HARNESSING INTELLECTUAL RESOURCES IN A COLLABORATIVE CONTEXT TO CREATE VALUE

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ABSTRACT

The value of electronic collaboration has arisen as successful organisations recognize that they need to convert their intellectual resources into customized services. The shift from personal computing to interpersonal or collaborative computing has given rise to ways of working that may bring about better and more effective use of intellectual resources. Current efforts in managing knowledge have concentrated on producing; sharing and storing knowledge while business problems require the combined use of these intellectual resources to enable organisations to provide innovative and customized services. In this chapter the collaborative context is developed using a model for electronic collaboration through the use of which organisations may mobilse collaborative technologies and intellectual resources towards achieving joint effect.

1. INTRODUCTION

For modern organisations, knowledge is increasingly being seen as a strategic resource that needs to be created and harnessed effectively in order for the organisation to survive and achieve competitive advantage. It is believed that managing this strategic resource can enable an organisation to achieve particular benefits such as minimisation of costs, innovation of products, product development procedures, improved quality, flexibility in a dynamic market

and improved customer service. For organisations to be successful, they must be capable of continuously acquiring, assimilating, disseminating, sharing and using knowledge (Senge *et al.* 1994, Huber 1991). Alavi and Leidner (1999) identify an emerging line of information systems referred to as Knowledge Management Systems (KMS) that target professional and managerial activities by focussing on creating, gathering, organising and disseminating an organisation's "knowledge" as opposed to "information" or "data". Hibbard and Carrillo (1998) believe information technology, which supports knowledge management, such as datamining, groupware, document management and search and retrieval applications, are widely available and already exist in many companies.

Efforts in organisations attempting to manage knowledge have concentrated on codifying or explicating knowledge and propose infrastructures for storing knowledge as well as refining, managing and distributing it (such as described in Zack 1999, Hansen *et al.*1999). While these efforts are valuable in themselves, practical considerations such as motivating employees to add to such databases and use them in their "knowledge work" have thwarted the success of such codification strategies. It has been suggested that problems which stem from traditional business environments that hoard knowledge is an obstacle which is preventing knowledge management efforts from being a complete success (Hibbard and Carrillo, 1998). In addition, Vance (1997) suggests that the reason information and knowledge may not be easily transferred from the holder to the person needing it may be because it is inarticulable in the mind of the holder.

Despite these problems with knowledge management efforts, Quinn (1992) suggests that most successful enterprises today can be considered "intelligent enterprises" as they convert intellectual resources into a chain of services in a form most useful for certain customers by

selling the skills and intellects of key professionals. The effective performance and growth of knowledge intensive organisations requires integrating and sharing knowledge that is often highly distributed (Zack 1999). Distributed knowledge is often personalised and resides in the pockets and communities within and outside of the organisation. According to Polanyi (1966) tacit knowledge is personal, context specific and therefore hard to formalise. Personalised knowledge is subjective, experiential and lies in mental models containing cognitive elements such as paradigms, perspectives and beliefs that help individuals perceive and define their world and lies in mental models containing technical elements such as skills and expertise. This knowledge is also seen to form the core competence or intellectual capital of the intelligent enterprise and has to be supported if the intelligent organisation is to remain competitive (Nunamaker et al. 2002; Quinn 1992). If this is true, then why are organisations still grappling with their intellectual resources?

This chapter begins by elucidating the context of collaboration and the forms of collaborative effort enhanced through the use of collaborative technologies. It proposes a model describing four conditions necessary for successful collaboration: shared spaces and collaborative culture enable collaboration whereas goal congruence and resource constraints are required for collaboration to take place. This model provides the structure of this chapter. Section three describes how collaborative technologies have created shared spaces for more efficient and effective collaborative work. Section four discusses knowledge management activities constraining collaborative culture. In section five the creation of goal congruence and overcoming resource constraints are seen to be brought about through the creative use of electronic collaboration and simulation technologies. Examples of collaborative contexts in which personalised knowledge is managed are provided in Section six, and finally, the

chapter concludes with implications and guidelines for managing knowledge in collaborative contexts.

