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# LEADERSHIP IN VIRTUAL TEAMS

BY

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of the requirements for the degree of

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ACKNOWLEDGMENTS

This dissertation, probably like most dissertations, is the combined work of a team of people most of whom have never met each other. In this regard, this dissertation on "Leadership in Virtual Teams" is a product of a virtual team in which, I as the dissertation writer and coordinator, played the role of the team leader.

There are lots of team members to thank.

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# CHAPTER 1

## Introduction

This dissertation is about leading virtual teams. Virtual teams are emerging structures in organizations characterized by their interactions and their geographic separation. Interpersonal interactions are primarily electronic, using simple communications devices such as telephones to advanced technologies such as personal computers, collaborative software, large-scale databases, and video conferencing. Geographic separation may range from nearby offices to offices in other countries on different continents. Team members may meet infrequently or in some cases not at all. Team members may come from different cultures. Therefore, virtual teams may pose new and challenging leadership problems. This paper attempts to explore some of these issues.

## Need for and Nature of the Research

Within the field of computer supported cooperative work is the framework of ideas, tools, methods, and technologies to support the collaboration of people on an anytime, anywhere basis.

The primary hypothesis for this study is that, as more organizations compete on time, teams of people can be expected to form, solve problems, and disband, in many cases without actually physically meeting face-to-face (Stalk, 1988).

Since between 80% to 90% of human communication is non-verbal, what sort of problems will arise in virtual teams (Simonds, Vazques, & Harris, 1993)?

How can these problems be overcome? Are there tools to assist people working in virtual teams? The evidence suggests that electronic brainstorming is a better way to generate ideas than both traditional brainstorming and nominal groups (Gallupe & Cooper, 1993). But is this always true? If teamwork is vital to the success of the 1990s organization, how do we build it when electronic communication seems to conflict with it (DeLisi, 1990)? And what about leadership in virtual teams? While there are volumes of information on both leadership and teams, there is little if anything published on leadership in virtual teams. Is there a difference between leadership in real teams and leadership in virtual teams? If there is a difference, what is it? If there is not a difference, why not?

These questions will become more important if the use of virtual teams increases in the future. The technology is currently available to enable virtual teams and it will continually improve over time. As with any promising technology, it seems reasonable to expect that it will be used.

## Research Questions

The goal of this study was to generate information from the data gathered from the Delphi surveys on leadership in virtual teams and from a case study on a specific virtual team. The research questions for both the Delphi survey and the case study are the same and are provided below.

The overall question for this study was: How do you lead virtual teams–teams of people you don't see on a day-to-day basis or may have never met–in terms of leadership practices and information technologies? Examples of virtual

teams include: (1) a team of people working in different cities given the task of planning and hosting a computer conference; and (2) a team of people developing a software product working by telecommuting from their homes.

The following three research questions relate to the overall question, but are more specific.

1. Are these teams effective?
2. How are virtual teams structured?
3. How do team leaders practice leadership?

This last question includes leadership practices such as bringing the team together for face-to-face interaction if necessary, communications, coaching, individual recognition, and team celebrations.

The interview questions were the same for the case study and the first questionnaire of the Delphi study. These questions were as follows.

1. What was the mission or purpose of the team and how was this mission or purpose created or shaped?
2. What has happened so far on the project? When did it start? What phase are you in? What's next for the project?
3. What is the structure or organization of the team?
4. What was your role on this team (team leader, committee chair, team member)?

5. Who did you primarily interact with (all team members, project leaders, etc.) and how? Did you have any previous interaction with these people before this project? How?
6. Where were the team members physically located? Why were they not all collocated?
7. How were the team members selected and why?
8. What information and communications technologies (telephone, e-mail, conferencing, project management software, etc.) did the team use?
9. Can you provide examples of when team members met face-to-face? Did sub-teams meet more frequently? Was face-to-face contact important? Why?
10. Can you provide examples of where individual or team accomplishments were celebrated? If not, would there have been any if the team had been collocated?
11. Can you provide any examples of team members being challenged, encouraged, rewarded, participating in key decisions, coached, or listened to? How was their morale?
12. Have you learned anything interesting about being on a virtual team? What would you have done differently if the team had been collocated?

13. What were some of the major problems or challenges attributable to working in a virtual environment (e.g., trust, collaboration, leadership, communicating, decision-making, team or individual focus)?

## Definitions

The following definitions are provided to clarify the remainder of this document:

**Case Study:** "The researcher explores a single entity or phenomenon, 'the case,' bounded by time and activity (a program, event, process, institution, or social group) and collects detailed information by using a variety of data collection procedures during a sustained period of time" (Creswell, 1994, p.12; Yin, 1989).

**Leader**: "A leader is a person you would follow to a place you wouldn't go by yourself" (Barker, 1992, p. 163).

**Leadership**: "Influence processes affecting the interpretation of events for followers, the choice of objectives for the group or organization, the organization of work activities to accomplish the objectives, the motivation of followers to achieve the objectives, the maintenance of cooperative relationships and teamwork, and the enlistment of support and cooperation from people outside the group or organization" (Yukl, 1994, p. 5).

**Team**: "A team is a small number of people with complementary skills who are committed to a common purpose, performance goals, and approach for which they hold themselves mutually accountable" (Katzenbach & Smith, 1993, p. 45).

**Virtual teams**: Virtual teams primarily interact electronically and meet face-to-face infrequently or in some cases not at all.

## Assumptions

The primary assumption was that organizations and individuals will create virtual teams to solve problems not generally possible by more traditional face-to-face means. Reasons for this include short timeframes, cost constraints, and need for team members who are not physically collocated.

The secondary assumption was the continuance of the convergence of two trends: increasing complexity and increasing urgency.

> The key to dealing with increasing complexity is human collaboration. Many human minds with different perspectives, different specialties, and different experience bases working together and sharing their knowledge, perspectives, and experience would be able to master complex tasks that no single human would be able to master (Engelbart, 1992, p. 2).

## Methodology

The proposed research was qualitative in design using two research methods: (1) the Delphi technique; and (2) case study.

The Delphi technique was used to collect facts and opinions related to the research questions using a three-round process.

The researcher wanted to identify between fifteen to twenty-five people willing to participate in dissertation process. Several organizations and groups were asked for input to this identification process: the Institute for Electrical and Electronics Engineers (IEEE); the Association for Computing Machinery Special

Interest Group on Computer-Human Interaction (ACM SIGCHI); the World Future Society; the Noetic Society; the Institute for the Future; faculty members at Seattle University and other Universities; the Boeing Company; and current writers on the subject.

The general Delphi technique utilized a three-round process. First a survey, containing questions of interest, was distributed. The survey outcomes were subjected to analysis according to categories and concepts, to determine majority and minority opinions. The second and third rounds of the process further refined the analysis including a request for additional comments.

As this was a study on virtual teams, the researcher planned to conduct as much of the research as possible via the Internet. E-mail was used to communicate with nominators and respondents and an interactive web site to capture the data, in so far as it was possible. As a contingency, hard copy correspondence was provided for those who were unable or unwilling to interact electronically.

The case study used the same research questions as the first Delphi survey. The case study studied the team of people who planned and implemented a computer conference (ABC 96) conference. A combination of face-to-face, telephone, and e-mail interviews were used.

## Summary

This dissertation was about leadership in virtual teams–teams of people who primarily interact electronically and who meet face-to-face infrequently or

not at all. Virtual teams are an emerging organizational structure, but little has been written about them and even less has been written about leading them.

The Delphi technique and case study methods were used to determine, if at this point in time, there are emerging patterns of leadership practices and information technologies used in leading virtual teams.

# CHAPTER 2

## Review of the Literature

### Introduction

Change is one of the few constants in our lives today. Just about everything we experience changes. Change may be either positive or negative–it depends on how it effects people and how they relate to it. It seems clear that the pace of change is increasing, especially in the fields of information and communications technologies.

This paper presents a synthesis and summary of information found in the literature related to a relatively common business structure--teams, and to an emerging new structure--virtual teams.

### Nature of Change

Change or the pace of change is one of the most talked-about issues in business today. Companies are bought and sold; alliances are made and broken; organizations downsize or right-size; software product life-spans drop from years to months; and globalization continues unabated with free trade zones, regional economies, and off-shore production of automobiles, textiles, software, and computer hardware. We are in the transition from the second wave to the third wave, in Alvin Toffler's words.

Globalization is one of the key trends occurring today. Business Week has published two special issues on the global economy in the last five years: Reinventing America–Meeting the new challenges of a Global Economy in 1992;

and 21st Century Capitalism–How Nations and Industries will compete in the Emerging Global Economy in 1994. Bookstores carry more and more titles on globalization. Companies such as Boeing and IBM derive more income from products sold outside of the United States than from inside the United States.

Lodge (1995) wrote, "The current rate of accelerated world trade shows almost yearly increases since 1950, when it stood at $308 billion; in 1993, internationally traded goods were valued at $3.8 trillion" (p. 2). He continued, "in 1980, cross-border lending by international banks was $324 billion. By 1991, it was $7.5 trillion; and during that time, the volume of transactions in equities also grew at a compound rate of 28% a year from $120 billion to $1.4 trillion a year" (Lodge, 1995, p. 3).

O'Hara-Devereaux and Johansen (1994) concurred with the globalization trend by suggesting four emerging fault lines or

> the unmistakable signs of change, the points at which innumerable underlying pressures–economic, social, political, technological–have converged and emerged at the surface to change the contours of the world of work, leaving us with new markets, new corporate institutions to serve those markets, and new jobs to produce new goods for the world's new consumers (p. 5).

These four signs of change are: (1) the global consumer; (2) knowledge as a global product; (3) global corporations; and (4) global jobs.

Another key trend is in information technology. In computing, Moore's law predicts that computer power quadruples and its price decreases by half every three years. This trend has been true for the last twelve years and is expected

to continue for the next several years. New computer generations come every three years. Software products change every six to eighteen months. Two years ago, the Internet was relatively unknown. Today it is a communications and publishing tool for millions of people. Tomorrow, it may be a new foundation for electronic commerce. New industries are created in response to change.

There is increasing change in politics, business, governments, and science, and the list goes on. It seems as if everything is in constant change.

But what are the real underlying forces of change? Huber and Glick (1993) wrote, "they are without exception the products of an energizing force. There are two such forces for change: the organization's top managers and the organization's environment" (p. 3).

Huber and Glick (1993) continued:

> Top managers influence organizational change in four important ways. The first way is through their belief systems–their values, ideologies, and mental models of cause-effect relationships. Top managers' beliefs determine the organizational strategies, structures, and cultures they prefer and seek to create in their organizations, and in this way they cause top managers to be sources of change. Second, top managers can also serve as inhibitors of change. Their beliefs and their competencies can cause top managers to serve as constraining agents. The third way top managers impact their organizations is as interpreters of the organization's environment. Finally, top managers are manipulators of the organization's environment. Top managers advertise, lobby, and educate to make environments hospitable for their organization (p. 6).

While Huber and Glick seem to primarily refer to business organizations, it seems reasonable to believe that these top managers could just as well be in government or non-profit organizations as well.

Regarding environmental change, Huber and Glick (1993) wrote.

> The fast-changing nature of today's organizational environments is largely a consequence of two factors: (1) the increasing effectiveness of information technology (both communications technology and computing technology) and (2) the increasing effectiveness of transportation technology (p. 4).

Huber and Glick (1993) offer three examples of environmental change.

- Global markets could not be what they are if information, products, and people could not be moved as easily as they can.
- The decline of manufacturing employment in the United States is directly a consequence of automation (read "information technology") and across-borders manufacturing and importation (read "transportation technology").
- The social issues that today affect organizations have much of their force because advances in communications technology (1) make social injustices and environmental tragedies vivid and widely known and (2) enable many separate entities to communicate, coordinate, and cooperate in confronting organizations on such matters (p. 4).

Finally, there is an interesting new research and education initiative being proposed at the Massachusetts Institute of Technology (MIT) (Buckley, 1996). The introduction of the proposal is on the need for new ways of working. The title of this paper is Inventing the Organizations of the 21st Century.

> There is a growing feeling among business leaders, academics, and others that the old ways of doing business aren't working anymore. In the last few years, we have seen dramatic changes in the global political landscape, unprecedented stresses on the physical

> environment of our planet, and startling setbacks for some of the most successful companies in the world. Together, these changes are leading many people to believe that the large, hierarchical organizations that were so successful in the decades after World War II are becoming obsolete (Buckley, 1996, [On-line]).

The trends driving these changes are by now becoming well-known. Three of the most important are:

- An increasingly intense level of international competition is forcing businesses to become both more efficient and effective if they are to survive.
- The growing power and capabilities of information technology (IT) are both driving and enabling new organizational forms, processes, and roles.
- Finally, a new assessment of human beings and their capabilities is underway. Driven partly by competition, partly by demographics, and partly by changing ideas of human potential, we have come to understand that communication, coordination, and learning are not peripheral activities that workers perform in their non-productive time. Rather, the sharing of information and the construction of shared interpretations is an essential activity of any human community, business or otherwise (Buckley, 1996, [On-line]).

Nature of Inquiry

The nature of the inquiry of this dissertation is to determine if and why organizations are creating virtual teams, and if so, what leadership practices and information technologies are being used.

Virtual teams are teams of people who primarily interact electronically and who meet face-to-face infrequently or in some cases not at all.

It is clear that organizations are forming virtual teams. Organizations may form virtual teams because team members may be distributed locally, regionally,

nationally, or even internationally. More specifically, teams may be distributed because of the new realities facing organizations such as:

- organization-wide projects or initiatives
- alliances with different organizations, some of which may be in other countries
- mergers and acquisitions
- emerging markets in different geographic locations
- the desire of many people and government organizations for telecommuting
- the continuing need for business travel and information and communications technologies available to support this travel

One example of a virtual team is a project team whose members telecommute to the office, and interact electronically with one another. The team works together in a virtual environment.

