GLOBALLY DISPERSED PROJECT TEAMS: INTERACTION SPACE MANAGEMENT

by

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Abstract

Rapid advances in communication technologies and globalization of products, processes and markets have fuelled a transition to new organizational forms. The virtual organization, consisting of individuals working from globally dispersed locations united by a common goal, is one such form. Virtual organizations, thus, rely on globally dispersed virtual teams for obtaining member participation and coordinating individual effort in productive work. This period of radical organizational change has also been accompanied by an equally radical change in communication technologies, allowing teams to be effectively reconstituted from formerly dispersed members across the globe thus realizing the competitive synergy of teamwork and exploiting the burgeoning revolution in telecommunications and information technology.

The emergence of technologically savvy globally dispersed teams has also heralded a complex and largely uninvestigated area of interaction practices of such team members. By enabling team interactions via non-traditional media, unrestrained by geographical and temporal constraints, communication technologies have actually expanded and transformed the conventional team interaction space. This merger of physical space with digital has created a new era of team interaction spaces, one where organizational, technological and spatial dimensions play a significant role. Taken together, organizational, technological and spatial dimensions constitute a dynamic team interaction system: a change in any one of the dimensions requiring a reinforcing change in the others. Inspite of the ever-growing number of globally dispersed teams, there is still much to be learned about what constitutes the anecdotal rules to create the proper team interaction space in which global teams can blossom and flourish. There is no set of best practices that can be adequately applied across every conceivable instance of a global team. This dissertation highlights an interaction framework based on team interaction space and presents key concepts from the research on team interaction space that team members and team leaders should consider in their interaction activities. The focus of this framework is to provide a structured look at the team interaction space on the whole and increase the effectiveness of the team interaction space to affect the overall team effectiveness.

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CHAPTER I

Globally Dispersed Teams: Who, What and Why?

1. 1 The Global Organization

Rapid advances in communication technologies and globalization of products, processes and markets have fuelled a transition to new organizational forms. The virtual organization, consisting of individuals working from globally dispersed locations united by a common goal, is one such form. Virtual organizations, thus, rely on globally dispersed or 'virtual' teams for obtaining member participation and coordinating individual effort in productive work. Technology and the availability of information are both drivers of, and driven by, these radical changes. A recurrent theme in organizational design throughout the 1990s has been the use of global teams to achieve greater levels of performance on tasks: "... *teams and good performance are inseparable: you cannot have one without the other...*" (Katzenbach & Smith, 1993).

1.2 What is A Globally Dispersed Project Team?

This dissertation relies on (Katzenbach & Smith, 1993)'s definition among the many definitions of 'team': "... a team is a small number of people with complementary skills who are committed to common purpose, performance goals, and approach for which they hold themselves mutually accountable..." There are several definitions for globally dispersed teams. This dissertation focuses on globally dispersed project teams. The members of a globally dispersed project team usually are dispersed over geographic, temporal and functional dimensions. The globally dispersed project team leverages the complementary competencies of its distributed team

dispersed project team leverages the complementary competencies of its distributed team members with the ultimate objective of producing a clearly defined and coordinated output in a specified time-span.

1.3 The Case for Dispersion

Globally dispersed teams are by definition, designed with deliberate differences in demographic diversity and technical specialization (Ancona & Caldwell, 1992). Diversity in groups and teams is often portrayed as a positive force leading to effective functioning of the team. Diversity leads to greater variance in ideas, creativity and innovation, thus generating better team performance. Studies have also found that demographic diversity can influence group processes. In fact, diversity can influence group processes in contradictory directions. For example, diversity has been shown to have negative effects on both group cohesion (O'Reilly et al., 1989) and the frequency or quantity of communication (Smith et al., 1994). However, diversity can also lead to enhanced creativity and innovation by generating greater variance in decision-making alternatives. (Heller, 1994) urges that mid to senior level managers need to develop genuine global outlook towards dispersion to effectively oversee organization functions and markets.

1.4 Challenges facing Global Teams

The management of globally dispersed project teams is a critical issue cutting across organizational boundaries. The importance and the necessity of these teams are increasingly being felt. This has also highlighted the importance of the issue of effective management of these teams. However, some of the potential advantages of going global could be offset by the ineffectiveness of the framework in which the collaborative effort is carried out. The issues that make the process of being globally dispersed difficult are related to the fact that

- Distributed teams cross boundaries related to time, distance (geography), and organization. The organization and work cultures and expectations related to work are different. When this is coupled with the fact that the workforce is collaborating through different time zones, it makes things more difficult especially when organizational processes are tied to a local perspective.
- Distributed teams communicate, share information and collaborate (work together to produce a product) using technology (technology being electronic communication and collaboration technology). The process of collaboration raises an entire range of issues -

the technology connection to the business model, its nature (push/pull) inside the organizations, the reach of technology and its effect on performance/convenience as to reducing workload – that need to be addressed. Technical competence among the workforce, technical resources and their comparative ease of use, their reliability, response time (speed transmission), capability, simplicity, accessibility, related training and support resources may vary from site to site. This results in dissatisfaction in sharing information and working together.

- Distributed teams are composed of people from different cultures. The presence of these people from different cultures introduces cultural barriers that increase the complexity of the collaborative effort as the ways people do work vary greatly and it is often difficult to understand and acknowledge the different ways in which people approach their work.
- Distributed teams have people coming not only from different cultures but who speak different languages. Language differences introduce barriers as interpretation of supplied information may vary greatly.

The diverse issues mentioned above related to bridging temporal, cultural, organizational barriers that are to be considered when a change from a "local" to a "global" environment is effected might make the process of collaboration complex and difficult to manage. One of the key issues for virtual teams is therefore to set the bounds of their collaboration or interaction space. To make effective use of the collaboration space, the foundations of this collaboration space must be identified and their importance to the interaction process understood. When the effectiveness foundations are properly implemented in virtual teams, all the issues mentioned above can be more easily solved.

1.5 Team Interaction Space

Globally dispersed teams are characterized by a considerable amount of interaction that is conducted synchronously and asynchronously using communication technologies (McMahan, 1998). While geographic dispersion or temporal displacement among team members typically drive these interactions, it is the degree of online interactions, not the dispersion or displacement of the team, that characterizes a team as virtual. This means that a group that is collocated but still conducts the majority of their interaction online may be considered a virtual team.

The nature of the interactions amongst globally dispersed team members differs significantly in several key areas from face-to-face teams. The lack of social cues: paraverbal (tone, inflection,

and volume) and nonverbal (body language such as eye contact, facial expression, and hand gestures) in computer-mediated communications significantly modifies the flow, context, and content of such online team interactions. For example, it is frequently observed that members of globally dispersed teams participate more freely in team interactions. This equality of participation is attributed to lower status members being less inhibited in computer-mediated interaction environments. In the absence of the interaction context and a failure to develop strong personal relationships, global team interactions also tend to be more focused on task execution and less on social behaviors. It is also seen that in the absence of a face-to-face interaction context, individuals express negative and uninhibited messages during computer-mediated interactions more freely. Finally, globally dispersed teams have more difficulty in reaching consensus than face-to-face teams because of a lack of interpersonal feedback and reduced concern with social norms.

However, opinion is divided about the magnitude of the differences between global and face-to-face team interactions. Studies have found that globally dispersed teams may communicate as effectively as face-to-face groups provided they have sufficient processes in place to develop a bonding or team context. The dominating issue in developing this team bonding may not necessarily be time. More often than not, virtual teams come together as a team for a short period of time not conducive to building team feeling. Thus, the interaction context is usually process-driven. In this context, computer-mediated communication can be beneficial to those individuals who have difficulty in meeting and forming relationships because of cultural, gender or appearance inhibitions.

The emphasis therefore must be on the process of communication of the detail and the nuances of face-to-face interaction through written text, without the assistance of paraverbal and nonverbal cues. Members of internationally dispersed teams may not share a common first language or business culture and thus facilitating the interaction space for globally dispersed team members requires all the finesse and skill of facilitating a face-to-face meeting or workshop experience. "*...When you get online, remember everything you've ever known about designing and facilitating group process. Just ask yourself: How can we move these virtual chairs into a circle?* ..." (Eunice & Kimball, 1997).

The importance of proper communication and interaction processes in facilitating interactions carried out in the team interaction space and its proper utilization is paramount. In order to

communicate better it is imperative that virtual teams have efficient communication processes, as they rarely get to meet face-to-face as often as they would like. If team members can work together to develop their own norms, or adopt pre-established organizational norms, and expectations based on team and organizational values, they can do much to maximize their potential to produce effective results by reducing the possibilities of misunderstanding and conflict. The proper use of technology coupled with organizational support for making team processes effective through emphasis on interaction protocols, leadership, diversity and proper management of resources plays a dominant role in making virtual teams successful.

1.6 Thesis Roadmap

The sequence of chapters in this dissertation essentially revolves around the various elements of the effectiveness framework for globally dispersed teams based on team interaction space. In addition, the chapters in the dissertation can be grouped together in to three parts.

The first part of the dissertation concentrates on the origins and the characteristics of globally dispersed teams presenting some research data reported on what constitutes a globally dispersed team and what is meant by effectiveness of globally dispersed teams from a number of different sources.

The second part of the dissertation introduces the effectiveness framework for globally dispersed teams based on the team interaction space. The chapters in this part deal with the basic elements of the effectiveness framework. The framework starts with the identification of the team interaction space in Chapter 3 and identifies three components: organizational processes, communication technologies and the spatial setup. Identification of the key components of the team interaction space helps identify the barriers to team effectiveness, which are covered next in Chapter 4. Data from the team interaction space and the identification of barriers to team effectiveness helps in positioning the team under review in a team effectiveness continuum. As part of the effectiveness framework, a new spiral effectiveness continuum model is proposed along with steps to help position global teams in the continuum. Chapter 5 talks about leveraging commonly available communication technologies for a collaboration-enabling experience. Chapter 6 of the dissertation includes a newly developed system dynamics model combining

some of the variables of global team effectiveness, for an evaluation of the effectiveness of a team's interaction space effectiveness.

The last part of the dissertation concentrates on leveraging the intangibles of a globally dispersed team's performance for the better of the larger organization. In particular, efforts and activities that should be carried out by the globally dispersed teams in the team interaction space to enable the contribution of these intangibles or capitals to the larger organization. This dissertation ends with an overview of the research completed and discusses the future scope of work in this area in Chapter 8.

Appendices include research instruments for the collection of data to validate the research hypotheses. The research hypotheses outlined in this report are currently being verified with "live-data" from virtual teams in a number of companies. The research instruments have been developed to test the team interaction model and the framework proposed. Da Vinci research team at Intelligent Engineering Systems Laboratory is currently performing data collection and analysis. Detailed description of the data collection phase from these instruments as well as the subsequent analysis is beyond the scope of the current report. However, interested parties can refer to the doctoral dissertation [Vadhavkar, 2001] for more information on this matter.

CHAPTER II

Research Findings

2.1 The Origin of Globally Dispersed Teams

This is the age of the networked organization. The industrial world is shifting to a stage where millions of team leaders and members may belong to geographically dispersed or virtual teams. The challenge of accomplishing project goals and assignments without the advantage of being co-located and being able to meet face-to-face is a critical and burning one.

The advantages of going "virtual" are numerous but for the potential to be achieved, significant challenges and barriers must be addressed. For instance, in virtual teams, language, culture, and style differences may be accentuated because of the losses in communication when body language, subtle tones, and facial gestures are not available to add to the spoken word. Misinterpretations and misunderstandings may be heightened if there is no direct way to work through what one member may think he/she heard on the phone conference meeting. Individual interpretations may create situations where each team member unknowingly "does his/her own thing" rather than promoting the team's agenda. The lack or void of relationship and trust may bring the tendency to work to one's advantage, causing problems for other team members. In addition, isolation, loneliness, and the feeling of disconnectedness may erode energy and lessen commitment to the team.

2.2 Investigation into Globally Dispersed Teams

(Hartman and Guss, 1996) provides a preliminary view of a new era of organizational investigation into these virtual organizations and their functional units, globally dispersed or virtual teams. The question posed is whether a shift to virtual organization is constrained more by technology or by corporate culture. Discussion of key factors for success and known technical and cultural challenges provide some practical ideas for making virtual teams work. A preliminary conclusion on the basis of a literature review suggests that the social and corporate cultural barriers are more significant than technological barriers in promoting the growth of virtual teams (Hartman and Guss, 1996). These pressures have forced the focus on organizing principles in a traditional organization to shift towards electronic interaction to demand interactive, knowledge intensive participation (Andriessen, 1995).

Despite the optimistic settings for globally dispersed teams, it should be noted that such teams do not just happen (Jarvenpaa & Ives, 1994). The dispersion between team members in location, time, language and culture makes common issues of communications, team interactions, team building and productivity a significant challenge to most organizations. Cases abound where management struggles with pressures unique to this type of organizational structure (Kurland & Bailey, 1999). Integration aspects of globally dispersed teams are often overlooked resulting in well-documented team failures. Team leaders and members are faced with the delicate tasks of setting up goals and responsibilities, managing the team interaction process, managing diverse cultural expectations, and monitoring the team for accountability. In addition, pressure from cost, quality and schedule issues exist for virtual teams as well (Lindstaedt & Schneider, 1997).

2.3 Definitions of Globally Dispersed Teams

This dissertation relies on (Katzenbach & Smith, 1993)'s definition among the many definitions of 'team': "... a team is a small number of people with complementary skills who are committed to common purpose, performance goals, and approach for which they hold themselves mutually accountable..." Virtual teams are cross-functional teams that operate across space, time, and organizational boundaries with members who communicate mainly through electronic technologies. There are several types of virtual teams, depending upon task, membership, and role (Duarte & Snyder, 1999). Virtual teams are more complex than regular teams because they cross boundaries of time and distance and because communication relies entirely on technology

(Duarte & Snyder, 1999). Virtual teams must over communicate; team leaders must be much more deliberate and structured in their communication and coordination efforts.

2.4 Case for Collaboration

" . . . *one of the thorniest problems . . . how to get all those individuals working together compatibly and productively, even though face-to-face contact was limited . . .*" (Geber, 1995).

(Geber, 1995) highlights virtual team members' real experiences and challenges from Hewlett Packard, Price Waterhouse, Lotus Development, Eastman Kodak and Whirlpool. These corporate giants had similar advice:

- Working face-to-face is necessary to form relationships and to become familiar with one another's work style and temperament.
- Valuable and informal team-building sessions occur outside business hours.
- Informal meetings help team members' size up each other.
- "It's important to develop some level of trust and relationship before you can move into electronic communication."
- Some companies regularly have a face-to-face "bonding fest" to kickoff a new project that will be completed by virtual team members.

(Hamlin, 1994) discusses the successful redesign of Apple's global procurement system into a network of globally dispersed teams. (McGarry, 1994) highlights the importance of global-local tensions while presenting the case about Xerox Canada's efforts and successes in redesigning operations to produce global product development teams. (Melymuka, 1997) presents the organizational need for virtual teams with a brief description of virtual teams at Arco Alaska, Lockheed Martin and General Electric. To emphasize the importance of applying learning across different industries (Hartman and Ashrafi, 1996) presents findings from a pilot study on globally dispersed teams in seven different industries: product development, utilities, oil and gas, entertainment, infrastructure (traditionally government), systems development and construction.

2. 5 Challenges Facing Global Teams

(Grenier and Metes, 1995) addresses the complexity of initiating and establishing globally dispersed teams in organizations, and deals directly with challenges facing executives, managers and team members themselves. (Grenier and Metes, 1995) present a model for globally dispersed team operations that includes: work processes or tasks; teaming; team interactions and learning.

(Henry and Hartzler, 1998) lists three challenges to increasing the effectiveness of globally dispersed teams: Challenge #1 is to provide direction and focus for the team. Second challenge deals with the team processes. This pertains to establishing a set of values/principles and operating agreements/expectations so that autonomous team members know what kinds of decisions to make, what methods to use for consistency, and how to support other team members. Challenge #3 is to keep the synergy and creativity flowing without day-to-day interaction and use communication as the vehicle for creating this synergy.

(Henry and Hartzler, 1998) provides 24 designs of synchronous team interaction spaces that any team leader or facilitator can follow to directly address the three challenges listed above. (Kostner, 1996) uses the background of King Arthur's round table to identify the three enemies to managing globally dispersed teams: geography, isolation and history. Building trust and communication processes are identified as the essential underpinnings for effective globally dispersed teams. In the absence of day-to-day interaction, (Kostner, 1996) emphasizes establishing group norms that emphasize the roles of social contact during team interactions. (Lipnack & Stamps, 1997) focus on team process, structure and communication to understand how a globally dispersed team operates. To understand the dynamics of globally dispersed teams, (Lipnack & Stamps, 1997) consider the basic principles of effective globally dispersed teams to be threefold: people - purpose - links. (O'Hara-Devereuax & Johansen, 1994) addresses the complexity of globally dispersed teams by looking at five different dimensions of language, context, time, power and information flow. (O'Hara-Devereuax & Johansen, 1994) provides a seven-stage model of team development, and specific content, decision and communication considerations in each of the seven stages, from orientation to renewal.

2.6 Team Interaction Space

There is a large body of research that suggests globally dispersed teams interact less effectively than face-to-face groups (Chidambaram, 1996; Hightower & Sayeed, 1996; Warkentin et al., 1997). This research proposes that the lack of social cues: paraverbal (tone, inflection, and volume) and nonverbal (body language such as eye contact, facial expression, and hand gestures) in computer-mediated communications significantly degrades the flow, context, and content of team interactions. (McGrath & Hollingshead, 1994) suggests that interactions among globally dispersed team members differ in several key areas from face-to-face teams. Researchers frequently observe more equal participation among members of globally dispersed teams. This equality of participation is attributed to lower status members being less inhibited in computer-

mediated interaction environments. In the absence of the interaction context and a failure to develop strong personal relationships, global team interactions also tend to be more focused on task execution and less on social behaviors. Studies have also found that individuals express more negative and uninhibited messages during computer-mediated interactions. Finally, globally dispersed teams have more difficulty in reaching consensus than face-to-face teams. Researchers attribute this finding to a lack of interpersonal feedback and reduced concern with social norms.

Critics of this research argue that the findings are limited because the groups in the studies were ad hoc, and the time period was not sufficient to establish effective working relationships. "... *as workers increasingly interact in a virtual mode, it is imperative that they rebuild the interpersonal interaction necessary for organizational effectiveness...*" (Townsend, 1998). Recent research on this topic suggests that the differences between global and face-to-face teams may not be as predominant as earlier implied. Studies have found that globally dispersed teams may communicate as effectively as face-to-face groups provided they have sufficient time to develop strong relationships and adapt to the use of collaboration technologies (Townsend, 1998; Chidambaram, 1996; Warkentin et al., 1997). (Townsend, 1998) believes that although a virtual working needs to overcome a few challenges it can also recreate the way work is done. "... *within the virtual connection lies an opportunity for efficiencies and team synergy unrealised in traditional work interaction...*"). In a study conducted by Scharlott and Christ (1994) computer-mediated communication was found to *"...help users overcome relationship-initiation barriers rooted in sex role, shyness, and appearance inhibitions...*" Computer-mediated communication was found to be beneficial in helping some individuals meet and form relationships, especially those who have had difficulty doing so because of cultural, gender or appearance inhibitions.

2.6.1 Communication Technologies

"...A technology that spans space and time causes us to rethink what we meant by the terms organizational boundaries and organization..." (Goodman & Sproull, 1990). Over the last decade, business organizations have used advances in communication technologies to transform their organizational processes. "... *virtual teams must over communicate; team leaders must be much more deliberate and structured in their communication and coordination efforts...*" (Duarte & Snyder, 1999). To identify the communication needs for globally dispersed teams, (Finley, 1995) describes the technologies that support the four Time/Space dimensions: Same Time/Same Place, Same Time/Different Place, Different Time/Different Place and Different Time/Same Place. (Miller et al., 1996) discusses the use of communication technologies to address the

interaction needs of globally dispersed teams. (Alavi & Yoo, 1997b) found that learning can occur among and across globally dispersed team members using technology-based communications. (Alavi & Yoo, 1997b) used two alternative communication technologies: an asynchronous e-mail system and a synchronous technology called Beta system in a controlled study of 206 executives. The executives worked in small virtual teams over a ten-week period to complete a complex and realistic project designed to enhance their individual learning. None of the team members were co-located and therefore no face-to-face interactions occurred during the project execution. The study showed that learning is impaired if the team members have not mastered the communication technologies used by the teams. There has been considerable discussion of the role of computer-supported communication technologies in supporting and enhancing the work of global teams (Jarvenpaa & Ives, 1994; Nohria & Eccles, 1992). Networked communication technologies have the potential, if used appropriately, to improve co-ordination among members of project teams (Allen & Hauptman, 1990; Gorton & Motwani, 1996; Keen, 1990).

2.6.2 Group Processes

Previous studies have examined the relationships between team performance and a variety of group processes. These include comprehensiveness in the strategic decision-making process and speed in decision-making processes. Group processes have also been shown to intervene in the relationship between diversity and group performance (Smith et al., 1994). The central arguments behind the study of group processes pertain either to group processes that provide greater efficiency (e.g., reducing costs or increasing speed in decision-making) or greater effectiveness (e.g., making better decisions).

"The structures and methods that managers use to achieve their goals will have to change. Perhaps the most fundamental transition in group processes will be the shift that management will have to make from directing action to ensuring the smooth function of group process" (Davidow & Malone, 1992). Traditionally, much of middle management's function has been to serve as an information channel from top management. This function is greatly reduced while managing globally dispersed virtual management. Top management, more and more, must become coaches and cheerleaders. "Hierarchical and directive management will turn into a management fiasco for the virtual corporation" (Davidow & Malone, 1992). Management will still set goals, measure

results, direct strategy, put work processes in place, and establish the environment to ensure these group processes work effectively.

Coaching becomes more important in virtual team settings as team membership spawns different regions, departments and even organizations. *"... Coaching is unlocking a person's potential to maximize their own performance. It's helping them learn rather than teaching them..."* (Whitmore, 1994) presents the GROW model for coaching: set goals, discover current reality, generate options, and establish accountability for a way forward. Basic coaching skills identified by (Whitmore, 1994) include:

- Asking leading questions
- Following the team's interest
- Listening to the team's voice and tone
- Reflecting back
- High personal self-awareness

2.6.3 Support Systems for Global Teams

One of the main reasons for the popularity of global teams in today's organizations can be traced to the fact that global teams provide a mechanism to deal with the complexity in the environment and allow for a more participative or democratic approach (Kimball, 1997). Organizations of the future will be those that find "new ways of working across boundaries, through systems, processes, technology, and people" (Duarte & Snyder, 1999) and that develop teams which allow more efficient means of allocating resources.

A vast amount of the literature on global teams discusses the critical role of the team. Virtual teams rely heavily on the leader, one typically outside of the group, to assist members in achieving a high degree of coordination, a shared understanding among members of the overall goals to be achieved, and an understanding of individual members' values and belief systems. Since virtual team formation is relatively new, and few people have had experience with it, we could also rely on material from research on substitutes for leadership (Howell, et al., 1990). This research recognizes that there are certain attributes of the follower, organization, or task that can negate the leader's ability to enhance or decrease a follower's performance. A leader may be able to enhance follower performance if the leader chooses a directive style and provides initial guidance for the employee. The leader can possibly adopt a more participative style as the

follower gains expertise. (Smith, 1996) describes a two-year study of international teamwork at thirteen companies and provides a model for team leadership that includes a changing role from advocacy at team startup, to a catalyst as the team evolves, to integration as the team matures.

Another team of researchers also stresses the importance of the leader's role in the virtual team interaction space. (Duarte & Snyder, 1999) emphasize that although many traditional leadership theories and practices can be applied in a virtual environment, global team leadership will experience unique situations and challenges. They find that a successful global leader will understand the fundamental principles of team output and accountability. The team leader will not allow time and space to modify the importance or completion of task goals. Autonomy, participation, and empowerment are important objectives, but the team must not lose sight of the task. The team leader must be able to match technology to the task, the team life cycle, and the team members' backgrounds.