2. THE COLLABORATIVE CONTEXT

Collaboration is the degree to which people in an organization can combine their mental efforts so as to achieve common goals (Nunamaker et al. 2001). The act of collaboration is the act of shared creation and/or discovery in which two or more individuals with complementary skills interact to create shared understanding that none had previously possessed or could have come to on their own (Schrage 1990 p.40). Schrage (1990) adds that collaborative technologies have changed the contexts of interaction completely. Many conversations can take place at the same time. Ideas generated by different people on a shared screen for all to see inspire conversations within the group. Ideas are both external and manipulable. People can create icons to represent ideas and concepts, which others can modify or manipulate until they become both community property and a visual part of the conversation.

Electronic collaboration is the use of networking and collaborative technologies to support groups in the creation of shared understanding. Electronic collaboration fosters new kinds of collective work made possible with advanced collaboration technologies. The use of collaborative technologies enables conversations with new kinds of properties- these shift from being fixed to being externalised and negotiated (Schrage 1990). In addition, Nunamaker et al. (2001) suggest that there are three levels of Collaborative Effort that may be made more effective through the use of collaborative technologies:

1. With ***collective effort***, people work on their own. Group productivity is simply the sum of individual efforts. Technologies such as shared network directories, word processors, and spreadsheets may be used effectively to support collective efforts.
2. With ***coordinated effort***, people make individual efforts, but they have critical hand-off points. Productivity depends on the level of individual effort and on the coordination among those efforts. E-mail, team databases, and workflow automation may support coordinated efforts.
3. With ***concerted effort*** all members must make their effort in synchrony with other members. The performance of any member directly affects the performance of the other members. There are no individual efforts. Collaborative reasoning tools may be used to enhance the value created by concerted efforts. Examples of collaborative reasoning tools include electronic brainstorming tools, group outlining tools, and idea categorizers.

Electronic collaboration has made it possible to harness intellectual resources across space and time. It has given the concept of work a new meaning: anytime, anywhere, in real space or cyberspace (Cascio 1999). For many employers the virtual workplace, in which employees operate remotely from each other and from managers, is a reality now and indications are that it will become even more prevalent in the future. Venkatraman and Henderson (1998) suggest "*information technology now enables knowledge and expertise to become drivers of value creation and organisational effectiveness"*. This suggests that harnessing the intellectual capital of an organisation to create value cannot be achieved without the assistance of information technologies.

Technology alone cannot enable this value creation. Effective collaboration has to take place in order for intellectual capital to be effectively used to create value. The conditions

necessary for successful collaboration in electronic environments are described by authors such as (Qureshi *et al*. 2002, Byrne 1993, Mowshowitz 1997, Nunamaker *et al*. 2001, Qureshi *et al.* 2000, Schrage 1990, Vreede and Bruijn 1999) to be the following:

1. There must be a shared space where different perspectives may be shared and shared understandings generated.
2. There must exist one or more congruent purposes (such as to solve a problem, create or to discover something) or goal-oriented virtually organised activities that have to be managed.
3. It must occur within constraints including limits of expertise, time, money, competition and cultural considerations and there must be a need to share these resources.
4. Collaboration must be seen as a legitimate way of working and must be part of the organisation's accepted work practice.

These conditions are illustrated in Figure 1. Congruent goals and resource constraints are

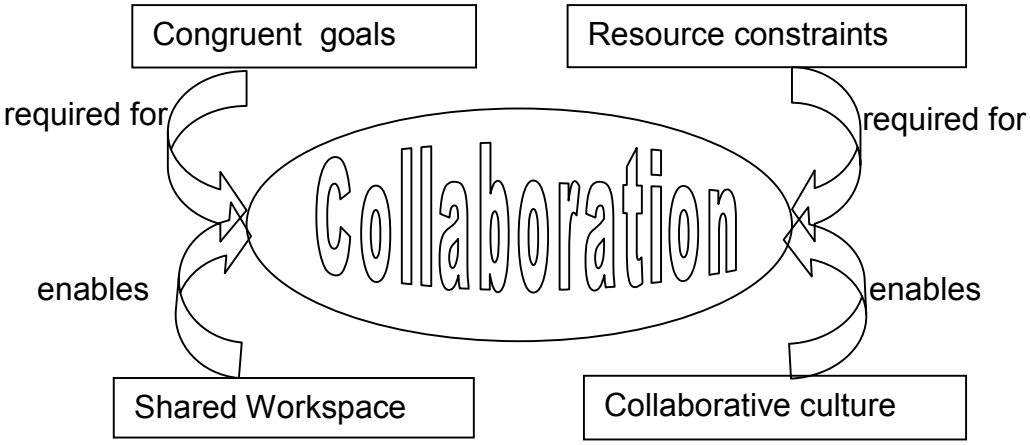

Figure 1: Conditions for Successful Collaboration (Source: Qureshi *et al.* 2002)

