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Developing Collective Knowledge in an Electronic Business Space

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ABSTRACT

Virtual teams have been increasingly cited as an efficient and flexible novel form of organisational arrangements affected by the emergence of the electronic business space. The purpose of forming such teams is a new 'knowledge creation'. The focus of this paper, therefore, is the process of collective 'knowing' resulting in novel combinations of products and services. The paper presents the preliminary results of a qualitative research study on seven virtual partnerships and proposes an initial conceptual model of the knowledge creative processes taking place in virtual business relationships.

INTRODUCTION

Virtual teams have been increasingly cited as an efficient and flexible novel form of organisational arrangements becoming increasingly popular in a global business environment (Kristof et al., 1995; Townsend et al., 1996; Grenier and Metes, 1995). Teamwork in a virtual organisation is essential to tap into the best talent to create the highest quality and fastest response to customer needs. The key purpose of such teams is a new "knowledge creation" and applying it into novel combinations of products and services (Seufert, et al., 1999). Virtual teams are usually formed by experts or scientists with diverse expertise and therefore the knowledge required for completing successfully a project is not 'owned' by any team member but is embedded in the dynamics and patterns of team's communications and interactions which can enable members to blend their individual expertise and develop collectively the required new knowledge.

The view adopted in this paper is that new knowledge creation is collectively constructed and embedded in the organising practices of virtual teams' activities. Although, there is a lack of consensus amongst scholars about the exact nature of the virtual organising principles, recent studies suggest that virtual teams are not simply an evolutionary form of collocated teams and they represent novel patterns of interactions and social exchange (Ratcheva and Vyakarnam, 2000). On one hand the boundaries of such partnerships are blurred and only socially constructed by the network members, on the other, the issues around socialising in such teams are distinctively different because the co-existence of 'space' and 'place' represents a fundamental change in the business environment. Although, the two spaces are not mutually exclusive and sometimes overlap with each other in the organisation and execution of activities, the rules governing the two spaces are fundamentally different. To survive, therefore, companies adopting virtual business model must not only exploit geographical differences and overcome geographical constraints in the physical world, but also exploit opportunities and face threats in the new electronic space (Lombard and Ditton, 1997).

This paper argues that unravelling the mystery of knowledge creation processes in distant relationships requires an in-depth understanding of the complex interaction processes involved in forming business relationships enabled by computer mediated communications. The focus, therefore, is on the process of "knowing" in distant interactions involving unique social activities rather than "knowledge" as a pre-given resource possessed by team members. The paper draws upon the results of a qualitative research study of seven virtual partnerships and presents an initial framework of the knowledge creative processes in virtual business relationships.

DEFINING TEAMS ENABLED BY ELECTRONIC SPACE

A number of studies try to capture the essence of virtual organising principles (Davidow and Malone, 1992; Mowshowitz, 1997). They have described mainly an organising logic that is especially relevant when a collection of geographically distributed, functionally and/or culturally diverse entities are linked by electronic forms of communication and rely on lateral, dynamic relationships for coordination. The virtual organisation is often described as one which is replete with external ties, managed via teams that are assembled and disassembled according to need (Grenier and Metes, 1995; Lipnack and Stamps, 1997) and consisting of employees who are physically dispersed from one another, creating a "*best-of-everything*" organisation (Miles and Snow, 1995).

Focal building blocks of such structures are the distributed cross-functional expert teams collaborating globally. The specific characteristics of the virtual teams, therefore, are best identified in the boundary crossing nature of the team's communications, interactions and forming relationships across space, time and organisations enabled by information technologies (Kristof et al., 1995; Townsend et al., 1996; Grenier and Metes, 1995). Davidow and Malone (1992) describe the formation of such teams as *"something like atoms temporarily joining together to form molecules, then breaking up to form a whole new set of bonds"*.

In summary, the virtual teams represent novel patters of organising contractual work. Disagreements, however, exist amongst authors about how different the computer-mediated partnerships are from other forms of network relationships (Staples et al., 1999; Ratcheva and Vyakarnam, 2001; Kraut et al., 1999). The view adopted in this paper is that the virtual teams are not simply an evolutionary form of collocated entrepreneurial or new product development teams and they represent novel patterns of interactions. The differences, however, do not purely steam from the different locations and variety of communication media used, but more importantly from the different patterns of social exchange, conveying social messages, developing inter-personal and trustworthy relationships, therefore factors which can critically affect the individual willingness to actively share personal knowledge.