Traditional models of leadership emergence have identified task-related contribution, speaking behavior, and power orientation as key predictors of leadership emergence in face-to-face environments. However, while looking at the interaction space of globally dispersed teams, an individual's skill in using communication technologies and the use of the technology could become important predictors of leadership emergence. Indeed, the role of speaking behavior in predicting leadership emergence would be diminishing in interactions between globally dispersed team members. (Alavi & Yoo, 1997a) propose a leadership emergence model for globally dispersed teams based on a data set collected from twenty-eight virtual teams working over a period of ten weeks. The model suggests that for team leaders to be influential, they must excel in electronic communication technologies besides traditional communication skills.

Management controls the resources required for teams to be effective. While little previous research relates directly to management, it seems clear that the level of management support is positively related to the ability of teams to perform. (Sundstrum et al., 1990) demonstrated a positive relationship between an organizational culture that is supportive of teams and team effectiveness, although for a collocated team.

Just as the organizational culture must support global teams to ensure their effective performance, management support for cultural diversity should also be positively related to the performance of culturally diverse global teams. For example, researchers suggest that the climate for diversity influences individual affect, which in turn impacts employee contributions to the organization.

Research that shows the importance of the value congruence between the firm or management and its employees (Meglino et al., 1989) is consistent with the notion of the effect of a supportive climate on individual and team performance.

In the context of globally dispersed teams, training becomes even more important to the corporation, as employees must be competent with communication technologies and teamwork skills required to make teams effective. The adequacy of training, including technical and team skills, has been shown to be significantly and positively related to both employee satisfaction and managerial judgments of team effectiveness. Researchers suggest that initial training for teams should include training in-group decision-making and the job skills necessary for accomplishing multiple skill tasks. Despite the intuitively obvious need for team training and a significant amount of research, the empirical evidence in support of the link between the level of team training and team effectiveness is not. (Hequet et al., 1996) urges that the best way to accommodate geographic diversity in globally dispersed teams is to give all team members the same training, regardless of location, and then turn them loose to learn how to work together.

2.6.4 Collaboration-Enabling Infrastructure

One of the most difficult things for globally dispersed teams is for members to "see" and "feel" what's happening above and around them in the organization. In the absence of physical contact to key parts of the organization, team members often feel disconnected which may adversely affect their effectiveness. When teams are co-located, members often sit in on briefings, company announcements, and meetings of related teams. This problem is exacerbated when there is a critical mass of members in one location and smaller groups elsewhere who will always feel that they are missing out on the action (Latane et al., 1995).

Team performance is greatly influenced by the physical workplace. Both the body and the mind are affected by workplace factors (Li and Williams, 1999). The sensory environment - sights, sounds, and physical sensations - can quickly overload individuals' information-processing capacity and reduce productivity. Workplaces continue to get more crowded, noisy, and distracting as globally dispersed team members deal with varying conditions at local workplaces. Variables such as the complexity of work and individual coping behavior must be dealt with as the physical workplace is set up. Individual and team workspaces must allow users some flexibility and control if organizations wish to optimize the "intellectual capital" they have invested in developing.

With all the literature devoted to change in the workplace, discussing either the role of technology or the need to restructure organizations, little attention has been paid to the physical workplace and how space can limit or shape both work and the application of technology. (Becker & Steele, 1995) look at workflow patterns, the status and identity aspects of space and location, the need for flexibility, the growing role of teams, health factors, and the unique characteristics and technological requirements of globally dispersed team members. With graphic illustrations and examples from Levi Strauss, Chrysler Corporation, Steelcase, Chiat/Day and others, (Becker & Steele, 1995) show how to plan, design, and manage a total workplace in which space is a tool for achieving business goals, not a drain on profits.

Based on a four-year research project of the Space Planning and Organization Research Group (SPORG) of MIT's School of Architecture and Planning, (Horgen et al., 1998) explores how to impact work processes through workspace — processes that are already impacted by the company's culture, resources and technology. (Horgen et al., 1998) explores how the workplace interacts with work practices, introducing proven strategies and providing a sound framework for creating the workplace of the future. The authors introduce a "process architecture" framework - a design development approach that responds to an organization's request for a changing workplace, or "workplace-making." Using cases from MIT Research Building, Somerville Hospital, Ainsley Building, and Pensacola Project, (Horgen et al., 1998) provide a comprehensive explanation of the approach and framework "Process architecture" has four characteristics: 1) It moves toward the objective of dynamic coherence - Space, Organization, Finance and Technology are in sync. 2) It extracts benefits from uneven development - cause and effect of innovation from one part of an organization to another. 3) There is an ongoing process of design inquiry - does not begin with a clear objective & proceed systematically, a coherence between workplace and work processes are followed by a benefit from the "workplace – making" process to the entire organization. 4) Its participants are collaboratively engaged - management and stakeholders benefit more to needs of the organization when they are involved in the "workplace-making process." (Zelinsky, 1998) presents "alternative workplaces" to cater to globally dispersed team members. Using examples, plans, designs, and photographs of twenty major corporations - from IBM to Pacific Bell (Zelinsky, 1998) identifies the following steps for creating "alternative workplaces": is the first design guide to the newest trends in office design today. Designers, facility managers, executives and real estate professionals will find the most cutting edge information on: sell the concept to senior management; deal with up-front technology expenditures; provisions the telecommuter's home office; apply traditional policy and

law in the environment. (Smith and Kearny, 1994) show readers how to design workplaces so they support good performance, instead of getting in the way by drawing on research from environmental and cognitive psychology, workplace design, human factors, organizational behavior, and performance technology. Starting with the premise that mental and physical workloads can cause overloads in teams, (Smith and Kearny, 1994) illustrate the connections between physical and sensory work environments and team performance. Overloads typically affect people in different ways. For example, individuals that are known to be high screeners (employees that can filter out distracting noises while working), can normally work in noisy work areas without having any problems stemming from mental overload. In contrasting, low screeners are employees that have more difficulty filtering out distracting work noises, and typically have more stress related illnesses. Once it is determined how a person deals with distracting work environment noises, they can be more closely matched with work environments that minimize mental overloads.

Human performance is greatly influenced by the physical workplace. Both the body and the mind are affected by workplace factors. The sensory environment—sights, sounds, and physical sensations—can quickly overload individuals' information-processing capacity and reduce productivity. Workplaces continue to get more crowded, noisy, and distracting as cost-saving measures pack people closer and closer together. Variables such as the complexity of work and individual coping behavior must be dealt with as the physical workplace is set up. Individual and team workspaces must allow users some flexibility and control if organizations wish to optimize the "intellectual capital" they have invested in developing. All workers need adequate work surfaces to spread out materials, storage space, adequate lighting, and furnishings that fit their bodies. To work productively, knowledge workers need the ability to remove or postpone interruptions. Workers with routine tasks need visual and auditory stimulation to stay focused on their work.

2.7 Information Sharing in Global Teams

In many organizations, there is a cultural bias against information sharing. Ash (1997) talks about information silos in every company; Myers & McLean (1997) note that individual performance evaluations don't generally consider information sharing, that many managers lack the commitment to share information, and that staff see too few role models to emulate. (Allee, 1997) reports data from companies like Chevron that are now realizing that the development and sharing of best practices (information about activities which led to knowledge that was applied to

a given situation) leads to a dramatic, positive impact on the business bottom line. (Davenport, 1997) includes information from more than 30 major firms to contend that in today's information rich environment, organizations must create organizational behavior, information systems and team processes to combine and integrate the wide and diverse sources of data and information.

2.8 Team Performance

There are a number of theories that discuss the developmental stages of team performance. One of the most widely used team performance theories is comprised of five stages: forming, storming, norming, performing, and adjourning. Initially, during the socialization phase of team formation, members are just beginning to learn about one another. The group then moves into the storming stage, where members become more proactive and take on specific tasks and roles. A real sense of cohesion in the group develops in the norming stage. During the performing stage there is an increase in task performance as deadlines approach. Finally, like most teams, the task ends and the team adjourn.

This theory was initially applied and tested in traditional team settings. Researchers propose that global teams progress through four stages of development: initiation, exploration, integration, and closure. The first stage, initiation, is similar to the first stage of other models and describes the period during which the group forms. During the exploration stage, team interaction is of paramount importance. Interactions can be either uni-directional or bi-directional. Teams that interact uni-directionally tend to operate in a sporadic manner and are unable to communicate content between team members. During the integration stage, members involved in bi-directional communication relationships respect each member's abilities and have open and meaningful interactions. Finally, the group reaches the closure stage. Once again, depending upon the performance level, group members may face a number of different emotions.

2.9 Team Effectiveness

Although *effectiveness* has been defined in several ways, there has been general agreement on its fundamental characteristics. For example, McGrath referred to effectiveness as the *functions* that a team performs, labeling them the production function, the member-support function, and the group well-being function. (Hackman, 1987) used a similar framework, describing an effective team as containing; (a) productivity meeting or exceeding customer expectations, (b) capability for working together in the future, and (c) satisfaction of group members. Following (Hackman,

1987), this dissertation suggests that effective teams can be defined using three criteria. First, the outcomes of the team effort must meet or exceed the standards for quantity and quality as set by the organization. Second, the team experience must satisfy the personal needs of team members. And third, the social processes that allow the team to function must maintain or enhance the capability of team members to work together. (Sundstrom et al., 1990) adopt a definition of team effectiveness that incorporates productivity, satisfaction, and sustainability. Primarily, teams are organized to accomplish the objectives of the organization. Therefore, any evaluation of the effectiveness of a team must include the degree to which the team accomplishes its work. The productivity of a team is defined as the degree to which the team "... *meets or exceeds the expectations of the performance standards of the people who receive and/or review the output...*" (Hackman, 1987). Teams also serve an individual function in the lives of their members (McGrath, 1991). In order for a team to be effective, it is necessary that the process of working together satisfies the social and task needs of the group members, resulting in their being satisfied with their experience in the team. Team member satisfaction also is a likely prerequisite for team sustainability. Team sustainability represents the team's capacity to successfully work together in the future. For example, a team may be productive and deliver a high quality product but the process of accomplishing the task may destroy the group's ability to continue working together. Such a team would obviously be considered less effective than a team that had interacted in such a way as to allow for future productivity. The above-mentioned dimensions of team effectiveness represent the multidimensional nature of effectiveness found in the literature that has been intercorrelated in prior studies. Definitions of effectiveness should include both team-level and individual-level indices of effectiveness.

CHAPTER III

Team Interaction Space

3. 1 The Need for Structured Interaction

This is the age of the networked organization. The industrial world is shifting to a stage where millions of team leaders and members may belong to geographically dispersed or virtual teams. The challenge of accomplishing project goals and assignments without the advantage of being co-located and being able to meet face-to-face is a critical and burning one.

The advantages of going "virtual" are numerous but for the potential to be achieved, significant challenges and barriers must be addressed. For instance, in virtual teams, language, culture, and style differences may be accentuated because of the losses in communication when body language, subtle tones, and facial gestures are not available to add to the spoken word. Misinterpretations and misunderstandings may be heightened if there is no direct way to work through what one member may think he/she heard on the phone conference meeting. Individual interpretations may create situations where each team member unknowingly "does his/her own thing" rather than promoting the team's agenda. The lack or void of relationship and trust may bring the tendency to work to one's advantage, causing problems for other team members. In addition, isolation, loneliness, and the feeling of disconnectedness may erode energy and lessen commitment to the team. The challenge is to keep the synergy and creativity flowing without face-to-face interaction. Keeping the momentum going can be difficult in any situation, but with virtual team members situated at dispersed locations it becomes much more difficult.

Communication is the vehicle for creating the synergy, keeping the team together, and moving forward. Virtual teams have to be deliberate and structured in their coordination efforts. In keeping with the emphasis on keeping the team aligned, multiple types of technologies are used to keep the team together and in alignment [Duarte, 1997; Mayer, 1998]. Teams communicate regularly by telephone, fax, videoconferencing, shared databases, web sites and a myriad of technologies. To ensure that the team members are able to maximize the usage of available communication channels, it is necessary that there is agreement on the usage of these multiple channels of communication. The challenge is to create effective communications across distance.

3.2 What is Team Interaction Space?

There are diverse issues related to bridging temporal, cultural, organizational barriers that are to be considered when a change from a "local" to a "global" environment is effected which might make the process of collaboration complex and difficult to manage. One of the key issues for virtual teams is therefore to set the bounds of their collaboration space. To effectively use this collaboration/interaction space, the individual components, which make up this space, must be identified and their importance to the interaction process understood. For virtual teams, this boundary or interaction space for virtual teams is made up of three components, which can be considered to be the **effectiveness foundations of virtual teams**. These effectiveness foundations making up the interaction space for virtual teams are [Pena-Mora, 1999; Pena-Mora, 2000] shown in Figure 1.

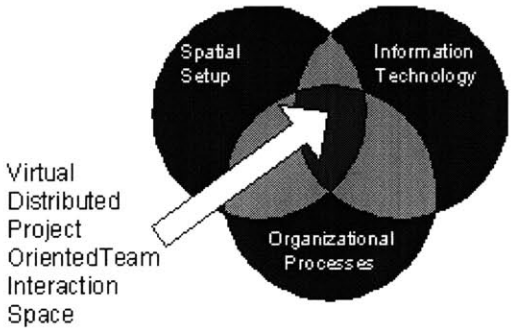

Figure 1: Virtual Team Interaction Space

- **Organizational Processes** – trust building, team culture, meeting processes, team processes and team members' behavior

- **Communication Technology** – audio/video conferencing systems and computer supported communication processes
- **Spatial Setup**
    - Physical space - meeting room layout, office environment, computer/TV positioning, screen layout, placement of audio and video equipment, placement of chairs.
    - Digital Space –web-based team interaction spaces such as collaborative application spaces, team websites, central repositories, and data conferencing servers.

3.3 Organizational Processes

Organizational processes form just one of the three critical aspects of having an effective interaction space for virtual teams. The manner in which virtual teams and indeed their parent organizations implement their team / organizational processes is critical to their success. The critical needs that need to be addressed if a globally dispersed team is to have an effective interaction space are described below.

3.3.1 Bridging the Local – Global Divide

A new twist on the classic tension between differentiation and integration is now playing itself out in the virtual arena, as organizations attempt to develop corporate-wide processes across globally dispersed sites while encouraging local innovation and adaptation. Key issues that need to be addressed if globally dispersed teams need to be bridge the local-global divide are explained below.

3.3.1.1 The Global vs. Local Conflict of Interest

The local-global dilemma is particularly apparent in globally dispersed teams, comprised of part-time team members pulled from their daily jobs at local sites, which are charged with developing common processes. Once the standard processes are determined, individual team members are expected to facilitate the implementation of those processes within their local sites. As such, team members must take the viewpoint of their home location as they move into the global team and, similarly, carry the viewpoint of the global team back to their home sites. Team members develop a shared global perspective of organizational conditions or competitive factors that is

often not understood or appreciated by their local supervision and co-workers [Klein & Barrett 2000].

3.3.1.2 Aligning Priorities

Globally dispersed teams may define their team needs and goals correctly from an organizational perspective, use established team norms and communication protocols, but the application of best practices around team processes and collaboration practices are insufficient if the natural tension between global and local priorities is ignored. Aligning priorities across multiple levels of the hierarchy are essential as is a supportive organizational context. As an example, two extreme scenarios are shown in Table 1. The right hand column describes the optimal outcome [Klein & Barrett 2000].

Table 1: Two Extreme Scenarios [Klein & Barrett, 2000]

	Tug of War	***Global/Local Alignment***
HEADQUARTERS	Standardize local practice	Mutual headquarters/local change
Local	Protect local interests: PR scout Implement piecemeal change	Share best practices Learn best practices Translate/implement best practice
	⇓ Local optimization	⇓ Global optimization
Global Team	***Frustration:*** ***uneven sharing*** ***distrust*** ***"lies"*** ***Narrow shared knowledge base***	*Increased levels of interdependence* ***Expanding shared knowledge base***

If the corporate objective is perceived to be to develop a global practice that will be imposed across all locations, team members will try to steer the team's output to optimize their local situation. Their peers back home will expect them to present their plant in a positive light while protecting their local plant's interests and secrets. They will also be expected to uncover and exploit opportunities to implement improvements made by other plants to optimize their local objectives. As a result, frustration builds within the team due to distrust, uneven sharing of best practices and perceived "lies" or fabrications [Klein & Barrett 2000]. Most of the literature on globally dispersed teams focuses on the importance of team processes and collaborative

technologies to develop trust among team members who are separated by time, distance and cultural barriers, however the influence that corporate and local strategies, practices and cultures play is often ignored. As shown in Figure 2, the willingness of team members to trust one another, share their expertise and their location's best practices, and then help in the facilitation and implementation of global and local change ultimately lies at the intersection between the horizontal (team processes and collaborative technologies) and vertical (global and local) polices and practices. [Klein & Barrett 2000]

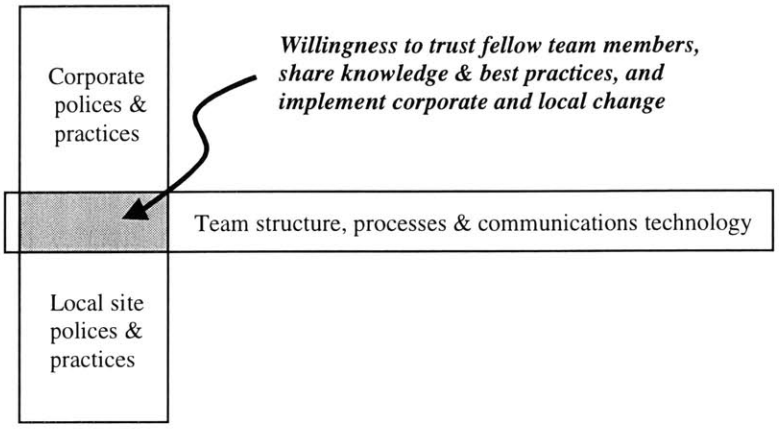

Figure 2: Aligning Global, Local and Team Processes [Klein & Barrett, 2000]

3.3.1.3 Global Teams from Multiple Perspectives

Global team members, by the very nature of their teams, represent a variety of diverse stakeholder interests. It is important to reiterate that the members of these teams are typically individual contributors in the middle or lower ranks of an organization's hierarchy at both the remote (local) sites and at the headquarters unit. It is the combination of the four factors mentioned below that enable team members to look at their local site through global eyes while simultaneously incorporating local needs into the global perspective. The factors are [Klein & Barrett, 2000]

- Headquarters perspective
    - Global business strategy
    - Organizational culture & values toward knowledge sharing
        - Appreciation of value of local knowledge
        - Competition across locations

    - Rewards/promotion/career development
    - Accountability and metrics
- Team member's perspective
    - Career aspirations
    - Employment security
    - Prior global living/work experience
    - Language competencies
    - National culture
- Local site's perspective
    - Long term economic viability of location
    - Organizational culture & values toward knowledge sharing
        - Appreciation of value of corporate or other locations' knowledge
        - Competition across locations
    - Country/national norms
    - Knowledge management mechanisms & technology
    - Resources [e.g., travel budgets, time, staffing]
    - Rewards/promotion/career development
    - Accountability, metrics and priorities
- Team's perspective
    - Perspective on reason for global team
    - Support for team [dependency on local/corporate resources]
    - Composition and stability of team
    - Team leadership
    - Team norms and protocols
    - Team structure [task design & team duration]

Figure 3 shows the different stakeholders in a virtual team environment. For the organizational/team processes to enable the virtual team interaction space to be effective, it is essential that the multiple stakeholders involved in a virtual team are in sync with each other.

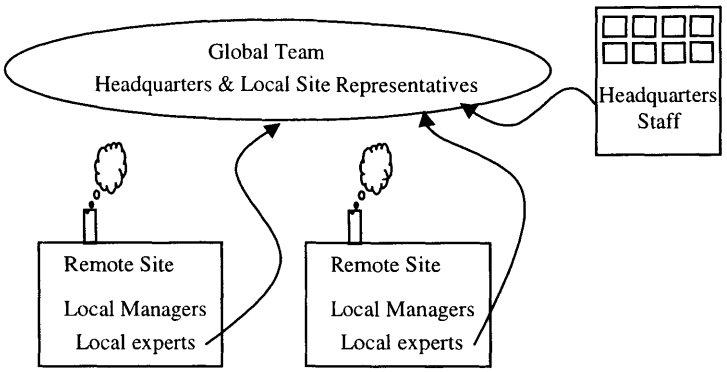

Figure 3: Multiple Stakeholders [Klein & Barrett, 2000]

3.3.1.4 Developing a Total System Perspective

There is a need to take a total system perspective in considering the elements that lead to effective globally dispersed teams. All to often, the research has focused on team structures, dynamics and communication processes -- the center box of Exhibit D. However, the inputs from a global and local perspective have a tremendous impact on how well the team functions and directly influence the perceptions of team members toward their team task and fellow team members. Furthermore, the alignment between those global and local perspectives impacts the degree to which team members are able to reconcile their roles both within the team and their home location. [Klein & Barrett, 2000]

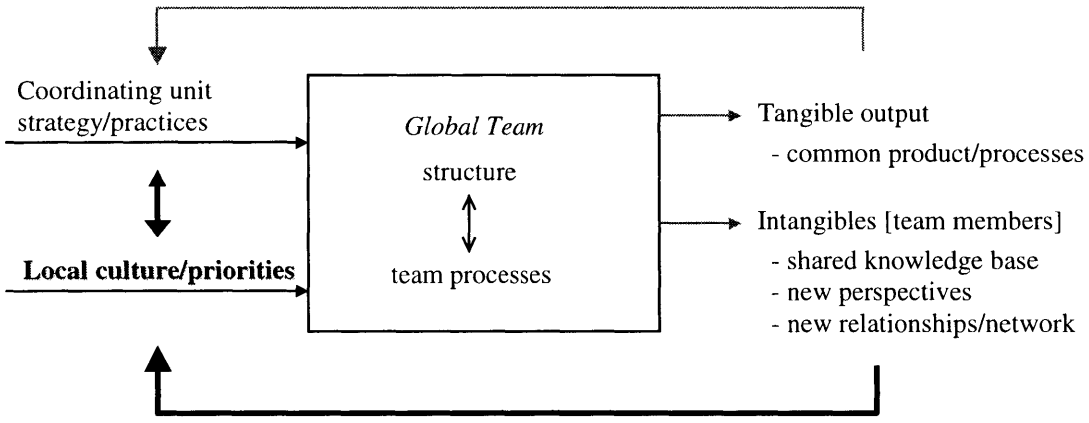

Figure 4: System Alignment [Klein & Barrett, 2000]

3.3.2 Building Trust

It is important to recognize the fact that most virtual teams are formed to perform a specific task. The team members in most cases do not know each other and the "glue" that is holding the team together is trust. The next sections talk in somewhat more detail about trust.

3.3.2.1 The Importance of Trust in Virtual Teams

The process in which virtual team members identify with each other, communicate and share knowledge are related to how much they trust each other and thus is an integral aspect of being a virtual team member. Effective use of the team interaction process also includes having a trusting relationship between team members, which enables collaboration, sometimes even in the absence of clear information available to all. Trust is a critical structural characteristic, which influences the team's success, performance and collaboration. Virtual teams are often very short-lived and hence establishing trust immediately becomes enormously important. [Lipnack, 1997;Haywood, 1997].

3.3.2.2 Measuring Trust in the Virtual Context

Any virtual team may evaluate itself on how it fares in showing commitments and showing results by asking the involved team members to answer the following questions [Lipnack, 1997;Haywood, 1997].

1. Team members meet all deliverable cost and schedule requirements
   a) Never b) Rarely c) Sometimes d) Mostly e) Always
2. In case of not being able to meet commitments, prior notification to others' is given
   a) Never b) Rarely c) Sometimes d) Mostly e) Always
3. The team is committed to sharing knowledge and information as speedily as possible
   a) Never b) Rarely c) Sometimes d) Mostly e) Always
4. Whenever circumstances change, all team members are notified immediately.
   a) Never b) Rarely c) Sometimes d) Mostly e) Always

3.3.2.3 Trust Factors

The important trust-enabling factors are performance and competence. Integrity and concern for others well being. Table 2 summarizes these trust factors and elaborates on them.

