and Cohendet (2000) argue that social processes underpin TK such that it is only through deep immersion in a phenomenon explained that we gain TK. For this reason, TK is regarded as highly personal: even when faced with the same message, agents constitute differentiated stocks of TK. The key qualities of TK are consequently that it is not mobilized when conducting activities in a given context (pp. 27-0-71) and that it has a highly specific, diverse and complex structure (pp. 273-75), which defines its relationship to EK as complementary within any given moment of time. These authors identify both the cognitive (mental models) – technical (know-how) dimensions and the individual-collective dimensions of TK and argue that these dimensions comprise necessary 'elements' of TK and should not be seen as a basis for explication.

The approach taken here emphasizes the meaning enhancing quality given to TK, where EK is believed to have meaning only when it is embedded in TK, hence to envisage explication is to destroy the very meaning of knowledge (Polanyi, 1967). The classic example upon which much of the literature in the complementary approach is built is that of Polanyi's 1962 craftsmanship. According to Polanyi, skilled behaviour can be explained along the dimensions of focal and subsidiary awareness. For example, a carpenter needs knowledge in using a hammer. When using a hammer to drive a nail, the carpenter attends to both the nail and the hammer, but in a different way: ' I have subsidiary awareness of the feeling in the palm of my hand which is merged into my focal awareness of my driving in the nail' (Polanyi, 1962). Here the meaning enhancing quality of TK is expressed by referring to the *tacit dimension* of knowing or what Polanyi later (1967) refers to as *tacit knowing*. Polanyi (1958, 1967) describes two terms of tacit knowing as (i) the proximal term (that which we attend from) and (ii) the distal (that which we attend to). Tacit knowing is then the movement from the proximal to the distal: we know the first term only by relying on our awareness of it for attending to the second. The functional structure of tacit knowing is the relationship between the two terms and its phenomenal structure is the appearance of that to which we are attending.

On this basis, it is argued that TK is distinct from EK: the one cannot do the others' work and they complement each other in any given moment in time, hence we describe these as complementary approaches. A further implication of this approach is the action-orientated nature of tacit knowing or what Cook and Seely Brown (1999) refer to as the epistemology of practice. In this context, the epistemology of practice (knowing) is considered to be a more apt description of the relationship between TK and EK where the one cannot be turned into the other (see also Polanyi, 1983) and the tacit form of knowledge is not considered to lie 'hidden' in EK but is actively used to acquire the other. It is due to the central role that the epistemology of practice plays in the depiction of the complementary approaches that we will refer to it as tacit knowledge in action.

Another key theme that is evident when understanding tacit knowledge in action is the level of its awareness. Unlike an explication continuum, such as that presented by Nonaka & Takeuchi (1995) which implies 'becoming aware of' TK in progression towards its explication, complementary approaches regard TK in action as something we are aware of. Lubit (2001) states that TK is embedded in skills, mental models in use, ways of approaching problems and organisational routines and although TK is essentially action-based, it cannot be made explicit: instead, awareness of TK can be created through the use of learning histories. Pleasants (1996) views TK as practical consciousness or the artefacts of social action (p. 249) and argues for the awareness of TK (hermeneutical task, p. 237) whilst highlighting that awareness cannot be equated with explication.

Polanyi's proximal awareness is used by both Lubit and Pleasants to support the notion that we are conscious of TK within an activity. Anthanassiou and Nigh (1999) suggest further that a deeper level of personal TK can be developed through articulate knowledge. In a sense, reflection on conversations between top management teams could raise awareness of embedded routines that underpin certain decisions that are made. Collins (2001) supports this notion and states that continuous social interaction (towards) routine makes the less obvious more obvious, however, TK remains tacit within a certain community. To illustrate, Collins uses the example of a community of scientists who can pass 'tricks-of-the-trade' between one another and so become more

aware of their practices but this TK in action can never be reflected in formulae or journal articles (ibid., p. 72).