The next four sections cover teams, leading teams, information technologies that support teams, and virtual teams.

## Teams

### Introduction

Some of the concepts about teams that seem to have general agreement among many different writers and appear to be applicable to virtual teams are explored in this section. These concepts include: (1) definitions of teams; (2)

types of teams; (3) the need for teams; (4) effective teams; (5) decision-making; and (6) team life cycles.

Definitions

This section provides and then compares and contrasts several definitions of teams. As might be expected, there are many different definitions of teams.

Katzenbach and Smith (1993) defined teams as: "A team is a small number of people with complementary skills who are committed to a common purpose, performance goals, and approach for which they hold themselves mutually accountable" (p. 45).

Lipnack and Stamps (1993) gave a similar definition of a team: "where small groups of people work with focus, motivation, and skill to achieve shared goals" (p. 7).

Ulsechak and SnowAntle (1995) defined a team as "two or more persons (6 to 10) who are engaged in a common goal, who are dependent on one another for results, and who have joint accountability for results" (p. 8).

Another but similar definition is "a distinguishable set of two or more individuals who interact interdependently and adaptively to achieve specified, shared, and valued objectives" (Morgan, Glickman, Woodard, Blaiwes, & Salas, 1986, p. 3).

The last definition of teams for this paper is from Mohrman, Cohen, and Mohrman (1995):

> A team is a group of individuals who work together to produce products or deliver services for which they are mutually accountable. Team members share goals and are mutually held accountable for meeting them, they are interdependent in their accomplishment, and they affect the results through their interactions with one another. Because the team is held collectively accountable, the work of integrating with one another is included among the responsibilities of each member (p. 39).

The common elements in these definitions are: a small group of people, shared goals, and mutually accountability. While Lipnack and Stamps do not specifically mention mutual accountability, if team members are indeed working with "focus, motivation, and skill," they probably have some sense of mutual accountability. These common elements are found in other definitions of teams that are not specifically cited here. It seems clear that while there are many different definitions of teams, there is also general agreement on what a team is.

Types of Teams

Teams or groups may be sub-classified as command, task, interest, or friendship groups. These sub-classifications were further defined as follows by Robbins (1993):

- A command group is determined by the organization chart. It is composed of the subordinates who report directly to a given manager.
- Task groups, also organizationally determined, represent those working together to complete a job task. However, a task group's boundaries are not limited to its immediate hierarchical superior. It can cross command relationships.
- People who may or may not be aligned into common command or task groups may affiliate to attain a specific objective with which each is concerned. This is an interest group.

> Friendship groups often develop because the individual members have one or more common interests (p. 285).

This dissertation is concerned only with three of these groups or teams--command groups, task groups, and interest groups. Within these three broad categories, there are different kinds or varieties such as self-directed teams, management teams, sales teams, product teams, design teams, cross-functional teams, and improvement teams. Some of these teams may be persistent or have a long life span while other teams may ramp up suddenly and just as quickly disband once the purpose is achieved.

The Need for Teams

While there are different thoughts on the need for teams, there is also a general agreement on the need for teams. Katzenbach and Smith (1993) wrote about team performance and flexibility:

> We believe that teams–real teams, not just groups that management calls 'teams'–should be the basic unit of performance for most organizations, regardless of size. In any situation requiring the real-time combination of multiple skills, experiences, and judgments, a team inevitably gets better results than a collection of individuals operating within confined job roles and responsibilities. Teams are more flexible than larger organizational grouping because they can be more quickly assembled, deployed, refocused, and disbanded, usually in ways that enhance rather than disrupt more permanent structures and processes (p. 15).

Mohrman, et al. (1995) reached the same conclusions as Katzenbach and Smith regarding performance and flexibility:

> During the past decade, the use of teams has increased dramatically in organizations as we have noted. For the most part, this

> increase reflects the belief that teams are an appropriate structure for implementing strategies formulated to deal with performance demands and opportunities presented by the changing business environment (p. 8).

Literature on the process of innovation and learning also points, if not specifically for the need for teams, at least to the need to establish linkages between the various perspectives in the organization.

Teams are also a structure organizations use for time-based competition. Using focused teams and reengineered business processes some companies are able to compress activities that used to take days or weeks into hours (Stalk & Hout, 1990). Good people are essential, but not sufficient. Productivity, quality, and reducing time-to-market are improved with teams and teamwork (Galbraith & Lawler, 1993; Varney, 1989).

Quite a different perspective comes from Nonaka and Takeuchi (1995) who wrote that teams are also important in creating and maintaining organizational knowledge. This is an insightful perspective. It leads to interesting questions such as: How can we effectively create, structure, store, access, and share knowledge?

Parker (1996) expressed the same thoughts about complexity as Engelbart when he wrote:

> The sheer complexity of business today means that no one person can do it all. With the widening of the marketplace, the increasing importance of technology, the imperative of innovation, and the new focus on the customer, teams, especially cross-functional groups, are becoming the only way to develop viable business

> solutions. People will be required to work with many other people whose backgrounds and styles may be quite different (p. 7).

Many products today are very large scale engineering products–jet aircraft, computer operating systems, and international communications systems are three common examples. Weisbord (1987) also believed that teams are essential to creating large and complex systems.

Robbins (1993) cited a specific example from a Seattle aerospace company:

> The Boeing Company has decided that the future of aircraft designs lies with replacing the firm's historical military-style hierarchy with self-regulating, cross-discipline work teams. Boeing's management believes that teams working intensely to hammer out designs well before the start of production will get the design right so there will be fewer fixes during production, which should lead to higher productivity and profits (p. 284).

A special case of teams, self-directed teams or self-managed work teams, is increasingly being suggested as a way to organize. Self-directed teams begin life as a traditional team with a traditional manager, and over time as the team matures, acquire many of the skills they need to manage themselves. There is a stated objective, agreed to by both the team and its management to become a self-directed team. The team is given training in team basics to begin to shape their own goals and objectives, shape their individual roles and responsibilities, and develop their own approach to accomplishing the job. The manager or team leader is given training in coaching teams. Over time, the manager gives up day-to-day management responsibilities as the team acquires them. Eventually

the manager may coach several teams and the manager to team member ratio may change from a typical 1:15 to 1:50 in one example.

Fisher (1993) provided some quantitative output regarding virtual teams:

> The . . . reason that self-directed work teams are here to stay is that (all else being equal) they get better results than their traditional counterparts. In a review of organizations that had transitioned from traditional work systems to SDWTs in seven countries, John Cotter, a prominent socio-technical system consultant, found that:
>
> - Ninety-three percent reported improved productivity.
> - Eighty-six percent reported decreased operating costs.
> - Eighty-six percent reported improved quality.
> - Seventy percent reported better employee attitudes (p. 22).

These are bottom-line results that management can relate to. It is therefore not surprising that a number of large organizations are now using self-directed work teams.

Fisher (1993) listed some of these organizations:

> Self-directed teams are the most advanced form of empowerment. Whether it is called employee involvement, a socio-technical system, a high performance system, partnership, semiautonomous work teams, or any of the multitude of names referring to organizations based on SDWT concepts, parts of companies like Corning, Procter and Gamble, Esso, Rockwell, TRW, Aid Association for Lutherans, Monsanto, Martin Marietta, Digital Equipment Corporation, Sherwin-Williams, Honeywell, Weyerhaeuser, Shell and a host of others have been using them aggressively (p. 14).

In summary, some of the salient reasons for teams are: (1) to improve performance and productivity; (2) to decrease costs; (3) to increase organizational flexibility; (4) to reduce time-to-market; (5) to create and maintain

organizational knowledge; and (6) to address the complexity of creating large and complex systems.

Effective Teams

There is general agreement about the need for and the importance of teams. But team performance can range from effective to ineffective. What is an effective team? What makes teams effective?

Characteristics of Effective Teams. Teams are created for a wide variety of reasons and therefore they may have a wide variety of purposes. The effectiveness of a team is a function of achieving its purpose. But a team is also a subset of a larger organization. It exists within the context of other organizations (its parent organization and major suppliers and customers) and systems (such as local, state, and federal government; the legal system; the economic system; and our environment). It is important for a team to achieve its purpose, but it also is important to understand its interdependencies and the consequences of the possible ways in which the purpose of the team is achieved. A team that burns members out, violates state or federal laws, or destroys a relationship with key stakeholders is probably not an effective team. Effectiveness must be considered from a variety of perspectives: the achievement of its goals, its relationships with its stakeholders, and its interdependencies with the world around it.

Likert (1961) was one of the early researchers of teams and described a number of factors which supported effective team functioning. Some of these

factors address issues of leadership, values, goal setting, norms, shared information, learning, and problem solving. These are many of the factors current writers about teams reference today.

Pasmore (1988) defined effective organizations as those which "produce excellent results by any measure of costs, quantity, or efficiency while simultaneously enhancing the energy and commitment of organizational members to the success of the enterprise" (p. 1). Effectiveness is seen as organization performance and team member satisfaction.

Parker (1996) listed several characteristics of effective teams that built on the early research by Renis Likert, Douglas McGregor, Blake and Moulton, and others:

- Clear purpose–The vision, mission, goal, or task of the team has been defined and is now accepted by everyone. There is an action plan.
- Informality–The climate tends to be informal, comfortable, and relaxed. There are no obvious tensions or signs of boredom.
- Participation–There is much discussion and everyone is encouraged to participate.
- Listening–The members use effective listening techniques such as questioning, paraphrasing, and summarizing to get out ideas.
- Consensus decisions–For important decisions, the goal is substantial but not necessarily unanimous agreement through open discussion of everyone's ideas, avoidance of formal voting, or easy compromises.
- Open communication - Team members feel free to express their feelings on the tasks as well as on the group's operation.

- Clear roles and work assignments–There are clear expectations about the roles played by each team member. Work is fairly distributed among team members.
- Shared leadership–While the team has a formal leader, leadership functions shift from time to time depending upon the circumstances, the needs of the group, and the skills of the members. The formal leader models the appropriate behavior and helps establish positive norms.
- External relations–The team spends time developing key outside relationships, mobilizing resources, and building credibility with important players in other parts of the organization.
- Self-assessment–Periodically, the team stops to examine how well it is functioning and what may be interfering with its effectiveness (p. 33).

Parker's observations above are very similar to those reported by French and Bell (1995) in a study by Larson and LaFasto on effective teams. French and Bell (1995) wrote:

> They [Larson and LaFasto] found eight characteristics that are always present: (1) a clear, elevating goal; (2) a results-driven structure; (3) competent team members; (4) unified commitment; (5) a collaborative climate; (6) standards of excellence; (7) external support and recognition; and (8) principled leadership. All these characteristics are required for superior team performance; when any one feature is lost, team performance declines. High-performance teams regulate the behavior of team members, help each other, find innovative ways around barriers, and set ever-higher goals. Larson and LaFasto also discovered that the most frequent cause of team failure was letting personal or political agendas take precedence over the clear and elevating team goal (p. 98).

Pasmore (1988) described team effectiveness in the following manner where a socio-technical system is a system or organization with both social and technical elements. Many business organizations are socio-technical systems.

This description of team effectiveness is similar to other descriptions in terms of team member competence, internal management, and external relationship management. It includes aspects of training that other descriptions don't cover, but on the other hand, it doesn't include team aspects such as leadership or purpose.

> The effectiveness of groups in socio-technical systems is related directly to: (1) the extent to which group members are technically proficient and, therefore able to engage in technical problem solving; (2) the extent to which organizational reward systems promote cooperative behavior in the group; (3) the extent to which the group is provided with the training, support, and resources required to accomplish its purposes; (4) the extent to which additions and departures to the group are well managed; and (5) the extent to which the group is able to manage its relationships with its environment (Pasmore, 1988, p. 31).

Another perspective is reported by Mohrman et al. (1995) who adopted the definition of effective teams used by Hackman. Hackman (1990) defined group effectiveness as consisting of three dimensions:

> The first is the extent to which the group's "productive output (product, service, or decision) meets the standards of quantity, quality, and timeliness of the people who receive, review, and/or use that output." This may be referred to as team performance.
>
> The second dimension is the degree to which, in the process of working together, the team "enhances the capability of members to work together interdependently in the future." This may be referred to as learning and improvement.
>
> The third dimension addresses the development and need-satisfaction of the group's members. This may be referred to as satisfaction (pp. 6-7).

However, Mohrman et al. (1995) didn't think that if a team accomplishes its objectives, especially in knowledge-work environments, that it has performed well. Instead, "the criteria for the effectiveness of a team-based knowledge organization address the effectiveness of the teams that constitute it and the effectiveness of the business unit as a whole" (Mohrman et al., 1995, p. 60). Team effectiveness is frequently subjective and varies with the person or group evaluating it.

Another perspective is provided by Ulsechak and SnowAntle (1995). The key components are: (1) purpose; (2) roles; (3) feedback; and (4) commitment. This model rests on a foundation called collaboration. Commitment is an interesting concept in teams, and one that seems very important. Commitment is the energy team members bring to their work. It may also be described as personal ownership or passion for work. If commitment is too low, so is productivity; if commitment is too high, burnout may be the long term outcome. Each team member must find the balance in commitment that can maintain productivity as well as personal health.