Table 2: Suggestions for building trust [Lipnack, '97; Haywood,'97]

	Trust Factors	Examples
PERFORMANCE AND COMPETENCE	Develop and display competence	Focus on individual and team results Acquire new skills keeping in sync with new trends Allow others to be experts Foster expertise and share learning.
	Follow through on commitments and show results	Keep a log of commitments and make them visible to teammates. Keep commitments in cost, schedule and technical areas even if situations change.
INTEGRITY	Consistency in speech and action	Align your behavior in meetings, reviews and at other critical times.
	Stand up for your convictions	Be able to say "I don't agree" even in disagreeable situations. Continue to do the right thing even in crisis situations.
	Stand up for the team	Keep up-to-date to prevent having to defend the team. Don' say negative things about the team unless you are sure about the reasons.
	Communicate and keep everybody informed about progress	Hold regular audio/video conferences and have agenda covering both bad as well as good news.
	Show both sides of issues	Present both pros and cons of issues. Start discussion forums to debate issues.
CONCERN FOR OTHERS' WELL BEING	Help team members during transitions	Rotate both "good" and "bad" jobs. Have uniform processes for selection, rewards and sharing of information
	Be aware of your impact on others	Take your role seriously. Take time to develop interpersonal contacts with team members. Ask others how they perceive your reliability in crisis situations and remedy possible faults objectively.
	Integrate personal, local, team and organizational needs.	Map your decisions on other functional areas so as to reduce the impact of adverse actions in team situations on other spheres of work life.

3.3.3 Trust and Communication

There is a vast difference between the natures of communication between face-to-face and collaborative communication. However, from recent research conducted on the role of communication in engendering trust, it can be said that communication can play a very important role in building trust in virtual teams.

3.3.3.1 Control of Communication

The concept of the control of communication, which plays a big role in determining the effectiveness of the collaboration effort in large measure, is shown in Figure 5 above. In a virtual

environment, since the control of communication is with the receiver, in the absence of a proper collaborative atmosphere the effectiveness of communication will be significantly hampered.

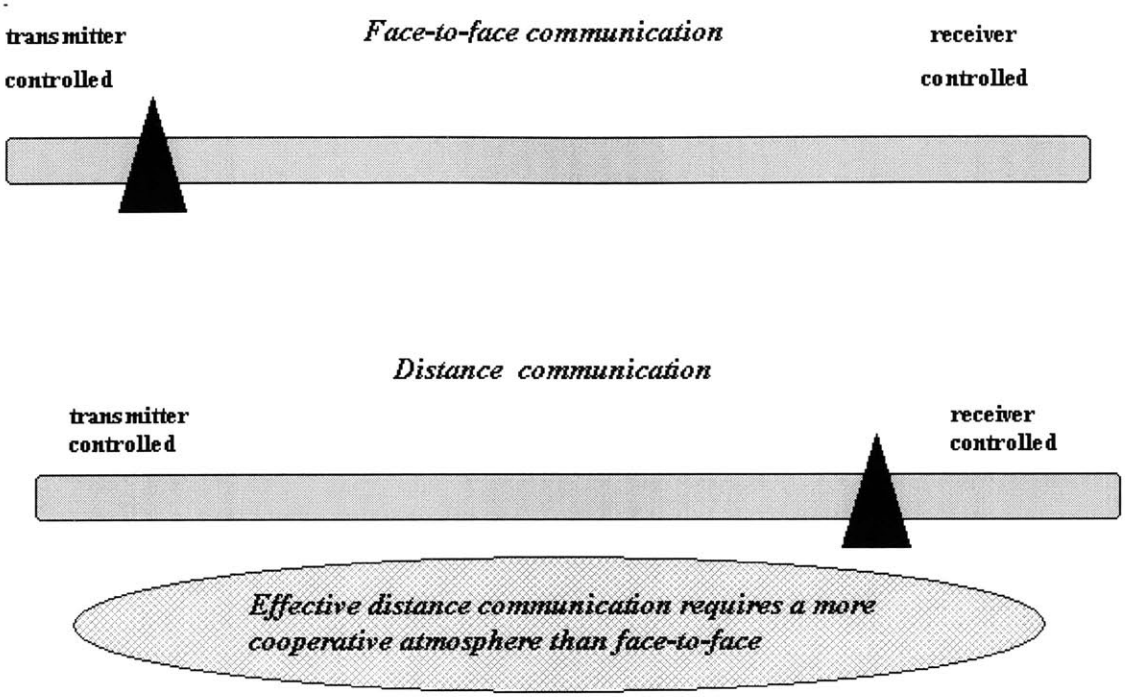

Figure 5: The Control of Communication [Chenier & Picasso, 2000]

3.3.3.2 Spectrum of Conversation: Building a Cooperative Atmosphere

To utilize distance communication effectively, it is essential that the proper environment in which such collaboration is carried out exist. The proper environment can be built through proper interaction. According to [Chenier & Picasso, 2000], the spectrum of conversation can be divided into 5 categories. These are a) conversation of relatedness; b) conversation of possibility; c) conversation of opportunity; d) conversation of action and e) conversation of closure. Table 3 summarizes the utility of these conversation categories and details the signs, which are reminiscent of their absence.

Lessons for communication behavior [Chenier & Picasso, 2000]

- Distinguish the spectrum of conversations - these are the conversations for relatedness, possibility, opportunity, action and closure.

- Provide the missing conversation - "The right words at the right time can make all the difference in the world... Language matters. It's the raw material of collaboration" [Schrage, 1989]
- Make reasoning explicit - articulate underlying facts and inferences
- Make distinctions in language - make language more concrete to reduce ambiguities.

Table 3: Spectrum of Conversation [Chenier & Picasso, 2000]

SPECTRUM OF CONVERSATION				
Relatedness	**Possibility**	**Opportunity**	**Action**	**Closure**
Building common ground. Deeper understanding	Create ideas and possibilities	Converting possibilities into realities	Commitment to actions and results	Commitment to have nothing holding you back
SIGNS IT IS MISSING				
Misunderstandings. Working at cross-purposes. Background conversations, not talking	Lack of vision. Business as usual, low energy, cynicism and arguing for doubts, resignation	Limited choice. Unfulfilled expectations, unengaged and lack of alignment	Piecemeal implementation, lack of results, explanations not forthcoming about what is going on. Things disappearing into a hole	Frustrations, hesitancy, lack of satisfaction, re-work.

3.3.4 Bridging Cultural Barriers

With virtual teams, there is a high chance that the team members are from culturally different backgrounds. The diversity of cultures can be a source of competitive advantage if the team knows how to use cultural differences to create synergy. The most important aspect of understanding and working with cultural differences is to create a team culture in which problems can be surfaced and differences discussed in a healthy manner. [Duarte, 1997; Hofstede, 1991].

The dimensions of culture according to Hofstede [Hofstede, 1991] are

- Power Distance
    - Extent to which members accept that power is unequally distributed
- Uncertainty Avoidance

- Degree to which people feel threatened by ambiguity

- Individualism/Collectivism
  - Primary concern being the individual or the group
- Masculinity/Femininity
  - Visible success (money & power) versus "caring values" such as sharing and group success.

It is very important for the team and the larger organization to rise above the different cultural dimensions and believe/trust in a team/organizational culture, which precedes all of them.

3.3.4.1 Culture and the Team Interaction Space

The team members come from varied cultural backgrounds. Virtual teams usually work under a time constraint and thus, the awareness of different cultures are essential as it can be the cause of a lot of angst and miscommunication. The interactions in the team interaction space helps in solving cultural issues by

- Development of team norms for communication (given later as the usage of communication channels)
- Development of a team culture different from national cultures and unique to the team which helps propagate understanding amongst team members from different cultural backgrounds
- Cultural exercises to come at an appreciation of the varied thinking/perception of people from different cultural backgrounds
- Team member competencies usually include an ability to work across cross-cultural boundaries
- Establishment of team processes ensuring role and goal clarity and understanding in terms of expectations from team members irrespective of cultural differences

A number of cultural exercises are shown below. These exercises stress issues that virtual team members face as part of virtual teams. Although it is not essential, it is always good if a virtual team goes through a cross-cultural exercise like the ones given below. These exercises are particularly helpful, to gain understanding about other peoples' work cultures and develop commonly acceptable norms for working.

3.3.4.2 Cultural Exercise I (Adapted from Win-All-You-Can National Training Laboratories)

If all four teams vote "X"...	*All 4 teams each lose $100*
If three teams take a strong position and one takes an open position...	*The 3 teams taking a strong position win $100 each* *The 1 team taking an open position loses $300*
If two teams take a strong position and two take an open position...	*The 2 teams taking a strong position win $200 each* *The 2 teams taking an open position lose $200*
If one team takes a strong position and three take an open position...	*The 1 team taking a strong position win $300 each* *The 3 teams taking an open position lose $100*
If all four teams take an open position...	*All 4 teams each win $100*

Figure 6: Win All You Can

- The object of this game is to **win as much as you can**.
- The exercise involves four teams that bargain in a cluster.
- There will be at least seven rounds, all of which feature bargaining within the team and some of which feature bargaining among representatives or even full teams in the cluster.
- In each round, each team has to make one simple decision -- whether to take what is termed a "strong" or an "open" position for the negotiations in that round. This is indicated by holding up either a card with the word "strong" on it or a card with the word "open" on it. The gains or losses are tallied at the end of each round, based on your position (strong or open) and the positions taken by the other three teams. Scoring is based on the following payoff matrix for all five possible outcomes:

Table 4: Score sheet for Win All You Can

SCORESHEET				
	Your Position	**Other 3 Positions**	**Dollars won/lost**	**Cumulative Score**
Round 1				
Round 2				
Round 3				

3.3.4.3 Cultural Exercise II (Adapted from Hatzler et al, 1996)

Conducting the exercise

- It should be clearly explained at the outset that there are no right or wrong answers.
- Try and pick questions where there are maximum chances of cultural differences being manifested.
- Select questions from suggestions offered by team members
- Ask everybody to answer the questions, one at a time
- Collect all answers recorded by different team members and pass answers to all team members

Suggested Questions for the Exercise

1. What are the expectations in the area of timeframes?
2. Do people in your culture believe that deadlines are requirements, options or moving targets?
3. How much uncertainty can you accept while working on a project?
4. What kind of leadership do you look for? Does having the choice to make your own decisions motivate you?
5. Do you think in terms of immediate short-term goals or long-term?
6. How much of a problem do you feel if you are using an alien language? If you do have problems, what kind of curtsey would you like to be shown?
7. What is the best means of communication with you?
8. How do you view your equations with people in power? What kind of equation are you comfortable with?
9. How do you view suggestions – call for action, commands or food for thought?
10. How does your culture view the individual? Do you like working in a group?
11. How do you like working with others? What would you consider rude when spoken to you? Are you in favor of formal or casual behavior among ream members?
12. Do you prefer to raise your voice or go through the channels?
13. Do you believe in competition? Is being openly competitive considered rude by your society?

14. How do you feel about being offered bribes or the like? Is it acceptable in your society?

Objectives of The Cultural Exercises

1. To develop respect for each person's preferred mode of communication
2. To prevent misunderstanding and conflict
3. Develop trust
4. Develop acceptable norms of preferred communication
5. Be properly able to judge other's responses base don previous knowledge about cultural bias.

3.4 Technology

Technology is one of the key components of the team interaction space. It is extremely important to ensure that the technology component is well addressed in virtual teams because communication is the means of creating synergy in virtual teams and technology enables communication. Keeping geographically dispersed team members on the same page is a difficult task and without a comprehensive technology infrastructure to facilitate the communication processes virtual teams veritably ensure their failure.

3.4.1 Technology as the Communication Enabler

Multiple types of technologies are used to keep the team together and in alignment [Duarte, 1997; Mayer, 1998]. Teams communicate regularly by telephone, fax, videoconferencing, shared databases, web sites and a myriad of technologies. The most important issues that relate to the use of communication technology and communication in general can be summarized very simply as [Duarte, 1997; Mayer, 1998, Rennecker, 2000]

- Use technology you ***need*** to use
- Use technology you ***know*** how to use and are comfortable with.
- Use technology you perceive as ***fastest*** relative to what you want to achieve.
- Use technology that ***works***
- Do not assume that others think like you on these issues.

3.4.2 Collaboration Technologies

The term **collaboration-based technologies (CBT)** are used to describe the entire category of electronic options available to a virtual team. It is a very broad term covering the spectrum of electronic systems that integrate software and hardware to enable communication and collaborative work. CBT can be broadly divided into two categories

- Asynchronous
    - E-mail
    - Group calendars and schedules
    - Bulletin boards and websites
    - Non-real-time database sharing and conferencing
    - Work-flow applications
- Synchronous
    - Desktop and real-time data and application conferencing
    - Electronic meeting systems
    - Video conferencing
    - Audio conferencing

The different synchronous and asynchronous technologies mentioned above all have their good and bad points. The pros and cons of using each of these technologies in each of the categories mentioned above are shown below for a better understanding about the possible advantages of using one over the other based on requirements. [Hatzler, 1997; DISEL Handbook, 1999-2000]

Table 5: Summary of Collaboration Technologies

CBT	Generating Ideas	Problems with Answers	Problems without Answers	Negotiating Technical and Interpersonal Conflicts
Desktop and Real-time Conferencing (chat only)	Good for Brainstorming, generating ideas about plans Not good for Voting on ideas, prioritizing them	Good for Collecting data, analyzing trends Not Good for Organize/prioritize/analyze data	Good for Listing/discussing options	Good for Stating opinions

Table 5: Summary of Collaboration Technologies (contd.)

CBT	Generating Ideas	Problems with Answers	Problems without Answers	Negotiating Technical and Interpersonal Conflicts
Multipoint, Multimedia, Real-time Data Conferencing	Good for Sketching ideas and concepts Not Good For Brainstorming	Good for Listing/displaying data, working on documents	Good for Listing/debating/prioritizing options, decision making	Good for Stating/discussing opinions Reaching compromises, deciding among optional approaches
Electronic Meeting Systems with Audio	Good for Brainstorming, voting/prioritizing, reaching consensus Not Good For Depicting complex concepts and processes, scenarios or graphs	Good for Defining problems/ reaching consensus Not Good For Performing in-depth analysis, displaying and diagramming data	Good for Listing/prioritizing options, making decisions Not Good For Deciding on ambiguous topics	Good for Stating/discussing opinions Reaching compromises, deciding among optional approaches Not Good For Resolving inter-personal conflicts
Electronic Presentation with Audio	Good for Brainstorming, sketching ideas, drawing concepts Not good for Voting on ideas, reaching consensus	Good for Listing data, displaying data, discussing trends Not good for Detailed or complex analysis	Good for Listing/debating options Not good for Prioritizing options, decision making and making difficult judgments	Good for Stating /discussing opinions Not good for Reaching compromises, deciding among a number of technical approaches
Video and Audio	Not Good for Brainstorming, reaching consensus about complex topics	Good for Defining problems, prioritizing options, making straightforward decisions Not good for Displaying complex data, performing analysis	Good for Listing options/ debating options Not good for Making complex judgments	Good for Reaching compromises, stating and discussing opinions Not good for Resolving inter personal conflicts

Table 5: Summary of Communication Technologies (contd.)

CBT	Generating Ideas	Problems with Answers	Problems without Answers	Negotiating Technical and Interpersonal Conflicts
E-Mail	Good For Discussing ideas and plans, exchanging comments, revised plans and documents Not Good For Brainstorming, prioritizing, outlining, voting on ideas, reaching a consensus	Good For Collecting data, discussing trends Not good for Discussing trends and collecting data, displaying data	Good For Listing and discussing trends Not good for Debating options, voting on options, deciding among several optional approaches	Good for Stating opinions Not good for Discussing opinions, reaching compromises
Bulletin Boards and Websites	Good for Brainstorming, generating ideas Not Good for Voting, prioritizing, reaching consensus	Good for Collecting data and discussing trends Not good for Organizing complex data, discussing and prioritizing data	Good for Listing options Not good for Discussing, debating, voting on options	Good for Stating opinions Not good for Reaching compromises
Non real-time data conferencing	Good for Brainstorming, commenting on products, collaborative authoring Not Good For Voting on ideas, prioritizing	Good for Collecting data and discussing trends Not good for Organizing complex data, discussing and prioritizing data	Good for Listing options Not good for Discussing, debating, voting on options	Good for Stating opinions Not good for Reaching compromises

3.4.3 The Minimum Technology Requirement

An organization always has a wealth of CBTs to choose from but a relatively simple suite of technologies should always be present. However, it is essential that the facilities provided to the team mirror the actual needs of the team in electronic communication and collaboration tools. A global team needs to communicate and work collaboratively, and the minimum set standards of technology include [Hatzler, 1997; DISEL Handbook, 1999-2000]

i. Telephones
ii. Audio conferencing equipment
iii. Voice mail
iv. Fax capability
v. Access to common e-mail system allowing people to send messages and exchange files
vi. The presence of a team website is essential.
vii. For conferencing purposes, there should be adequate bridge facilities with toll-free access from home, work or anywhere with the contact information for the bridge being easily accessible.
viii. Skill in using electronic collaboration equipment should be distributed equally among the team members from different functional, geographic and partner organizations.
ix. The technology in use should be the same everywhere wherever they are located.
x. Video-conferencing, scheduling, real-time data conferencing, electronic meeting systems, collaborative writing tools and collaborative whiteboards can be added if the strategy calls for intensive collaboration work or if sufficient information system resources exist to make the technology work reliably.

3.5 Spatial Setup

The spatial setup of a globally dispersed team is one of the key components of its team interaction space. More often than not, virtual teams do not pay attention to using its spatial setup effectively. The components of the spatial setup of the team interaction space are described below.

3.5.1 Spatial Setup Components

Spatial setup for a globally dispersed team can be broadly subdivided into

- Physical space - meeting room layout, office environment, computer/TV positioning, screen layout, placement of audio and video equipment, placement of chairs.
- Digital Space –web-based team interaction spaces such as collaborative application spaces, team websites, central repositories, and data conferencing servers.

To enable collaboration or to provide support for a globally dispersed team, both the aspects of spatial setup mentioned above need equal attention.

3.5.2 Physical Space

The physical setup is important when the emphasis is on synchronous communication, as in meetings. The physical setup of rooms used for meetings should engender the spirit of collaboration. The ideal seating arrangement for meetings is shown in Figure 12. For comparison, the seating arrangement of a team, which does not induce collaboration, is also shown in Figure 11. [DiSEL Handbook, 1999- 2000].

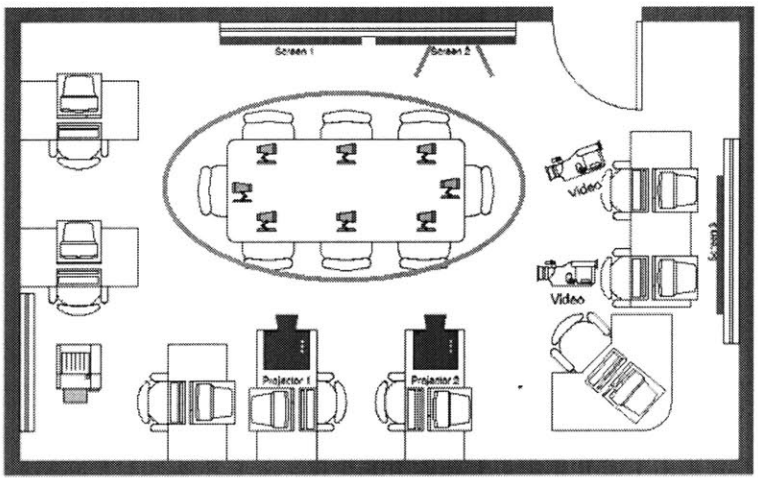

Figure 7: Physical Setup for Meetings

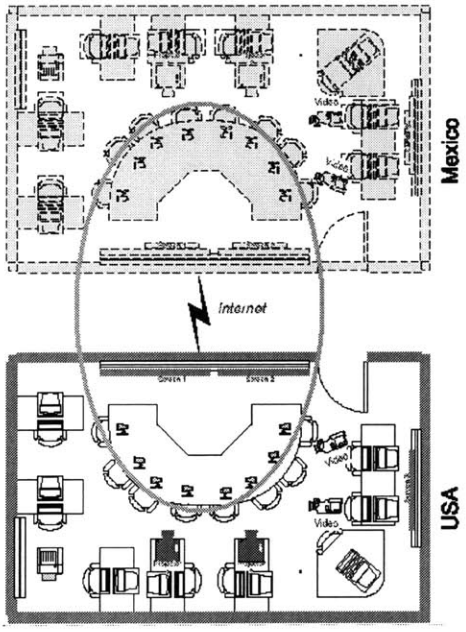

Figure 8: Ideal Setup for Meetings

3.5.3 Digital Space

The importance of having a common shared vision and common understanding of team tasks is immense. Thus a set of support methodologies that are going to implement all of proposed suggestions for proper communication processes in the team as well as for fostering trust becomes very important. The support methodologies can well be implemented in the form of a team website where team information, team member information, the team communication norms as well for information sharing for project purposes can come together.

3.5.3.1 Personalized Team Website

A **personalized team website** can play a very important role in the team dynamics, if the concept is exploited well. The team website should be something which the team has made its own. This could help to define a common goal definition, common understanding of usage of communication channels and a better knowledge of remote locations as the site not only provides relevant project information but also personal information of all team members. Such a website should provide the following information

- Site List – the names of the dispersed sites where the virtual team members are located.
- Member List – the list of team members sorted by site so that they can be more easily identifiable.
- Time – the times of all the sites where the team has members
- Interaction Protocols – a common contract/ agreement of the team members on a list of communication protocols, which serve as support methodologies as well as active communication channel usage guide to all team members to be respected and followed. The protocols are divided into
    - Issues – a group/collection of issues considered important for consideration of the team members so that they can agree upon how best to coordinate their communication efforts
    - Suggestions – a list of suggestions for the usage of different communication channels is also provided.
    - Agreements – a set of agreements in any of the interaction categories.
- Repository – this team website can also serve as a data repository for the team for all related documents and sharing these documents. The data repository should provide team

members to upload and download files, as well as allow them to change the submitted files. The repository should provide a log of such changes committed to submitted files and information pertaining to these changes, notably the person who created the file, the list of people who have actually modified the file and the date and time of the file modification. It should be possible to rollback to previous editions of the same file.

- Information Categories – these include categories like weather and news created by different site members. The different sites can then fill in the details for their local site and thus, the team website would reflect information about the local sites that the sites want to show and which would be reflective of the local site information. These help in relating to remote team members on a personal level and can serve as the basis for personal interactions.