required for collaboration to be effective. If these two conditions are absent, then electronic collaborative technologies may be of little use or even have an adverse effect on the organisation. If goals do converge and there are resources that need to be overcome through collaboration, then the use of electronic collaboration can add value – even bring about significant gains. Once the need for collaboration is clear, then shared spaces where different

perspectives may come together in physical face to face or virtual environments will enable collaboration to take place. A collaborative culture also enables electronic collaboration to be effective.

First the enabling conditions for successful collaboration are discussed in the light of what we know about current knowledge management efforts. As described in section three, shared spaces provided by collaborative technologies have changed the contexts for collaboration significantly. Section four explains how knowledge management activities are still restricting the emergence of a collaborative culture in organisations and thus holding back the development of collaborative efforts in managing knowledge. In the light of this paradox, the creation of goal congruence and overcoming resource constraints are discussed in section five.

3. COLLABORATIVE TECHNOLOGIES FOR CREATING SHARED SPACES

Collaborative technologies for the creation of shared spaces include message systems, computer conferencing systems, procedure processing systems, calendar systems, shared filing systems, co-authoring systems, screen sharing systems, Group Support Systems (GDSS), advanced meeting rooms and finally team development and management tools. Together these technologies are often included in the umbrella term "groupware" (Coleman and Khanna 1995). Groupware can be defined as to represent "computer-based systems that support groups of people engaged in a common task (or goal) and that provide an interface to a shared environment" (Ellis *et al.* 1991).

Group Support Systems (GSS) represent a subset of groupware. A GSS is a socio-technical system consisting of software, hardware, meeting procedures, facilitation support, and a group of meeting participants engaged in intellectual collaborative work (Eden 1995; Jessup and Valacich 1993). GSS are employed to focus and structure group deliberation, while reducing cognitive costs of communication and information access among teams working collaboratively towards a goal (Davison and Briggs 2000).

There are various commercially available GSS. The most widely used GSS is GroupSystems, originally developed at the University of Arizona and commercialised by GroupSystems.com. GroupSystems consists of different modules, each of which supports one or more group activities such as generating, organising, and evaluating ideas (see Table 1).

Module	Supports groups…
Categorizer	Making lists of ideas with underlying comments. Lists can be organised in definable categories.
Group Outliner	Establishing hierarchical order in a list of ideas with underlying comments.
Electronic Brainstorming	During divergent brainstorming activities by automatically rotating electronic cards with ideas.
Topic Commenter	Commenting on a number of definable topics.
Vote	Evaluating ideas using various voting techniques, such as Yes/No, 4, 5, and 10 pt scales, allocation, and multiple
Alternative Analyzer	Evaluating ideas using a number of definable criteria with varying weights.
Survey	Designing and executing (stand alone) questionnaires.

Table 1: Modules in GroupSystems

Many different ideas can be generated in parallel and recorded instantaneously. As this process is not hindered by factors such as dominance of boisterous orators, turn yielding cues and pressure to conform, key information items that would have otherwise been lost can be

highlighted and further developed. An example of the Categorizer module in action is depicted in Figure 2.