UNDERSTANDING KNOWLEDGE CREATION IN VIRTUAL PARTNERSHIPS

From the idea-generation phase of new product or service around which a new team of experts is formed to the launch phase, the creation of new knowledge can be viewed as a central theme of the virtual partnership formation. The purpose of forming such teams, therefore, is developing collective knowledge which is not held by any individual member. However, this collective knowledge is not present by definition when the team is assembled and it is only consequently developed. It emerges as highly complex, dynamic and fuzzy, embracing different languages, experiences, working cultures, processes, interactions, interpretations, routines and information.

According to Nonaka's (1994) "spiral" model of knowledge creation, the organisational knowledge is created through a continues

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dialogue between tacit and explicit knowledge. While the explicit knowledge is easy to communicate and express as it resides in symbols, technical documentation, etc., the tacit aspect can only be described as personal non-verbal form of knowledge embedded in routines and cultures (Polanyi, 1966). Badaracco (1991) also refers to the tacit knowledge in individuals and social groups as "embedded" knowledge. Nonaka (1994) points out in his model that the knowledge creation process depends on developing interactive relationships between the ontological and the epistemological dimensions of knowledge. While the epistemological dimension refers to "knowledge" as "justified true believes" which reside in people, the justification can only be achieved through social interactions between individuals to which Nonaka refers as ontological dimension.

The social interactions to which Nonaka refers, reside inside a particular company's organisational environment and therefore the new knowledge creation processes are well embedded in the organisational culture, routines, established procedures, etc. The social interactions in a virtual environment are rather different and recently writers started to advocate to consider virtualisation as a major social process (Diemers, 2000). The virtualisation has led also to major reconseptualisation of organisational roles, norms and cultures which traditionally use to constitute the environment in which social interactions took place. In contrast to the "real" environment in which face to face social interactions take place, the virtual networks are only media platform, where according to Harisim (1993), common interpretative spaces of social networks constitute 'social spaces'. The social interactions enabled through mediated forms of communications need further careful considerations and probably reconseptualisation of our current understandings about what constitutes a 'social space'.

A logical step further in these analysis is how new knowledge is created through personal interactions in a space which does not really exist neither the attributes traditionally associated with an organisational environment. According to Nonaka and Konno (1998), to bring personal knowledge into a social context within which it can be amplified, it is necessary to have a "field", defined as "Ba", that provides a place in which individual perspectives are articulated and higher-level concepts are developed interactively. "Ba", therefore, can be thought of as a shared physical, virtual or mental space or shared space of relationships which provides a contextual platform for advancing individual and collective knowledge. Therefore, the potential for developing new knowledge is embedded in the team members' experiences and know-how and as such, it resides, or is stored in patterns of connections, routines, norms and procedures, or the interrelationships of individuals' actions (Weick and Roberts, 1993).

So far an emphasis was placed on the mechanisms of knowledge creation. It was highlighted earlier in the paper that the intellectual power of virtual teams is in their diffuse expertise, ability to blend the different experiences out of which to create a new collective knowledge. This process can be assisted by the existence of "*redundant information*" (Nonaka, 1994) or *"common knowledge"* (Grant, 1996), but the process also needs triggering and coordinating forces. It is referred to such triggers as forces rather than mechanisms as they are usually team specific, negotiated by the team members, dynamic in nature as they change through the life of the partnership influenced by changes in the membership, the project progress, external influences, etc. Previous research on self-organising teams indicates that such teams trigger organisational knowledge creation through two processes appearing simultaneously or alternatively. The first facilitates the building of mutual trust amongst members, which accelerates the sharing of personal experiences. The second process involves conceptualisation of the implicitly shared experiences through continuous dialogue amongst members (Nonaka, 1994). The interplay between these two processes which enable the creation of new knowledge is further explored in seven small companies which adopted a virtual business model for their current operations.

RESEARCH METHODOLOGY AND SAMPLE DEFINITION

Seven companies took part in a longitudinal qualitative study investigating the interaction and communication patterns in virtual teams. The results presented in this paper are the preliminary outcomes of the second stage of the research project specifically focusing on successful practices in developing new knowledge consequently resulting in novel products, procedures, processes, etc. A common characteristic of the sample companies is that they went through a major strategic and structural change processes during the late 90's in order to maintain their competitive positions. These change processes revolved around a re-definition of the vision and the identification of key areas where innovations and work processes improvements could continually support the companies' strategic edge (see Table 1 for companies' background information). One of the outcomes of the restructuring initiatives was the increased reliance on multidisciplinary virtual teams to handle a variety of business initiatives, formed across organisational and country boundaries.