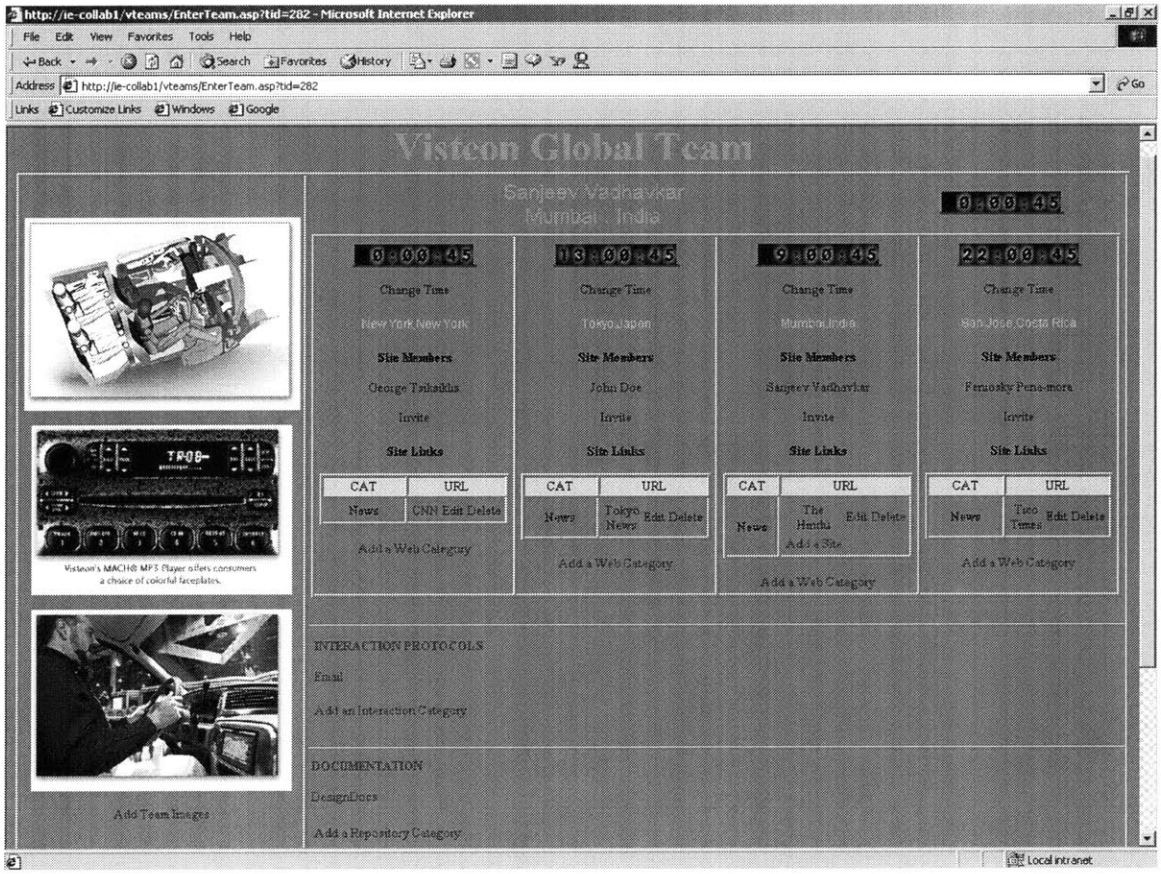

Figure 9: Team Website Main Page

The screen dump of the team website main page, shown in Figure 9. The following information is available for the team

- The team name highlighted prominently on the top
- The name, location and the local time of the current team member viewing the web page.

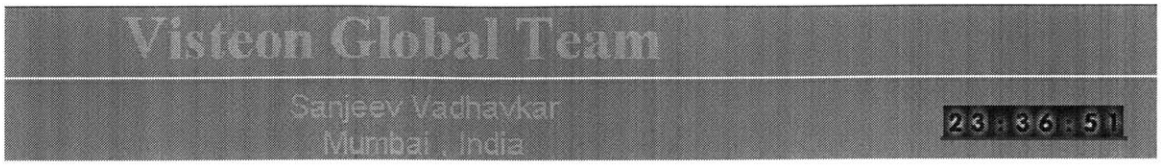

Figure 10: Team and Specific Team Member Info

- A group of team images representative of the team project or the reason for the team's coming together shown in Figure 11

Figure 11: Team Images

- Figure 12 captures all the site-specific information.

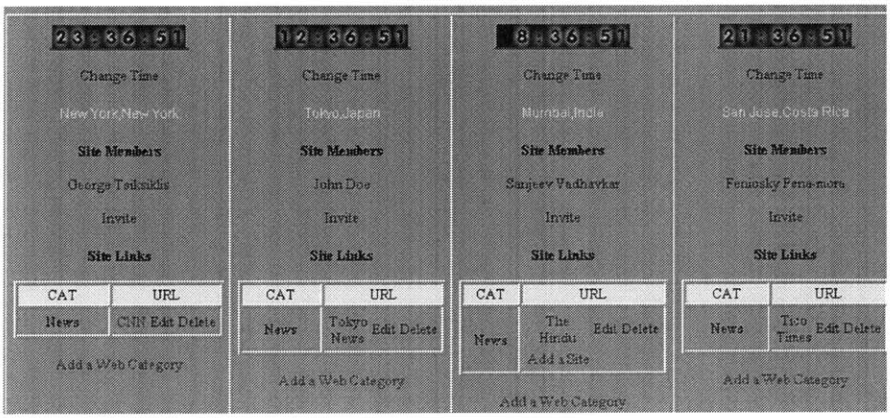

Figure 12: Team Site Information

The site-specific information that is displayed on figure 12

- The location of the site, city and country
- The local time for that site
- The names of the team members belonging to that site
- The information or web links created by the members of the local site

- The interaction protocols that the team has created
- The repository categories that the team has created

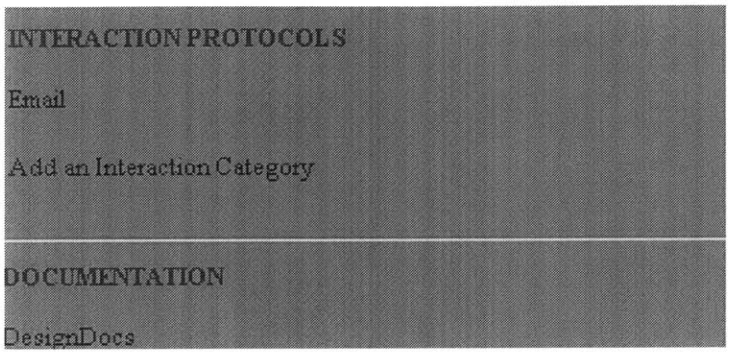

Figure 13: Team Interaction Protocols and Repository

The interaction protocols can be followed as a link. The information on the shown information protocol, in this case, email, is shown below. For each interaction protocol, the following information is available.

- Issues that the team has created in that interaction protocol.

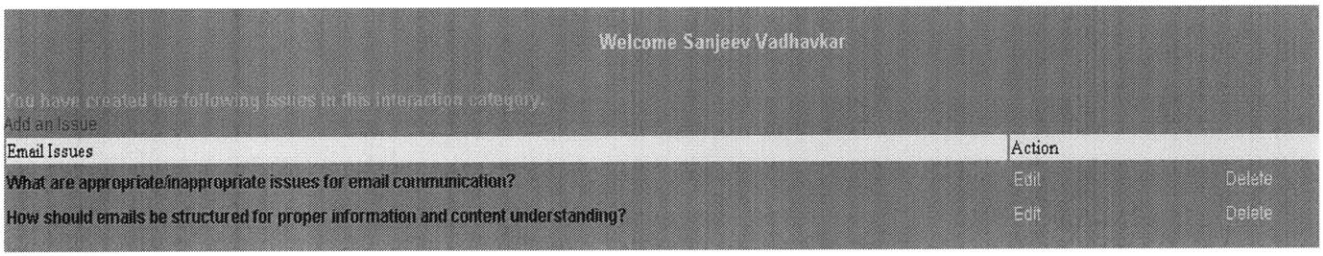

Figure 14: Interaction Protocol Issues

- The suggestions that have been made by different team members about using that interaction medium

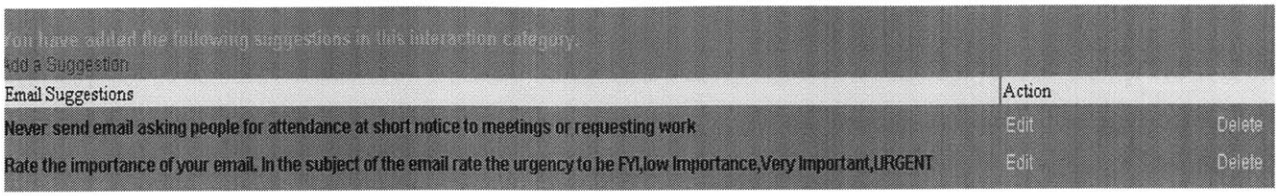

Figure 15: Interaction Protocol Suggestions

- The agreements that the team has reached, as regards using the specific interaction medium.

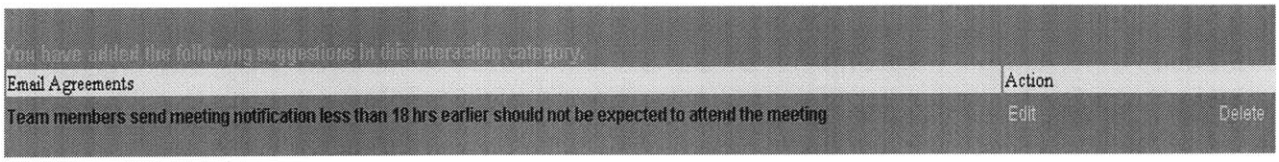

Figure 16: Interaction Protocol Agreements

In the case of repositories, for each repository category, the following information is displayed

- The names of the posted files in the specific repository category.
- For each posted file, the following information is displayed
    - The latest name of the file
    - The name of the original file creator
    - The name of the last file modifier
    - The date of last modification of the file
    - The different actions that can be taken on a file
        - To view, edit and delete the file
        - To view its past history. The actions that can be taken by viewing the file history are
            - List all the past versions of the file
            - The date and name of the person responsible for the file modification
            - The ability to rollback to an earlier version of the file

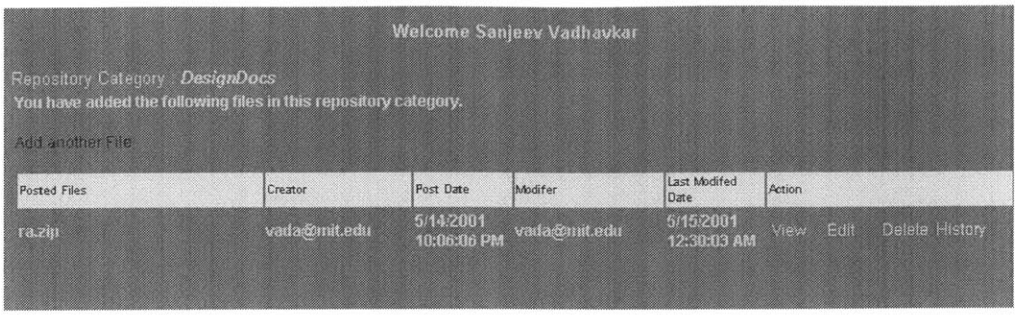

Figure 17: Repository Category Files

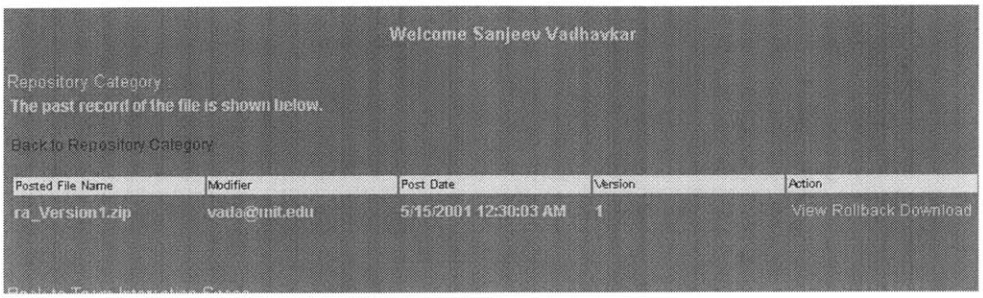

Figure 18: Repository Category file's History

Team Website Features

- Ability to add and remove posted team images
- Invitation of new members
- Ability to modify site –specific information (only by the local site members).
- Ability to create/modify and delete information category items.
- Ability to create, modify and delete interaction protocols
- Ability to create/modify and delete repository categories. Ability to add/update and delete files in any of these repository categories.
- Ability to regulate the team member permissions. The process of setting user permissions is shown below in Figure 19.
    - Users – can create information/interaction categories, delete whatever they themselves create. However, they cannot add Agreements in the different interaction protocol categories.
    - Power users – ability to modify issues and suggestions in interaction categories and information links created in information categories by other users.

- Supervisors – can created agreements in different information and interaction categories.
- Administrators – ability to modify other user's permissions.

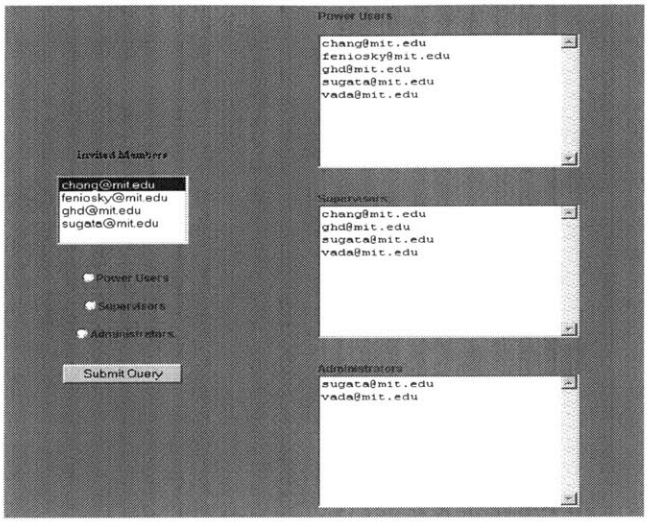

Figure 19: Setting User Permissions for a Created Team

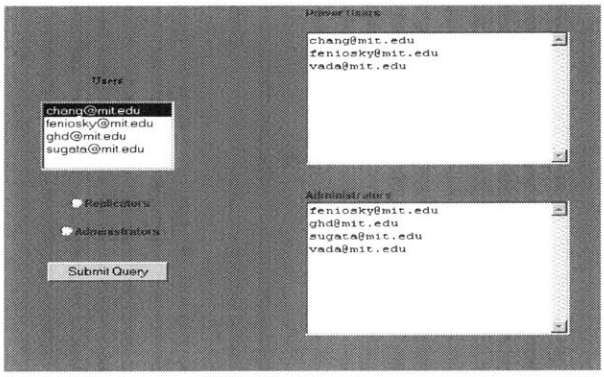

Figure 20: Setting File Permissions for Users

- Ability to set/change file permissions. Figure 20 captures the process of setting file permissions.
  - Authors – can add, edit and delete files
  - Replicators – can modify files created by others.
  - Administrators – can delete files created by others.

CHAPTER IV

Interaction Space Effectiveness Framework

4.1 Team Interaction Space – The Bigger Picture

The last chapter identified the boundary of the collaboration space in which virtual teams conduct their interactions. It also identified the three key components that make up this virtual interaction space. However, what is needed is to relate the components of the team interaction space or "where teams interact" to the work process that they follow to achieve their goals or "how they interact". Virtual teams come together for a specific purpose in mind – they are asked to achieve specifically set goals. It is imperative that these teams learn how to do the "how to interact" part of the interaction effectively so that they can do their work with minimum resistance. This is only possible if the risks/problems/challenges that these teams face in doing the "how to interact" part are clearly identified beforehand and even while they are involved in their interactions. Once the teams know what are the problems that are hindering their efforts, they can try to improve their interactions inside a framework, which lets them identify current problems that they face, suggest way/means in which these problems might be handled in a self-sustaining iterative manner. This chapter attempts to address the issues captured above by

- Identifying barriers to effective interaction in the team interaction space
- Recommending an infrastructure/framework where the team can carry out its interactions
- Specify a medium of measuring the team performance, which would identify current problems as well set targets that the team can aspire to improve their performance

- Specify a medium of measuring the team performance, which would identify current problems as well set targets that the team can aspire to improve their performance

4.2 Barriers to Effective Interaction in the Team Interaction Space

In order to make productive use of the virtual team interaction space, virtual teams need to identify the barriers to effective interaction in the team interaction space. The effectiveness barriers have also been grouped under the heads of team/organizational processes, technology and spatial setup,

4.2.1 Effectiveness Barriers – Organizational/Team Processes

Table 6: Effectiveness Barriers - Organizational/Team Processes

EFFECTIVENESS BARRIERS – ORGANIZATIONAL/TEAM PROCESSES	YES/NO
Language barriers	
Cultural barriers	
Distance barriers	
Insufficient team member motivation	
Ineffective organizational information flow	
Improper group composition and lack of complementing competencies and inadequate combined skill set	
Insufficient role and goal clarity and definition	
Ineffective task control	
Lack of management support	
Lack of group norms	
Lack of trust	
Inadequate organizational/job tenure and instability of membership because of inadequate transition management	
Inadequate size of team	
Inappropriate amount of employee empowerment	
Reconciliation of quantity of work vs. the quality of output from team members	
Congruency between personal and team evaluation of work both formal and informal	
Structured and agile decision-making	
OTHERS	

The effectiveness barriers faced by a virtual team in the organizational/team processes domain is usually a subset or a combination of the barriers enumerated in Table 6. However, it is quite possible that specific teams face additional barriers not enumerated here. Virtual team members can use this to identity the set of effectiveness barriers applicable to their own global team.

4.2.2 Effectiveness Barriers – Communication Technology

The effectiveness barriers that a team faces in technology domain are usually a subset or a combination of the barriers enumerated below. However, it is quite possible that specific teams face additional barriers not enumerated here. Virtual team members can use this to identity the set of effectiveness barriers applicable to their own global team.

Table 7: Effectiveness Barriers - Communication Technology

EFFECTIVENESS BARRIERS-COMMUNICATION TECHNOLOGY	YES/NO
Inadequate technical accessibility	
Inadequate technical expertise	
Insufficient protocols for use of communication channels	
Power/functionality offered by technical resources	
Lack of commonly available technical resources	
Insufficient expertise of using shared resources	
Inadequate use of technical facilities	
Insufficiency of information notification system	
Inadequacy of technical training	
Language/cultural influence in interpreting information coming through information channels	
Ease of use of technical facilities	
Reliability of technologies used	
Speed of communication	
OTHERS	

4.2.3 Effectiveness Barriers – Spatial Setup

The effectiveness barriers that a team faces in spatial setup domain are usually a subset or a combination of the barriers enumerated below. However, it is quite possible that specific teams face additional barriers not enumerated here. Virtual team members can use this to identity the set of effectiveness barriers applicable to their own global team.

Table 8: Effectiveness Barriers - Spatial Setup

EFFECTIVENESS BARRIERS - SPATIAL SETUP	YES/NO
Physical Space	
Improper meeting room layout	
Inadequate resources – lights, microphones, screens, speakers.	
Improper positioning of technical resources	
Inadequate skills of members to use technical resources for better use of physical space	
Digital Space	
Inadequate utilization of online resources	
Insufficient technological reliability, ease of use, excessive response time	
Inadequate technical training of team members	
Improper layout	
Improper mobilization of team website or common web repository	
Inadequate usage of digital resources for meetings	
OTHERS	

4.3 Virtual Team Interaction Framework

The previous chapter dealt with the fundamental constructs of the virtual team interaction space. The previous sections of this chapter described the barriers to team interaction space effectiveness. However, it also should be understood that virtual teams do not function in a vacuum. These virtual teams function inside a virtual team interaction framework [Pena-Mora, 1999; Pena-Mora 2000], which captures the interactions in a holistic sense. The interaction framework includes the whole range of activities, from interactions carried out in the interaction space, to observing the barriers to effective interaction in the interaction space comparing them with the desired state, making adjustments to remove these barriers and mapping team performance to a team interaction effectiveness continuum (discussed later) to identify areas of improvement as well as evaluate the team's performance. This interaction framework also captures the iterative nature of the interaction process. Thus, it can be said that this interaction framework represents the iterative cycle in which virtual teams function. The iterative steps as shown in Figure 21 are

- Identify barriers to team interaction space effectiveness through observation of the interactions carried out in the interaction space (deviation from desired state as indicated by effectiveness targets)

- Position the team in the team interaction space effectiveness continuum (discussed later)
- Evaluate the revised team interaction space effectiveness targets after positioning the team on the team interaction space effectiveness continuum
- Enhance/provide goals for further interaction in the interaction domain/space
- Iterate the cycle over time, as the interactions are dynamic and as the framework shows the cycle is repeated over time

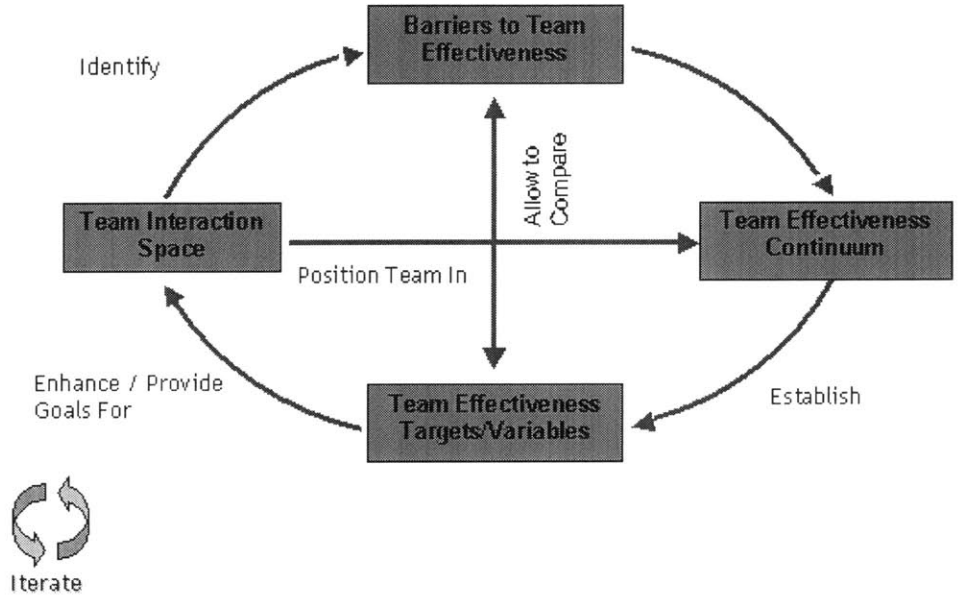

Figure 21: Virtual Team Interaction Framework

4.4 The Virtual Team Interaction Space Effectiveness Continuum

The interaction space effectiveness continuum is a spiral curve mirroring the real life growth of a virtual team from its inception when it is just a collection of combative people with conflicting ideas to an optimized group with efficient processes for effective use of the virtual team interaction space. What needs to be stressed however is that a team newly formed, can join the spiral curve at any level of proficiency on the team interaction space effectiveness continuum. Even small deviations in team composition or the environment can move the team up or down the team interaction space effectiveness continuum. The effectiveness continuum relates the team to the effectiveness barriers, which hamper the team from a more effective interaction, to the effectiveness targets that they would expect to achieve as they improve their interaction process

over time. The effectiveness targets are the indicators of the team interaction performance and are measures/deliverables that the interaction process would have at specific and defined checkpoints. The metrics/checkpoints that serve as indicators of what is wrong or what are the barriers to their interaction, which they need to consider and eliminate. The interaction space effectiveness continuum is shown in Figure 22 below.