Drawing on the example of communities-of-practice (such as research scientists), a further theme in the complementary approaches is highlighted: TK in action is relational and can be mediated through artifacts. Gherhardi & Nicolini (2000) view the origins of TK as social participation in a community of practice, which they refer to as knowing. For this reason, TK in action is thought to exist only on a collective level: action is always social. These qualities imply that, although TK is not articulated, it is shared by 'learning from the master' (Spender, 1996) and is mediated via artefacts. Lam (2000) integrates the action-orientated and mediated notions of TK, arguing that personal TK can be regarded as embodied knowledge whereas shared/mediated TK is embedded knowledge. By integrating these qualities and levels of appearance of TK, the intuitive (Leonard & Sensiper, 1998, Leonard, 1995) and unarticulated essence of TK is maintained. TK can therefore be considered to be conceptually discrete from EK but in action, the concepts are interwoven.

The notion that TK and EK are complementary forms of knowledge and indeed, no knowledge exists outside TK (Polanyi, 1967), holds particular research implications: the action-orientated origins of TK together with the emphasis on its interrelational characteristics need to be appreciated and reflected in the research methodology. Mindful of these implications, we explored the nature of TK within an in-depth single case study, using a variety of methods during an intensive, 12-month period of fieldwork.

Methodology

Novel situations that are steeped in ambiguity are noted as the most fertile for observing TK (Baumard, 1999, p. 37), hence we sought a case setting characterised by fast multiple change waves and uncertainty regarding future strategies. The financial services industry in the United Kingdom met these criteria and we began to negotiate access to a bank. We were seeking, in particular, a group of individuals who would have discretion to act on the awareness of tacit knowledge, ideally in positions

where response to a diverse set of urgent problems was necessary. This led us to study senior people with central involvement in operational issues, as we began to work with. Senior managers in the Regional Operations Management Division of a Retail Bank.

The team comprised seventeen members and was further divided into five sub-teams. According to the competency levels and grading system in the organisation, the team members were all senior and middle managers. Each sub-team had particular responsibilities including:

- for overseeing the migration of processing work from the regional branches to the central account management centres being set up nationally. This also involved preparing the detail for human resource planning and management of several thousand redundancies.
- for setting up call centres in the region, together with the development of the radial telephony network.
- for developing customer retention strategies. These strategies would normally be piloted regionally and then implemented nationally.
- for providing statistical management information on these transformation processes as well as managing legal cases of fraud and cash losses that occurred in the region.
- for actual branch closure and integration of staff members into other operational areas of the organisation. This team was also the point of contact for all the retail banking branches in the region.

We followed a grounded theory methodology (Locke, 2000) characterized by multi-method data collection within a particular group of participants. Grounded theory (as developed by Glaser, Strauss, Corbin and their co-workers) is the development of a set of strategies for conducting vigorous qualitative research (Braud & Anderson, 1998, p. 276). In this methodology, researcher qualities are recognised in the concept of *theoretical sensitivity.* Effective theoretical coding is also greatly enhanced by theoretical sensitivity (Glaser, Strauss & Corbin, 1990, as quoted by Strauss & Corbin, 1994, p. 280). In this way, the investigator's prior familiarity with what is studied and his or her observational and interpretative experiences and skills help inform the theories that are being developed along with data interactions throughout

the research project (Glaser, 1978, as quoted by Braud & Anderson, 1998, p. 21). Within grounded theory, knowing and being are co-constitutive (ibid, p.22). For this reason, it is particularly relevant for an inquiry into tacit knowledge (Partington, 2000, p. 93) because it embraces the action-orientated and collective approach to knowledge construction.

Grounded theory is characterised by a process of giving information back to the research participants, in the form of a final theoretical analysis or framework or, more frequently, through observations informed by an evolving theory (Strauss & Corbin, 1998, p. 174). This process was undertaken both formally (during monthly management meetings) and informally (in discussions during the course of working in the field). As the emerging frameworks were shared, input from participants was integrated into shaping both the methods used and the findings developed.

Multiple methods: exploring TK within an international retail bank

The methods reported here were part of a larger study which focused on the relationship between self-awareness and collective tacit knowledge. All the methods used informed our understanding of TK and are summarised in Table 1. Of these, three in particular generated significant insight into the nature of TK and are presented here[i]:

(i) Collective tacit knowledge 'questionnaire' (cross-comparing with data gathered previously)[ii]
(ii) Collective tacit knowledge interviews: clarifying and sharing themes developed in the analysis of the questionnaire
(iii) Pictorial displays: exploring with the participants alternative ways in which to symbolise the action orientated nature of TK.