The present study was carried using a multi-method approach. The companies selected were initially considered as focal points for identifying project partnerships. Each company was asked to identify one virtual partnership in which the particular organisation have played a leading role in terms of resource commitment and the outcomes of the partnership were highly satisfactory. In order to maintain consistencies between cases, the teams were selected according to the following criteria:

- Use of a variety of communication channels as electronic communications being the main one throughout the live span of the project.
- Teams involving members from more than two organisations (or independent experts).
- Teams involving members with diverse expertise (different functional or subject areas).
- Partnerships the outcomes of which were considered by the approached companies as highly successful in terms of new knowledge creation.

In order to achieve consistencies between cases, the collective knowledge created in each partnership was measured using the Innovation Assessment Questionnaire previously used by Sethi (1995). Further evaluation was carried out using creativity scale (Andrew and Smith, 1996), which allowed to examine how original the project

Table 1: Companies' background information

Cases	Main activities	Team boundaries	No. of team members
Case 1	Engineering and software project consulting	Different organisations, operating in 2 countries	8
Case 2	Engineering consultancy	Different organisations, operating in 3 countries	7
Case 3	Electronic modem assembly	Different organisations, operating in 2 countries	9
Case 4	Assembly of electronic connectors	Different organisations, operating in 3 countries	10
Case 5	Research and development engineering consultancy	Different organisations, operating in 3 countries	7
Case 6	Management consultancy	Different organisations, operating in 4 countries	6
Case 7	Medical equipment services	Different organisations, operating in 2 countries	8

outcome was (novelty dimension) and how useful/useless it was (appropriateness dimension). The partnerships which took part in the study had high scores for both novelty and usefulness of the achieved outcomes.

The identified seven virtual partnerships were further in-depth investigated using a variety of data collection approaches. The data was analysed using content analysis and a coding scheme procedure (Weber, 1985) in order to illuminate the underlying differences between the partnerships and identify the key factors/processes affecting the team's ability to create a new collective knowledge.

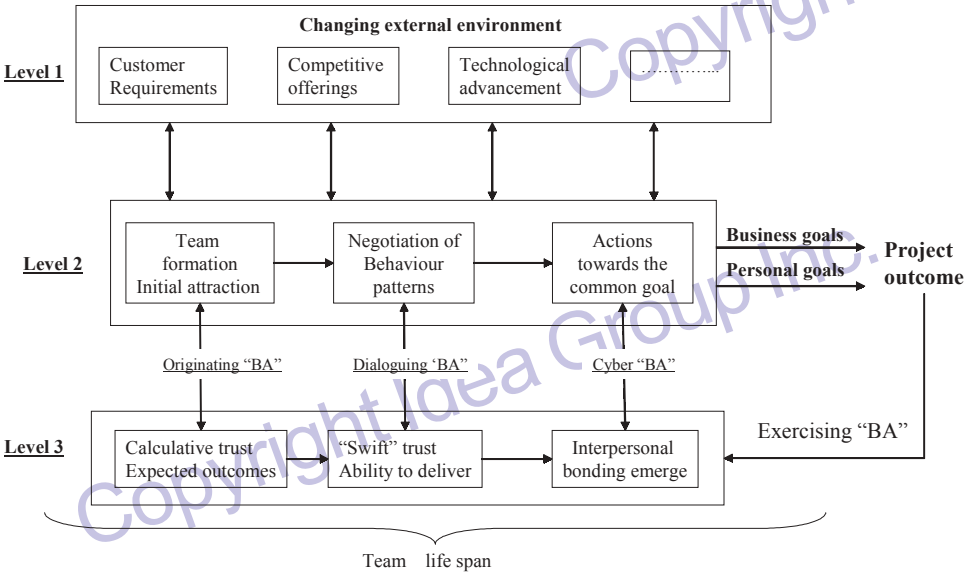
SUMMARY OF THE RESEARCH RESULTS

The analyses of the empirical data allowed to establish some common patterns of teams' development, interactions and communications between team members which allowed them to blend their individual expertise and jointly develop new collective knowledge. The preliminary results from the data analysis led to the development of an initial conceptual model of knowledge creative interaction processes according to which there are three interrelated levels of interactions (see Figure 1). Levels 1 and 2 present the knowledge flows throughout the formation and development of the partnership. As the development of inter-personal and trustworthy relationships follows specific patterns, it is included a third level in the framework which presents the process of formation of inter-personal relationships throughout the life span of the partnership and the way they affect the work related interactions. The three levels are considered in interaction rather than separately because a new knowledge is created only through achieving successful synergy between them.