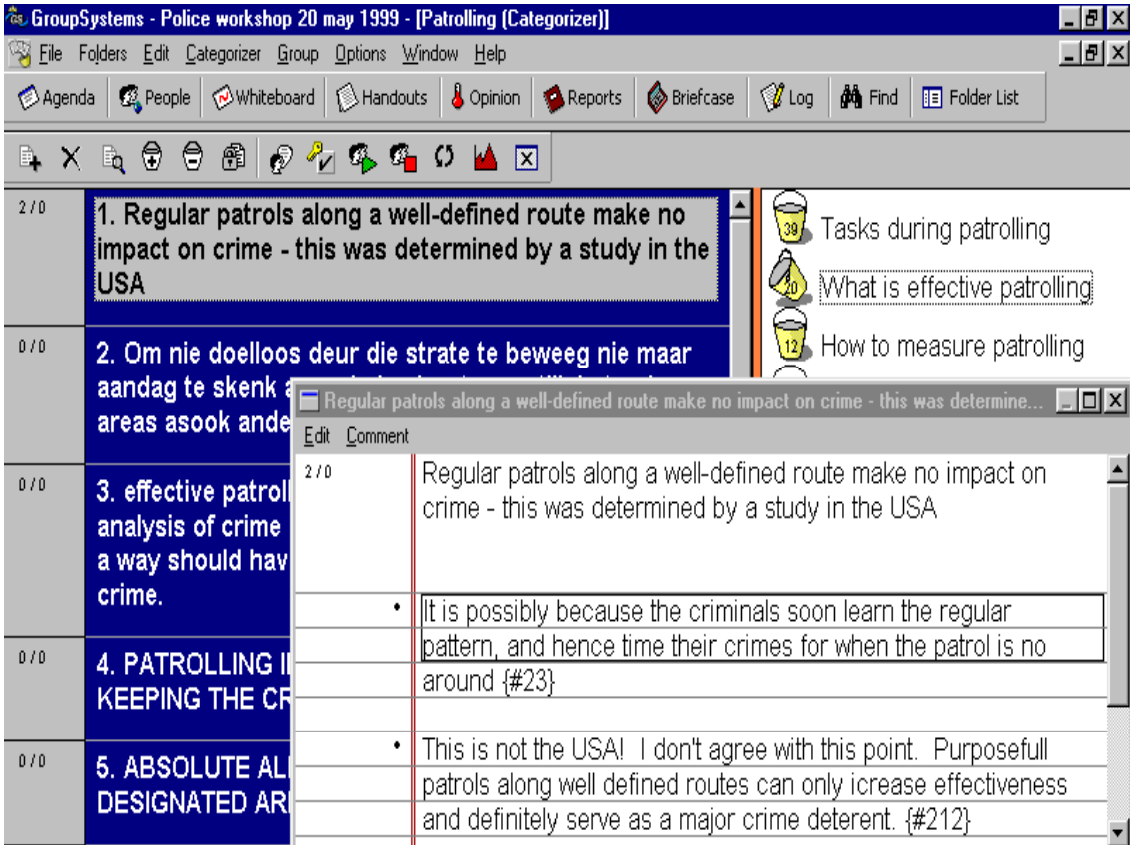

Figure 2: GroupSystems Categorizer module

GSS are often used in meeting room environments, as they have become a very popular means of running efficient and effective meetings. In particular, GSS have been gaining much attention among researchers and practitioners for their ability to enhance decision making by making the management of knowledge more effective. GSS technology has been deployed in meetings rooms in the US Navy, Air Force and Pentagon (Briggs et al. 1998). Examples of these are illustrated in Figure 3.

GSS have also been used in international organisations such as the United Nations and the Commonwealth Secretariat to support negotiation processes in policy making. Various businesses have deployed GSS for the productivity gains that have been achieved in terms of

the reduction in meeting time, increase in return on investment and increased satisfaction, e.g. IBM (Nunamaker et al. 1989), Boeing (Post 1993), and the Nationale-Nederlanden Insurance in the Netherlands (Vreede 2001).

Figure 3: Air Force Innovation Center, The Pentagon (Source: GroupSystems.Com)

Universities have employed GSS in their education and research programmes. The use of GSS in education (in schools and universities) has brought about a shift in the role of the instructors and their relationships with their students (Vreede et al. 1999). This shift in the role of the instructor can be paraphrased as "from the sage on the stage to the guide by the side" (Briggs and Brown 1997). Together with these changes in mode of instruction, the technology has moved to being multi-locational. This means that instead of bringing groups together in an electronic meeting room, the electronic meeting facility can move to places where groups traditionally meet.

Figure 4: Video-Conferencing for Communication and Coordination

This type of electronic collaboration has become a powerful means of capturing, exchanging, and managing personalised organisational knowledge. In this way, electronic collaboration becomes instrumental in capitalising on an organisation's intellectual capital. Nunamaker et al. (2001) and Qureshi et al. (2002) suggest that an organisation's potential to create value through the use of its intellectual capital is affected by the extent to which collaborative activities can take place. For optimum collaborative knowledge management activities, organisations must seek collaborative support that extends the electronic meeting room into an electronic meeting space, enabling any time any place collaboration.