Following the grounded theory approach to data analysis, all data gathered were analysed firstly via open-codes, which were shared with the participants. During open coding categories of codes were not identified (Strauss & Corbin, 1990), it was only after the sharing of a summary of the codes with participants in the feedback

interviews (see Table 1) that one of the researchers went back to the original codes and grouped them into conceptually similar categories. This grouping was representative of secondary or axial codes and are reflected in the strands of the triple helix model (see Figure 1, following section). The axial coding made the comparison between subsequent data sets a lot more fluid.

[Place Table 1 Here]

Collective Tacit Knowledge: A process of redescription

We found conclusive evidence of the irreplaceable value of experience as a foundation of organizational knowledge, where this did not mean the experience of repetition (i.e. giving the same responses to familiar situations), but rather the experience of how things work in the organization which then serves as a guide for action in novel situations. That is, through action a very rich web of pictures or maps of CTK is constructed, while reflection upon action creates awareness of the interrelations in these maps. As one participant put it: *"If I don't reflect on my experience I am not aware of the knowledge that I have"*. In other words, participants drew on experiences in the organisation to make sense of novel situations and the used their interaction with team members to embed further patterns of action, thereby re-describing collective tacit knowledge (CTK). The nature of experience is collective in the sense that it represented embedded patterns of collective experience, thereby echoing Wittgenstein's insight that all knowledge is, in a fundamental way, collective (Tsoukas & Vladimirou, 2001). This was a key finding and points to our conclusion that not only is all knowledge tacit or embedded in TK (Polanyi, 1967) but all TK is by nature of origin collective. It is for this reason that we chose to refer to the nature of TK in the discussion of our data as CTK.

From our data, we also found that participants had specific **representations** (pictures) of CTK and that these representations are continuously **shaped by action (re-described)**. The terminology of redescription draws from the work of Karmiloff-Smith (1992) who proposes that representations held of knowledge are redescribed or,

more precisely, iteratively re-represented, in different representational formats to facilitate theory building: a process she calls representational redescription.

The concept of '**redescription**' illustrates the combination of *reshaping and guidance* and depicts how action redescribes (shapes and guides) representation and vice versa. In so doing, there is a tension between action and representation which is due to the action-orientated nature of CTK: that is, *holding representations of embedded patterns of action may guide and shape collective action, while the very nature of the action will reshape CTK and it representation*. Due to this intertwined nature, the redescription process is not depicted by different phases but rather than as a multi-dimensional helix (see Figure 1).

[Place Figure 1 Here]

The three strands of this model comprise: (i) representations held of CTK, (ii) shaping of representations through creative dialogue and (iii) practice and participation (see Figure 1). We first discuss each strand below before considering what we call the spatial dimension.

(i) The representation of CTK

This strand refers to how research participants perceived CTK; that is, the representations they held of embodied patterns of interrelation. Many did not actually use the term TK but instead, used metaphors and chose to speak about a "feeling of knowing" which we found to be an expression of and action upon *a complex, rich picture or map of interrelations that are embedded in the organization*.

Important aspects which underlie this analytical theme include:

(i) the process of constructing a 'picture' of embedded organizational responses, in effect, building maps which act as guides for understanding how various reponses in the organization fit together. The emphasis on *fitting together* responses is important as rarely would a single participant hold a detailed picture of all previous responses of

the organization at large. One person used the metaphor of an atlas to describe how even though one is aware of a more complete picture of the organization, only specific areas will be focused on during involvement in particular projects: as he put it "the map of the world does not appear on every page of the atlas".

(ii) a distinction between explicit information (eg. contained in process manuals and company procedures) and insight into '*the way things really work*', where their 'feeling of knowing' embodied in collective action was informed by insight into patterns of interrelation which deviated from company guidelines. Although a not uncommon distinction, what was particularly important in this case was our observation that it was always the latter which seemed to guide behaviour, particularly when facing novel situations.

(iii) a time dimension, affording not just a snapshot view of CTK at a place and point in time but also embedded in a social system, infused with historical and shifting patterns of interaction and interrelation. These representational maps also provide the foundation upon which future responses - ie. either preserving (reaffirming) or renewing (developing) this representation of CTK - in novel situations are built.