The process usually starts as group of experts self-organise themselves as a team to exploit a spotted market opportunity or to apply a technological advancement. Three interrelated stages of relationship development are considered (level 2). Because of the temporary nature of the project, team members usually import into the partnership their perceptions and understandings about each other's potential to contribute. These observations are consistent with the Luhmann (1986) definition of *'impersonal trust'* according to which the initial development of team's relationships are based on the appearance of *"everything in proper order"*, rather than on an emotional bond, knowledge or past history of interactions. In the same way, the concept of *'swift'* trust maintains that *"unless one trust quickly, one may never trust at all"* (Meyerson et al., 1996). Positive expectations of trust, therefore, motivate members to take a proactive part in the team, which can result in strengthening the trustworthy relationships amongst team members. A previous empirical study (Ratcheva and Vyakarnam, 2000) similarly established that the factors causing the initial attraction amongst team members are based on recognition of complimentary expertise, sound professionalism, previous joint working experience and potential access to other business networks. Relationships building at that stage, therefore, are based on the potential to act and are highly depersonalised. As indicated at Level 3, they are calculative in nature and initial trust is based on expectations. This is followed by negotiating the boundaries of team behaviour patterns which proved to be an influential factor on team integrity and follow-up performance. Once the working rules are established, team interactions are characterised by cyclical inputs of actions, deeper communication and sharing of ideas, and new initiatives. This cycle is close to what Nonaka and Konno (1998) refer as "originating ba", when the knowledge-creation process begins. They also established that at that stage the actual physical activities and face–to-face experiences are the key to sharing of tacit knowledge.

At the second cycle of partnership development (Level 2), the team as a whole starts to develop its own behaviour patterns which proved to be an influential factor in achieving team integrity and follow up performance (Ratcheva and Vyakarnam, 2000). The established norms of behaviour and team roles are specific and unique for each team and depend on the goals to be achieved. Nonaka and Konno (1998) refer to this stage as "dialoging ba" which is more consciously constructed. As virtual teams do not have structures of authority, the particular roles in the team adopted by each member are identified in a process of dialog, sharing mental models, reflection and analysis. According to Nonaka and Konno (1998), to construct "dialoging ba" and trigger conversations, is important to select people with the right mix of specific knowledge and capabilities. The expertise required in the team should be also redefined as a result of actively interacting with the external environment in terms of changed customer requirements, monitoring new competitive offerings, new technological advancements, etc. There also should be established formal mechanisms for continuous monitoring of market changes. It is expected that the external changes will lead to redefinition of roles and responsibilities in the team, bringing complimentary external expertise. This will cause further changes in the team's patterns of interactions and knowledge base. Developing a team with appropriate mix of expertise results in speeding up the progress of the project which increases members' confidence in the ability of the team to deliver and as a result stimulates accelerated interpersonal relationships.

Figure 1: Knowledge creating interaction patterns



Once the working rules are established, teams' interactions are directed toward the project final goal and are characterised by cyclical inputs of actions, deeper communication and sharing of ideas, and new initiatives. It is likely that at that stage team members work from distant locations and the communications and interactions are related to the tasks performance and project assembly. This cycle of interactions is a variation of what Nonaka and Konno (1998) define as "cyber ba" or a place of monologue. Similarly "cyber ba" is associated with generation and systematisation of explicit knowledge supported by information and network technology followed by final justification of the product concept.

A successful project outcome incorporates achieving personal and business goals. Therefore, the end of the project and dissolving the partnership is not an end of the knowledge cre-

ation at individual and team level. Similarly to the "exercising ba" (Nonaka and Konno, 1998), the explicit knowledge materialised in the project outcome is converted in a new tacit knowledge through a process of reflection and learning and brought into new projects and partnerships.

CONCLUSIONS

As new media and communication technologies have led to a significant change in the ways we interact and work together, it is important not to constrain this phenomenon to its novel information processing side but to consider virtualization as a social process. These distant ways of work arrangements and business partnerships have a significant impact on social interactions and relationships development in a business context and led to reconceptualization of the traditional understandings about organizational norms, roles, identity and culture. The author adopts the view that the creation of new knowledge is socially embedded in interaction and communication practices. Therefore, new knowledge creation processes in virtual partnerships reside in the connections of experts, and the interaction and communication patterns and rules established amongst team members determine how knowledge is accumulated.

The paper presents an initial conceptual model of the dynamic knowledge creation processes in virtual teams. A next step of this study is to test the proposed model by developing a larger number of in-depth case studies on virtual partnerships.

The proposed model also indicates that establishing and cultivating competence networks involve highly complex social processes. These will require from managers to adopt new roles and from knowledge workers to develop new understanding of the challenges of working in distributed organisational environments.

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