Nunamaker *et al.* (2001) suggest that "*we are moving towards an age of any time any place collaboration*". Fuelled by the exponential growth of the Internet, the World Wide Web, and local area networks, there are various communication technologies that enable this flexible form of collaboration. These include combinations of electronic mail, real time conferencing, and multicast audio and video used to support, for example, internet-based concerts and presentations (Sproull and Kiesler 1991, Grudin and Palen 1995). An example of multi-point videoconferencing is provided in Figure 4.

Any time any place collaboration can also be achieved through information sharing technologies such as digital whiteboards, computer bulletin boards and threaded discussion groups (netnews, etc.), document management systems that provide for the creation and reuse of documents as well as the control of access, concurrency, and versioning (Ellis *et al.* 1991; Whitaker 1996). Such a suite of collaborative technologies is for example included in the Electronic Meeting Room of Erasmus University's Faculty of Management in the

Netherlands. As illustrated in Figure 5, this room contains GSS as well as shared workspaces for distributed collaboration.

Figure 5: Erasmus University's Electronic Meeting Room

To provide an overview of this myriad of collaboration technologies various authors have suggested taxonomies for the classification of groupware applications and products, see e.g. (Johansen 1991, Grudin and Poltrock 1997, Ellis *et al.* 1991). However, the use of collaborative technologies has yet to be considered in terms of the type collaborative effort required. We present a taxonomy below based on the three levels of collaborative effort discussed in section 2, and the three key requirements for group productivity: communication, thinking, and information availability (Briggs and Nunamaker 1994). Communication is required for a group to accomplish its goals. Groups also need structured methods to guide their fundamental thinking process. Such methods are also referred to as problem solving processes or decision-making processes. Finally, groups cannot be productive if they do not have the appropriate information for the task at hand available.

Combining these levels of collaboration and group productivity requirements results in the taxonomy presented in Table 2. Such taxonomy is useful in making sense of the plethora of collaborative technologies and software currently available. For each cell the type of supporting technology is listed. This provides an overview of the functionalities that support the type of collaborative work defined above. As different types of technologies may support

the functionalities described in Table 2, some examples of such technologies are given in Table 3.

	Communication support	Thinking support	Information availability
Collected effort	Multimedia presentations	Spreadsheet	Database systems
Coordinated effort	Email Workflow management	Project management tool Team Scheduling tool	Multi-user database Notice boards
Concerted effort	Video conferencing Computer conferencing	Group Decision Support	Screen sharing system

Table 2: The Groupware Grid: A Taxonomy for Collaborative Technologies

	Communication support	Thinking support	Information availability
Collected effort	Microsoft PowerPoint Visio Professional	Microsoft Excel SPSS	Microsoft Access Windows Explorer
Coordinated effort	E-Room Lotus Notes	E-Room Microsoft Project	E-Room Lotus Notes
Concerted effort	GroupSystems NetMeeting	GroupSystems DecisionExplorer	GroupSystems GroupIntelligence

Table 3: Examples of Collaborative Technologies Mapped To The Groupware Grid

From the above it follows that the value of using certain collaborative technologies depends on the collaborative task at hand and the group productivity requirements. Support for coordination among individuals carrying out a collaborative work process requires a different combination of technologies than do concerted collaboration efforts. In addition to the shared spaces provided by these technologies, a collaborative culture is also needed to enable collaboration if value is to be created from the intellectual capital of an organisation. In the following section, the cultural constraints imposed by traditional knowledge management activities are described. The reasons why organisations are still grappling with trying to create value from their intellectual resources are discussed.

4. KNOWLEDGE MANAGEMENT ACTIVITIES CONSTRAINING COLLABORATIVE CULTURE

Courtney et al (1997) suggest that in order to support communication it is necessary not only to have proper media with which to communicate, but also a social network or "community of minds" whose members know one another and speak the same language. This means that a culture of communication enables effective collaborative effort. In addition, Holsapple and Whinston (1987) add that as organisations will be increasingly regarded as joint human-computer knowledge processing systems, they will be viewed as societies of knowledge workers who are interconnected by computerised infrastructures. This suggests that knowledge management activities will be most effective when conducted collaboratively.