(iv) the interrelationship of representations of CTK[iii] such that, continuing the atlas metaphor, each person may have a map of one continent but when 'acting together', a map of the world is represented. As one contributor remarked:

> *Sometimes you have this picture, right? But you know there are holes in it. Luckily you know who to talk to, to fill in those holes and you know, sometimes you don't even want to fill them in you just need to know who could help you with them.*

In summary, we concluded that through collective action and reflection, representational maps of embedded organizational responses are developed. These maps represent both patterns of interrelation and their spatial dimensions i.e. how embedded responses fit together. The representation of CTK can therefore be regarded as the envisaging of a complex social system: an intricate picture which takes into account a myriad of interrelations and about which we can know more than we can tell[iv]. The map/representation of the social system guides collective action and

gives meaning to action through its location within a particular context. The tension between representation and action will now be explored further in the second and third dimensions of the redescriptional process, depicted by the triple helix.

(ii) The shaping of representations through creative dialogue

The representations of CTK described by the first strand of the triple helix effectively comprise mental images or maps which guide and infuse action with meaning, and which remain tacit, unarticulated. The second strand describes a continuing process of reflection and questioning of assumptions which we call creative dialogue. At the root of this theme lies the observation that people were aware of the construction and existence of such representations, yet could not describe them. As one contributor put it: *"I can never tell you in a million years what this map in my mind looks like, all I know is it works."*

Hence, the tacit, embedded nature of collective knowledge can be viewed as infusing action with meaning (i.e. using the representational map to understand how action fits into the larger patterns of embedded action) rather than being tacit at one particular moment in time and then being moved along to an explicit 'form' of knowledge at a later stage. Furthermore, CTK is qualitatively different from collective explicit knowledge in so far as it serves the purpose of shaping and guiding action.

This notion of creative dialogue was further supported by the fact that participants used tools such as decision trees to illustrate issues they considered to have an impact on the organization: that is, their understanding of effective organizational responses as guided by their representational maps of CTK[v]. When asked why, participants described them as, in effect, creating a platform upon which reflection on suggestions as well as possible paths of action could be built. This indicated that creative dialogue informs action and awareness of action and highlights a tension between awareness and action was prominent, illustrated in the following example.

In a brainstorming session which addressed the technological aspects of management during the Millennium period, decision trees resembling previous experiences (in this case drawing on a failure of the regional banking platform - RBP[vi]), were used as a guide to dialogue. Most of those involved in this brainstorming shared the previous experience of the RBP failure yet the decision trees that reflected their experiences were not similar, implying different representations in which the decision trees are embedded and an iterative creative process of dialogue[vii].

> *The shaping of ideas was an iterative process for me. You start with a thought, test it in your mind, get feedback, change the thought and so the process continues.*

Hence, this creative process took place in several cycles of the raising of issues and possible consequences, rethinking, resharing and again, rethinking, with strong emotional expressions of "*a light going on*" and "*it all making sense*" which leads to a belief of shared understanding. Notwithstanding this, different interpretations may remain and the process of creative dialogue is often revisited after action is taken on decisions made, creating an environment of creative conflict which led to the formulation of richer solutions.

In summary, we identify three key reasons why the dialogic dimension of the redescription process can be regarded as creative: the *diversity* of individual representations; the tensions between *action* (of dialogue and action taken upon decisions in dialogue) and *awareness of representations*; and the richness of the solutions that are generated due to the *iterative process*. This creative process is uniquely situated around fields of interest (areas of commonality), within and/or between team boundaries in the organization and between organizations in the industry as well as between industries. An important characteristic of the situated dialogue is therefore that it is *independent of organizational boundaries*, indicating that rich solutions can be generated within or between teams/organizations/industries. Similarly, team boundaries are often spanned when engaging in practice with others (practice and participation); having a significant impact on the shaping of representations held, the focus of our third strand.

(iii) The shaping of representations through practice and participation

"I act on my experience of how this organization works."

Practice and participation refers to the social enactment of the representations (pictures) of interrelation held between individuals. Through this third strand in the triple helix model, the tension between representation and redescription becomes evident: representation shapes action yet it is also shaped (redescribed) through its enactment. This (social) practice comprises action taken in novel, complex situations as well as envisioned future action. In other words, planning future action is regarded as a form of practice and, by mapping out action in response to novel, complex situations, personally-held representations are acted upon. The shaping of representations during action is facilitated by an appreciation of the influence and power of individuals in the organization.