Pfeiffer (1981) illustrated commitment this way:

> Commitment involves the binding of an individual to a decision so that consistent beliefs develop and similar decisions are taken in the future. The interesting thing about commitment is that it causes individuals, because they are bound to a course of action and a set of beliefs, to persist even when evidence suggests that action and decisions should change. The first necessary condition for commitment to occur is choice. The second condition for commitment is that the chosen behavior is made public. A third cause of

> commitment is when the publicly chosen behavior is irrevocable (p. 293).

A relatively well known historical example of the third cause of commitment is the Spanish commander Cortez who set his ships on fire, thus ensuring there would be no retreat from battle. It would be victory or death. While this example was not public in the world at large, it was certainly public in the eyes of his men.

Not all commitment is the same; there are different levels of commitment. Senge (1990) identified the following levels of commitment from high to low.

1. Commitment: Wants it. Will make it happen. Creates whatever "laws" (structures) are needed.
2. Enrollment: Wants it. Will do whatever can be done within the "spirit of the law."
3. Genuine compliance: Sees the benefits of the vision. Does everything expected and more. Follows the "letter of the law." "Good soldiers."
4. Formal compliance: On the whole, sees the benefits of the vision. Does what's expected and no more. "Pretty good soldier."
5. Grudging compliance: Does not see the benefits of the vision. But, also, does not want to lose job. Does enough of what's expected because he has to, but also lets it be known that he is not really on board.
6. Noncompliance: Does not see the benefits of the vision and will not do what's expected. "I won't do it; you can't make me."
7. Apathy: Neither for nor against vision. No interest. No energy. "Is it five o'clock yet" (p. 219)?

Senge (1990) concluded that:

> There is a world of difference between compliance and commitment. The committed person brings an energy, passion, and excitement that cannot be generated if you are only compliant, even genuinely compliant. The committed person doesn't play by the "rules of the game." He is responsible for the game. If the

> rules of the game stand in the way of the vision, he will find ways to change the rules. A group of people truly committed to a common vision is an awesome force. They can accomplish the seemingly impossible (p. 221).

Given this, it seems very clear that commitment is a very desired aspect of teams and should be cultivated, encouraged, and rewarded.

Collaboration is the foundation of this team model. Collaboration, as defined by Ulsechak and SnowAntle, has four elements: truth telling, choice, regard, and renewal. Truth telling is essential. Team members who cannot be believed cannot be trusted and become counterproductive to a team's success. This is no different from the information technology quip, GIGO–garbage in (into the process), garbage out. Choice includes responsibility. A mature team is one where "individuals accept the choices they have made and take responsibility for those choices" (Ulsechak & SnowAntle, 1995, p. 83). Regard has two dimensions:

> The first of which is regard for self, and the second is regard for others. Self-regard means you like yourself. You regard yourself as a competent, loving, and loved person. This means you will take care of yourself. We regard others as important people who invite our attention and respect. On the team, we need to regard them as colleagues whom we trust within the team boundaries and, perhaps, even outside the team boundaries (Ulshak & SnowAntle, 1995, p. 83).

Finally, the fourth element of collaboration is renewal. Renewal recognizes that change is on-going and the team learns to manage change. Team members may come and go, the mission may change, the environment may change, but the team stays.

Another perspective on collaboration comes from Marshall (1995). Collaboration is a principle-based process of working together, which produces trust, integrity, and breakthrough results by building true consensus, ownership, and alignment in all aspects of the organization.

Marshall's description of collaboration has many of the same elements as does the description by Ulsechak and SnowAntle, such as trust, integrity (truth telling) and ownership (responsibility).

Collaboration is a win-win model of conflict resolution. Collaboration leads to synergy. Synergy leads to effectiveness, which is what teamwork is all about.

A final perspective on effectiveness is provided by Robbins (1993). While this model is presented as a model for individuals, it is easily abstracted to be useful for teams as well. This model describes performance as a function of ability, motivation, and opportunity. All three elements need to be present for an individual (or team) to be effective. For example if a team has the ability and the motivation, but not the opportunity to be successful, it will not be very effective. If ability or competence is not present, it doesn't matter how much motivation or opportunity is present. Certainly, this model can be expanded to include additional elements as described above.

While there are many different perspectives of what makes up team effectiveness, there is also significant overlap and complementary ideas. Parker's list above, plus team performance, team member commitment, and team member

collaboration seems to capture the essential characteristics of an effective team, when comparing ideas presented by most of the researchers.

Effective teams are concerned both with the tasks and the process for completing the job, that is, both the ends and the means. Effective teams also require effective team members (Parker, 1996).

Effective Team Members. Effective teams are composed of team members with complementary skills. Katzenbach and Smith (1993) wrote:

> Teams must develop the right mix of skills, that is, each of the complementary skills necessary to do the team's job. These team skill requirements fall into three categories:
>
> - Technical or functional expertise.
> - Problem-solving and decision-making skills.
> - Interpersonal skills (p. 47).

Katzenbach and Smith (1993) pointed out two common errors regarding teams and skills.

> 1. Don't just assemble teams on the basis of personal compatibility or formal position in the company.
> 2. Teams don't need to be assembled with all the required skills at the outset. Required skills can be acquired or learned as the team matures (p. 48).

Parker (1996) looked at team skills from another perspective:

> Our research indicates four types or styles of team players. Each style contributes in different ways to the success of the team and each style has a downside when carried to an extreme.
>
> 1. A Contributor is a task-oriented team member who enjoys providing the team with good technical information and data, does

his or her homework, and pushes the team to set high performance standards and to use their resources wisely.

2. A Collaborator is a goal-directed member who sees the vision, mission, or goal of the team as paramount but is flexible and open to new ideas, is willing to pitch in and work outside his or her defined role, and is able to share the limelight with other team members.
3. A Communicator is a process-oriented member who is an effective listener and facilitator of involvement, conflict resolution, consensus building, feedback, and the building of an informal, relaxed climate.
4. A Challenger is a member who questions the goals, methods, and even the ethics of the team, is willing to disagree with the leader or higher authority, and encourages the team to take well-conceived risks (p. 63).

It is clear that effective teams need effective team members and while it is important for the team members to "fit," it is also important that the team have team members with the complementary skills to cover the job to be performed. In other words, according to Ashby's Law of Requisite Variety, the effective team will have to have the required and sufficient skill sets to accomplish their job.

Decision-making

This is an important aspect of teams because it is one of the few aspects of teams that can be improved through computer software.

For example, Gallupe and Cooper (1993) reported that:

> Electronic brainstorming groups have consistently been more productive than traditional brainstorming groups that operate under the same structured rules. Across five studies involving more than eight hundred people, productivity advantages have ranged from 25 percent to 50 percent for four-person groups and to nearly 200 percent for twelve-person groups. And it is not only the number of ideas that is greater. Because so many more ideas are generated,

> the chance of producing more high-quality ideas is also greater (p. 30).

While brainstorming is actually an idea-generating process and not a true decision-making technique, it is typically a process that precedes decision making and is frequently listed as a decision-making technique.

Robbins (1993) offered another example of using computer software to assist in decision-making. He reported that "electronic meetings are as much as fifty-five percent faster than traditional face-to-face meetings" (Robbins, 1993, p. 352). One case in particular reduced its annual meeting from several days to twelve hours. This time savings directly translates into saving significant amounts of money. In addition, the time saved can be used to explore other opportunities or accomplish other tasks.

Another important aspect of group or team decision-making is the quality of the decisions made. Robbins (1993) provided the following advantages, disadvantages, and analysis of team decision-making:

Advantages

- Teams provide more input into the decision process.
- Groups bring more heterogeneity (diversity of views) to the decision process.
- There is an increased acceptance of a solution.
- There is an increased legitimacy of the decision.

Disadvantages

- It is time-consuming.
- There are pressures to conform.

- Group discussion is subject to domination by the few.
- Group decisions may result in ambiguous responsibility.

Analysis

- In terms of accuracy, group decisions will tend to be more accurate.
- In terms of speed, individuals are faster.
- In terms of creativity, groups tend to be more effective.
- In terms of acceptance, groups tend to be more effective (pp. 346-347).

In summary, software tools can be used to improve decision-making and reducing the time required for some meetings. Teams make better overall decisions than individuals. Teams bring a diversity of perspectives to bear on the problem and typically, the combined knowledge base of the team is greater than the individual which can lead to better decisions.

Team Life Cycles

Teams have life cycles. Teams follow fairly predictable patterns. For example, in team sports, it is easy to see teams at the top, at the bottom, and in between. But, over time, it is rare to see a team continually at the top of its game. Teams improve, achieve success, falter, and finally rebuild.

The first model of a team life cycle is probably the most well known model of a team life cycle. This linear model was developed by Tuckman (1955). He identified the four stages of teams as forming, storming, norming, and performing. A fifth stage, adjourning, is frequently added today. The first thing a team does is to form. A team is created. Second, the team will storm or engage in

various conflicts. Third, the team will begin to mature, and build norms. Fourth, the team will work through its conflicts, mature, and begin to perform. At this stage it reaches its potential. Finally, the team may disband or adjourn, after it achieves its intended purpose.

A second model is provided in Figure 2.1 below. It illustrates a condensed form of a model for group development. Ulsechak and SnowAntle (1995) reference this model in a discussion on team life cycles. This model, developed by Jones and Bearly (1993), is a two-dimensional model. The two dimensions are process behavior and task behavior. The four phases of process behavior is similar to the Tuckman model. These phases are: (1) dependency; (2) conflict; (3) cohesion; and (4) interdependence. The steps on the task side are (1) orientation; (2) organization; (3) data flow; and (4) problem-solving. Orientation is concerned with the purpose of the team. Organization addresses who will do what and when. Data flow is concerned with trust and how open members are about sharing data. Problem-solving is concerned about how the team solves problems.

Between the boundaries of process and task is the line representing the stages of group development. These five stages are: (1) immature group; (2) fractionated group; (3) sharing group; (4) effective team; and (5) group synergy.

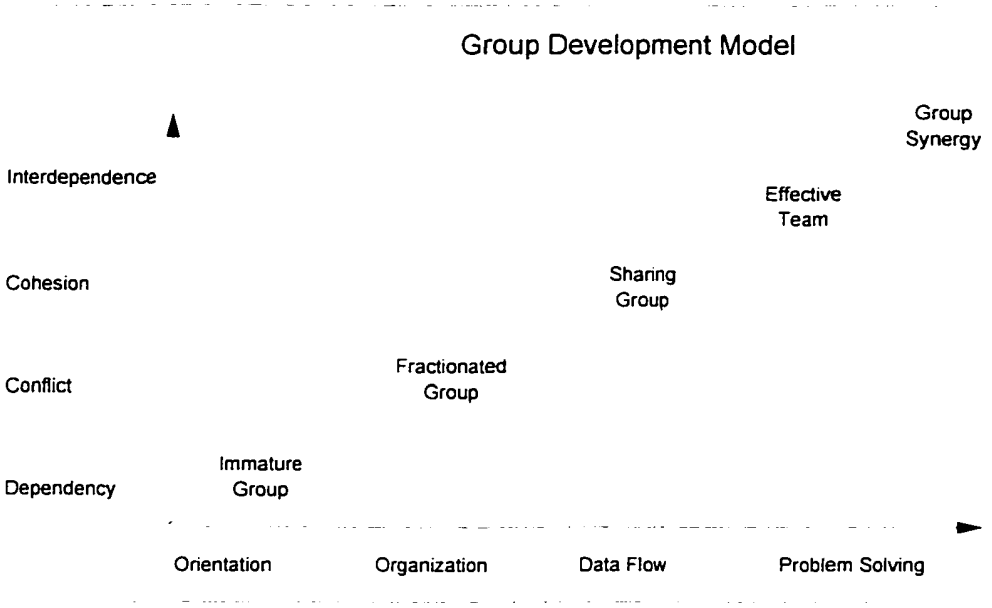


Figure 2.1.

Group Development Model.

Both models of team life cycles illustrate different ideas of team maturity. Teams have a maturity scale as it relates to team relationships as well as one related to team tasks or their technical competency. In Pasmore's terminology, team maturity would be reflected on both the socio and technical sides.

Summary

There seems to be a general consensus on many aspects of teams. Most of the early work on teams was done in the 1960's and 1970's by Likert, McGregor, Lewin, Blake and Molton, and others.

First, a team can be defined as "a small number of people with complementary skills who are committed to a common purpose, performance goals, and

approach for which they hold themselves mutually accountable" (Katzenbach & Smith, 1993, p. 45).

Second, teams can be categorized by type: (1) command; (2) task; (3) interest; and (4) friendship.

Third, teams are required in business today. They are considered to be the fundamental unit of performance by a number of researchers. Teams are a flexible organizational structure. Teams create and manage organizational knowledge. Teams are necessary to address the complexity of creating and maintaining large-scale engineering products. One international study on self-directed teams, a special case of teams, found that eighty-six percent of the organizations studied reported a decrease in operating costs.

Fourth, effective teams have the following types of characteristics.

- Clear purpose or vision
- Informality or relaxed team member atmosphere
- Everyone participates
- Active listening is practiced
- There is civilized disagreement
- Clear roles and responsibilities
- Shared leadership

In addition, teams have effective team members who bring a complementary set of skills and roles to get the job done.

Fifth, teams in general make better decisions than individuals and team member buy-in is improved.

Sixth, teams follow a predictable life cycle. The basic process steps are forming, storming, norming, performing, and adjourning.

## Leading Teams

### Introduction

The need for teams is clear. Teams are essential in organizations. But what about team leadership? What is an effective team leader? This section provides a synthesis and summary of some of the salient aspects of leadership and leading teams that the researcher expects to be applicable to virtual teams. These aspects of leadership include a definition of leadership, theories of leadership, and team leadership.