However, the concept of managing knowledge is still in its formative stages and very much an “individualised” concept. Sveiby (1997) attempts to explain the concept of knowledge management by analysing research publications in this field. He claims that the people involved in knowledge management can be divided into two categories. The first one is where people come from a background, which is computer, and/or information science oriented who perceive knowledge to be an object and knowledge management refers to ‘Management of Information’. This is very much conducive towards a culture of managing information as inventory through which information, often referred to as knowledge, is packaged, and stored or distributed to relevant individuals in a sequential manner. Different authors define even knowledge management activities with the same name differently. For example, according to Angus and Patel (1998) knowledge gathering refers to the bringing in information and data, organising related to ensuring that the knowledge is easily accessible by giving it context through linking items to subject, refining relates to adding value to knowledge using various means including identifying relationships, abstracting synthesis and

sharing, whilst knowledge dissemination is associated with ensuring that the right people have access to this knowledge. Kramer (1998) describes gathering knowledge as the process of collecting knowledge, organising it involves classifying knowledge with the aim of giving it meaning so that it can be located with ease by those searching for it, distribution refers to dispersing the knowledge. These knowledge management activities provide little room for collaboration, since collaboration entails the collective use and combined development of knowledge.

Although the volume of literature on knowledge management is in general increasing, especially with regard to its "soft" (human and organisational) aspects (e.g. Gupta and Govindarajan, 2000; Hansen and Oetinger, 2001), there is less information available about technical aspects or software tools for knowledge management (Hlupic et al., 2002). Examples of publications offering some insight into KM tools include (Borghoff and Pareschi, 1998), (Gamble and Blackwell, 2001), (Quinn et al., 1997), and (Skyrme,. 1999). In essence, if knowledge management tools support knowledge management activities within organisations, they should capture the complexity of content and the richness of knowledge (Duffy, 2001). The literature, however, does not offer consensuses as to what these activities are, which is illustrated in Table 4.

AUTHORS	KNOWLEDGE MANAGEMENT ACTIVITIES				
Ruggles (1997)	Generation	Codification	Transfer		
Angus and Patel (1998)	Gathering	Organising	Refining	Disseminating	
Kramer (1998)	Gathering	Organising	Distributing	Collaboration	
Ferran-Urdaneta (1999)	Creation	Legitimisation	Sharing		
Jackson (1999)	Gathering	Synthesis	Storage	Communication	Dissemination

Macintosh (1999)	Developing	Preserving	Using	Sharing	

Table 4: Knowledge Management Activities identified in KM literature

Sveiby (1997)'s second category of knowledge management consists of writers from a philosophy, psychology, sociology or business/management who consider knowledge to be related to processes and knowledge management to be the 'Management of People'. This management of people has taken the form of urging employees to share their knowledge with each other. Various performance appraisal mechanisms have been put in place to ensure that key knowledge and expertise is shared, transferred or codified. These strategies have not been very successful as 1) experiential knowledge is very difficult to communicate and thus share with colleagues, 2) employees often equate sharing key knowledge or information with losing their competitive advantage and 3) entering project information into company databases is seen as a waste of time.

Knowledge management tools have also restricted the management of personal knowledge. Ruggles (1997) defines knowledge management tools as technologies that enhance and enable knowledge generation, codification and transfer. Knowledge generation relates to the creation of new ideas, the recognition of new patterns, the synthesis of separate disciplines or to the development of new processes. Knowledge codification refers to organising and classifying the knowledge obtained through knowledge generation, whilst knowledge transfer relates to knowledge dissemination. Knowledge transfer is often hindered by barriers such as *temporal distance* (if knowledge is exchanged in a conversation between two people and not captured, nobody else could make use of such knowledge); *spatial distance* (physical distance involved within organisations and between customer suppliers); and *social distance* (barriers related to hierarchical, functional and cultural differences between people involved

in communication). These barriers have made it difficult for a collaborative culture to emerge in organisations.