Undoubtedly, an appreciation of the influence and power of individuals in the organization is important to the enactment of dialogue and by implication the preservation or renewal of CTK. However, in order to explicate our understanding of this redescriptional process, we felt it was not so important for us here to unpack this complex web of 'other' individual, organizational and environmental factors (eg. power, influence, culture, values) which may influence the process of redescription as it was to identify the very conceptualisation of this process for developing understanding of the awareness and enactment of TK in this first instance.

In the situations observed, their impact reached to regional level operations yet few changes were experienced organization wide. This raises some interesting questions of learning and knowledge sharing in organizations: that is, the situations studied here were chosen as they were novel, implying that much could be learnt with longer term organizational implications. However, the apparently isolated nature of each novel project meant implementation was singular and particular to that region of the organization. Renewed local practice therefore did not become organization-wide practice and ideas seemed to evaporate as soon as solutions for novel problems were generated. A striking resemblance of this 'evaporation' was illustrated in a pictorial display where the evolution of thought was presented as the metamorphosis of a

butterfly in which the brightly coloured butterfly takes off and flies away, so the cycle is not completed. When questioned about this incomplete cycle, the participant explained that "*all our ideas stay with our customer, they just never become part of us"*.

In summary, we found that the awareness and enactment of tacit knowledge can best be understood as a process of redescription. Within this process, 'descriptions' (representations) of CTK are held in the form of 'maps of the organization', built up through interaction and experience (creative dialogue and practice and participation). A core characteristic of these descriptions (or representations) is that they are continually shaped (re-described/renewed or re-presented/preserved) through dialogue and interaction. This shaping of the maps or representations pictured is identified as the redescription of CTK.

The spatial dimension

During the course of developing the triple helix, we became aware of what we can best describe as a spatial dimension to the redescriptional process. For example, consider the knowledge implications of questions such as: do localized patterns of behaviour (individual and team level) become embedded in organizational patterns of behaviour; or does redescribed local knowledge, like a butterfly, simply 'fly away' as alluded to by one of our participants (see previous section)? From the three strands of the model, we found evidence of this spatial dimension such as:

(i) The atlas metaphor used in the description of the representational strand: representations that are held individually are ‘localised pictures’ of greater organizational patterns of behaviour. *("the map of the world does not appear on every page of the atlas"*.)

(ii) the boundary spanning characteristic of the creative dialogue strand, which is guided by the representations held of how ‘the pictures fit together’, and

(iii) the notion that renewed action remains local or even inter-organizational (between the team-level and the client) in the practice and participation strand.

Weaving these together highlights a tension between action within a localized context (team or inter-team) that shapes representation although redescription is by its very nature collective. In other words, it is the informal social structures in the organisation that facilitates the building of representations and it is within this powerful context that novel problems are solved often leading to new patterns of action at a team level. However, redescribed local patterns of behaviour are seldom integrated within the wider organizational context.

The communities-of-practice model could provide insight into this spatial tension. According to this model, it is through legitimate peripheral participation (Lave & Wenger, 1991; Wenger 1998, 2000) that collective tacit knowledge is mediated. If this model is then fused with the triple helix, it is likely that communities-of-practice facilitate the redescription process: that is, within dynamic communities patterns of action are built up, creative dialogue engaged in and participation encouraged. However, while communities of practice afford the opportunity for redescription, they also represent specific boundaries themselves. For instance, these communities are often not recognised by the organization: they are more fluid and interpretative than bounded, often crossing the restrictive boundaries of the organization to include people across formal organizational structures (Seely Brown & Duguid, 1991) yet they represent very real informal boundaries, which are often organised according to practice rather than a dominant structural logic in the organisation.

Amongst the five teams in our case study, we observed that dialogue is engaged in within a community yet the selection of the community is informal (not the formal organisational structure) and is guided by representations (how the pieces fit together and who knows what). It is also the interactions within the communities that creates a backdrop for the interpretation of novel situations. Yet there is a greater awareness that '*there is a map of the world but it may not be on the page currently used*': that is, this focus of this page is directed by the community within which the interaction is contained. The community-of-practice therefore is also a vehicle for the localization of knowledge and, as our data evidenced, different communities within one organisation may hold distinct representations of organizational knowledge.