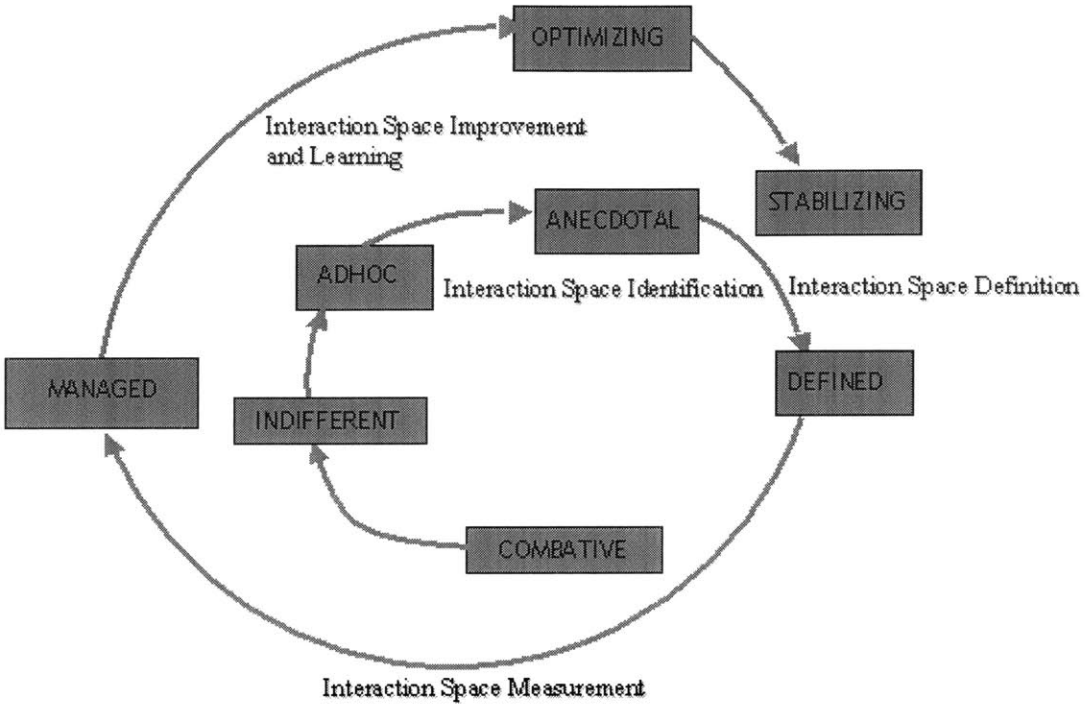

Figure 22: Virtual Team Interaction Space Effectiveness Continuum

The different stages in the team effectiveness continuum are [Pena-Mora, 1999; Pena-Mora 2000]

- Combative
    - Lack of team alignment
    - Interpersonal conflict and disregard for others
    - Technology used as a means to stress the inequalities as a measure of importance
- Indifferent
    - Total lack of disregard for team issues.
    - Lack of interest in team
    - Technology misused and stresses the disenchantment of members in the interaction process

- Adhoc
    - No available standards
    - Interaction processes undefined
    - Effective by chance and chances of successful replication remote
- Anecdotal
    - Some standards, mostly borrowed
    - Communication primarily push
- Defined
    - Team has its own set of protocols whose applicability and need are not well understood
    - Team has identified some barriers and their relation to team effectiveness
- Managed
    - Defined and documented interaction processes
    - Communication transitioning from push to pull
    - Infrastructure for building and utilizing corporate memory in place
- Optimized
    - Improved global learning
    - Ability to work anyplace and anytime
    - Team metrics optimized regularly
- Stabilization and Improving
    - Steady state, which can be impacted by several disturbances thus bringing the team interaction space effectiveness down to any of the above stages

4.5 Assessing Virtual Team Interaction Space Effectiveness

> *Information and communication technology provides an infrastructure for the corporation to communicate with customers and deliver information necessary for decision making...if the management insists on maintaining a purely functional organization or does not empower workers, information systems will add little value*
>
> Says Bill Davidow, former HP and Intel executive [Duarte, 1997]

This thesis has delved into what constitutes the virtual team interaction space, the pillars or building blocks of the interaction space and the framework in which such interaction is carried

out. It has also identified several barriers to team interaction space effectiveness grouped under the three heads of organizational/team processes, technology and spatial setup. The activities carried out under the aegis of the team interaction framework include the interactions carried out by the virtual team in the team interaction space, the identification of the team interaction space effectiveness barriers and evaluating the team's interaction space effectiveness.

The evaluation of the team interaction space effectiveness and subsequently positioning the team on the team interaction space effectiveness continuum is based on evaluating the team's activities in the team interaction space on a number of counts. The MIT Research team has developed a collaborative survey, which is designed to evaluate the team's interaction space effectiveness. The collaboration survey is given in the appendix. However, the diverse elements, which are investigated to judge the team's interaction space effectiveness, have been summarized below. These elements are [Manasseh, 1999;Prodonoff, 1999;Yang, 1999]

- Communication Technologies – The virtual team will be using a suite of communication technologies to facilitate their interaction with dispersed team members. There are a number of issues pertaining to the use of these communication technologies. Some of the broad issues are

    - The needs of the team and the relevancy of the communication technologies in fulfilling these needs
    - The capability of these technologies in terms of usability, functionability and reliability
    - Facilitation of team interaction processes by using adequate communication technologies
    - Support for the team in using these technologies
    - Adequacy of the technologies used in providing reliable and correct information adequately for working purposes

- Team Interactions – the team interacts predominantly through virtual conferences and through asynchronous means. The important issues in team interaction processes are

    - The degree of interest in team processes among local and remote team members
    - The effectiveness of face-to-face and virtual team meetings

- Capability of global team members in running virtual meetings
- The adequacy of the agenda in virtual meetings
- Reconciliation of local vs. global needs
- Process in which lessons learned are shared and assimilated
- The distribution of tasks amongst team members

- Individual Perceptions – individuals form the team. Thus, the value of individual perceptions about the team and the organization directly affect the effectiveness of interaction processes carried out by these people. The issues are

    - Belief in organizational culture
    - Understanding about the team's goals and objectives
    - Trust in local and remote team members
    - Assessment of performance evaluation mechanisms
    - Team member participation in decision-making processes

- Team structure and processes – this section deals about the team processes and the team structure. It encapsulates most team related issues. Broadly, these issues are

    - Cumulative and matching technical and social competencies of team members
    - The importance of language in team interaction processes
    - Norms for team member behavior
    - Transitioning of global team members on or off the team
    - The mechanisms for knowledge sharing
    - How the time difference of remote team members affect team bonding and interaction
    - Information flow mechanisms from team members to team leaders

- Team/organizational outcomes – the team is usually brought together for a specific project to achieve a particular goal. The evaluation of team performance and the criteria on which such judgments are based form this section. The issues here are

    - Agility in decision-making
    - Team performance evaluation in terms of deliverables

- Relative improvement of technical skills after participation in global teams
- Career advancement through global team performance
- Performance evaluation metrics based on local vs. global performance

- Team Support – the organization needs a lot of support both in terms of infrastructure as well as high-level support for the team. The issues are
  - Identification of global teams as appreciated/valued by company
  - Performance evaluation and reward processes
  - Local perception about global team processes
  - Sharing lessons from team level to a broader organizational level
  - Level of support from a high level strategic viewpoint to global teams as opposed to more traditional and standard local teams.

4.6 Lessons from the Real World – A Distributed Collaborative Experience

For a better appreciation of the issues involved in participating in globally dispersed teams, the MIT research team decided to get the experience first hand. Prof. Feniosky Pena-mora started the Distributed Software Engineering Lab (DiSEL), where the researchers themselves would participate thus acquiring insights into the collaboration process from their own experiences. The real world collaborative experience is described in the following sections.

4.6.1 Background for DiSEL

The Distributed Software Engineering Lab (DiSEL), located at the Massachusetts Institute of Technology (MIT) in the USA and at the Centro de Investigacion Cientifica y Estudios Superiores de Ensenada (CICESE) in Mexico, is a course designed to provide graduate engineering students with an opportunity to get "real world" software development experience in an academic setting. Recognizing the need to prepare students to be active participants in industry without too much re-training from companies, the DiSEL instructors designed their course to better prepare participants for their transition from "software engineering student" to "software engineering professional." Students participating in the DiSEL Lab therefore learn about the software development life cycle while simultaneously designing and developing a marketable, innovative, and reliable synchronous communications software product that would support teams in geographically distributed situations such as theirs. [The DISEL Handbook 1999-2000]

In the process of building the synchronous communications software in the DiSEL Lab, students learn about new communication technologies, develop entrepreneurial and collaboration skills, and create a collective memory repository for such an environment. By the end of the class, students should have developed a working version of the software efficiently and on time according to a schedule they set for themselves within the constraints of an academic year. Thus, after completing their course work, the DiSEL students should have learned to master some complex systems and ill-defined requirements while working in different time zones and cultures. These challenges provide class participants with a "real world" experience in organizing their work to accomplish tasks that may at first seem near impossible. Such efforts are critical for the type of innovative engineers the future demands.

4.6.2 The Team Interaction Process

Group interaction patterns are an early indicator of a dysfunctional group process. Patterns of interpersonal communication have often been used by social scientists to determine the effectiveness of team processes. Understanding the dynamics of each stage is critical for the realization of a distributed group interaction system since they each have a distinct form of conversational interaction. The graphs do show the dynamics of the interaction process in certain aspects. The different stages of the interaction process are in a way a reflection of the group formation process. The stages of the interaction are

- Forming – people getting acquainted with each other
- Storming – definition of roles inside the team. Assertion of authorities of different members leading to interpersonal conflicts
- Norming - all roles are settled and the group focuses more intensely on the priorities of subtasks as well as procedures and methods to tackle them.
- Performing - is when real work gets done, goals are achieved and the group becomes productive, energetic and effective.
- Adjourning – the group is dissolved and reassigned to different tasks

Virtual teams should realize that the collaboration process is not going to go smoothly forever, and usually it is pretty common to see collaborative efforts not working properly. However, once the team members get the basics right, there is every chance that the collaboration process is going to be much smoother and enjoyable and learning and knowledge sharing will occur.

The team interaction process has been captured over time through certain key aspects of the team interaction process, which are [The DISEL Handbook '99-00]

- *Ability to distribute/divide work*

  Figure 11 shows that as time progresses, the team is better able to distribute work amongst its members as they get a better understanding of each other's work habits and sense of responsibility in doing the work. The team becomes more productive with time as they move to the "performing" stage.

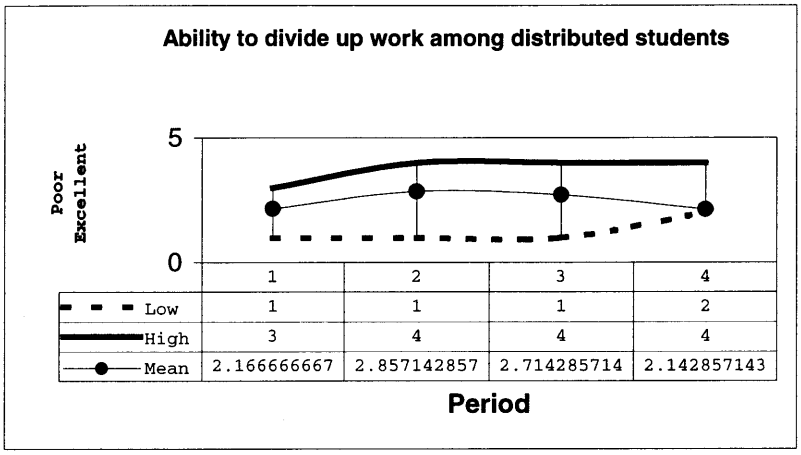

Figure 23: Ability to Distribute Work and Track Progress

- *Ability to explain your ideas to distributed team members*

  Figure 12 shows that as time progresses team members are better able to articulate their thoughts. Better participation observed with everybody having their say as they gain confidence in their members' willingness to listen to what they say.

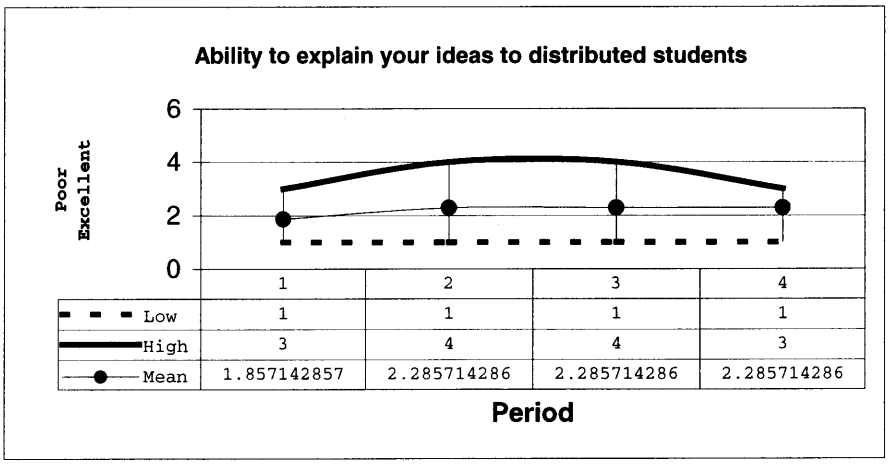

Figure 24: Ability to Explain Ideas

Also, the team as a whole reaches "better" decisions, as most team members will not hesitate their opinions. This willingness to air their views would impact favorably on the team's decision-making processes.

- *Ability to get information out of the students (transparency of knowledge sharing)*

  The team members work better if they have a handle on the information they need and they have processes in place to access the information required. The team's ability to share and disseminate relevant information to the team members that need it, impacts critically on the team's performance. The team's ability to share information effectively directly impacts on its performance. Coincidentally, that team is not using its team interaction space effectively as its information sharing processes are not up the mark.

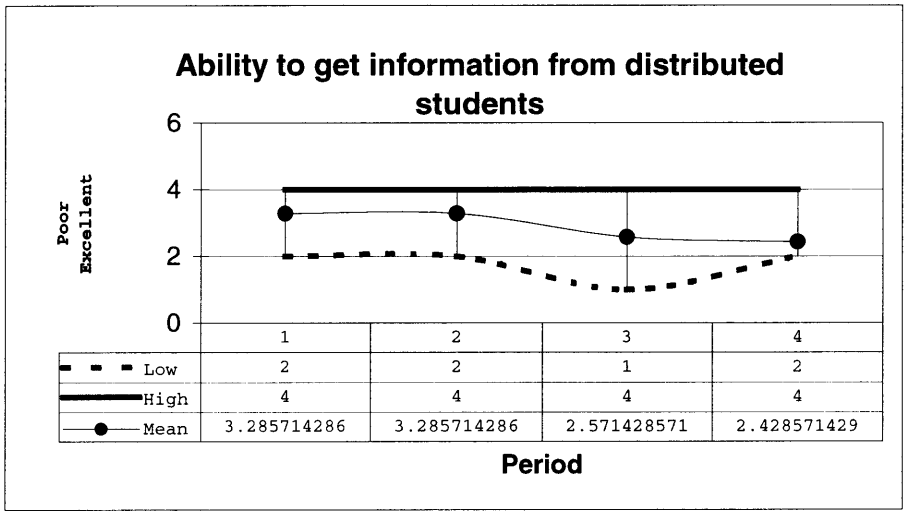

Figure 25: Ability to Share Information

- *Ability to track progress*

The team's performance is closely related to track its progress in a smooth manner and take action based on that information. A team, which is unable to either, extract correct information about its performance due to insufficient workflow management processes will perform poorly or take action on the culled project tracking information, will perform poorly. The team interaction space includes organization/team processes that take care of these workflow metrics. Figure 26 shows the student's ability to track the progress of their team over time.

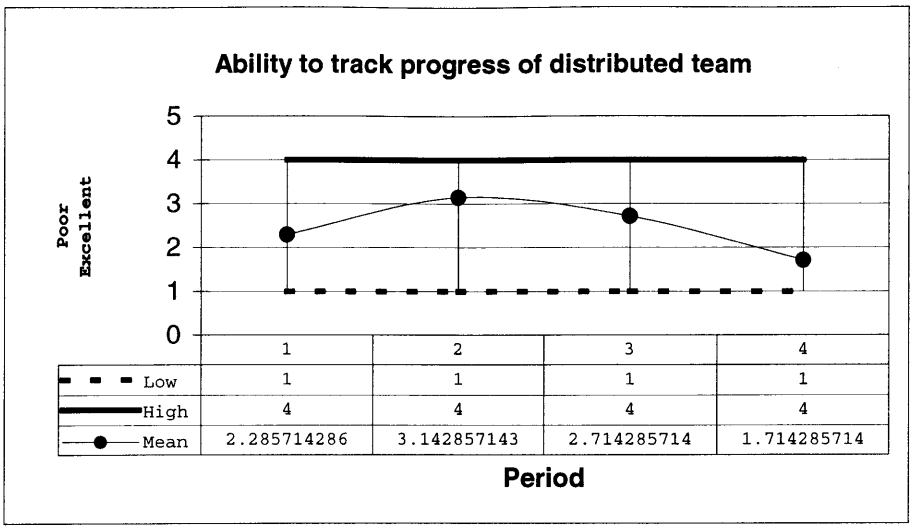

Figure 26: Ability to Track Progress

4.6.3 Takeaways from the "Real World" Experience

The real-world collaborative experience outlined above was an educative experience for the researchers involved. However, although it helped identify a number of issues that would probably not have been appreciated otherwise, there was a deeper lesson imparted as well. The virtual team formed was in an educational environment. The stakes for the project for which the team was formed were not very high. In spite of the precautions that were taken, the team failed to achieve the goals that they had been set at the start of the project in a convincing manner.

However, virtual teams in the industry do not have that luxury. They are brought together for a specific purpose and if they fail in achieving their goals, then the whole exercise becomes an exercise in futility. Thus it is vital that they learn to use their interaction space effectively for an assured performance-enabling scenario.

CHAPTER V

Facilitating the Virtual Team Interaction Process: Using Commonly Available Technologies

5.1 Communication Technologies and the Team Interaction Space

Virtual teams are usually constituted of people from geographically distributed locations with different languages and cultures. And it is not unreasonable to assume that language, culture, and style differences are accentuated because of the losses in communication when body language, subtle tones, and facial gestures are not available to add to the spoken word. Misinterpretations and misunderstandings can be heightened if there is no direct way to work through what one member may think he/she heard on the phone or saw in the email. Individual interpretations can create situations where each team member unknowingly "does his/her own thing" rather than promoting the team's agenda. The lack or void of relationship and trust can bring the tendency to work to one's advantage, causing problems for other team members. In addition, isolation, loneliness, and the feeling of disconnectedness may erode energy and lessen commitment to the team. Communication is the vehicle for creating the synergy, keeping the team together, and moving forward.

Virtual teams have to be deliberate and structured in their coordination efforts. Since, these teams use diverse technologies to keep the team aligned, the role of these technologies in building a cooperative atmosphere is significant. Hence, it is imperative that virtual teams "learn" how to use these technologies to their advantage. These technologies can be leveraged to create an enabling environment by developing proper team interaction protocols.

use these technologies to their advantage. These technologies can be leveraged to create an enabling environment by developing proper team interaction protocols.

It is often seen that the effectiveness barriers crop up because of incorrect usage of the facilities that are being used to facilitate the interaction process. The team interaction space protocols help facilitate the team interaction process by prescribing processes to leverage the communication infrastructure to eliminate or marginalize effectiveness barriers. The team protocols recommend guidelines that should be followed when using specific commonly available communication infrastructure to lessen the chances of development of effectiveness barriers to the interaction process. The protocols potentially hold the key to the development of trust and a unique team culture. The team protocols serve as

- Facilitators of the virtual team interaction process – a series of how-tos' for the use of common communication methodologies.
- Support systems for the development of trust and team culture when grouped together as a team website which invades the spatial consciousness of the team members and influences their usage of communication infrastructure

The following sections detail the recommended usage of the communication infrastructure to derive benefits to the team interaction space. Teams should adapt the following set of recommendations to their specific circumstances to manage expectations and develop a set of protocols for their own interactions using these technologies. [Duarte, 1997;Mayer, 1998, Disel Handbook, 1999-2000]

5.2 Asynchronous Communication

This includes all forms of synchronous communication systems that the globally dispersed team uses to stay in touch with each other. Commonly used asynchronous communication systems are email, voicemail and project/team websites. The pertinent issues with using these technologies are described below.

5.2.1 Email

It is the most common and well-understood computer-mediated technology for distance collaboration. E-mail is easy to use and even easier to misuse. Thus it is better to develop team norms regarding the usage of e-mails. Some considerations that might make the process of deciding when to use e-mail better are given below.

5.2.1.2 Considerations in Using Email

1. What are appropriate/inappropriate issues for email communication?
2. How should emails be structured for proper information and content understanding?
3. Who should be getting the email?
4. How do you decide on the urgency of an email? Are there protocols, which help you to make that decision? Do you think there should be any in this matter? If yes, what should they be?
5. When should email be discarded for a higher and richer medium of communication?
6. What should be the size of emails?
7. What should be the frequency of checking emails?
8. What software should be used for sending attachments?
9. How should emails be structured to take cognizance of cultural differences?

5.2.1.3 Suggestions for Writing Emails

1. Never send email asking people for attendance at short notice to meetings or requesting work
2. Rate the importance of your email. In the subject of the email rate the urgency to be
    - FYI (No response necessary)
    - Low Importance (Response expected within a week)
    - Very Important (Response required within 24 hours)
    - URGENT (Response expected within 3 business hours)
3. Before sending email, check whether you need to send the email to all the people you are sending it to. AVOID LARGE CANNED DISTRIBUTION LISTS.
4. Distinguish between core team members and extended team members. When sending emails, use "To" for core members and Cc for extended members.
5. Limit the size of emails to less than a page.
6. Use email software, which is compatible with what others have and can access easily.
7. Check for emails frequently.
8. Be regular in replying to emails according to urgency status marked on subject line.
9. Treat readers with respect.
10. Prior to transmittal of any email
    - Check for spelling and grammatical errors
    - Verify distribution list
    - Insert objective on subject line ahead of the subject

- Ensure that the urgency status has been marked on the email
- Check whether the email conveys clearly what you want to say.
- Check to see that the expected time in which a reply is required is displayed prominently.

5.2.2 Voicemail and telephone

Voicemail is like e-mail. It is easy to use and it serves the purpose better than emails sometimes. Establishing team norms for the use of voicemail services within the team is a good practice, which adds a lot of value to the interaction process. Some considerations about the use of voicemail and telephone are given below. [Duarte, 1997; Mayer, 1998;Disel Handbook, 1999-2000]

5.2.2.1 Considerations in Using Voicemail/Telephone

1. What are appropriate/inappropriate issues for telephone communication?
2. What is the degree of detail in the information that your site has about other sites of the virtual team? What kind of information do you think is necessary to coordinate the sites and keep them hooked up via telephone and voicemail?
3. Do you think that there should be any time restrictions regarding when a call can be placed taking time zone differences into account?
4. How frequently should people check voice messages?
5. What kind of information/recorded message should people leave on their answering machines?
6. Should there be a timeframe of replying to voice mails?
7. What should be the norms regarding contacting people during emergencies when they are out of office?
8. What kind of detail should be there when somebody calls up and leaves a message? Is there a need to structure the information given when a message is left?

5.2.2.2 Suggestions for the Use of Voicemail/Telephone

1. All sites should have the contact information for the technical contact for a particular site. He/she should have all related information for other members in the site. Incase, a team

member cannot be reached then the technical contact should be contacted and information left with him/her as well. The technical contact should be responsible for ensuring that communication between local site members and other sites is not hampered [Pena-Mora et al, 2000; The MIT-CICESE Distributed Software Engineering Lab, 1999-2000]

2. Check messages at least 3 times a day (start, noon, before going home)
3. Update your message daily to reflect whether you are in or out of the office today. If out of the office leave instructions on who to contact in an emergency.
4. When leaving a message
    - Speak slowly and clearly
    - Identify who you are
    - The date and time of the call
    - What the call is in reference to and any specific questions or actions required.
    - Repeat phone numbers or important information twice.... Slowly.
    - Minimize any background noise.
    - Specify the phone number to call back and the time.
    - Suggest a time within which the call should be responded to.
    - Act professionally
5. Answer all voice mails promptly (upon receipt if feasible).

5.2.3 Website

Internet or intranet web pages provide shared workspaces for the posting of messages and ideas, the display and editing of documents, and for non-real time discussions about questions, which do not require immediate answers. The importance of the website for a team to build and engender and enhance team feeling is immense. It also serves as the repository for personal information about team members and may also act as a personal forum of interaction between team members. It can also act as a central data repository for team related information – files, documents and miscellaneous information.

5.2.3.1 Planning the Website

1. How important a role do you envisage the website would play? Do you consider the presence of a team website a good or a bad thing? Do you need it?
2. What should be the security aspects for the site?

3. What should be the level of access of members to site contents vis-à-vis organizational position?
4. What should be the software used to read the documents posted on the site or for viewing the site?
5. Who should be responsible for administering the site?
6. How regularly should the site be updated?
7. What kind of information should be posted on the site?
8. What kind of system is required for keeping track of related files?
9. Should high priority decisions that apply to the whole team be listed on the website?
10. What should be the notification process to team members when something changes on the site?
11. How regularly should the site be visited?

5.2.3.2 Suggestions for the Website

1. The team members should decide upon the need of such a website. The norms for the operation of the website is also dependant on what the team feels. The rest of the pointers may be ignored if the need for such a website is not felt.
2. The website should be secure so that only team members can access it.
3. The level of access to the site should preferably be based on who needs to access what and why. However, most things should be visible to all the team members.
4. Care should be taken that the software of documents posted on the web is accessible to everybody.
5. If the website maintenance is not done automatically, preferably, there should be a person responsible for maintaining the website.
6. There should be a notification scheme for notifying team members when documents are posted on the site.
7. There has to be an in-house workflow system in place that would be responsible for keeping track of all related files, meeting agenda and meeting minutes, spreadsheets, and similar project documents maintained as official records. It should be a robust system that would be capable of tracking current versions of the product and its associated files. Increased facilities that can be provided should include the capacity to provide the video/audio documentation of meetings.