5. CREATION OF SHARED UNDERSTANDING AND GOAL CONGRUENCE

While collaborative work can potentially enhance the gains to be made from managing personalised knowledge, it can also hinder the process of using knowledge to joint effect. The main obstacle lies in traditional notions of knowledge management that focus on the inventorisation of knowledge and those that force employees to share or codify knowledge that cannot be imparted in any coherent form. As stated in section 2, effective collaboration for the management of personalised knowledge also requires goal congruence and the need to overcome resource constraints. Goal congruence is the degree to which the private goals of individuals are compatible with the declared goals of a collaborating group. Goal congruence does not necessarily mean goal sharing. Consider, for example, the case of a rock and roll band. The guitar player might seek artistic expression, while the drummer might seek wealth and fame. Their private goals are not shared, but they are congruent with the declared goal of cutting an album.

Simulation models have been used to align perceptions of stakeholders and arrive at goal congruence in many ways. The extent to which members collectively increase an organisation's ability to acquire new areas of expertise largely depends on the ability of the individuals to communicate and share information. The structure of the organisation must be conducive to information sharing and its dissemination. Senge *et al.* (1994), propose learning laboratories or `microworlds' that are microcosms of real business settings that allow managers to play roles

within a simulated organisational environment. The idea is to enhance the mental models of managers as they collectively learn how and in what ways their strategies affect the organisation at large. In this respect, it is the transformation and impact of information that brings about an increase in the extent to which learning takes place in an organisation.

In addition, simulation modelling forces assumptions about a work situation to be made explicit and often measurable. This means that resource constraints can often be better understood and the use of collaborative technologies can enable these resource constraints to be collectively overcome. Simulation models may be used to generate new insight about business processes through "what if" analysis. The process of simulation model development usually involves an extensive collection of data that needs to be analysed, and this often results in generation of new understanding. There are business simulation games (such as Tango KM Business Simulation Game supported by Sveiby Knowledge Management) specifically designed for managing organisational knowledge, and simulation models can be developed to evaluate various knowledge management strategies.

When Robinson and Pidd (1998) investigated factors that play a key role in the success of a simulation project, they discovered that communication and interaction between stakeholders (e.g. clients, simulation consultants, and people working with processes being modeled) involved in simulation model development are crucial. This suggests that the role of GSS in communicating stakeholder perceptions is an important one. Studies of GSS together with various modeling techniques confirm this and have provided valuable understanding into the power and pitfalls of combining two very powerful ways of supporting organisational processes, see e.g. (Dean *et al.* 2001, Vreede 1998, Vreede and Dickson 2000, Appelman et al. 2002).

In their studies at the Criminal Investigations Department of the Amsterdam Police Force Vreede and colleagues used GSS to elicit the perceptions of different stakeholders (Vreede 1998; Vreede and Dickson 2000). The results of the GSS sessions where used as input for a dynamic simulation modeling process that was conducted in close cooperation with the same stakeholders. Consecutive models were simulated to groups of stakeholders who then discussed their models using the GSS. The use of GSS together with dynamic simulation modeling enabled a powerful participative approach to be developed that enabled the collaborative design of organisational processes and the development of information system prototypes. In addition, Appelman et al. (2002) used GSS with the System Dynamics model building technique to support negotiations among a group of airlines and agents in an international process of negotiations. They found that GSS was useful in bringing together the conflicting political interests yet did not offer direct support to match the elicited stakeholder views included in the group model building. They suggested that the negotiation process could have been more successful had the GSS been used more to manage the conflict and the group model building, and less to model the desired outcome.

6. IMPLICATIONS FOR MANAGING KNOWLEDGE IN COLLABORATIVE CONTEXTS

We have seen thus far that the shared spaces provided by collaborative technologies can enhance knowledge management efforts by providing support for communication, collective thinking and information availability. Personalised knowledge can be put to joint effect through collective, coordinated and concerted effort. Used effectively, electronic collaboration can become a powerful means of creating value by using an organisation's

intellectual capital. In the following sections examples of various collaborative contexts in which knowledge has been managed are provided.

Communication and Thinking Support for Collective Knowledge Sharing

Knowledge sharing and communication in the context of simulation models is achieved through animation of model performance and graphical display of model results which could be viewed simultaneously by people distributed geographically through the use of Groupware applications. For example, Taylor (2000) provides an example of use of NetMeeting (groupware application supported by Microsoft) for communicating knowledge obtained from simulation models. NetMeeting successfully linked a simulation modelling application across three sites (two in London, one in the USA). Since then, several companies that participated in this experiment have introduced NetMeeting for end user support and use it regularly. This demonstrates that groupware (net-conferencing) i.e. the form of knowledge management and simulation modelling are a sensible combination.