### Leadership Definitions

There are about as many different definitions and ideas on leadership as there are writers about leadership. This section starts with some ideas on leadership from a person who has thought about it for over fifty years--Peter Drucker:

> All the effective leaders I have encountered--both those I worked with and those I merely watched--knew four simple things:
>
> 1. The only definition of a leader is someone who has followers. Some people are thinkers. Some are prophets. Both roles are important and badly needed. But without followers, there can be no leaders.
> 2. An effective leader is not someone who is loved or admired. He or she is someone whose followers do the right things. Popularity is not leadership. Results are.
> 3. Leaders are highly visible. They therefore set examples.
> 4. Leadership is not rank, privileges, titles, or money. It is responsibility (Hesselbein, Goldsmith, & Beckhard, 1995, p. xii).

The key elements in this definition are responsibility, setting examples, and results (this includes both task and process). These elements are mentioned by other writers on leadership as well.

Kouzes and Posner (1995) defined leadership as "the art of mobilizing others to want to struggle for shared aspirations" (p. 30). This definition is similar to Drucker's in that leadership requires followership, but it is also different, or more extensive, in that it acknowledges an influence or relationship between leaders and followers. In this case, the influence is "the art of mobilizing others." Many other writers on leadership mention the notion of an influence leaders have on followers.

Drucker mentions three characteristics of leadership: (1) results; (2) set examples; and (3) responsibility. While these could be interpreted as characteristic of a democratic leader, they could more likely be interpreted as characteristic of an autocratic or non-participative style of leader. For example, Drucker specifically mentioned responsibility, not shared responsibility. Kouzes and Posner (1995), on the other hand, suggested ten commitments of leadership that would seem more characteristic of a democratic or participative style of leadership. These ten commitments are:

1. Search out challenging opportunities to change, grow, innovate, and improve.
2. Experiment, take risks, and learn from the accompanying mistakes.
3. Envision an uplifting and ennobling future.

4. Enlist others in a common vision by appealing to their values, interests, hopes, and dreams.
5. Foster collaboration by promoting cooperative goals and building trust.
6. Strengthen people by giving power away, providing choice, developing competence, assigning critical tasks, and offering visible support.
7. Set the example by behaving in ways that are consistent with shared values.
8. Achieve small wins that promote consistent progress and build commitment.
9. Recognize individual contributions to the success of every project.
10. Celebrate team accomplishments regularly (Kouzes & Posner, 1995, p. 18).

Bennis (1994) listed six ingredients of leadership: (1) have a guiding vision; (2) passion; (3) integrity; (4) trust; (5) curiosity; and (6) daring. These ingredients are excellent traits that most people would agree with, but they do not particularly describe a leader.

Yukl (1994) gave this definition of leadership.

> Leadership is defined broadly as influence processes affecting the interpretation of events for followers, the choice of objectives for the group or organization, the organization of work activities to accomplish the objectives, the motivation of followers to achieve the objectives, the maintenance of cooperative relationships and teamwork, and the enlistment of support and cooperation from people outside the group or organization (p. 5).

Yukl's definition of leadership offers a list of activities leaders may perform. It is clearly defined broadly. A broader definition, but much simpler to understand is provided by Robbins (1993). He described leadership as "the

ability to influence a group toward the achievement of goals" (Robbins, 1993, p. 365). This definition has some elements in common with Drucker and others: results, outcome, or the attainment or achievement of goals and the influencing of a group or followers. Robbins does not burden the leader with responsibility. It is sufficient that the leader provide the leadership or influence.

Steven Covey listed three simple roles of leadership: "(1) pathfinding or vision setting; (2) aligning or ensuring that organizational resources contribute to the achievement of the vision or mission; and (3) empowering people to accomplish their tasks" (Hesselbein et al., 1995, pp. 152-153). Covey's three roles include the notion of influence but stop short of using the word responsibility.

John Gardner (1993) offered this definition of leadership: "Leadership is the process of persuasion or example by which an individual (or leadership team) induces a group to pursue objectives held by the leader or shared by the leader and his or her followers" (p. 1). Here again, persuasion or influence of others and shared objectives is mentioned. This definition is close to Yukl's and Robbins's idea of leadership.

A final look at leadership comes from Katzenbach (1995). He characterized leaders as having: (1) commitment to a better way; (2) courage to challenge existing power bases and norms; (3) personal initiative to go beyond defined boundaries; (4) motivation of themselves and others; (5) caring about how people are treated and enabled to perform; (6) staying undercover; and

(7) a sense of humor about themselves and their situations.

The first five of these characteristics are essentially captured in Kouzes and Posner's ten commitments. Item seven was not mentioned by other researchers, but given today's frantic pace of change, humor can certainly help people work through difficult circumstances.

As previously mentioned, there are probably as many definitions or characteristics of leaders and leadership as there are writers. The samples reviewed illustrate some of the ideas on leadership. While there is agreement in some areas, there is not in other areas.

Theories of Leadership

Several of the major theories of leadership are presented here as a preface to a focused section on team leadership. Leadership theories are important because they are foundational for team leadership. That is, an understanding of the theories of leadership should be part of the training of a team leader and should help him or her be a more effective team leader. The next two sections will provide a look at leadership from general to specific.

The Managerial Grid. This two-dimensional view of leadership style was developed by Blake and Mouton in 1964. This grid was based on the styles of "concern for people" and "concern for production." The grid has eighty-one different cells or leadership positions, with nine positions on each axis (see Figure 2.2). This grid does not show outcome, but rather, the dominating factors in a leader's thinking in regard to getting results (Robbins, 1993).

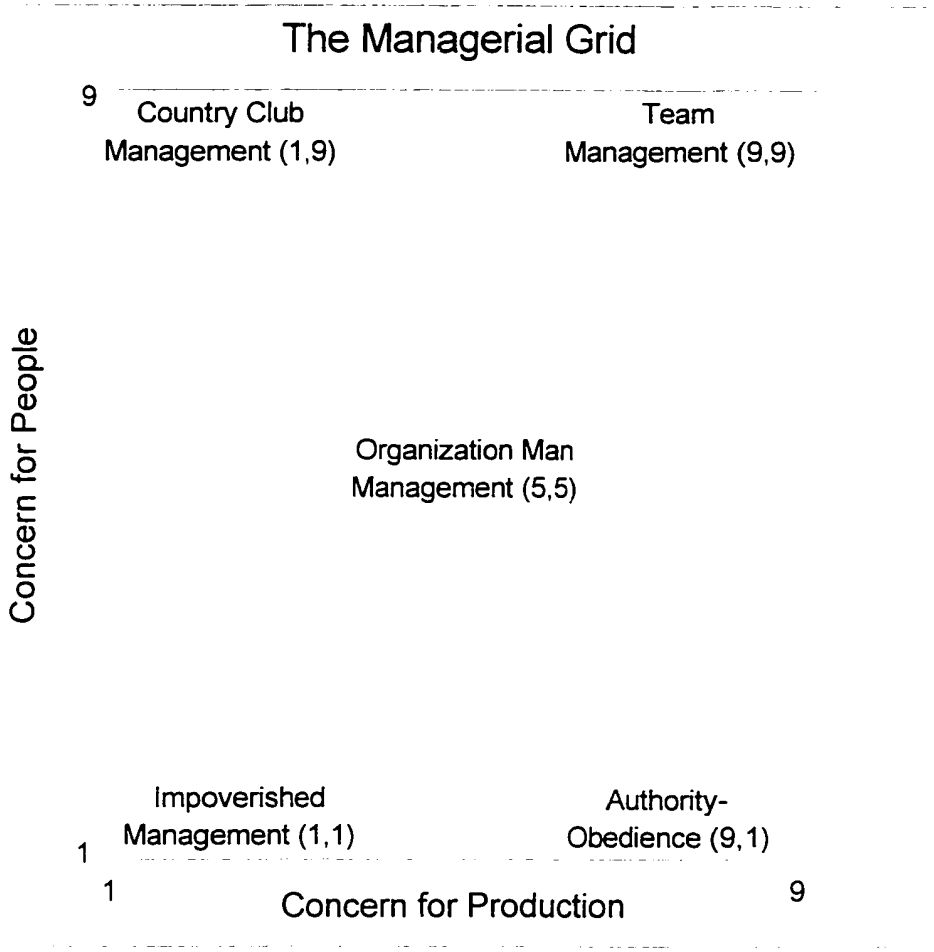


Figure 2.2.

The Managerial Grid.

Robbins (1993) summarized the model in this manner:

> Based on the findings of Blake and Mouton, managers were found to perform best under a 9,9 style. Unfortunately, the grid offers a better framework for conceptualizing leadership style than for presenting any tangible new information in clarifying the leadership quandary, since there is little substantive evidence to support the conclusion that a 9,9 style is most effective in all situations (pp. 370-371).

While the 9,9 style may not be the most effective in all situations, it offered an alternative perspective to the command and control style typically found in organizations at that time.

As Blake and Mouton defined the 9,9 style of team management, it looks very similar to the concepts of team leadership expressed by today's researchers: "Team management. Work accomplishment is from committed people, interdependence through a 'common stake' in organization purpose leads to relationships of trust and respect" (Robbins, 1993, p. 370).

The elements of teams, commitment, interdependencies, and common or shared goals are frequently referenced by many of today's writers on leadership. Blake and Mouton were clearly on the right path with their research.

Situational Leadership. One of the most widely practiced leadership models is Paul Hersey and Ken Blanchard's situational leadership theory. Robbins (1993) described it this way:

> It [situational leadership] has been used as a major training device at such Fortune 500 companies as BankAmerica, Caterpillar, IBM, Mobile Oil, and Xerox; it has also been widely accepted in all the military services. Although the theory as not undergone extensive evaluation to test its validity, we include it here because of its wide acceptance and its strong intuitive appeal. Additionally, in defense of the theory, it's too early at this point in its development to dismiss it out of hand merely because researchers have not chosen to evaluate it more thoroughly (p. 376).

Robbins (1993) described the situational leadership theory in more detail in the following paragraphs.

Situational leadership is a contingency theory that focuses on the followers. Successful leadership is achieved by selecting the right leadership style, which Hersey and Blanchard argue is contingent on the level of the followers' maturity.

The term, maturity, as defined by Hersey and Blanchard, is the ability and willingness of people to take responsibility for directing their own behavior.

Situational leadership uses two leadership dimensions: task and relationship behaviors. However, Hersey and Blanchard go a step farther by considering each as either high or low and then combining them into four specific leadership styles: telling, selling, participating, and delegating. They are described as follows:

- Telling (high task - low relationship). The leader defines roles and tells people what, how, when, and where to do various tasks. It emphasizes directive behavior.
- Selling (high task - high relationship). The leader provides both directive behavior and supportive behavior.
- Participating (low task - high relationship). The leader and follower share in decision making, with the main role of the leader being facilitating and communicating.
- Delegating (low task - low relationship). The leader provides little direction and little support.

The final component in Hersey and Blanchard's theory is defining four stages of maturity:

- M1. People are both unable and unwilling to take responsibility to do something. They are neither competent nor confident.
- M2. People are unable, but willing to do the necessary job tasks. They are motivated but currently lack the appropriate skills.
- M3. People are able but unwilling to do what the leader wants.
- M4. People are both able and willing to do what is asked of them (pp. 376-377).

The linkage between these components is then straightforward: Telling/M1, Selling/M2, Participating/M3, and Delegating/M4. There is no one right way to lead. Instead, a leadership style is chosen to match the style or maturity of the followers. Otherwise, there seems to be little difference between what Blake and Mouton proposed and Hersey and Blanchard's situational leadership theory.

While there is partial research support for Hersey and Blanchard's theory, a number of organizations use it and seem to find that it works in practice.

Path-goal Theory. Currently, one of the most respected approaches to leadership is the path-goal theory (Robbins, 1993). Path-Goal Theory was developed by Robert House in 1971. Robbins (1993) explained path-goal theory this way:

> According to path-goal theory, a leader's behavior is acceptable to subordinates to the degree that it is viewed by them as an immediate source of satisfaction or as a means of future satisfaction. A leader's behavior is motivational to the degree that it (1) makes subordinate need satisfaction contingent on effective performance and (2) provides the coaching, guidance, support, and rewards that are necessary for effective performance (p. 379).

House identified four leadership behaviors that are listed below and explored more fully in a set of hypotheses.

1. Directive leadership
2. Supportive leadership
3. Participative leadership
4. Achievement-oriented leadership (Robbins, 1993, p. 379)

The following are some examples of hypotheses that have evolved out of path-goal theory:

- Directive leadership leads to greater satisfaction when tasks are ambiguous or stressful than when they are highly structured and well laid out.
- Supportive leadership results in high employee performance and satisfaction when subordinates are performing structured tasks.
- Directive leadership is likely to be perceived as redundant among subordinates with perceived ability or with considerable experience.
- The more clear and bureaucratic the formal authority relationships, the more leaders should exhibit supportive behavior and de-emphasize directive behavior.
- Subordinates with an internal locus of control (those who believe they control their own destiny) will be more satisfied with a participative style.
- Achievement-oriented leadership will increase subordinates' expectancies that effort will lead to high performance when tasks are ambiguously structured.

Research generally supports the theory. As with other theories of leadership, it seems clear that there is no one best way to lead. Instead, there seems to be a direct relationship between the style of the leader and the style or maturity of the followers. It seems evident that effective leadership is dependent on the "fit" between leaders and followers.

Transactional and Transformational Theories. Many of the theories of leadership such as path-goal theory, have concerned transactional leaders. These kind of leaders guide or motivate their followers in the direction of established goals by clarifying role and task requirements (Robbins, 1993).

Transformational leaders are those who provide individualized consideration and intellectual stimulation.