5.3 Synchronous Communication

Synchronous communications used by teams commonly include meetings and audio/video conferences. This section covers how to structure meetings effectively and also talks about the issues in using audio/video conferences.

5.3.1 Meetings

A distributed team is going to spend a lot of time in meetings for checking progress and deciding on outstanding issues. Ineffective meetings not only cause frustration to creep in and morale to drop it has a tremendous time commitment involved as well. Thus, the importance of having effective meetings cannot be underestimated.

5.3.1.1 Types of Meetings

There are two basic types of meetings [Intel Workshop,'98]. The two types of meetings have different objectives. They are "status" meetings and "decision" meetings. It is important that the team members themselves know the purpose and the type of a meeting beforehand so that they can prepare accordingly. Table 9 shows the types of meetings and their aims.

However, knowing what kind of meeting to conduct is not enough. Virtual teams should be capable enough of conducting effective meetings. The following sections will cover in more detail 1) the role of agendas in enhancing the interaction process by making possible effective meetings; 2) agenda building exercises; 3) communicating effectively in meeting; 4) meeting tips and 5) tips for video/audio/data conferencing meetings.

To conduct an effective meeting, addressing any one or a combination of these issues is not enough. It must be understood that all these issues are equally important when it comes to having an effective meeting.

Table 9: Types of Meetings

Schedule	Status Meetings	Decision Meetings
Purpose	Regular	As needed
Outputs	Sustain organizational structure and processes	Leverage group intelligence to accomplish a specific result.

Table 9: Types of Meetings (contd.)

Schedule	Status Meetings	Decision Meetings
	Ratify or veto proposals Make routine decisions Share status/information	Solve problems Make recommendations Accomplish a deliverable Brainstorm/generate ideas
Membership	Allocate resources Reflects the organization – all who need to know	Project planning Relevant and necessary to accomplish the task – generally 5-6 individuals

5.3.2 Effective Agendas to Enhance Collaboration

An effective meeting agenda enables participants to come to the meeting prepared to make the best use of time. It also gives meeting participants a framework to follow in accomplishing the goals of the meting in the time allowed. [Intel Workshop,'98, Pena-mora,'00]

Table 10: Suggestions for an Effective Agenda

Items	Suggestions
Responsibility	It is the responsibility of the team members to review the agenda and come prepared to contribute to the outcome of each agenda item.
Rules for Effective Agendas	Separate Items - keep the various types of meeting work separate. At the very least, separate decision-making and status sections of the agenda. Keep agenda items separate within each section Estimate Time Frames - schedule amount of time for each item, an approximate estimate is good enough. List Attendees - list the people who are expected to attend the meeting. The criteria should be on a need-to-know basis. List Presenters - list the names of team members who are going to present each agenda item List Requestors - list the names of team members who had requested each agenda item Pre-publish - pre-publish the agenda and attach any required documents Clarify Decision Method - clarify the process in which the agenda was decided before the meeting Clarify expected Outcomes - clarify what action or output is expected for each agenda item. Screen potential agenda topics to ensure that they are relevant

5.3.2.1 Agenda Building Exercise

Working as a team, the objective is to create an agenda for the meeting specifics given above. Please ensure that your new agenda has

- Meeting title
- Date of meeting
- Location
- Time
- Attending members
- Agenda items
- Time frames
- Requestors of each agenda item
- Presenters/owners of each agenda item
- Expected outcomes

Identify meeting facilitator (if any). Use a flipchart to redraft the agenda. Be prepared to discuss the new agenda with team members. Discuss the specifics of who will lead which section and how much time will be devoted to each item.

5.3.2.2 Agenda Evaluation Exercise

A sample agenda from a Visteon forum (VCMIT) meeting is shown below in Figure 27. The purpose is to evaluate this agenda after assimilating the tips given above and improving upon it.

1. What rules does this agenda follow?
2. What rules does it violate?
3. Using the rules given above, improve the agenda given in Figure 27.

I. Introductions & Check-In (Kumar Sambandan, 10 minutes)

II. Action Items from previous meetings

III. AutoCAD for Manufacturing (40 min)

   a. Visteon AutoCAD Policy Letter Draft Discussion - Kumar

   b. AutoCAD Data Management Status - Kumar

   c. AutoCAD for ECAD Update - Kumar

   d. AutoCAD Add-on modules (German Carretie Warleta, Cadiz)

IV. Open GTI issues (30 minutes)

   a. Visual 5.0 Release (Greg Deakins)

   b. EBOM & NT (Joe Borland)

   c. Other

V. HP UX 11.0 upgrade; support for 10.2 Clarification (Ian Smart, 5 min)

VI. Visteon Separation: Visteon VSA Usage discussion (Leon Scott/Sandra Kalnins 5 min)

VII. Walk-ins (15 minutes)

VIII. Next meeting's agenda (10 minutes)

IX. Wrap-up and Check-Out

Figure 27: Sample Agenda

5.3.3 Meeting Tools and Tips

In this section some of the important tools and tips for conducting effective virtual meetings will be covered. These include

- Group memory
- Meeting minutes
- Effective use of telephone
- Communicating effectively in diverse groups
- Using conferencing technology for audio, video and data conferencing purposes

All meeting participants should be familiar and competent with each of these tools and tips and will be able to use them in meetings, which they attend. The sections which will be covered for now include

- Communicating effectively through proper use of language
- Meeting norms

- Conferencing tips
    - Audio
    - Video
    - Data

5.3.3.1 Communicating Effectively

The importance of language and its use while in meetings cannot be denied. With diverse background and varying aptitudes of language, it becomes essential that language used does not become a barrier to communication.

Guidelines to using Language

- Avoid slang
- Avoid sarcasm
- Define terms and avoid jargon
- Spell out acronyms
- Use simple short sentences.
- Speak slowly, clearly and deliberately emphasizing each word and making it separate.
- Try to limit the number of ideas you propose in a sentence to one.
- Ask only one question at a time
- Be careful about jokes. Use humor at your own discretion.
- Do not interrupt. If it is a videoconference, raise your hand to show you have a QUESTION.
- Slow down. Leave pauses between sentences

5.3.3.2 Meeting Norms

These are the formal articulation of how the group intends to work together. They are useful reminders of the agreements about use of time, acceptable behavior and special considerations.

- The chairperson/leader sets the expectations for the meeting's objectives. Given that, there still should be ground rules for a group to work together and keep on track. The leader solicits input from the group and records them for future reference. The sample norms might be
    - Everyone participates

- Listens to each other
- There is one meeting going on and there is no sub groups going off by themselves.
- People are not dropping off

- The group might modify this list at any time. It is always a good idea to have these rules up for everyone to see during the meeting.

- It is the responsibility of everyone to ensure that the meeting does not degenerate into small fights and personality clashes. Norms give every member the license to monitor the behavior of the group

5.3.3.3 Suggestions Regarding Audio / Videoconferencing for Meetings

1. Prior to the meeting [Hatzler, 1998;Duarte, 1997]
   The following must be accomplished 24 hours in advance of the meeting
   - Publish agenda
   - If you cannot attend notify meeting host
   - A copy of the meeting presentation to all participants via team websites or e-mail

2. Telephone protocols in the meeting
   - If due to non-availability of videoconferencing facilities or technical glitches one or more of the parties involved in a distributed meeting cannot participate with video, then it is audio that should keep them linked to the meeting.
   - It is very important that members state their names before stating their views.
   - Process checks should be done from time to time to ensure that people on audio are online and are able to participate or understand what is going on in the meetings.

3. Selecting the appropriate technology [Duarte, 1997]
   The selection of appropriate technology given the purpose of the meeting and the level of interaction that it demands is of absolute importance to the success of the meeting. The meeting interaction continuum is an indicator of how meetings could choose their technologies as shown in Figure 28.

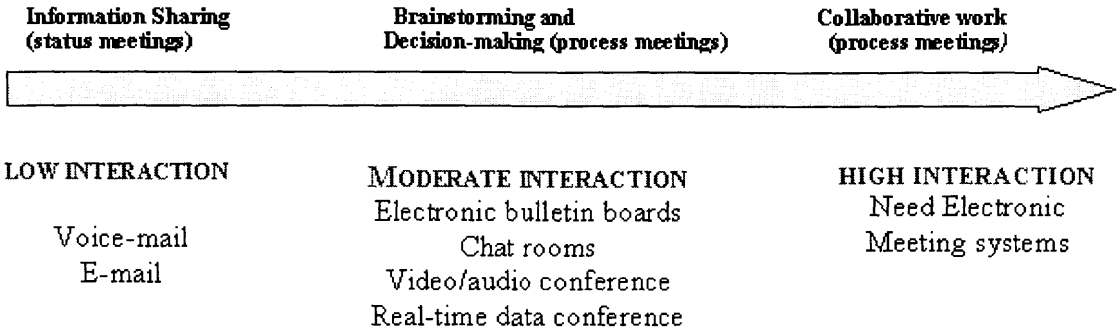

Figure 28: Choosing the Meeting Technology

4. In the Meeting
   - Meeting facilitators should be present in big (5-6 members) sites to track agendas and notes. At least one meeting facilitator will be identified who will be responsible for the agenda, recording minutes and actions and publishing results
   - CHECKING IN - The meeting should be started with a review of the agenda and an informal role call to determine if a quorum is present for the decisions or business to be reviewed during the meeting. Members should mention any items he or she wants added to the agenda, briefly talk about something interesting that has happened to them, or what they would like to achieve in the meeting.
   - At the start of the meeting, the chairman should go over the last meeting and detail the open and close items.
   - Teleconference rooms probably should be equipped with enough speakers to enable effective participation of all participants.
   - The chairperson probably should speak clearly and succinctly so that everyone can hear. Further, the meeting leader must ensure that every person's opinion is requested whether physically present or not.
   - The chairperson should conduct a check of health of the team so the team members have a common understanding of the team performance.
   - The presenter probably should identify their objectives or desired outcomes of the meeting (decision, information sharing, etc).
   - Speakers should introduce themselves before speaking slowly and articulately. In a distributed team, the members are in all probability located in different places. Thus, it is essential that speaking fast does not further compound the difficulties involved in

understanding different accents. The people connected only by audio can also understand who is saying what and why.

- When reviewing information, a standard routine must be followed. The suggested routine is: clarify, value, raise concerns and make suggestions when having a meeting. Specifically, whenever information is not clear, ask for clarification. Next, judge others' input and build on it if it is useful. Third, raise concerns and finally, make suggestions.
- CHECKING OUT
  - The chairperson should ask for suggestions for action items for the next meeting.
  - The chairperson should also specify the state of resolution in which every action item was left and required follow-up actions for each with the names of team members who should report back to the group in the next meeting about them.
- Team knowledge of videoconferencing
  - The team members preferably should be comfortable with the videoconferencing technologies so that if any technical snags come up and technical assistants are absent, they should be able to handle the problem.

5. Tracking the Meeting [Pena-Mora, 1999]
   - Agenda format - the agenda format should be specified before the meeting and it is always better to have a specific agenda format which can be reused. The format that is a good starting point for all virtual meetings is
     - Checking in
     - Chairman keeping to times allotted to agenda items
     - The agenda being discussed with specific agenda items delegated to the person who raised it to lead.
     - Next meeting's agenda – deciding on the next meeting's agenda from suggestions of members or for discussion / closing outstanding issues
     - Closing issues – the issues discussed in the meeting should either be closed or given to someone to work offline on it, to be brought up for update in the next meeting.
   - Process check – the chairman should check from time to time to see if the meeting attendees are still live in the meeting or not.
   - Interaction map – the real time mapping of inter and intra site communication. It is a snapshot of the team and does give an idea of the team social dimension. (This is not required all the time). A sample team interaction map is shown below in Figure 29.

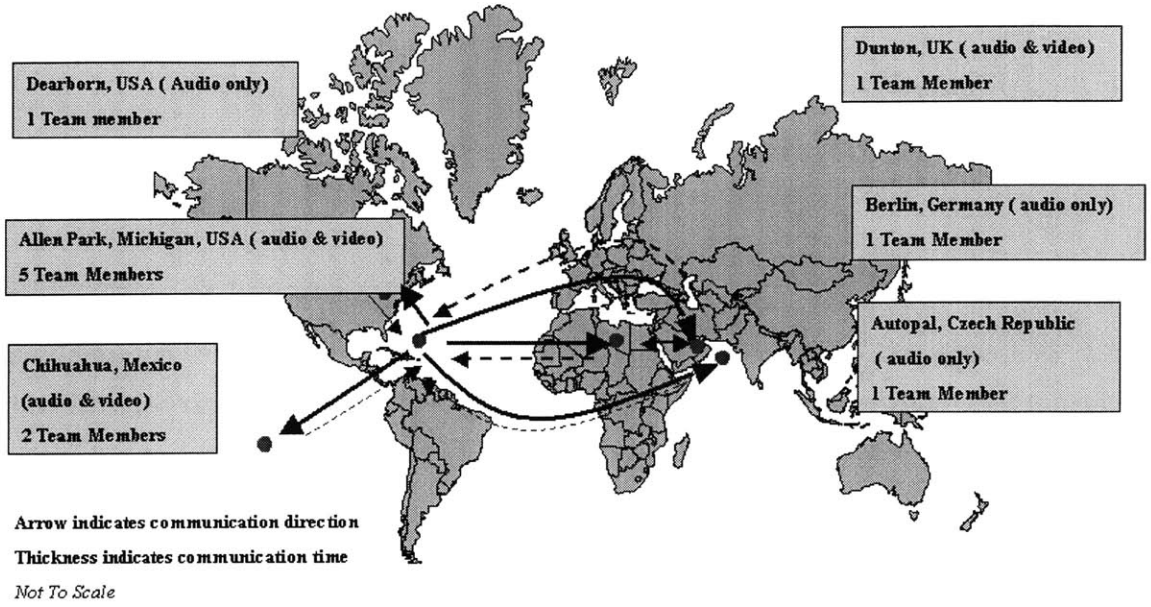

Figure 29: Meeting Interaction Map

5.3.4 Meeting Templates

To provide meeting specific information and also to track meetings, the MIT team has developed a number of templates which help in

- Scheduling meetings (making sure nothing has been omitted)
- Making the agenda
- Tracking meetings
- Building memory of events in meetings as well as keeping track of sites and what is going in meeting, that is tracking meeting communication patterns.

The templates are extremely helpful in scheduling, tracking and learning from meeting experience and providing feedback. The templates are shown below. The templates are

- Meeting information
- Meeting agenda
- Meeting tracking
- Meeting evaluation survey (attached in appendix)

Meeting Information

Name of the Team: _____

Title of the Meeting: _____

Date: _____

Suggested start time: Actual start time: _____
Suggested end time: Actual end time: _____

Meeting Sites:

Meeting Participants:

#	Name	Gender	Location	Position
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
20				

Team Leader: _____

Meeting Chairperson: _____

Team Coach: _____

Coded by: _____

Figure 30: Meeting Information Template

Meeting Agenda

Meeting Agenda circulated? ___ Yes ___ No

#	Topic	Time	Style	Proposer	Presenter	Desired Outcome	Action Items

Coded by: _____

Figure 31: Meeting Agenda Template

Meeting Tracking

Time	Members	Comments	H Code	Analyses
Page Number: ____			Coded by: _____	

Figure 32: Meeting-Tracking Template

CHAPTER VI

Evaluating Virtual Team Interaction Space Effectiveness

6.1 Measuring Team Interaction Effectiveness

The previous sections have delved in detail into what are the constituents of the team interaction space, what kind of barriers that it might face and what are the norms for interaction protocols to be followed to be effective in harnessing technology for the good of the team interaction. In the team interaction effectiveness framework, one of the activities includes evaluation of the team interaction space effectiveness. Additionally, in previous chapters, there have been attempts to evaluate specific aspects of the team interaction space effectiveness by trying to evaluate meeting effectiveness through the medium of meeting evaluation sheets and by drawing team interaction maps. However, nothing has been said about how all these nuggets of information gleaned from different team interaction space observation sources translate into a position on the team interaction space effectiveness continuum.

The positioning of the team on the team interaction space effectiveness continuum is indicative of the health of the team interaction space. This positioning helps in providing solutions to the team regarding what it should be doing to improve the team's interaction space effectiveness. This is achieved through the team interaction space effectiveness model described herein. The team interaction space effectiveness model comes up with a number on a scale of ten as indicative of

team interaction space effectiveness. This number will map to a specific evaluation of the team by its positioning on the team interaction space effectiveness continuum

6.2 Benefits of the Team Interaction Space Effectiveness Model

The final objective of this research, is to build a virtual team effectiveness model which will be used to increase the team's effectiveness as would be evident by its positioning on the effectiveness continuum.

The potential benefits of the team effectiveness model are [Pena-Mora et al, 2000]

1. Providing team metric – identifying the level of team collaboration and providing guidelines to increase the overall team collaboration.
2. Requesting and providing feedback – informing the team and individuals of observations and the effect of their behavior in meetings and indeed in their use of available media of communication.
3. Identifying information technologies – aiding synchronous and asynchronous communication.
4. Recommending a supportive physical setup – aiding in synchronous communication in meetings.
5. Establishing team structure – defining distributed team structure and controls.
6. Establishing and maintaining team focus – controlling the attention of the distributed team and maintaining a common line of reasoning.
7. Monitoring and controlling – providing metrics to control and calibrate team performance through the means of the effectiveness continuum.

6.3 Team Interaction Space Effectiveness Model Variables

The effectiveness model variables are [Gladstein, 1984;Hackman, 1987;Ancona, 1992]

1. Organizational/Team Processes – these variables relate to the team and the organization as a whole. They are subdivided into
    i. Group Composition – this variable relates to the team composition which is affected by
        1. Adequate Skills – the skill set of the team members
        2. Heterogeneity – the degree of heterogeneity of the team members

3. Organizational Tenure – the time for which the team members have been part of the organization
4. Job Tenure – the time at the current job for team members
5. Language Barriers – this relates to the difficulties faced by team members as the language of interaction is often not the language in which team members are comfortable in
6. Cultural Barriers – the cultural differences amongst team members

ii. Group Structure – this relates to the way the work gets done in the team. This variable encompasses a number of sub-variables like

1. Role and Goal Clarity – the degree of clarity amongst team members about assigned tasks
2. Work Norms – the process in which tasks are done
3. Task Control – the allotment of tasks and the relative importance
4. Size – the size of the group
5. Leadership – the kind of leadership that the team is using, the degree of empowerment of the team members

iii. Management Support – the degree of support that the team receives, whether it is being micromanaged by upper-tier management

2. Technology – this is the second aspect of the team interaction space. [Pena-Mora et al, 2000;Pena-Mora, 1999]. The variables are

i. Capability – the technology capabilities of used communication technologies

1. Synchronous Communication facilities
2. Asynchronous Communication facilities

ii. Accessibility – the degree of access to technical facilities to team members

iii. Ability – the degree to which team members know how to use the technology they have at their disposal

1. Resources Utilization
   - Inadequate expertise in handling and using shared facilities
   - Insufficient information notification system
   - Insufficient protocols for use of communication channels
2. Ease of Use – usability of technologies used
3. Technical Training – the presence and the adequacy of technical support training to team members

3. Physical Setup [MIT-CICESE Handbook, 1999;Pena-Mora et al, 2000]
   i. Capability – the adequacy of facilities available for use
      1. Infrastructure layout – the layout of rooms and equipment
      2. Interaction of digital and physical space – the way digital and physical space interface with each other
   ii. Accessibility - the level of access to physical setup facilities
   iii. Ability
      1. Collaborative climate
      2. Ease of manipulation

5. Group Process [Gladstein, 1984;Ancone, 1992; Hackman, 1987]
   i. Motivation – the team member involvement in the team interaction process
   ii. Trust – the degree of trust that team members have for each other
   iii. Open communication channels – the degree of openness of communication channels
   iv. Supportiveness – the degree of support that team members receive in their daily functioning from the team
   v. Conflict management – the manner in which conflicts are managed in and outside the team
   vi. Collective decision-making ability – the ability of the team members to take decisions as a group
   vii. Boundary management – the way the team interfaces with the larger environment both within the parent organization and the external world.

5. Group Task [Gladstein, 1984;Ancone, 1992; Hackman, 1987;Pena-Mora et al, 2000]
   i. Task complexity – the degree of complexity of the task to be done
   ii. Impact of environmental factors – the way the environment affects the nature of the task
   iii. Task interdependencies – the dependencies of the task on external factors
   iv. Task uncertainty – the degree of uncertainty in the task in terms of whether it can be done or not
   v. Task sensitivity
   vi. Task reliability – the requisite reliability of the task required

Process output/measurable

1. Team performance
   i. Internal evaluation – team metric based
   ii. External validation – from upper level management and formal organizational evaluation processes

2. Satisfaction
   i. Team satisfaction
   ii. Individual satisfaction
   iii. Process satisfaction

3. Learning
   i. Team learning
   ii. Individual learning
   iii. Organizational learning

6.4 The Team Interaction Space Effectiveness Model

Figure 33 shows the virtual team interaction space effectiveness model. What needs to be stressed here is that the model is still undergoing development and is by no means complete. At the present time, this model is limited to being just a conceptual model. However, quantitative and qualitative data exists which needs to be synthesized and analyzed before the numerical relationships amongst the variables can be identified. Once the qualitative data obtained from the collaboration survey (see appendix) can be translated into numerical data, this model can be used to obtain team interaction space effectiveness on a numerical scale. Additionally, the modified model would be capable of giving the following outcomes

- Team performance – internal team-metric based evaluation as well as external managerial/organizational evaluation
- Satisfaction – individual, team and process related
- Learning - individual, team and organizational

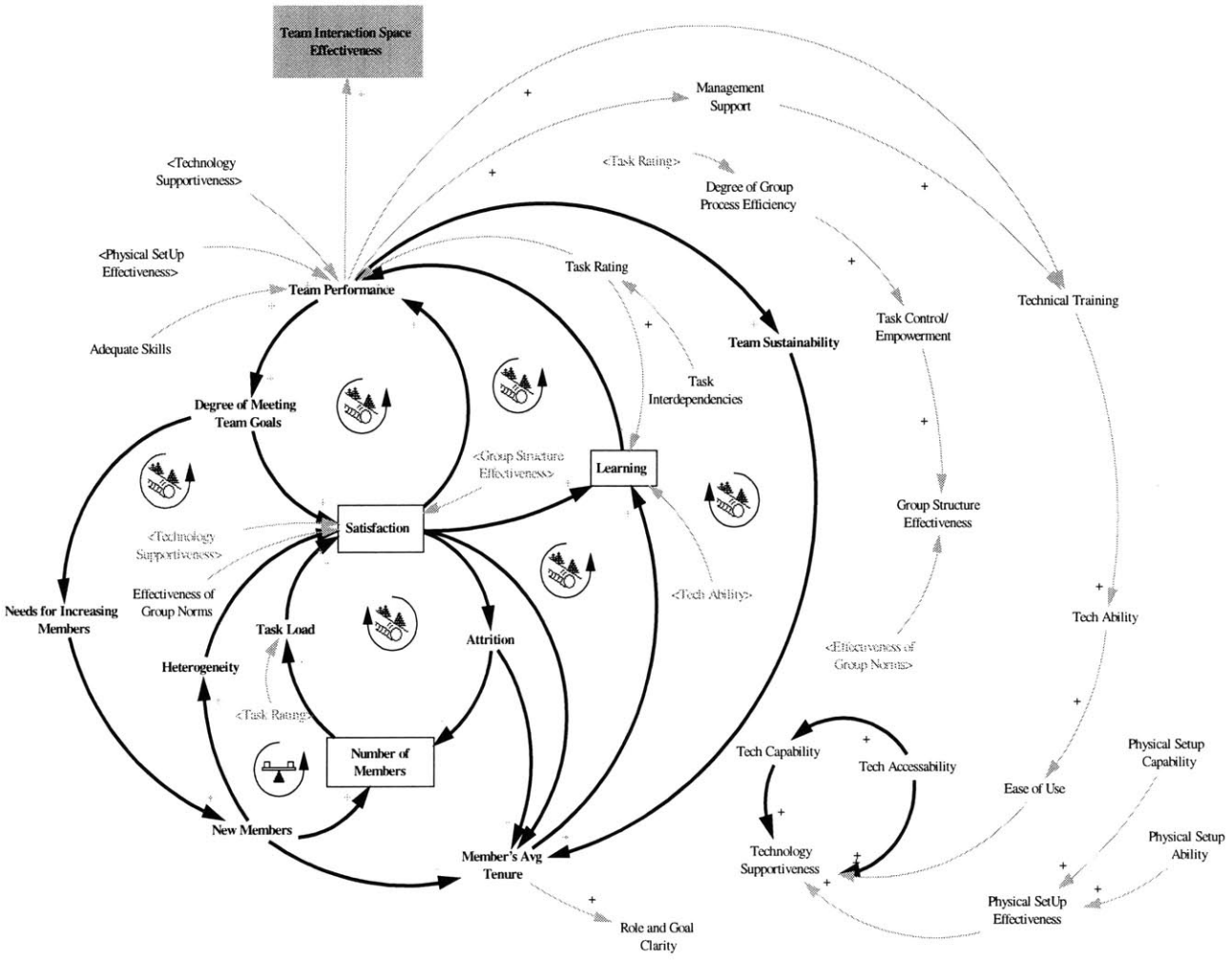

Figure 33: Team Interaction Space Effectiveness Model

CHAPTER VII

Leveraging the Intangibles through Effective Use of the Virtual Team Interaction Space