Hence the community of practice also affords a vehicle for representation of embedded patterns of behaviour within the organisation as a whole. The community holds within it a sense of history (Orr, 1990) a definition of competent behaviour (Thompson, Warhurst & Gallahan, 2001), it acts as the collective mind within which sense is made of novel situations (Weick & Roberts, 1993). In this sense, the community of practice plays a unique role of 'filtering through' CTK and containing redescribed TK. In summary, it is the community-of-practice that facilitates redescription of CTK and it is also this community that creates boundaries within the organizational redescription process, thereby mediating CTK and simultaneously restricting the integration of local redescription into organizational patterns of behaviour.

Holding both sides of the community-of-practice argument (shaping collective representations and restricting collective redescription), it can be argued that the design of the organizational architecture needs to be reconsidered. Conceptual reorganization must stretch from the individual level communities-of-practice to the overarching organizational level moving toward the organization as a community-of-communities (Seely Brown & Duguid, 1991). It is through this conceptual reorganization that 'learning at boundaries' (Wenger, 2000) becomes possible. Here the redescription of CTK between communities integrates 'pictures' from different embedded patterns of behaviour, thereby constructing a clearer picture of 'the map of the world' and moving toward the embedding of renewed patterns of behaviour. An architecture that appreciates the community-of-communities model then addresses the spatial dimension by using boundaries to build bridges and facilitates collective redescription.

Conclusion

In this paper, we have offered empirical evidence in support of the action-orientated nature of TK, based on our empirical case set in a large UK retail bank. We found our research participants regarded their collective experience as central to their sense-making in novel situations and this led to the conclusion that TK is by nature

collective: just as experience and action is collective or relies on representations of collective action (embedded patterns of behaviour).

Secondly, we conclude that the enactment of collective tacit knowledge (CTK) can best be understood as a process of redescription. Within this process, 'descriptions' (representations) of CTK are held in the form of ‘maps of the organisation’, built up through interaction and experience. A core characteristic of these descriptions (or representations) is that they are continually shaped (re-described or re-presented) through dialogue and interaction. It is this shaping of what is pictured that was identified as the redescription of CTK. This notion challenges the contemporary view that tacit knowledge can be made explicit (Nonaka & Takeuchi, 1995) by demonstrating that CTK is redescribed through dialogue and practice rather than explicated.

Furthermore, descriptions of organised experience are held individually, but constructed collectively, they shape and are shaped by collective action. For example, certain representations were held of customer service behaviours and the responses of the organisation to these patterns. When participants had to plan for unexpected demands during the Millennium, these frames were cast into the future and brainstorming sessions of possible solutions were held. Often ideas had to be reshaped and the problem had to be reformulated. This iterative process had reflection at the heart of it but could, however, not be enacted without the representations of the patterns held in the first instance.

In other words, embedded patterns of interrelation are preserved through generations in the organisation and therefore inform action. The latter is only possible if the representation of these patterns is shared in a social space and, in so doing, enables collective action. It is the sharing of the patterns of interaction, which allow for the meaning infusing characteristic of CTK. Polanyi (1967) states in this regard that objects are meaningless without the appreciation of the tacit knowledge in which they are rooted. This view is supported by our conclusions in so far as action that has permanence[viii] has little meaning if not understood from its embedded interrelations. Furthermore, action may have permanence only at the local/team level and may not be embedded in the wider organisational patterns of behaviour.

We also identified the importance of what we call a spatial dimension to the redescriptional process which drew attention to a tension between a local/team and organisational redescription which has important implications for understanding of knowledge sharing and creation in organizations. That is, in our case study we found that redescribed patterns of (local) behaviour seldom found organisational permanence. Through the community-of-practice model, it is argued that it is through these informal communities that CTK is mediated, yet their informal boundaries represent possible barriers to the embedding of renewed action. In other words, communities-of practice could both facilitate redescription and could create a spatial tension within the redescription process. However, conceptual reorganisation of the *organisation as a community-of-communities* addresses this tension by enabling redescription 'at the boundaries' between communities (Wenger, 2000).