> They pay attention to the concerns and development needs of followers; they change followers' awareness of issues by helping them to look at old problems in new ways; and they are able to excite, arouse, and inspire followers to put out extra effort to achieve group goals (Robbins, 1993, p. 392).

Table 2.1 briefly identifies and defines the four characteristics that differentiate these two types of leaders (Robbins, 1993, p. 392).

Table 2.1

Characteristics of Transactional and Transformational Leaders

| **Transactional Leader** | |
|---|---|
| Contingent Reward | Contracts exchange of rewards for effort, promises rewards for good performance, recognizes accomplishments. |
| Management by Exception (active) | Watches and searches for deviations from rules and standards, takes corrective action. |
| Management by Exception (passive) | Intervenes only if standards are not met. |
| Laissez-Faire | Abdicates responsibilities, avoids making decisions. |
| **Transformational Leader** | |
| Charisma | Provides vision and sense of mission, instills pride, gains respect and trust. |
| Inspiration | Communicates high expectations, uses symbols to focus efforts, expresses important purposes in simple ways. |
| Intellectual Stimulation | Promotes intelligence, rationality, and careful problem solving. |
| Individualized Consideration | Gives personal attention, treats each employee individually, coaches, advises. |

Robbins (1993) concluded: "In summary, the overall evidence indicates that transformational leadership is more strongly correlated than transactional leadership with lower turnover rates, higher productivity, and higher employee satisfaction" (p. 392).

Summary. This section has looked at leadership in general. The essential elements of leadership gained from these theories are that there is no one right way to lead, that there are different styles of leadership and there are different styles or maturities of followers, that effective leadership is more a matter of the right "fit" or alignment between leaders and followers than a single style of leadership, that transformational leadership is the type of leadership leaders should aspire to.

Leading Teams

Team leadership is a special case of leadership. The following four references explore leadership from the perspective of teams.

The first perspective is from CareerTrack (1993) an educational and training consulting firm. CareerTrack identified six dimensions of team leadership. These six dimensions were derived from a survey of organizations about the types of team leadership skills that are most needed. The six dimensions are:

1. Fostering team identity and commitment
    - Shared purpose
    - Agreed upon rules of behavior

- Shared values

2. Building trust and teamwork
3. Working as a team
   - Building accountability
   - Facilitation
   - Problem solving
   - Decision making
4. Working through conflict
5. Expanding team capabilities
6. Assuming a strategic role

CareerTrack, in addition to structuring a training class around these six dimensions, provides exercises for team members to work together to develop a team mission statement, develop team values, create a team operating agreement, develop behavior norms, understand the nature of conflict and conflict resolution, build a problem-solving tool kit, and learn to facilitate a meeting. These are certainly excellent skills for both team leaders and team members to have and to build on. The six dimensions of team leadership are clearly more focused than leadership in general, but still convey the notions of trust, commitment, values, and vision espoused by the major writers on leadership.

The second perspective is from Zenger, Musselwhite, Hurson, and Perrin (1994). They described three styles of leadership. The third style has two variations. These styles of leadership are:

> (1) Traditional leadership–team members perform technical tasks and relate to me [the leader] one-on-one for problem solving and

> communicating with the organization. I make most decisions and develop solutions for most problems.
>
> (2) Participative leadership–I [team leader] usually coordinate team interactions but team members interact with each other as well. I get input from team members before planning team activities and making critical decisions affecting the team.
>
> (3a) Team leadership–I [team leader] share responsibility with the team for decision making, planning, problem solving, and coordinating with other teams. I often spend time on larger organizational issues affecting team performance.
>
> (3b) Though still accountable for team performance, I'm [team leader] rarely involved in day-to-day team decisions and activities. I divide my time between strategic activities and meeting needs identified by the team (Zenger et al., 1994, p. 17).

The style of team leadership illustrated by (3b) is sometimes described as a coach for a self-directed team.

Zenger, et al (1994, p. 29) further characterized these styles of leadership as described in table 2.2 below.

Table 2.2

Leadership Styles and Characteristics

| Traditional Leadership | Participative Leadership | Team Leadership |
|---|---|---|
| Direct people | Involve people | Build trust and inspire teamwork |
| Explain decisions | Get input for decisions | Facilitate and support team decisions |
| Train individuals | Develop individual performance | Expand team capabilities |
| Manage one-on-one | Coordinate group effort | Create a team identity |
| Contain conflict | Resolve conflict | Make the most of team differences |
| React to change | Implement change | Foresee and influence change |

These styles of leadership may be used with teams with different levels of maturity. The traditional style of leadership may be appropriate for an immature team but would not be appropriate for a team capable of self direction. Similarly, the team leader or coaching style of leadership would probably not be appropriate for a team of new recruits. There is no one right style of leadership.

Ryan and Oestreich described leadership in a similar manner. They added to the notion of decision-making (row 2 in the table above) and related it to effective teams. They wrote,

> when people have become skilled at collaborative problem solving, the following traits are typical:
> - The group works from an agenda; it moves quickly from decision to decision as it addresses needed topics within a known but flexible time frame.
> - There are numerous "process" comments, such as "How do the rest of you feel about this?" and "I think we are getting off on a tangent here," that encourage and manage communications; the leader is not the only person making these comments.
> - There are high levels of interaction.
> - People feel free to brainstorm informally.
> - There is no sense that any one person's ideas dominate or that someone's private "agenda" has been forced on the group (Ryan & Oestreich, 1991, p. 205).

The fourth and final perspective comes from Kazenbach and Smith. Attitude is a key factor in team leadership. They wrote:

> Team leaders genuinely believe that they do *not* have all the answers – so they do not insist on providing them. They believe they do *not* need to make all key decisions–so they do not do so. They believe they *cannot* succeed without the combined contributions of all the other members of the team to a common end–and so they

> avoid any action that might constrain inputs or intimidate anyone on the team (Katzenbach & Smith, 1993, p. 131).

Clearly Katzenbach and Smith recognize the concept of team maturity, but even with a relatively immature team, team members can learn from their mistakes and over time, can become productive. It is in the interest of the team leader to develop team members.

Katzenbach and Smith (1993) provided their own list of six things necessary for good team leadership:

1. Keep the purpose, goals, and approach relevant and meaningful. All teams must shape their own common purpose, performance goals, and approach.
2. Build commitment and confidence. Team leaders should work to build the commitment and confidence of each individual as well as the team as a whole.
3. Strengthen the mix and level of skills. Effective team leaders are vigilant about skills. Their goal is clear: ultimately, the most flexible and top-performing teams consist of people with all the technical, functional, problem-solving, decision-making, interpersonal, and teamwork skills the team needs to perform.
4. Manage relationships with outsiders, including removing obstacles. Team leaders are expected, by people outside as well as inside the team, to manage much of the team's contacts and relationships with the rest of the organization.
5. Create opportunities for others. Team performance is not possible if the leader grabs all the best opportunities, assignments, and credit for himself or herself.
6. Do real work. Everyone on a real team, including the leader, does real work in roughly equivalent amounts (pp. 139-144).

Summary

Team leaders, over time will likely have teams of different levels of maturity. There are choices of leadership style that team leaders may use with differing degrees of effectiveness. The leader should feel comfortable with the leadership style. The leadership style should also "fit" the team's level of maturity.

Effective team leadership should be an outcome of both the understanding of the theory of teams and leadership and sufficient practice or experience with leading teams. Leadership is not something a person is born with. Leadership can be taught and learned.

## Information Technology Supporting Teams

### Introduction

This section on information technology primarily covers the software or applications used by teams. This class of applications is frequently referred to as "groupware" or computer supported cooperative work (CSCW). These applications assist people and teams in collaborating and coordinating activities. While computers and communications hardware are required, it is the application itself that provides the unique capability of "groupware." Hardware is infrastructure.

### Definitions

Palmer and Fields (1994) provide a number of useful definitions found in computer supported cooperative work:

- CSCW--A system that integrates information processing and communications activities to help individuals work together as a group.

- Distributed asynchronous--Group-functioning mode that occurs at different times and places.

- Distributed synchronous--Group-functioning mode that occurs at the same time but at different places.

- Homogeneous Group--A group composed of individuals with similar experiences and background information relating to the group's task.

- Loosely coupled group--A group composed of individuals who normally do not work together or address common problems in a consensus-seeking fashion. These individuals may not be electronically coupled as a group.

- Multi-group Decision-Support System (MGDSS)--A system designed to assist multiple small groups of individuals (who are frequently loosely coupled and non-homogeneous) in addressing a common problem.

- Non-homogeneous group--A group composed of individuals who do not have similar experiences and background information relating to the group's tasks.

- Spatially distributed--Occurring at different locations

- Synchronous--Group-functioning mode that occurs at the same time at the same place.

- Asynchronous--Group-function mode that occurs at different times in the same place.

- Tightly coupled group--A group of people who interact through a computer over a network to address a common problem ( p. 16).

This researcher defines a virtual team as a team of people who primarily interact electronically and who meet face-to-face infrequently or in some cases,

not at all. Essentially, a virtual team could be either a tightly coupled group or a loosely coupled group primarily interacting electronically, using the terminology defined above.

A virtual team may be homogeneous or non-homogeneous group. It is probably preferable if the team is non-homogeneous or has a variety of differing skills. A virtual team will most likely use all four modes of communication: synchronous, asynchronous, distributed asynchronous, and distributed synchronous.

Groupware

The following table provides the framework for this section of the paper. This table illustrates a 3 X 3 grid of the categories of applications found in groupware today (Grudin, 1994).

Table 2.3

CSCW 3X3 Map: Categories of Applications

| | | Time | | |
|---|---|---|---|---|
| | | Same | Different but Predictable | Different and Unpredictable |
| Place | Same | Meeting Facilitation | Work Shifts | Team Rooms |
| | Different but Predictable | Tele/video/desk top conferencing | Electronic mail | Collaborative writing |
| | Different and Unpredictable | Interactive multicast seminars | Computer bulletin boards | Workflow |

These categories of CSCW applications are structured by time and place. The applications can be used by people in the same office or distributed around the world. Distance shrinks to zero with computers and high-speed communication links. When a team is distributed they have to rely on communicating electronically all the time instead of just some of the time. There is no physical place for them to meet. The software works the same in either case.

A few of these software applications will be covered below.

Electronic Mail. This is an example of a distributed asynchronous application. The participants neither have to be in the same location nor in the same time frame to send and receive messages. Electronic mail (generally referred to as e-mail) has changed dramatically in the past few years. Instead of simple text only messages, today's modern e-mail systems are capable of transmitting and displaying compound documents–that is, documents containing not only text, but also graphs or charts, tables, images, animation, video, speech, and audio. Essentially e-mail is now multi-media. For example, Microsoft's e-mail product – Exchange, can send attached documents such as a Word file containing text, tables, and charts. Embedded in the table could be a voice annotated spreadsheet cell. E-mail is a globally available application. It is as easy to send e-mail to Finland as it is to send e-mail to the person in the next office.

Desktop Conferencing. This is a distributed synchronous application wherein the participants in this conference are meeting together but yet apart. It is similar to a telephone conference, wherein the participants are connected in

one large telephone call. In the case of desktop conferencing, they can both see and hear each other, wherever they may be physically located. This application is still immature, but given the advances in communications bandwidth, it should become very practical in just a few years.

Desktop conferencing could have interesting consequences in that people could meet electronically and convey many of the social cues found in face-to-face meetings such as body language, without actually traveling to the meeting. Today, conferencing systems are expensive and immature. But as the technical and economic problems are solved, there could be new applications developed that take advantage of desktop conferencing.

Shared Whiteboards. AT&T (1996) advertised this whiteboard application on their HomePage:

> Once you have a high-speed communications link, such as an ISDN, frame relay or other high-speed network service, you can use new technology to further improve your productivity.
>
> The shared whiteboard is a new software application that allows you to participate in distributed meetings. Each participant in the meeting uses a software application that displays a common white-board. Whenever someone writes or draws on the whiteboard, the software transfers the data to all other participants in the meeting. The software typically allows you to cut and paste information be-tween other applications and the shared whiteboard, and identifies different participants by drawing their contributions in a particular color. Many types of meetings can benefit from this technology. A shared whiteboard and a telephone allow people to meet, no mat-ter where they may be working.

Computer Bulletin Boards. This is another example of a distributed asyn-chronous application. Participants using this application can post questions and

receive answers. The application maintains a list of categories and postings by category and time. A question posted might not be answered by another participant for several hours or even days. It depends on who reads the question and if they have the information required to answer it and if not, do they have the inclination to research the question and answer it.

Miscellaneous

Two examples of applications that focus more on coordination than on collaboration or cooperation are time management and project management when linked with e-mail and used in a work group environment.

Time Management. Organizations that schedule frequent meetings find a group time management system very helpful as long as everyone maintains their personal calendar using the same system. It then becomes easy for anyone to scan other people's calendars, conference rooms, and other required resources for available time and then schedule a meeting. Hours of telephone tag can be eliminated with this application.

For example, using Microsoft's Schedule Plus time management application, the "Meeting Wizard" takes a person through a series of interactive forms that search for available time. In about a minute or two, anyone can create a meeting and notify the participants of the subject, location, and agenda.

Project Management. Some project management systems now link to e-mail systems. A project manager can now send a structured form requesting status information about project tasks and time spent on them. When the forms

are returned by reply mail, the project schedule can be easily updated by the project manager (or even automatically based on rules). Then an updated project schedule can be distributed to everyone concerned with the project. This application illustrates again that it doesn't matter where people are located.