7.1 The Intangibles

The success of organizational processes encapsulated by a team as well as organizational culture, is usually expressed/embodied by a number of intangible factors, which are generally never formally measured nor recognized. However, it is important for the success of virtual teams that they learn to identify these factors as well as learn how to leverage these factors for the success of the team and the larger organization and increased effective performance. These factors are

- Social capital
- Intellectual capital
- Human capital
- Traditional capital

7.2 Team Interaction Space and the Generation of Capital

The virtual team interaction space acts as an enabler for the team to contribute the intangibles or the capitals mentioned above to the organization as members of the organization. The success of a project that a virtual team is assigned depends on how effectively the team eco-system namely the team interaction space is utilized. The team interaction space essentially comprises variables, and acts as a life-support to the overall project. Proper interactions carried out in the team interaction

team interaction space is utilized. The team interaction space essentially comprises variables, and acts as a life-support to the overall project. Proper interactions carried out in the team interaction space not only manages the explicit goals of satisfying cost and schedule criteria but is also responsible for generating several intangibles which are outcomes of the team interaction processes none the less. The project eco-system is the environment in which the team interaction space develops. Figure 34 shows the team interaction space and the different aspects of the project in relation to the project identifiers. The project that a team is brought together for can be usually divided into

- Scope – the project objectives and the direction in which the project begins, the point it ends and the explicitly defined project goals
- Quality/performance – the criterion for measuring the performance or the amount of rework required before the project is assumed to be complete
- Schedule – the time aspect
- Cost – the cost of completion for the project
- Environment – the environment in which team members interact, in a way their virtual team interaction space and a reflection of the team interaction space dimension of the team spatial setup.
- Socio-political – the area in which the project is being executed and its relevance in the organizational context

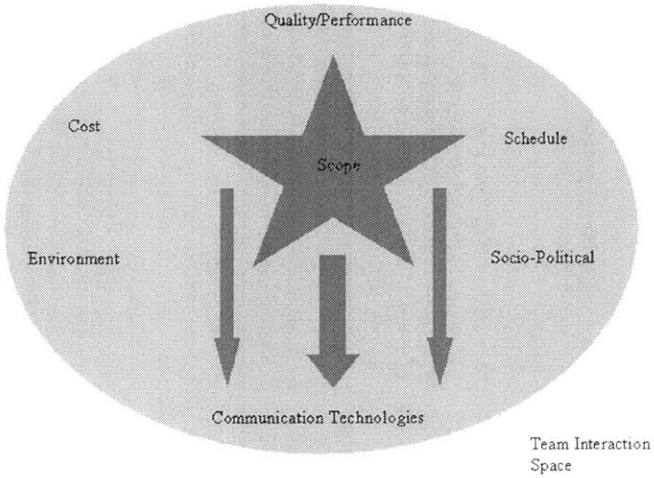

Figure 34: The Project Ecosystem

The project goals directly tie back to the intangible deliverables that the team contributes to the organization.

- Realizing the team project deliverables in time (meeting time to market deadlines, keeping infrastructure costs low through proper utilization and allocation of resources in the team interaction space) results in the generation of traditional capital in terms of revenue for the organization
- Executing the project generates valuable intellectual capital as team members grow in technical knowledge and the overall skill of the team as an organizational entity improves. Embedded ways and means to share the knowledge generated helps in creating a greater organizational knowledge capital
- Team interactions in the process of meeting the explicit project deliverables help in generating social capital as the team comes up with ways and means to formalize the team interaction process so that communication processes are robust and prevent miscommunication. Trust is engendered and social capital is generated.

The team members share in the production of the team outputs. The alignment of the team objectives with personal/individual expectations results in satisfaction – in terms of rewards for work well done as well as professional satisfaction. The team contributes to the growth to human capital of the organization.

7.3 Generating Social Capital

Virtual teams are dynamic and susceptible to a lot of change through transitioning of team members. Also, as virtual teams come together for a specific purpose they aggregate and disperse quite quickly. However, that is a potential source of leveraging the technical skills and expertise for the better of the organization. Team members can propagate learning through the organization by taking the knowledge that they have gained to new teams. When team members who have worked earlier together come together, they can already build upon the understanding and the trust that they have. These advantages can be leveraged by building social capital in a virtual world. [Klein et al', 2000]. For creating and sustaining social capital in a virtual world, teams should ensure that

- There is alignment both within the team amongst the team members as well as alignment of the team with the broader goals/objectives of the organization as a whole
- Teams should help build and propagate globally developed learning practices

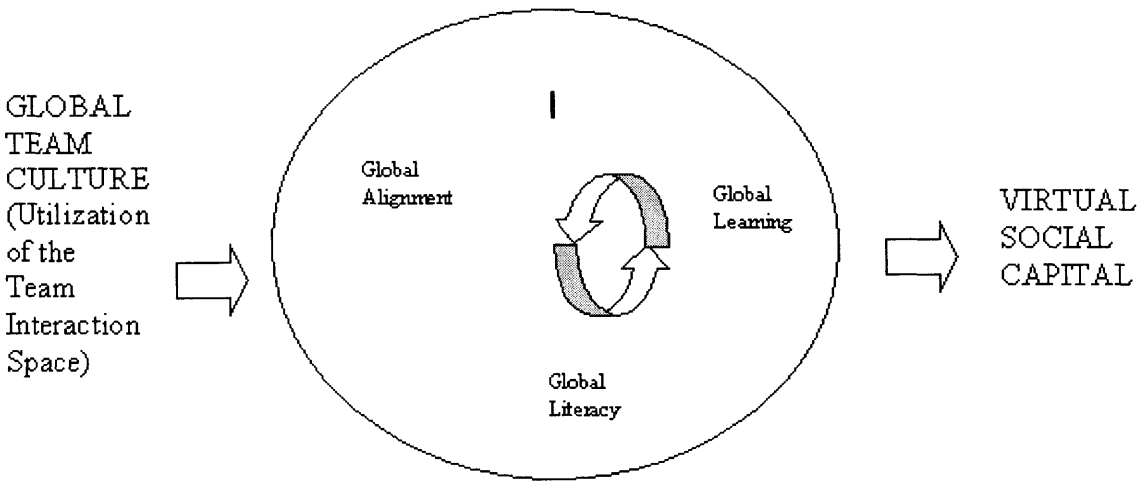

Figure 35: Building Social Capital (Klein et al','00)

Figure 35 shows the different skill-sets that need to be leveraged to generate virtual social capital and to transform the global team culture. The skill-sets that must be leveraged in an efficient manner are

- *Global Alignment*
    - Establishing a compelling, cross-cultural, cross-functional reason for being by inspiring and communicating a relevant picture of where the team is headed in terms of goals/objectives in an organizational context.
    - Unified Vision – the interactions carried out in the team interaction space helps in creating the right processes, balances and mechanisms (global team norms) for effective exchange of information to enable the formulation of a unified direction and momentum.
- *Global Literacy*
    - Global awareness – through interactions carried out in the team interaction space, team members have an acute awareness about cultures. Team norms build their own team culture cutting across national cultures which helps engender a particular form of global literacy.
    - Context – Situational Interpretation
        - Developing the ability to assess the complex and interdependent factors of multicultural interchanges.

- *Global Learning*
    - Integration and Cross-Fertilization of Knowledge - actively facilitating the dissemination of knowledge throughout global structure; moving intellectual capital (in the form of ideas, people, resources) to where they are most needed in an organizational context.

7.4 Generating Intellectual Capital

7.4.1 Intellectual Capital

An important aspect of having effective teams is to leverage the intellectual resources in the team for a better performance-enabling situation. Knowledge is increasingly regarded as an essential growth factor in most progressive organizations. Teams contribute to the knowledge capital of the organization by generating knowledge and technical expertise, which makes the organization, advanced and better equipped to handle challenges. For virtual teams, knowledge sharing is critical for engendering trust and making things happen in a positive manner. Thus, it is essential that virtual teams understand the concept of "intellectual capital" and leverage it effectively to its ends.

The components of Intellectual Capital are [Brooking et al', 1996]

- Human-centered assets - Human-Centered Assets comprise the collective expertise, creative capability, leadership, entrepreneurial and managerial skills embodied by the team members.
- Infrastructure assets - Infrastructure assets are those technologies, methodologies and processes, which enable the team to function (global team norms). Basically the elements, which make up the way the team works.
- Market assets - Markets assets define the potential of the team in terms of market-related intangibles.

7.4.2 Realizing Intellectual Capital

Knowledge of intellectual capital is a rich source of information about the team, and is of particular value in the following scenarios. [Brooking et al', 1996]

- Validating the Team's Ability to Achieve its Goals.
- Planning /scheduling project based on realistic estimation of team member capabilities

- The team contributes to the knowledge enhancement of the organization and thus increases the assessment of the organization through increased value of the team in the organizational context.
- Increasing Organizational Learning by sharing/dissemination of knowledge.

7.5 Generating Human Capital

This is a concept, which was developed, in the early 1960s to describe the value of the people part of the work equation, the skill and knowledge and the will to work together of individuals. However, there is a subtle difference between human and intellectual capital. Human capital is essentially about people being innovative, creative and loyal to the cause of the team. Interactions in the team interaction space engender trust and team bonding and thus contribute to the cause of the team by generating human capital.

With economic, social and technological change all calling for constant flexibility and adaptation, teams and team members alike are increasingly aware of the importance of lifelong learning; similarly, they share a common interest in renewing and increasing the skills base of the greater organization as a whole and thus contributing to the cause of the organization. The empowerment of team members through knowledge sharing not only helps in producing intellectual capital but also helps in building team feeling and thus is an effective way of leveraging human capital.

7.5.1 Realizing Human Capital

Proper utilization of the team interaction space helps engender human capital. The team contributes to building human capital for the organization through its team norms. Team interactions in the interaction space helps in building

Trust based on team culture developed through mutual agreement of team members (global team norms)

- Alignment of team member expectations implies satisfaction in developed processes for performance evaluation and reward structure inside the team
- Learning/ personal growth and increase in technical expertise through knowledge sharing using developed team processes

- Enhanced communication processes facilitate team member interactions and promote trust and personal (outside of professional interactions) team member interactions.
- Free information sharing and transparency of communication protocols help in building trust

7.6 Generating Traditional Capital

All firms whether collocated or virtual always target "traditional capital". It is the representation of the asset-based calculations of the team's productivity. It reflects directly on the team's effectiveness/performance and is usually the purely result-oriented and totally tangible measure of the team's productivity. Some of the factors, which embody the traditional capital of a team, are

- Infrastructure Resources
- Time to market
- Revenue generation
- Market size
- Environment

7.6.1 Generating Traditional Capital

Teams work together to produce capital. There are a number of levels of capital that is produced by virtual team interaction and these "capitals" are a high level indicator of the team's performance. Traditional capital is the most basic level of the different capitals produced and helps in shaping the team structure and processes and their dynamics in many ways.

The virtual nature of the team makes it imperative that the basic issues like time to market (which is related to scheduling), revenue generation (which is an indicator or measuring stick of the efficiency of cost reduction) and the market size (representative of the quality of its competitors' offerings and market share) are monitored closely as these metrics of evaluation of the team performance help in determining the team and organizational processes, one of the core foundations of the team interaction space, in large measure.

CHAPTER VIII

Conclusions And Future Research

7.1 Research Summary

The problem of building and sustaining effective virtual teams is a multi-dimensional one. The research outlined in this report presents a holistic view for a comprehensive understanding of the problem. Research has shown that the identification and optimum use of the virtual team interaction space is essential for the success of virtual teams. To maximize their potential to produce effective results, team members need to develop their own norms, or adopt pre-established organizational norms for managing their team interaction space. Virtual team members can reduce the possibilities of misunderstanding and conflict by managing the three drivers of team interaction space: technology, organization protocols and the physical environment. These three drivers with emphasis on interaction protocols, leadership, diversity and proper management of resources play a dominant role in making virtual teams successful. The approach outlined in this report has tried to understand the scope of the problem and provide measures to prevent the disintegration of the interaction process. The approach can be summarized as:

- Identify the components of the virtual team interaction process
- Identify the barriers to effective interaction (which is done through regular observations/analyses of the team interaction process)
- Improve the interaction process by taking some actions to eliminate the barriers
- Evaluate the effectiveness of the team interaction process

- Provide suggested actions to improve the team effectiveness

The research outlined in this report is currently being verified with "live-data" from virtual teams in the following companies: Intel Corporation, Ford Motor Company and Visteon Corporation. To test the team interaction model and the framework proposed in this report, the following instruments are currently being developed, tested and deployed: surveys, participant observations and interviews. Da Vinci research team at Intelligent Engineering Systems Laboratory is currently performing data collection and analysis. Detailed description of the data collection phase from these instruments as well as the subsequent analysis is beyond the scope of the current report.

7.2 Further Research

The significant new concepts introduced in this research are the team interaction space effectiveness framework, the team interaction space effectiveness continuum and the team interaction space effectiveness model. These concepts at present are highly conceptual and abstract. At present, there are quite a few missing links tying these separate research areas together. The missing links are

- Team Interaction Model
    - Team Interaction Space Effectiveness Model
        - The current model is not a conceptually complete model. Some amount of work is necessary to account for all the variables that have been identified as being significantly important from a doctoral dissertation conducted parallely on exploring the relevance of team interaction space to perceived team performance. The variables identified need to be integrated into the current model.
    - Assimilating Survey Data from Collaboration Surveys
        - The data gathered by numerous research instruments like surveys and real-life observations in meeting needs to be translated into numerical data that will be the input to the team interaction space effectiveness model. This translation from conceptual data to numerical form will need to be backed up by experimentation to actually resolve what should be the data translation instrument and calibrating the instrument.
    - Establishing Numerical Relationships

        - The team interaction space effectiveness model at present is a conceptual model. If it is to be effective, it should have a numerical form lending itself to automation. This is possible only when the numerical relationships between the different variables are identified in mathematical form. There is substantial quantitative and qualitative data that can be used for this purpose. However, the simulations required establishing the numerical relationships need to be done
    - Relating team interaction space effectiveness model to team interaction space effectiveness continuum
        - Relation of team interaction space effectiveness as computed numerically from the team interaction space effectiveness model to the team interaction space effectiveness continuum. The team interaction space effectiveness model will be a translation from a conceptual and real-life "as is" view of the team through the measurements of different aspects of the team interaction space to a "how good is the process" view in the team interaction space effectiveness continuum. The represent different dimensions of the same problem and relating the results from the team interaction space effectiveness to a related position on the continuum will require a significant amount of calibration backed by data to prove that the translation is indeed representative of the actual case.
- Automation of the Team Interaction Space
    - Since the interaction process is continuous, not discrete, the whole process/framework in which the virtual team is constrained in its interactions lends itself to automation. A thorough understanding of the interaction processes would definitely lead to the development of a comprehensive information technology framework capable of:
        - Mimicking the virtual team interaction space
        - Providing formal methods to evaluate team interaction effectiveness through the means of questionnaires/communication patterns and feedback of interaction participants
        - Providing a comprehensive model to evaluate the team interaction effectiveness
        - Proactively make suggestions to the team on required action for improvement of the interaction process.

- Team interaction space effectiveness continuum
    - The development of the team interaction space effectiveness continuum is not complete. This continuum should have associated effectiveness targets that need to be identified as representative of the team performance at the different stages. The effectiveness targets described as part of this research are too simplistic to account for the myriad real-life scenarios that are there in the real world. The continuum needs to be calibrated accurately.
- Validation of the Team Interaction Framework – the developed framework and its constituent concepts need to be validated through its application in a real life case and observing the result of its application. The involved constituents will need to be tweaked and changed so that they are able to model and mimic real life cases.

REFERENCES

1. Alavi, Maryam, & Yoo, Youngjin. (1997a). Is learning in virtual teams real? A Harvard Business School Working Paper, 97-095, 1997.
2. Alavi, Maryam, & Yoo, Youngjin. (1997b). Leadership emergence in virtual team environments. A Harvard Business School Working Paper, 97-097, 1997.
3. Allee, V. (1997). Chevron Maps Key Processes and Transfers Best Practices. Knowledge, Inc., April 1997
   Available http://webcom.com/quantera/Chevron.html
4. Allen, T. J., & Hauptman, O. (1990). The substitution of communication technologies for organizational structure in research and development. In J. Fulk & C. W. Steinfield (Eds.), Organizations and Communication Technology (pp. 275-294). Newbury Park, CA: Sage.
5. Ancona, D. G. & Caldwell, D. F. (1992). Bridging the boundary: External activity and performance in organizational teams. Administrative Science Quarterly, 37, 634-665.
6. Andriessen, J.H.E. (1995). The why, how and what to evaluate of interaction technology: A review and proposed integration. In Thomas, P.J. (Ed.), CSCW Requirements and Evaluation (pp. 107-124). New York: Springer.
7. Ash, J. (1997). State of KM practice among Early Adopters. Knowledge, Inc.
   Available http://aviary.share.net/delphi/ash/KMtext.html
8. Becker, F., & Steele, F (1995). Workplace by Design: Mapping the High-Performance Workspace. Jossey-Bass Management Series.
9. Brooking, A., Motta, E. A Taxonomy of Intellectual Capital and a Methodology for Auditing It.17th Annual National Business Conference. 1996
10. Chenier, D., Picasso, M. Enabling Globally Distributed Teams. April 2000. Unpublished Sloan School of Management.
11. Chidambaram, L., & Jones, B. (1993). Impact of communication medium and computer support on group perceptions and performance: A comparison of face-to-face and dispersed meetings. MIS Quarterly, 17(4), 465-491.
12. Cohen, G., Ledford, G., Spreitzer, G. (1992). Predictive Model of Self-Managing Work Team Effectiveness. Human Relations v49 (n5).
13. Davenport, Thomas H. (1997). Information ecology. New York: Oxford University Press.
14. Davidow, William H. & Malone, Michael S. (1992) The virtual corporation: Structuring and revitalizing the corporation for the 21st century. New York: Harper Collins.
15. Duarte, D., Snyder, N. (1997). Mastering Virtual Teams. San Francisco: Jossey-Bass Publishers
16. Eunice, Amy, & Kimball, Lisa. (1997). Zen and the art of facilitating virtual teams. 1997 Organization Development Network Annual Conference, Conference Proceedings, October 4-8, 1997.
17. Finley, Michael. (1995). Toward a definition of groupware. Managing Office Technology, 4 (10), October 1995.
18. Geber, Beverly. (1995). Virtual Teams. Training, April 1995. pp. 36-40.
19. Gerber, S.C. and Pennito, J.W. (2000). Virtual Teams at Work: One Manager's Story. Pub: Leaders for Manufacturing Program of the Alfred P. Sloan School of Management and the School of Engineering.
20. Gladstein, G. (1984). Groups in Context: A Model of Task Group Effectiveness. Administrative Science Quarterly, Vol. 29.
21. Grenier, Ray & Metes, George. (1995). Going Virtual. New Jersey: Prentice Hall.

22. Goodman, Paul S. & Sproull, Lee S. (1990). Technology and Organizations. San Francisco: Jossey- Bass.
23. Goodman, Paul S. & Associates. (1986). Designing Effective Work Groups. San Francisco: Jossey Bass Publishers.
24. Gorton, I. & Motwani, S. (1996). Issues in Co-operative Software Engineering Using Globally Distributed Teams. Information and Software Technology, 38, pp. 647-655.
25. Hackman, J.R (1987). The design of work teams. In J.W. Lorsch (Ed.), Handbook of organizational behavior. Englewood Cliffs, NJ: Prentice-Hall.
26. Hamlin, Cole. (1994). Team Building a Global team at Apple Computer. Employee Relations Today, Spring 1994, 21 (1).
27. Harbison, A., Howell, H., Klein, J. (2000). The Role of Senior Leadership in Nurturing High Performance Global Teams. Unpublished Leaders for Manufacturing. Program of the Alfred P. Sloan School of Management.
28. Hartman, F. and Ashrafi, R. (1996). Virtual organizations - an opportunity for learning IEEE 1996 International Conference on Management Engineering & Technology, (IEMC '96 Proceedings), Vancouver, 1996, pp. 201-205.
29. Hartman, F. and Guss, C. (1996). Virtual teams: constrained by technology or culture? IEEE 1996 International Conference on Engineering & Technology, Vancouver, 1996, pp. 185-190.
30. Haywood, M.(1999). Managing Virtual Teams. Pub: Artech House.
31. Heller, Robert. (1994) Survival of the Globally Adapted. Management Today, August 1994.
32. Henry, Jane E. & Hartzler, Meg (1998). Tools for Virtual Teams. Milwaukee: ASQ Quality Press.
33. Hequet, M., Lee, C., Picard, M., & Stamps, D. (1996). Teams get Global. Training, 33 (12), December 1996.
34. Hightower, R.T.& Sayeed, L. (1996). Effects of communication mode and pre-discussion information distribution characteristics on information exchange in groups. Information Systems Research, 7(4), 451-465.
35. Hofstede, G. Culture and Organizations: Intercultural Cooperation and its Importance for Survival: Software of the Mind. 1991. McGraw-Hill
36. Hollingsworth, A.T., Meglino, B.M., & Shaner, M.C. (1979). Coping with team trauma. Management Review, 68, August 1979, pp. 48-50.
37. Horgen, T., Schon, D., Porter, W., Joroff, M. (1998). Excellence by Design: Transforming Workplace and Work Practice. John Wiley & Sons.
38. Intel Workshop. (1998). Effective Meetings Workshop Participant Guide. Intel Corporation.
39. Jarvenpaa, S. L., & Ives, B. (1994). The global network organization of the future: Information management opportunities and challenges. Journal of MIS, 10(4), 25-57.
40. Katzenbach, J. R., & Smith, D. K. (1993). The discipline of teams. Harvard Business Review, March-April, 111-120.
41. Katzenbach, J.R., & Smith, D.K. (1992). The wisdom of teams. Boston: Harvard Business School Press.
42. Keen, P. G. W. (1990). Telecommunications and organizational choice. In J. Fulk & C. W. Steinfield (Eds.), Organizations and Communication Technology pp. 295-294. Newbury Park, CA: Sage.
43. Klein, J., Barrett, B. (2000). One foot in a global team, one foot at the local site: Making sense out of living in two worlds simultaneously. Submitted to Individual, Team, and Organizational Effectiveness Symposium at University of North Texas.
44. Kostner, J. K. (1996). Virtual leadership: Secrets from the round table. New York: Warner.