We conclude that organisational knowledge can best be conceptualised as being grounded in tacit knowledge and collective by nature. We present our analysis of TK in action in terms of a process of redescription, depicted in our triple helix model. From our case data, we argue that the three interwoven strands of this model offer a valuable way of understanding the awareness and enactment of TK. It also offers potential for further research, exploring both the integration of the strands as well as the nature of each strand. In particular, reflection on the spatial dimension offers an exciting opportunity for learning more about knowledge sharing between communities with important implications for our understanding of the facilitators and barriers to this process.

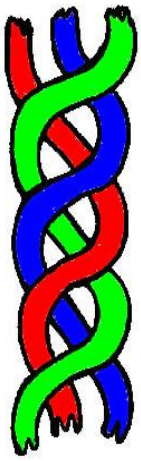
Table 1 The operational detail of the fieldwork

presented in chronological / developmental order

Method	Time spent in the organisation	Researcher role
Competency clarification sessions	6 groups over three months	Facilitator/researcher wanting to build a research relationship and a solid base from which to conduct the assessments
Observation	6 months, one week per participant (overlapping with competency clarification, and feedback interviews)	Observer, evolving into participant observer
360-degree assessment process	The assessments were completed away from the organisation.	Observer exploring the assessments
Feedback interviews	One hour per participant	Researcher/explorer, wanting to understand the self-awareness process as well as the process of research
CTKQ	Completed by participants in their own time	Researcher/analyst, comparing data from observation and competency clarification with theory in order to construct the questionnaire
Collective tacit knowledge-interviews	1 ½ - 2 hours per participant	Co-researcher wanting to understand what lay behind the process of completing questionnaires and developing an appreciation of what drives behaviour in novel situations.
Pictorial displays	During the collective tacit knowledge-interviews	Reflecting on the analysis of the participants and giving feedback on how the analysis fits into other data sets.

Figure 1 The threads of the redescription process

The threads of the redescription process co-exist: participants weave together these threads at any particular moment in time in order to 'redescribe' TK.



Representation of embedded patterns of interrelation

Creative dialogue reflection on and questioning of assumptions held, personal or collective

Practice and participation Collective action, or the enactment of dialogue

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[i] Given the complexity and integrated nature of the fieldwork and findings and the space available in this conference paper format, we direct the read to either Swart (2000) or the authors for further detail on each method.

[ii] The apparent contradiction between a questionnaire and the grounded theory approach is very simply explained: questionnaires began by requesting a 300-word scenario from the contributor which was subsequently analysed through questionnaire questions and follow-up interviews, providing a very rich seam of data on TK.

[iii] Parallels can be drawn here between the spatial quality of representational maps and Wegner's (1987) notion of transactive memory, which proposes that memory is constructed in the location of common events and that connected individuals hold related information.

[iv] These observations are based on the work of authors such Asch, 1949, as quoted by Weick & Roberts, 1993, p. 361, James 1890/1950, Polanyi, 1967.

[v] The myriad of interrelations within which their experiences are embedded was, however, not reflected in the issues raised or tools used. This confirms the Bakhtinian theory (1984, as quoted by Gergen, 1999, 130) of utterances (*decision trees* or *issues raised* in this context) which proposes that when we communicate with each other we inevitably draw from an enormous and diverse repository of past experience. The utterance carries with it not only fragments from a diverse heritage, but also significance derived from its present context and its form of intonation. Meaning in this sense could be regarded as a by-product of diverse past and present experiences.

[vi] The regional banking platform refers to the technological system through which all transactions in a particular region is processed.

[vii] According to Berger and Luckmann (1966, p. 185) incipient counter definitions of reality trigger a process of change and a more complex distribution of knowledge. It is therefore these unique, yet collectively constructed, representations that provide energy and creative force to decision making in novel situations. It can also be argued that the diverse insights originate through a process of internal dialogue and reflection on experience. This echoes Husserl's (1925, p. 21) idea that internal experience is a process of disclosure to be effected in every new reflection. The creative force of the dialogue is therefore situated between those different experiences and interpretations as well as in the internal experiences of a particular individual.

[iv] Action that has permanence is used here in the context of Berger and Luckmann's (1966) habitualisation and refers to objectivated social reality.