Notes

There is one essential thing in common with all of these applications. They require people who are willing to use them and share information. If people are unwilling or unable to use these applications, then there is no value in them. In a team environment, this means that team members must have the requisite hardware and software, know how to use it, and be willing to use it in order for the application to provide value for all. The culture of the team must support working in a team environment for the team to be effective. Technology is only an enabler, but it can add value to the team.

While CSCW applications enable teams to work more effectively together while working remotely, most CSCW applications provide little direct support for team leaders. Team leaders of course can use e-mail, conferencing, project management and so on, just as any other team member can. But, this researcher has found no software applications designed just for team leaders. But then CSCW applications are defined as "groupware" not "leaderware." What would leaderware look like? Leaderware applications could include a knowledge base for leaders and leadership simulation tools that could teach or refine

leadership skills as well as offering interactive leadership case studies with "what-if" analysis.

Support of Teams

Briggs and Nunamaker wrote that there are three levels of supporting groups or teams with information technology.

1. The individual level. Team members can use applications such as word processing, spreadsheets, and graphics packages to improve their own individual level of productivity. Team productivity is the sum of the gains of individual productivity.

2. The team coordination level. Teams use networked applications such as e-mail, group time management, conferencing, bulletin boards, data bases and project management. Gains at this level include gains from having access to shared information and reducing coordination time.

3. The team group dynamics level. This level of support addresses some of the problems associated with working in teams such as "airtime" or the time team members have to speak and make their views known. Groupware can support multiple channels of parallel communication, something that is limited to a single serial channel of communication in face-to-face meetings. Another problem overcome with software is evaluation apprehension. In face-to-face meetings, sometimes people are afraid to speak up in public for a variety of reasons including the fear of looking dumb. This fear is generally not present in electronic meetings (Lloyd, 1994, p. 67).

Summary

Software to support the collaboration and coordination of team work has been available for only a few years. It is rapidly improving and the near term outlook is that video conferencing will soon be supported making possible the exchange of social cues which is missing in today's applications. Both the

communications bandwidth and computer processing power will be readily available in a few years. Video conferencing, while not providing as rich a communications capability as real life, is considerably better than today's e-mail systems.

As groupware matures, many of the features commonly associate with it will become embedded in the software applications individuals typically use today such as word processing. For example, word processing will probably begin to include group authoring capability within two to three years.

Groupware products today enable more productive teams than teams that work without it.

## Virtual Teams

### Introduction and Definitions

Virtual teams are special cases of traditional or face-to-face (FTF) teams. Virtual teams primarily interact electronically and meet face-to-face infrequently or not at all. This is similar to the U.S. Navy's definition of a team called a virtual project team.

> Virtual Project Teams consist of groups of people working together to solve a problem while connected electronically. The electronic connection can be used to create the initial tasking, define the problem, recruit the required resources, report progress, and transmit the final product for review and feedback. Many projects require sophisticated problem solving and analytical skills, but do not require the work to be performed at a specific site. These projects can be assigned to virtual project teams consisting of electronically connected reservists (U. S. Navy, 1995).

Electronic media are the electronic means or technologies used to communicate. These include the telephone, fax, personal computers, servers, the Internet; applications such as electronic mail, word processors, spreadsheets, graphics packages, video conferencing, data bases, group decision-support systems; and collaborative or group ware software frequently referred to as computer supported cooperative work. Information exchanged may range from simple telephone messages to multi-media including full motion video.

While there is not much information on virtual teams, there are cases that clearly suggest they may be as effective as real teams and in other cases more effective.

A documented case in software engineering is illustrative.

> In 1986, seven teams of software developers raced against a deadline to design and implement computer-based information systems for their clients. All the teams used a computer network to access databases and programming tools; some also used the network for team communication. Teams that used the network to communicate had fewer meetings but induced greater contributions from their members even though team members were physically dispersed and had divided responsibilities. When the teams completed their projects, those that used network-based communication had created better products but with a work process that was substantially different, with more bottom-up contributions, new coordination procedures, and new subgroup structures (Sproull & Kiesler, 1991, p. ix).

## Overview

Studies. The following paragraphs provide an introduction to the subject of virtual teams based on studies of corporations currently involved in this activity.

> The virtual organization is just a starting point. Value is created not by the organization's existence, but by the accomplishments of virtual teams: product development teams, management teams, executive teams. These teams engage in the following activities:
>
> 1. Create value by bringing together stakeholders who have the competencies needed to deliver a product or service, regardless of where physically, or in what organization the competency resides.
> - Ameritech, a leading provider of telecommunications products and services has put together a network of telecommunications product and service providers to deliver mobile office solutions in record times.
> - Virtual teams combine multi-organizational competencies to conduct biomedical product R&D, perform surgical procedures, and write proposals to government agencies. No longer anomalies, virtual teams are rapidly becoming mainstream.
> 2. Produce information-based products or services by accessing, sharing and processing electronic information, and by building collaborative knowledge through electronic communications: networks, shared databases, groupware applications, and so forth.
> - Universities, such as those constituting the BESTNET consortium in California and Mexico, use computer conferencing across the Internet to collaboratively teach courses in Spanish and English, thereby addressing the needs of the border communities, where language, not nationality governs accessibility to learning.
> 3. Ground their product and service design and development processes, as well as all other key business processes (marketing, sales, management, continuous learning) in the capabilities of robust, networked information and communications infrastructures. These organizations live, learn, and work in the network; the infrastructure is the virtual office, lab, and shop floor (Grenier & Metes, 1995, p. 7).

Examples of Virtual Teams. Three generic examples of virtual teams are: (1) a software development project team of people who telecommute (work from home); (2) a team of people working in different cities organizing a professional conference; and (3) a team of sales representatives, some working in an office

and some working out of their homes, supporting a nationally distributed customer.

A real-life example comes from BellCore where they used the Internet as a global communications and coordination channel.

> BellCore scientist Arjen Lenstra created a limited-lifetime virtual problem-solving network that broke the RSA -129 encryption code. He coordinated the collective efforts of 600 volunteers in 25 countries, identified via a request he posted on the Internet. This virtual community committed 1600 computers available to them (ranging from PCs to Cray supercomputers) to working on a set of algorithms Lenstra provided. Lenstra and his colleagues at BellCore were thus able to break the notorious RSA - 129 encryption code in eight months (in 1977 the prediction was that it would take millions of years to do this). The problem required finding the prime number factors of a 129 - digit number. After the factors were found, the network dissolved (Goldman, Nagel, & Preiss, 1994, p. 137).

Factors Influencing Virtual Teams

Social Factors. Increasing traffic congestion, air pollution, and parking problems, coupled with many people's desires to work at home are emerging factors. In addition, many people have difficulty working outside of the home. For example, "workers who previously found it difficult to work outside the home (e.g., the elderly, handicapped, or parents with child care responsibilities), now use telecommuting as a vehicle to participate in the workforce" (Snizek, 1995, p. 15).

Technology Factors. Advanced technology is rapidly becoming available to support people on an any time, any where basis, and at an affordable cost. Products range from the simple telephone and fax machine to multimedia

capable workstations and collaborative software. The communications system will soon provide the capability to transmit full motion video which will enable desktop conferencing.

Collaborative software or computer supported cooperative work (CSCW) is a fundamental enabler. CSCW applications were covered in the previous section on information technology.

Business Factors. Businesses can reduce costs by having people tele-commute. The demand for buildings and parking spaces can be reduced and therefore costs. People, especially sales people, can spend more time with their customers, instead of commuting to an office and then traveling to customer sites. People can also be recruited who live in different geographical areas who have no desire to relocate. Another business factor is, "the cost of market entry is often smaller than previously thought, especially in the information services and other technology-driven industries, where even under-capitalized startups can have an enormous impact on innovation" (Bleecker, 1994, p. 10). Looking at the trend of globalization, "businesses no longer compete only with their nearest rivals, but internationally" (Bleecker, 1994, p. 10). Finally, the pace of business is changing, especially in computers, communications, and content enterprises. Software products typically have a 12-18 month life, but now Internet browsers are rushed to the marketplace within 6 months, and beta versions are available for testing within two or three months. New hardware products are released every 2 to 3 years. There is no end in sight.

Government Factors. Both the U.S. Government and State Governments are encouraging businesses and people to explore and adopt telecommuting. It can reduce the demand for new highways and bridges and reduce air pollution. Some companies are already working on this. Raymond W. Smith (1994), CEO of Bell Atlantic, indicated that

> at Bell Atlantic, we've expanded telecommuting from a trial of 100 managers three years ago to an option for all 16,000 of our management people today–and we're working with the union to open the option as much as possible to our 50,000 associates (p. 13).

Organizations Involved in Virtual Teams

Microsoft. This Microsoft reference was delivered from a speech at Comdex on the subject of virtual offices. It is interesting because it covers many of the factors influencing virtual teams covered above and in addition provides some imaginative uses of emerging technologies. Welcome to the virtual office.

> Today, the common idea of an office is a place where people go to see each other and to use tools such as PCs, fax machines, and photocopiers to complete tasks individually and in teams. However, in the future, mobile computing and wireless communication will create a different model of how people work together. Intelligent applications, high-bandwidth networks, and innovative devices will connect people and information wherever they are–from homes, cars, or public kiosks. For example, a "virtual team" of experts around the world could work together to produce a report. They could meet, pass information, documents, images, and large files back and forth–or review them together–saving the time and expense of travel. The network becomes their "virtual conference room.
>
> "Virtual" will never replace "real" in the things that are important to us. Rather, technology gives you the power of choice. For example, this flexibility would allow a parent to spend more time with their child and still get a full day's work done. Smaller central

offices, more cost-effective ways to train and communicate with employees, and greater flexibility in reaching customers adds up to a better bottom line for businesses.

Businesses will also have greater access to global resources. This means getting precisely the right information and people for every job–and increasing productivity and quality. By 2005, the world will be your office and your marketplace.

Voice recognition. Giving voice commands to your PC, interactive TV, and other consumer electronics or business systems will make them easier to use. A field salesperson could makes notes and record action items on the way to the next sales call by talking to a microphone system in the car. Work could be organized, filed, and follow-up activities initiated–all automatically–so they make the most of their time.

Access to widespread resources. Today, you can access text files in the Library of Congress via the Internet. In the future, you'll have access to a much wider range of expertise and information instantly and easily–a rich collection of text, video, audio, and images from the world over–whether it be a museum in Peru or a college in Poughkeepsie.

Electronic mail and bulletin boards. E-mail is already a critical business application on many private and public networks. As e-mail's ubiquity and versatility grow, collaboration with team members outside your company and connection to customers will be seamless.

Video-conferencing. This is fast becoming a key component of business and personal communications. Through your PC or interactive TV, you'll be able to converse and work with business colleagues, friends, and family. Video-conferences may even take place from your living room, your car, or a video phone booth. And because it's practical, productive, and flexible, video-conferencing will become commonplace in much the way cellular phones are today (Microsoft, 1995).

University of Texas. Dr. Sirkka Jarvenpaa and Dr. Kathleen Knoll of the University of Texas sponsored an interesting study on virtual teams–global

virtual team collaboration–during Spring Quarter 1996. The exercise had three objectives: "to learn how to collaborate with others in a virtual setting, to obtain international exposure by working with people from different countries, and to learn about the Internet" (Jarvenpaa & Knoll, 1995, p. 1). Previous studies have been conducted on this subject. The following abstract is on learning to work in distributed global teams.

> International teamwork is one of the core components of network organizations. A set of studies was conducted to observe how students learned to work in globally dispersed virtual teams. Nineteen teams of three to seven graduate students, who resided in 13 different universities in nine different countries, were observed for five weeks. Many teams had members separated by a 16-hour time difference. Students were challenged to push the limits of electronic mail by collaborating on unstructured tasks with people they would never meet face-to-face. Students learned a variety of collaboration, socialization, and global communication skills while accomplishing difficult work (Knoll & Jarvenpaa, 1995, p. 1).

In response to the question, why virtual teams, Knoll replied,

> Although global virtual teams comprised of strangers might be a rare business arrangement today, our attempt was to help create a glimpse of the future. Today, many organizations can fly people to face-to-face meetings. Yet in a future of compressed time windows and dwindling margins and budgets, where ad hoc teams are formed overnight to solve problems the next day, teams will be unable to physically materialize from the far corners of the earth (Knoll & Jarvenpaa, 1995, p. 2).

Clearly this is one of the benefits of virtual teams.

CEST. An example of a virtual organization is CEST which brokers virtual consulting teams in Europe.

> CEST is a Virtual Corporation that links independent member consultants with contracts and new business opportunities. Our

> unique approach joins geographically scattered professionals into a powerful Europe-wide network. The CEST network is a flexible mix of independent resources, technology, and skills integrated to exploit business opportunities throughout Europe. Independent consultants in a range of technology and research domains can quickly form small conglomerates of members under CEST's corporate flag (CEST, 1995).

This note provides another benefit of virtual teams–the rapid exploitation of business opportunities where time frames are very narrow and speed, flexibility, and knowledge are crucial.

Institute for the Future. The Institute for the Future (IFTF) is a small research firm founded as a spin-off of the Rand Corporation. Currently they are engaged in research and consulting in a number of emerging technologies such as telework and electronic commerce. One of their current projects is the "Outlook Project" and is defined as follows (IFTF, 1966).

> The Outlook Project conducts pragmatic futures research on the emerging information technologies horizon. Our focus is two to ten years out. Research topics include evaluations of new group ware products and players, organizational memory, intellectual capital, electronic commerce, telecommunities, wireless, distributed leadership, the special learning needs of collaborative work groups, and ways of cost justifying and evaluating tools for teams. Clients help select topics and steer the research. We include both user issues and market opportunities.