45. Kurland, N. B., Bailey, D. E. (1999). The advantages and challenges of working here, there, anywhere, and anytime. Organizational Dynamics, Autumn 1999.
46. Latane, B., Liu, J. H., Nowak, A., Bonevento, M. Zheng, L. (1995). Distance matters: Physical space and social impact. Personality and Social Psychology Bulletin, 21 (8), August 1995, 805.
47. Li F. and Williams H. (1999). Organisational Innovations Through Information Systems: Some Lessons From Geography. In Brooks L. and Kimble C. Information Systems – The Next Generation. Proceedings of the 4th UKAIS Conference pp. 471 - 485. York UK.
48. Lindstaedt, S.N., & Schneider, K. (1997). Bridging the gap between face-to-face communication and long-term collaboration. Proceedings of the International ACM SIGGROUP Conference on Supporting Group Work: the Integration Challenge, pp. 331-340.
49. Lipnack, J. & Stamps, J. (1997). Virtual teams: Reaching across space, time, and organizations with technology. New York: John Wiley & Sons.
50. Manasseh, C.G. Project Management of Geographically Distributed Software Development Teams. Unpublished School of Engineering, MIT. June 1999
51. Mayer, M. (1998). The Virtual Edge. Pub: Project Management Institute Headquarters.
52. McGarry, Diane. (1994). Playing on both the home and the away teams. Business Quarterly, 59 (2), Winter, 1994.
53. McGrath, J.E., & Hollingshead, A.B. (1994). Groups interacting with technology. Thousand Oaks, CA: Sage Publications.
54. McMahan, K. (1998). Effective communication and information sharing in virtual teams. Available http://www.bizresources.com/learning/evt.html.
55. Melymuka, Kathleen. (1997). Virtual realities: Need for teamwork across geographical boundaries. Computerworld, 31 (17), April 26th 1997.
56. Myers, J., & McLean, J. (1997). Knowledge management for citizens' advice in the 21st century: an innovative IS strategy. http://www.ifi.uio.no/iris20/proceedings/11.htm
57. Miller, Paddy, & Pons, Jose Maria, & Naude, Peter. (1996, June 14). Global teams. Financial Times, 33009.
58. Mittleman, D & Briggs, R.O. (1999). Communications technologies for traditional and virtual teams. In E. Sundstrom & Associates (Eds,), Supporting work team effectiveness 246-270. San Francisco: Jossey-Bass.
59. Nohria, N., & Eccles, R. (1992). Face-to-face: Making network organizations work. In N. Nohria & R. Eccles (Eds.), Networks and Organizations: Structure, Form, and Action (pp. 288-301). Boston, MA: Harvard Business School Press.
60. O'Hara-Devereuax, Mary, & Johansen, Robert. (1994). GlobalWork: Bridging distance, culture & time. San Francisco: Jossey-Bass.
61. Pena-Mora, F., Struminger, R., Fuller, J. and Losey, R. Supporting a "Real World" Project-Based, Technology-Supported, Collaborative, Distance Learning Environment: The MIT-CICESE Distributed Software Engineering Lab. Submitted to ASEE for publication, 2000.
62. Pena-Mora, F., Sen, S., Vadhavkar, V. (2000). Team Effectiveness Models for Geographically Distributed Teams. Unpublished School of Engineering, MIT.
63. Prodonoff, V. (1999) Management of Globally Dispersed Teams. Pub: Leaders for Manufacturing Program of the Alfred P. Sloan School of Management and the School of Engineering., MIT.
64. Rennecker, J. (1999). The Myth of Spontaneous Connection: Insight from the Experiences of One Virtual Team. Pub: Sloan School of Management.
65. Smith, P., Kearny, L (1994). Creating Workplaces Where People Can Think. Jossey-Bass Management Series.

66. Smith, S. (1996). Using Transnational Teams to Globalize Your Company. Organizational Dynamics, 34 (4), Spring, 1996.
67. Schrage, M. No More Teams! Mastering the Dynamics of Creative Collaboration. 1999. DoubleDay.
68. Smith, P., Kearny, L (1994). Creating Workplaces Where People Can Think. Jossey-Bass Management Series
69. Townsend, A. M., DeMarie, S. M., Hendrickson, A. R. (1998). Virtual teams: Technology and the workplace of the future. Academy of Management Executive, 12(3), pp.17-29.
70. The MIT-CICESE Distributed Software Engineering Lab. Unpublished MIT IESL Lab, Draft 9., 1999.
71. The DISEL Handbook 1999-2000. Unpublished MIT IESL Lab, June 1999.
72. Vadhavkar, S. (2001). Team Interaction Space Effectiveness for Globally Dispersed Teams: Theory and Case Studies. Unpublished School of Engineering, MIT.
73. Warkentin, M.E., Sayeed, L., & Hightower, R. (1997). Virtual teams versus face-to-face teams: An exploratory study of a web-based conference system. Decision Sciences, 28(4), Fall 1997, pp. 975-995.
74. Whitmore, John (1992, 1994). Coaching for performance. Amsterdam: Pfeiffer
75. Yang, B. (1998). Managing a Distributed Software Engineering Team. Unpublished School of Engineering. May 1998.
76. Zelinsky, M (1998). New Workplaces for New Work styles. McGraw-Hill Publishers.

Appendix 1: Collaboration Survey

GENERAL INSTRUCTIONS

Most of the questions in this survey ask that you circle one of several numbers that appear under or to the right of the item. You are to choose the one number that best matches the description of how you feel about the item.

For example, if you were asked how much you agree with the statement "I enjoy the weather here." and feel that you agree, circle the number under Agree like this:

	Strongly Agree	Agree	Agree Somewhat	Neither	Disagree Somewhat	Disagree	Strongly Disagree
I enjoy the weather here.....	1	2	(3)	4	5	6	7

So be sure to read the special instructions that appear on each page and to read the response choices before choosing your answers. This is NOT a test. There are no right answers, just your candid opinion.

Thank you.

Please answer the remaining questions in this survey based on your experiences working on a *specific globally dispersed* team. For this survey, globally dispersed teams are defined as teams that required significant collaborations between team members that were separated across boundaries (different regions, countries, time zones or organizations).

1. For this questionnaire I am answering the questions based on my experiences on the following *globally dispersed team:* _____
2. How many members in total are on the team? _____ full-time _____ part-time
3. What is the expected time span for the team? _____ months or _____ on-going
4. Has the team membership changed since you joined the team? Yes _____ No _____
   a. If yes, over the past year, how frequently did the membership change? _____ Times
   b. Are changes planned? Yes _____ No _____
5. Number of sites represented on the team: _____ Sites
6. How many countries do these sites represent? _____ Countries
7. Number of functional departments represented on the team: _____ Functions
8. What percentage of your total work time do you spend on this globally dispersed team? _____%

SECTION A: Communication Technologies

Please indicate the degree to which you agree or disagree with each of the following statements about communication technologies.

	Strongly Agree	Agree	Agree Somewhat	Neither	Disagree Somewhat	Disagree	Strongly Disagree
1. Overall, I am satisfied with the current set of technologies used in communicating with global team members	1	2	3	4	5	6	7
2. Communication technologies used for communicating synchronously with remote team members are difficult to use	1	2	3	4	5	6	7
3. Communication technologies used for communicating with remote team members facilitate effective global team meetings	1	2	3	4	5	6	7
4. I receive sufficient training to use communication technologies most effectively on global teams	1	2	3	4	5	6	7
5. I have no input in the selection of communication technologies that we use on the global team	1	2	3	4	5	6	7
6. Communication technologies allow me to convey my ideas very effectively to my global team members	1	2	3	4	5	6	7
7. I use very basic technologies such as phone, email and project web sites to meet my functional needs to collaborate with my global team members	1	2	3	4	5	6	7
8. Asynchronous communication technologies (e.g., emails, team web sites) are more useful than synchronous technologies (e.g., real-time presentation sharing)	1	2	3	4	5	6	7
9. Communication technologies used by the global team are conveniently accessed from multiple locations (e.g., cubicle, office, meeting room, home)	1	2	3	4	5	6	7
10. New communication technologies that provide better functionalities do not have to be very reliable before they can be adopted by global team members	1	2	3	4	5	6	7
11. For computer-based communication technologies (e.g., team web sites), I prefer functionality over user interface	1	2	3	4	5	6	7
12. The company provides excellent support (e.g., training staff, help desks) for using communication technologies	1	2	3	4	5	6	7
13. Communication technologies allow everyone in the team to have access to information needed to get the job done	1	2	3	4	5	6	7

SECTION B: Team Interactions

Please indicate the degree to which you agree or disagree with each of the following statements on your interactions with team members.

	Strongly Agree	Agree	Agree Somewhat	Neither	Disagree Somewhat	Disagree	Strongly Disagree
1. Face-to-face meetings are much more effective than remote conferencing meetings (e.g., audio or video teleconference meetings)	1	2	3	4	5	6	7
2. Local team members appear more interested than remote team members in meeting discussions	1	2	3	4	5	6	7
3. It is important to have a well-defined agenda circulated to all team members before a global team meeting	1	2	3	4	5	6	7
4. The agenda items for my global team meetings are poorly defined	1	2	3	4	5	6	7
5. My team rotates the responsibility of chairing the meetings among all the sites represented on the global team	1	2	3	4	5	6	7
6. Remote team members appear less committed than local team members during most meetings	1	2	3	4	5	6	7
7. Team members have the training to run effective global team meetings	1	2	3	4	5	6	7
8. All global team members express opinions and ideas freely in most meetings	1	2	3	4	5	6	7
9. The same team members appear to be making all the decisions in global team meetings	1	2	3	4	5	6	7
10. The team leader regularly talks with team members outside global team meetings	1	2	3	4	5	6	7
11. Team meetings are used by the team to agree on the responsibility for specific tasks	1	2	3	4	5	6	7
12. The needs of the global team and local priorities are reconciled outside team meetings	1	2	3	4	5	6	7
13. On a regular basis, global team members take the time during the meetings to share lessons learned at their local sites	1	2	3	4	5	6	7
14. The needs of the global team and local priorities are rarely reconciled during meetings	1	2	3	4	5	6	7
15. Ambiguous tasks are clarified with all the global team members outside meetings	1	2	3	4	5	6	7
16. When this global team meets, the team members whose input is needed to accomplish the task are always present	1	2	3	4	5	6	7
17. Audio conferencing technologies for global team meetings are more effective than video conferencing technologies	1	2	3	4	5	6	7
18. The team has sufficient opportunities to conduct face-to-face meetings	1	2	3	4	5	6	7
19. Asynchronous interactions (e.g., using email or posting documents on a web site) are not as important as synchronous interactions (e.g., audio/video teleconferences)	1	2	3	4	5	6	7
20. I regularly talk about work related issues with my remote team members outside global team meetings	1	2	3	4	5	6	7

SECTION C: Individual

Please indicate the degree to which you agree or disagree with each of the following statements based on your personal experiences.	Strongly Agree	Agree	Agree Somewhat	Neither	Disagree Somewhat	Disagree	Strongly Disagree
1. I believe my company has a strong corporate culture.	1	2	3	4	5	6	7
2. It is hard to work with global team members who are more than two time zones (hours) away.	1	2	3	4	5	6	7
3. I have yet to master the communication technologies needed to share knowledge with global team members	1	2	3	4	5	6	7
4. My prior experience on global teams was an important reason why I was selected for this global team	1	2	3	4	5	6	7
5. I completely understand the goals of the global team.	1	2	3	4	5	6	7
6. My individual role in the global team is ambiguous.	1	2	3	4	5	6	7
7. I have complete confidence and trust in *local* team members to get the job done	1	2	3	4	5	6	7
8. I have complete confidence and trust in *remote* team members to get the job done.	1	2	3	4	5	6	7
9. I believe the work of the global team is important.	1	2	3	4	5	6	7
10. Working on a global team has changed how I relate to coworkers at my local site.	1	2	3	4	5	6	7
11. I get official recognition for working on globally dispersed teams.	1	2	3	4	5	6	7
12. I report to the top management at my site about the global team on a regular basis.	1	2	3	4	5	6	7
13. I never expected to learn as much as I do from other members of the global team.	1	2	3	4	5	6	7
14. Employees should not disagree with management decisions	1	2	3	4	5	6	7
15. Managers should not delegate important tasks to employees.	1	2	3	4	5	6	7
16. It is important to have job requirements and instructions spelled out in detail so that employees know what they are expected to do.	1	2	3	4	5	6	7
17. Rules and regulations are important because they inform employees what the organization expects from them.	1	2	3	4	5	6	7
18. I believe training in my company prepares people to work on globally dispersed teams.	1	2	3	4	5	6	7

SECTION D: Team Structure and Processes

Please indicate the degree to which you agree or disagree with each of the following statements about your global team.

	Strongly Agree	Agree	Agree Somewhat	Neither	Disagree Somewhat	Disagree	Strongly Disagree
1. All members of the global team agree on the team's goals	1	2	3	4	5	6	7
2. Team members participate in the decision making process	1	2	3	4	5	6	7
3. The combination of skills on this global team was carefully chosen to fit the task	1	2	3	4	5	6	7
4. Our global team has complementary technical and social skills	1	2	3	4	5	6	7
5. Functional skills are the most important factor for choosing global team members	1	2	3	4	5	6	7
6. Language is not a barrier to success of global teams	1	2	3	4	5	6	7
7. Team members of different countries do not work well together on the team	1	2	3	4	5	6	7
8. Most team members in my global team have no experience working in locations with different culture	1	2	3	4	5	6	7
9. Diversity among people on the global team helps create better solutions	1	2	3	4	5	6	7
10. Cultural differences hinder global team performance	1	2	3	4	5	6	7
11. Changes in the team membership negatively impact global team performance effectiveness	1	2	3	4	5	6	7
12. Working together over time improves my team's performance	1	2	3	4	5	6	7
13. The team members trust our team leader to fairly represent our global team needs	1	2	3	4	5	6	7
14. The team has the autonomy to select options that the team leader does not endorse	1	2	3	4	5	6	7
15. The global team has a formal process to help transition new team members into their new role	1	2	3	4	5	6	7
16. Transition for new members on the global team happens too quickly	1	2	3	4	5	6	7
17. The team has created norms of appropriate behavior among its members	1	2	3	4	5	6	7
18. The global team has a mentor who helps the global team in reaching its goals	1	2	3	4	5	6	7
19. Global team operating procedures and protocols support successful completion of the team's task	1	2	3	4	5	6	7
20. Success of the team is dependent on the shared contributions of all team members	1	2	3	4	5	6	7
21. Among the members of the global team, duties are divided equitably	1	2	3	4	5	6	7
22. Work details are often defined when team members talk with each other	1	2	3	4	5	6	7
23. Over time the team is creating it's own unique 'history' of stories and ways of doing things	1	2	3	4	5	6	7
24. Sharing knowledge with my team members is an important part of my work with team	1	2	3	4	5	6	7
25. My global team shares lessons learned from other teams	1	2	3	4	5	6	7
26. As the global team continues to work toward a shared goal, the relationships among all the team members are becoming stronger and more important	1	2	3	4	5	6	7
27. It is hard to trust the other people on the global team because we do not have time to get to know each other	1	2	3	4	5	6	7
28. Remote team members are less productive than team members from local site	1	2	3	4	5	6	7

SECTION E: Team Outcomes

Please indicate the degree to which you agree or disagree with each of the following statements about your team.

		Strongly Agree	Agree	Agree Somewhat	Neither	Disagree Somewhat	Disagree	Strongly Disagree
1.	The success of my global team depends entirely on the team delivering results.	1	2	3	4	5	6	7
2.	My global team makes fast decisions.	1	2	3	4	5	6	7
3.	Decisions made in the global team are of high quality	1	2	3	4	5	6	7
4.	My global team has not been very successful in achieving its mission and objectives	1	2	3	4	5	6	7
5.	Working on global teams has been a good experience for me	1	2	3	4	5	6	7
6.	Working together the team creates solutions that I could not create working alone.	1	2	3	4	5	6	7
7.	Working on global teams increases my technical expertise	1	2	3	4	5	6	7
8.	An important information-sharing network has been created among members of the team.	1	2	3	4	5	6	7
9.	Working on the global team gives me access to useful knowledge I can get nowhere else	1	2	3	4	5	6	7
10.	I derive great personal satisfaction from my work with the members of the global team	1	2	3	4	5	6	7
11.	I am satisfied with my individual performance on the global team	1	2	3	4	5	6	7
12.	I would enjoying work with my current team members on another global team	1	2	3	4	5	6	7
13.	Work on global teams helps my long-term career objectives.	1	2	3	4	5	6	7
14.	I enjoy working on global teams.	1	2	3	4	5	6	7
15.	My global team members have no input in my individual performance appraisal.	1	2	3	4	5	6	7
16.	I know exactly how my performance is measured on this team.	1	2	3	4	5	6	7
17.	I think my global team could have performed a lot better	1	2	3	4	5	6	7
18.	My global team leader provides formal input in my individual performance appraisal.	1	2	3	4	5	6	7
19.	Concerns about individual promotion and career advancement Have an impact on the performance of the global team.	1	2	3	4	5	6	7
20.	I do not plan on networking with members of this global team for other projects.	1	2	3	4	5	6	7
21.	My work on the global team helps my local site achieve its performance metrics	1	2	3	4	5	6	7
22.	I feel that I have increased my ability to work in a global community.	1	2	3	4	5	6	7
23.	My performance in global teams enhances the reputation of my local site.	1	2	3	4	5	6	7

SECTION F: Team Support

Please indicate the degree to which you agree or disagree with each of the following statements based on the support received by the team.

	Strongly Agree	Agree	Agree Somewhat	Neither	Disagree Somewhat	Disagree	Strongly Disagree
1. Considering the company as a whole, globally dispersed teams are successful	1	2	3	4	5	6	7
2. Company leadership does not understand the major concerns facing global teams	1	2	3	4	5	6	7
3. Company provided cross-cultural training classes to help its employees work effectively on global teams	1	2	3	4	5	6	7
4. The team is a global initiative, but the company has no global structure of policies and procedures to support it	1	2	3	4	5	6	7
5. Local supervisors chose members of my global team	1	2	3	4	5	6	7
6. Functional department goals take priority over the goals of the global team	1	2	3	4	5	6	7
7. No matter how global the focus of some of my work is, it is what I do locally that gets rewarded	1	2	3	4	5	6	7
8. Any rewards I receive for my work with the team must come from my local supervisors	1	2	3	4	5	6	7
9. Work on global teams is weighted equally with functional department work on performance evaluations.	1	2	3	4	5	6	7
10. All global team members identify with a corporate culture	1	2	3	4	5	6	7
11. My local supervisor supports global teams as long as they don't disrupt local activities.	1	2	3	4	5	6	7
12. Local needs are taken into account in global team decisions	1	2	3	4	5	6	7
13. My local site readily implements the recommendations of the global team	1	2	3	4	5	6	7
14. Local management does not understand how to support its employees when they work on globally dispersed teams	1	2	3	4	5	6	7
15. My local supervisor understands the goals of the globally dispersed team	1	2	3	4	5	6	7
16. Contributions of the local sites in global teams are not as appreciated as they should be	1	2	3	4	5	6	7
17. My local supervisor doesn't understand the importance of my work on the global team.	1	2	3	4	5	6	7
18. Global teams have made a significant impact on the way the company does business.	1	2	3	4	5	6	7
19. Company provides the global team with all the material resources (e.g. money for equipment, computers) needed to make it successful	1	2	3	4	5	6	7
20. Travel funds are not always available for the global team to do its work	1	2	3	4	5	6	7
21. The company is promoting cross-cultural working relationships among its workforce	1	2	3	4	5	6	7
22. It is clear in this company that employees are valued equally for their contribution no matter what site they come from	1	2	3	4	5	6	7
23. The company does not understand what employees at remote sites need to be successful.	1	2	3	4	5	6	7
24. The company appreciates my contribution to globally dispersed teams.	1	2	3	4	5	6	7
25. The company effectively shares lessons learned across the organization	1	2	3	4	5	6	7
26. I depend on the local site budget to support my global team activities	1	2	3	4	5	6	7

SECTION H: DEMOGRAPHICS

In this section we ask a number of questions about your background. This information will allow comparisons among different groups of employees and comparisons with similar groups of employees in other organizations.

All of your responses are strictly confidential. Individual responses will not be seen by anyone in your company. All data received from this survey will be reported in aggregate, with all specific individual or other identifying information masked.

We appreciate your help in providing this important information.

1. Are you... 1. Female 2. Male
2. How old were you on your last birthday? _____ years
3. What is the level of your education? (Please indicate highest completed.)

   1. High school
   2. Some college or technical training, but no degree, beyond high school (1-3 years)
   3. Associate's Degree (2-year degree)
   4. Graduated from 4-year college (BA, BS, or other Bachelor's degree)
   5. Some graduate school
   6. Master's degree or equivalent in Technical Discipline
   7. Master's degree or equivalent in Business
   8. Doctorate degree or equivalent

4. Languages spoken
   a. First language spoken/Mother tongue _____
   b. Language in which you were educated _____
   c. Language use for business _____
   d. Other languages spoken _____
   e. Other languages understood _____

5. Continuous overseas work experience of more than 3 months Yes_____ No_____
6. Continuous overseas living experience of more than 3 months Yes_____ No_____
7. Years with the industry _____ Years in current job_____ Years with the company _____
8. Other work experience, if any:

Company Name	Years

9. Your primary work location _____
10. What is your position within the company (Please choose one)
    1. Executive
    2. Senior Level Management
    3. Middle Level Management
    4. First Level Management
    5. Non-supervisory Position

11. In the past, have you been involved in globally dispersed teams? Yes _____ No_____
12. How many of these globally dispersed teams are you involved with each year? _____
13. What percentage of the current global team members have you previously worked with? _____%

Appendix 2: Meeting Evaluation Survey

MEETING SURVEY - GENERAL INSTRUCTIONS

There are two main objectives of this survey. Firstly, the MIT research team will use data from this survey to analyze the effectiveness of audio/video teleconference meetings and suggest guidelines to enhance collaboration during these meetings. Secondly, data from this survey is expected to provide requirements useful in shaping future MIT collaboration technologies.

This is a confidential survey and individual responses will be kept confidential. Data collected from this questionnaire will not be published or used outside the current project scope, without explicit permission from the team members. This survey is voluntary; omit any questions you are unable to or uncomfortable in answering. This is NOT a test. There are NO RIGHT answers, just your candid opinion.

Please answer the following questions based on your experiences from the current meeting.

1. I have been working with the present team for _____ months.
2. What percentage of your total work time do you spend on this team? _____%
3. For this meeting, my location was: _____ (Town, Country)
4. In the past, have you been involved in audio/video teleconference meetings with team members who were separated across geographical boundaries? Yes _____ No_____
5. Face-to-face meetings are much more effective than audio/video teleconference meetings. Yes _____ No_____

MEETING EFFECTIVENESS

The remaining questions in this survey ask that you circle one of several numbers that appear to the right of the item. You are to choose the one number that best matches the description of how you feel about the item.

Please indicate the degree to which you agree or disagree with each of the following statements about the current team meeting.	Very Strongly Disagree	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree	Very Strongly Agree
1. Technology used for communicating with remote team members was easy to use	1	2	3	4	5	6	7
2. Technology used in meetings with remote team members is *not* well supported in the organization	1	2	3	4	5	6	7
3. Technology used for communicating helped me contribute in the meeting	1	2	3	4	5	6	7
4. The positioning of the cameras, screens, chairs, and tables at *my* location helped me interact in the meeting	1	2	3	4	5	6	7
5. The positioning of the cameras, screens, chairs, and tables at *remote* locations helped others to interact with me in the meeting	1	2	3	4	5	6	7
6. The agenda items for the current meeting were poorly defined	1	2	3	4	5	6	7
7. Meeting chairperson diligently managed the agenda during the meeting	1	2	3	4	5	6	7
8. This meeting was poorly structured	1	2	3	4	5	6	7
9. Team decisions were made based on consensus from majority of team members	1	2	3	4	5	6	7
10. Team members appeared disinterested in the meeting proceedings	1	2	3	4	5	6	7
11. The team reached all the major goals set forth before the meeting	1	2	3	4	5	6	7
12. Most times in the meeting, I was *not* aware of all the participants	1	2	3	4	5	6	7
13. In this meeting, I got the feeling that the team was collaborating together as a team	1	2	3	4	5	6	7
14. The meeting did *not* identify the next steps for the team	1	2	3	4	5	6	7
15. I learnt something new about conducting effective audio/video teleconference meetings that I can use for other meetings that I am involved in	1	2	3	4	5	6	7
17. I felt this was a good meeting	1	2	3	4	5	6	7