Communication Support for Coordinated Knowledge

Qureshi and Zigurs (2001) describe how the Central and Eastern European node within Shell Europe Oil Products Retail Network had to be managed as a whole and investment plans had to be proposed for the entire Central and Eastern European node. Qureshi and Zigurs (2001) suggest that the use of collaborative technologies actually enable better face-to-face meetings. The decision-making process relied on a network of people from different geographical locations and expertise to work together. This network was composed of a core team for all retail activities established in Budapest, and an extended team of planners, engineers, and other staff located throughout the node. As most of the team members had never met before, they received training in trust building, communication etiquette, agenda sharing, and timely

responses. The teams used NetMeeting for teleconferencing and that was seen as ideal for communicating management decisions to the rest of the team, sharing documents, and above all not having to travel long distances to meet. Additional communication channels used were email, telephone, and scheduling software (Schedule +). As the team members felt no need to see each other's faces, videoconferencing was not used at all and face-to-face contact was minimal.

Communication and Thinking Support for Coordinated Knowledge Management

Qureshi and Zigurs (2001) suggest that simple adaptable technologies enable more complex virtual collaboration. This is because collaborative technologies present opportunities for sharing knowledge and skill, for mobilizing resources towards joint effect and for providing more innovative and customised products and services. Managing knowledge is viewed as key to enabling KPMG's consultants to provide customised services. Its knowledge management system, K-World, is an Intranet in which electronic communication, workflow, resource planning, external newsfeeds, and document sharing systems are available to consultants. It is seen as a knowledge repository that stores all information on employees and their expertise, projects, and clients. K-World also makes available task-specific information related to tax treaties, fiscal regulations per country, and audit techniques. The virtual spaces provided by K-World have yet to be used to form relationships among professionals from different functional areas, let alone within their own area. However, more recently KPMG has started using K-Client a distributed collaboration system to manage contacts with international clients. As of June 2001, KPMG has over 6000 members working in over 1000 virtual spaces (eRooms) in seven countries with people accessing the facilities from 64 countries.

7. CONCLUSIONS

Managing knowledge in a collaborative context enables organisations to create value through the use of their intellectual capital. The use of the knowledge and expertise of an organisation's employees requires a careful understanding of the collaborative context, the type of knowledge required for the task to be accomplished and an alignment of goals and resources required to complete the task. The vast arrays of collaborative technologies available for use in collaborative knowledge management efforts are poised to meet the challenges of growing globalisation of work environments and the need to manage geographically dispersed expertise. In bringing these perspectives together, highlighting opportunities and pitfalls this chapter provides a unique view of the ways in which knowledge may be managed through electronic collaboration.

The potential to create value by managing personalised knowledge through electronic collaboration is far reaching. But how can managers make use of this potential and avoid the pitfalls described in this chapter? The following guidelines provides managers with some key pointers as to how the gains from managing knowledge in a collaborative context may be maximised:

1. Make sure that there is a match between the type of collaborative effort: collective, coordinated and concerted; and the group productivity requirements: communication, thinking and information availability.

2. Ensure that the level of collaborative effort required and the type of knowledge management activities to be undertaken are well aligned. A cultural conflict between the collaborative creation of value and the inventorisation of information may be problematic.
3. Avoid inventorising information and imposing guidelines for knowledge sharing or codifying. Instead, emphasise the need to collectively build upon the available pool of knowledge and expertise in order to provide innovative products and services that meet customer needs.
4. Recognise that temporal, spatial and social distance exists when attempting to support the transfer of knowledge, information or data.
5. Adopt a strategy for enhancing learning mechanisms that continue to update the organisation's core competencies. Providing support for collective thinking and the creation of shared understanding through tools and techniques such as collaborative simulation modelling.
6. Ensure that there are sufficient facilitation and conflict management roles available to the organisations knowledge management processes.

When implementing these guidelines it is important to recognise the collaborative context within which knowledge can be managed to create value varies. This means that the above guidelines should be implemented with sensitivity to the organisation's goals, structure and processes.

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