While neither virtual teams nor leadership on virtual teams is specifically mentioned, almost every other related subject is. Two researchers for the Institute for the Future (O'Hara-Devereaux & Johansen, 1994) recently published a book entitled, Global Work–Bridging Distance, Culture, and Time, wherein many

of the aspects of global virtual teams are covered, including technology, social and cultural issues, and business issues.

AT&T. AT&T has become very interested in virtual teams and virtual office. AT&T's HomePage (AT&T, 1996) provides access to a telecommuting guide titled Smart Valley Telecommuting Guide which offers tips on both the business and technical aspects of telecommuting. In addition, the HomePage contains a document on "Alternative WorkPlace Solutions," which is aimed at mobile workers. While these documents do not directly address virtual teams, they provide a set of tools (business and technical) which can be used by virtual teams.

AT&T also offers a variety of seminars: "The Telecommuting and Virtual Workplace," "Working in the Virtual Workplace," and "Managing in the Virtual Workplace" in various locations in the United States.

IBM. IBM (IBM, 1994) published a report on telecommuting for the mobile worker. Included in this report is a discussion of security, metrics, objectives, the lack of social cues in electronic interaction, technology supporting teams, and business reasons for telecommuting.

Working by Wire. Working by Wire (WBW, 1996) is a recently formed organization focused on virtual teams. Working by Wire is a collaborative, online learning program developed by Dr. John Gundry and Dr. George Metes. This program is delivered electronically. The program is a four-week course including such subjects as online collaboration skills, collaborative technologies, strategies

for online teamwork, online work processes, online behavior and communications skills, knowledge-sharing, and the virtual meeting. The program is delivered via computer conferencing, electronic mail, and the Internet.

Virtual education is now available for virtual teams. However, even Working by Wire still doesn't address the subject of leadership in virtual teams.

General Findings

Benefits of Virtual Teams. Some of the benefits have already been described. These include reduced costs associated with office space and parking space, the potential inclusion of more people in the workforce, compliance with government programs such as the Clean Air Act, increased flexibility for both workers and organizations alike. For example,

> Price Waterhouse has 45,000 employees in 120 countries, and people often work on projects without benefit of having met in person. It would be unrealistic to put everyone on a plane for a get-together when all the necessary information can be coalesced quickly on networked computers (Gerber, 1995, p. 38).

In addition, there are productivity or problem solving benefits. For example, Gallupe and Cooper (1993) found in research "that electronic brainstorming groups are more productive than groups that use traditional, oral brainstorming–and participants like the process more. Electronic brainstorming allows widely dispersed groups to interact, reduces the problems associated with oral brainstorming, and improves the productivity of larger groups" (p. 27).

Downside of Virtual Teams. There are downsides to virtual teams. Some of the identified problems are,

> the tendency for full-time telecommuters to quickly feel a sense of isolation from fellow workers and the larger organization. This alienation can be minimized by bringing telecommuters to a central location for periodic meetings. Two other difficulties confront the full-time telecommuter. The first is low wages. In most instances, wages paid for work done by telecommuters in the home lag noticeably behind wages paid to office workers. A second major difficulty confronting full-time and part-time telecommuters alike are various marital and family tensions stemming from the merging of home and office (Snizek, 1995, p. 16).

Another downside is that the introduction of technology into an organization potentially can be destructive of the organization's culture. DeLisi (1990) provided an interesting example from anthropology where "an Australian aboriginal tribe, the Yir Yoront, offers a startling example of the often dramatic interplay between culture and technology. At the turn of this century, the Yir Yoront society was literally destroyed by the introduction of technology" (p. 83). Although this is an extreme case, the tools an organization uses certainly influences its culture.

Implications of Virtual Teams. Given the growth in technology and teams, especially virtual teams, there are a number of implications. First, "people will need to develop specialized communication and planning skills to succeed in the virtual work environment" (Barner, 1996, p. 14). Second, "managers and team members will have to form clear upfront agreements regarding: (1) performance expectations; (2) the team's priorities; (3) how communications are to be carried out among members; and (4) the degree of resource support for telecommuters" (Barner, 1996, p. 14-15). Third, continual learning will be required. With product

life cycles dropping to a year or less, especially in the software market, continual and life-long learning is required simply to keep up with change. Fourth, cost allocations will change. More will be spent on computing and communications and less on the office. As Gunn and Burroughs (1996) put it, "The virtual organization has radical implications for office design, creating significant opportunities for saving money: Less space is needed for the new world order of virtuality" (p. 22).

Leadership in Virtual Teams

Leadership is another key factor in virtual teams. Chris Newell, executive director of the Lotus Institute, the research and education arm of Lotus Development Corporation recommended "that virtual teams have both a team leader (formally called a manager) and a team facilitator. The team facilitator is a member of the team who is assigned to monitor the way in which the team works" (Geber, 1995, p. 40). A different and more democratic view was expressed by Raymond W. Smith (1994), CEO of Bell Atlantic: "Leadership on those (virtual) teams will likely be determined by who's most expert on the matter at hand–not by corporate hierarchy. And leadership under these terms will not be the exclusive enclave of management employees" (p. 13). Warren Bennis (1994), a well-known business professor at the University of Southern California would have agreed with Smith when he wrote on leadership: "Whips and chains are no longer an alternative. Leaders must learn how to change the nature of power and how it's employed" (p. 44). He continued,

> If they don't, technology will. Business already is moving to organize itself into virtual organizations: fungible modules build around information networks, flexible work forces, outsourcing, and webs of strategic partnerships. Virtual leadership is about keeping everyone focused as old structures, including old hierarchies, crumble (Bennis, 1994, p. 44).

Traditionally, organizations and groups have operated in a command and control hierarchy. As organizations transition to teams, especially self-directed teams and virtual teams, the organization tends to flatten and control changes.

Trust comes up over and over again regarding teams. Several writers believe that long-term virtual teams cannot be successful without some socialization and the personal contact that builds trust.

Handy (1995) wrote, "If we are to enjoy the efficiencies and other benefits of the virtual organization, we will have to rediscover how to run organizations based more on trust than on control. Virtuality requires trust to make it work: Technology on its own is not enough" (p. 44). Handy (1995) then provided what he terms the "seven cardinal principals of trust" (p. 44). These principals are: (1) trust is not blind, (2) trust need boundaries, (3) trust demands learning, (4) trust is tough, (5) trust needs bonding, (6) trust needs touch, and (7) trust requires leaders.

## Summary

### Summary Highlights

- Teams are small groups of people with complementary skills, shared goals, and mutual accountability. Teams are considered to be the new unit of

performance by many researchers. Teams in general make better decisions than do individuals. Teams can be thought of as having two dimensions: task and relationship or technical and social. Each dimension has its own stages of maturity. Effective teams are mature teams with characteristics such as clear purpose, consensus decisions, shared leadership, team member commitment, and collaborative interactions.

- Leadership is about responsibility, vision setting, accomplishments through people, setting examples, recognizing people, and celebrating completed activities. There is no one way to lead. Leadership styles range from directive to coaching.
- Team leadership can be taught and learned. Effective team leadership should be an outcome of both the understanding of the theory of teams and leadership and sufficient practice or experience with leading teams.
- Information technology in support of teams is an emerging technology used by early adopters. Groupware can enhance team performance. Over time, groupware will become embedded in products primarily thought of as individual software packages such as word processing and project management.
- Virtual teams occur in business, government, and universities. Virtual teams save money and improve productivity. Virtual teams require computing and communications skills. Virtual teams may be global in scope. Virtual teams are not without problems but so far the upsides outweigh the downsides. Virtual teams can be used to address problems that more traditional teams

cannot by reason of structure. These types of problems may require experts located in different geographic areas, may be temporary, and may require significant speed and flexibility. Virtual teams require all the things that teams operating in face-to-face mode require: leadership, trust, clearly stated goals and objectives, and time for socialization among others.

The literature search ends here. While there is an abundance of published research on teams and leadership, there is very little published research on virtual teams and even less published research on leadership in virtual teams.

If an organizational structure of virtual teams may be expected to be used more in the future, it may become important to learn more about them and perhaps even more important to learn how to lead them effectively.

# Chapter 3

## Methodology–Delphi Study

### Introduction

The focus of this study was to obtain information on leading virtual teams. Leadership may also be thought of as a management or coordination function. The Delphi study or technique was used to determine if there are emerging patterns or consensus on leadership practices and information technologies used in leading virtual teams. A case study (described in Chapter 4) was used to obtain more detailed information regarding one virtual team.

### Introduction to the Delphi technique

The Delphi technique was developed by the Rand Corporation in the 1950's. It is a method for the "systematic solicitation and collation of judgments on a particular topic through a set of carefully designed sequential questionnaires interspersed with summarized information and feedback of opinions derived from earlier responses" (Delbecq, Van de Ven, & Gustafson, 1975, p. 10). This technique does not require that participants be collocated or meet face-to-face, thereby making it useful to conduct surveys with qualified people over a wide geographic area.

The Delphi technique can be used in planning situations to achieve a number of objectives.

1. To determine or develop a range of possible program alternatives.

2. To explore or expose underlying assumptions or information leading to different judgments.
3. To seek out information which may generate a consensus on the part of the respondent group.
4. To correlate informed judgments on a topic spanning a wide range of disciplines.
5. To educate the respondent group as to the diverse and interrelated aspects of the topic (Delbecq et al., 1975, p. 11).

Delbecq, et al. (1975) described the Delphi technique by the following process:

1. Develop a set of questionnaires. Typically three or four questionnaires mailed to the respondents are used to obtain the required data.

2. Identify, select, and contact the respondents. Frequently a nominating process is used whereby key individuals may nominate someone with the expertise to participate in the study.

3. Select a sample size. Thirty is frequently used as an upper bound due to limited numbers of new ideas, three or four people is probably too few, and usually between ten and twenty people is reasonable.

4. Develop the first questionnaire, mail it to the respondents, and obtain the responses. For example, the questionnaire could contain ten to fifteen open-ended questions.

5. Analyze the data. Responses to questions could be grouped or categorized by frequency or other criteria.

6. Develop the second questionnaire, mail it to the respondents, and obtain the responses. This questionnaire is developed from the first questionnaire responses. It might request the respondents to review responses that have been categorized and rate them according to a scale.

7. Analyze the data. This analysis should tally the votes for each of the responses; determine various statistics such as mean,

mode, standard deviation, and so on for each response; and finally, summarize additional responses for the next round.

8. Develop the third questionnaire, mail it to the respondents, and obtain the responses. Provide the respondents with the outcome of the second round and ask them if they would like to reconsider their own second round responses.

9. Analyze the data. Determine if there is a consensus.

10. Complete the final report (pp. 87-107).

Application of the Delphi Technique

The purpose of the Delphi technique in this study was the third item mentioned above, namely, to seek out information which may generate a consensus on the part of the respondent group regarding leadership practices and information technologies used in virtual teams (Delbecq et al., 1975).

A three phase process was used–that is, three rounds of questionnaires were used. Respondents or participants were identified by a nominating process as having some expertise in virtual teams (Delbecq et al., 1975). These participants were then contacted by electronic mail to determine if they would be interested in participating.

The first round of the Delphi method asked the participants to respond to thirteen specific questions on virtual teams. The second round used questions developed from responses to the first questionnaire. The participants were asked to rate each statement on a 1 to 5 scale (strongly disagree to strongly agree) and to optionally comment on each statement. The third round used the same statements as the second round and asked the participants if they would

like to modify their answers based on the responses of the other participants (Delbecq et al., 1975).

Selection of Participants

Participants in this study were selected by nominations of people (or self-nominations) with some expertise on virtual teams. Nominators were identified from organizations such as AT&T, the Boeing Company, World Future Society, and Universities. Each nominator was asked to provide a list of names of people with expertise in virtual teams who may be willing to be participants. Identified participants were contacted to see if they would be willing to participate. Once a target list of thirteen names was obtained, round 1 began. The number of participants in a Delphi study varies. As Delbecq et al. (1975) indicated, "the size of the respondent panel is variable. With a homogenous group of people, ten to fifteen participants might be enough" (p. 89).

Data Collection Process

Once the participants were identified, three rounds or phases were used to collect data in response to a series of questions.

Delbecq, et al. (1975) wrote,

> Delphi is essentially a series of questionnaires. The first questionnaire asks individual to respond to a broad question. (Delphi questions might focus upon problems, objectives, solutions, or forecasts.) Each subsequent questionnaire is built upon responses to the preceding questionnaire. The process stops when consensus has been approached among participants (p. 83).

This dissertation stopped at three questionnaires or rounds which seems fairly typical of many studies. Consensus or trends towards consensus were documented at the conclusion of round 3.

Round 1. Questions used in this round were as follows. The overall question for this Delphi Process is: How do you lead virtual teams–teams of people you don't see on a day-to-day basis or may have never met–in terms of leadership practices and information technologies?

The following three research questions relate to the overall question, but are more specific and are the focus of the study.

1. Are virtual teams effective?
2. How are virtual teams structured?
3. How do team leaders practice leadership?

This last question includes leadership practices such as bringing the team together for face-to-face interaction if necessary, communications, coaching, individual recognition, and team celebrations.

Examples of virtual teams include teams of people who work at home or telecommute and a project composed of team members who live in different cities.

Examples of leadership, management, or coordination practices and behaviors include planning, guiding, encouraging, coaching, mentoring, and rewarding team members; setting examples; and communications.

The following thirteen questions were used for the first questionnaire. This researcher was looking for data and examples as responses to these questions, not opinions. This was stated at the beginning of all data collection processes.

1. What was the mission or purpose of the team and how was this mission or purpose created or shaped?
2. What has happened so far on the project? When did it start? What phase are your in? What's next for the project?
3. What is the structure or organization of the team?
4. What was your role on this team (team leader, committee chair, team member)?
5. Who did you primarily interact with (all team members, project leaders, etc.) and how? Did you have any previous interaction with these people before this project? How?
6. Where were the team members physically located? Why were they not all collocated?
7. How were the team members selected and why?
8. What information and communication technologies (telephone, e-mail, conferencing, project management software, etc.) did the team use?
9. Can you provide examples of when team members met face-to-face? Did sub-teams meet more frequently? Was face-to-face contact important? Why?

10. Can you provide examples of where individual or team accomplishments were celebrated? If not, would there have been any if the team had been collocated?
11. Can you provide any examples of team members being challenged, encouraged, rewarded, participating in key decisions, coached, or listened to? How was their morale?
12. Have you learned anything interesting about being on a virtual team? What would you have done differently if the team had been collocated?
13. What were some of the major problems or challenges attributable to working in a virtual environment (e.g., trust, collaboration, leadership, communicating, decision-making, team or individual focus)?

Round 2. Responses to the first round were categorized or grouped by frequency or similarity of response in order to reduce the number to a manageable level but yet keeping the essential meaning of the responses. Participants were asked to rate the categorized responses from round 1 on a scale of 1 to 5, with 1 being "strongly disagree" and 5 being "strongly agree."

Round 3. The purpose of this round was to determine if there was a consensus. Responses from the round 2 were analyzed by determining the mode for each response. Participants were asked to review their response and the modal response, respond again using the same rating scale, and add any comments regarding the responses.

Final Analysis of Data. Responses from round 3 were then analyzed to determine if there was a consensus by looking at the responses and their modes.

Survey Instruments

The survey instrument containing the questions listed above is also provided in the Appendix and was the questionnaire in round 1 of the Delphi technique. This survey instrument was developed by the researcher in discussions with committee members and other researchers. Questionnaires for Delphi rounds 2 and 3 were developed from the responses to Delphi round 1.

Validity. These instruments (questionnaires 1, 2, and 3) were reviewed by other researchers to establish the face validity (do the questionnaire items appear to measure what the instrument purports to measure?). The purpose of a review is to improve the questions, format, and the scales (Creswell, 1994).

Reliability. In addition to validity, these instruments were tested for reliability, that is, limitations in replicating the study. Creswell (1994) wrote, "statements about the researcher's positions–the central assumptions, the selection of informants, the biases and values of the researcher–enhance the study's chances of being replicated in another setting" (p. 159). These assumptions, selection, process, and so forth are documented. Other researchers were asked to comment on this documentation and modified the instruments and supporting documentation where it was necessary.

Confidentiality

Responses to the Delphi questionnaires were treated with complete confidentiality.

# Chapter 4

## Methodology–Case Study

### Introduction

The focus of this study was to obtain information on leading virtual teams. Leadership may also be thought of as a management or coordination function. A case or field study was used to explore a specific virtual team in more detail than the teams studied using the Delphi technique. The primary difference between the two studies was that only one person from a virtual team in the Delphi study was interviewed whereas several team members from the specific case study were interviewed and each contributed his or her unique perspective of the same team. These multiple perspectives provided greater insight into the dynamics of a virtual team.

### Introduction to the Case Study

#### The Case

The case study was about the team of people responsible for planning and hosting a computer conference in 1996, the ABC 96 Conference. The team was primarily distributed throughout major corporations and universities in the United States and setting up this conference was a volunteer effort over and above their primary work responsibilities.

#### Qualitative Methods

There are a variety of terms used to describe qualitative methods such as ethnography, field methods, qualitative inquiry, participant observation, case

study, naturalistic methods, and responsive evaluation (Miles & Huberman, 1994, p. 1). Some researchers such as L.M. Smith (1992) consider them to be practically synonymous. Field studies are frequently used by social psychologists and anthropologists to study a group or organization in their natural environment. This field study may be considered a case study (a type of qualitative method), where a single entity or case is studied by collecting detailed information using a variety of data collection procedures over some period of time (Creswell, 1994). The social group in this "case" is the virtual team that planned and hosted the ABC 96 conference.

Data Collection and Analysis Process

The case was studied by interviewing team members. Thirteen of the team of 34 people on 24 committee chairs granted interviews and these were conducted from August 1996 to February 1997. There were three types of interviews: (1) two face-to-face interviews which were tape-recorded; (2) four telephone interviews during which the researcher took notes; and (3) seven interview responses using electronic mail.

Each interview consisted of 13 major questions, see Appendix G, plus a few additional questions where probing or clarification was needed. Each respondent was assured of confidentiality.

In addition, over 250 pages of collected artifacts were reviewed and selected items were included in this paper. These artifacts included notes, organization charts, conference brochures, and electronic mail. The reason to

analyze these artifacts is to ascertain evidence of leadership through statements that indicate leadership styles, shared purpose, team direction, effectiveness, problems solved, and so on. Comparing both interviews and artifacts provides a better overall description of leadership, especially if there is consistency. If the comparison indicates conflicting information, additional probing may be required for clarification. Yin (1989) regards the primary modes of data analysis in case study as:

> (a) the search for "patterns" by comparing results predicted from theory or the literature; (b) "explanation building," in which the researcher looks for casual links and/or explores plausible or rival explanations and attempts to build an explanation about the case; and (c) time-series analysis in which the researcher traces changes in a pattern over time (Creswell, 1994, pp. 156-157).

In this instance, the data collected was analyzed for patterns or categories of information on leadership practices. These patterns "form the basis for the emerging story to be told by the qualitative researcher" (Creswell, 1994, p. 154). In addition, data collected was searched for "unusual or useful quotes that can be incorporated into the qualitative story" (Creswell, 1994, p. 155).

Confidentiality

Responses to the case study interviews and subsequent analysis of artifacts from the ABC 96 virtual team were treated with complete confidentiality.

# Chapter 5

## Analysis and Findings

### Introduction

The focus of this study was on leadership in virtual teams-teams of people who primarily interact electronically and who meet face-to-face infrequently or not at all. The Delphi technique and case study methods were used to determine if were emerging patterns of leadership practices and information and communications technologies used in leading virtual teams.

This chapter contains three primary sections: the analysis of data collected from interviews and questionnaires and subsequent findings, conclusions, and recommendations.

### Analysis and Findings from the Delphi Study

Responses to the thirteen interview questions were categorized or grouped by frequency or similarity of response and patterns of interest. This was done to reach a number that is manageable in order to create the second and third questionnaires. These responses were used to construct twenty-two aspect statements reflecting characteristics of leadership in virtual teams.

Question 1. What was the mission or purpose of the team and how was this mission or purpose created or shaped?

Team missions varied considerably. Some team missions were starting a new business, growing an existing business, developing a course, writing a book, and developing a software product. Mission statements were generally

given to the team; only a few teams were able to shape the mission. One respondent replied this way.

> The team's purpose was to upgrade an existing software product to a new look and a better interface, including new features and to upgrade to Windows 95 compatibility.

Another respondent provided the following example illustrating a start-up business based from home.

> This was a new business start-up consisting of three individuals working out of their homes. The object was to provide consultation.

There were no identifiable patterns. The interesting thing to this researcher was the variety of projects virtual teams were used to address.

This question was not explored further in subsequent rounds.

Question 2. What has happened so far on the project? When did it start? What phase are your in? What's next for the project?

This question was used to obtain information on the history or progress of the project and where it was headed. This question was not explored further in subsequent rounds.

Question 3. What is the structure or organization of the team?

With few exceptions, the teams studied were generally flat (low in hierarchy); organized in a wheel, all-channel, or combination structure; and interconnected electronically. The wheel and all-channel structure are further described as follows. The wheel is a structure where relatively independent team members primarily interact with just the team leader and the all-channel

structure is one where relatively interdependent team members interact with each other and the team leader. Wheel structured teams tend to be composed of relatively independent team members producing individual work-products and could be categorized as workgroups. All-channel or nearly all-channel structured teams tend to be compose of relatively interdependent team members and work-products may be either individual or collective. A typical combination is one in which sub-team leaders primarily interact with the team leader and sub-team members interact with everyone on their sub-team. The following three responses are illustrative of the flat structure of most of the teams.

> [The XYZ publisher] and I were the editors, the rest of the 100+ team were authors of individual chapters.
>
> Obviously, there is no hierarchical structure to the team. The project manager has no ruling authority over other members of the team. Her role is more of a coordinator charged with maintaining the team's focus.
>
> The team consisted of 3 consultants in the Change Management practice. There was no team leader; instead, the team members worked together on deliverables and provide insights on their client experiences.

This question was not explored further in subsequent rounds.

Question 4. What was your role on this team (team leader, committee chair, team member)?

Respondents played a variety of roles on their teams such as editor, project manager, team leader, regional coordinator, representative, equal partner, and primary coordinator. There were no identifiable patterns.

This question was not explored further in subsequent rounds.

Question 5. Who did you primarily interact with (all team members, project leaders, etc.) and how? Did you have any previous interaction with these people before this project? How?

This question provides more information about the context of the teams particularly in regards to organizational structure. Responses to this question were combined with responses to question 3 in order to more completely identify the organizational structures. The following four responses illustrate the range and similarity of these interactions.

> I interact with all fellow project development members (a project manager, two other instructional designers, two content experts, and a technology expert).
>
> I interact with the leaders of the project, as well as the entire 100 affiliates that are members of this project.
>
> All members.
>
> My primary interactions were with the project manager. I had some direct interaction with the other functional representatives, but most of my dependencies were managed within the team.

This question was not explored further in subsequent rounds.

Question 6. Where were the team members physically located? Why were they not all collocated?

The virtual teams studied varied in their distribution. Some teams were distributed in a specific city, some were distributed throughout the United States, and some teams were distributed world wide. In some cases, only a few team

members worked remotely from the remainder of the team. There were no identifiable patterns in terms of distribution. The following four responses illustrate the variety of distribution.

> At final count, in 7 countries around the world.
>
> The entire team was in Seattle except for myself and the development tester. We are in Minneapolis.
>
> Members were located at their homes. We were not collocated since we did not want to incur the expense of offices and support.
>
> Across the US: LA, Washington DC, Patuxent, MD, Connecticut, Orlando, UK, Germany, Netherlands. Co-location is not an option.

This question was not explored further in subsequent rounds.

Question 7. How were the team members selected and why?

There were no identifiable patterns of team selection. Some team members were selected because they were qualified, some were selected because they were available to work on the project, and some were invited to participate. The following four responses illustrate the variety of selection methods.

> Peer review of submitted chapter proposals.
>
> For the pilots, the team members either volunteered or their names were given to our development team by representatives in their offices.
>
> Team members were selected based on the needs to employ people to help run this organization.
>
> The three partners selected each other to form the company. Associates were selected based on their experience and knowledge of groupware and collaboration skills.

This question was not explored further in subsequent rounds.

Question 8. What information and communication technologies (telephone, e-mail, conferencing, project management software, etc.) did the team use?

Electronic mail and the telephone were the two primary technologies used by the teams. FAX, Lotus Notes, and voice and video conferencing were used by a few teams.

This question was not explored further in subsequent rounds.

Question 9. Can you provide examples of when team members met face-to-face? Did sub-teams meet more frequently? Was face-to-face contact important? Why?

Seven aspect statements were created from the responses to this question for subsequent study. These statements were:

1. Face-to-face contact was not important.
2. Face-to-face meetings were important in creating ties and relationships.
3. Face-to-face contact was important in order to understand each other.
4. Face-to-face contact was important in order to address controversial issues.
5. Face-to-face contact was important to resolve conflict among team members.
6. Face-to-face contact was important for planning.
7. Face-to-face contact was important for problem solving.

The rating of the top four aspect statements on the importance of face-to-face contact at the end of questionnaire #2 ranged from a mean of 3.40 to 4.0 or

less than complete agreement (rating of 4) of the importance. However, the modal response was 4 or 5 or "strongly agree" with the importance of meeting face-to-face. There was a slight improvement in these ratings on questionnaire #3. However, in both questionnaires #2 and #3, the range of responses was from 1 to 5. Consensus was not evident.

The following two responses illustrate the importance of face-to-face contact.

> Face-to-face is VERY important. You yell at the girl from Bell when your phone bill is messed up, not because she is responsible, but because you do not know her face. Once you have met, you have more compassion and understanding for your fellow team members.

> Face-to-face contact is extremely important on this team. CMC (Computer Mediated Communications) is used primarily for non-controversial, detailed information that typically must be communicated to large numbers of people. Face-to-face meetings are needed to address controversial issues, resolve conflicts among team members or sub-teams, and to manage priorities and resources.

But there were other virtual teams where face-to-face contact was just not that important, for example, those teams with relatively independent team members producing individual work-products rather than collective work-products. Face-to-face contact also didn't seem important for a number of teams during the operational phase. The following two responses illustrate this notion.

> Except for [co-team leader] and I meeting, there was only the occasional FTF at a conference which was not related to this project. So no, FTF was not important, except for [co-team leader] and myself.

> We never met FTF during this project. I don't think it was necessary to have that contact in this instance. This was an upgrade of an existing product, so everyone had fairly substantive knowledge and expectations of the product.

Table 4.1 presents the distribution of response data for questionnaires #2 and #3 and for the seven related aspect statements.

The following comments were received from the respondents regarding this question.

Aspect 1: Face-to-face contact was not important.

Questionnaire #2 comments:

*Comment.* Although the team can function on its own, it is much more difficult to have friction between people that you can put a face to. Teams that have never met risk the argument over progress or direction caused by the inability of a disembodied voice to command authority.

*Comment.* A virtual environment must compensate for the innate lack of personal, face-to-face contact. We are at essence still social creatures and we need to SEE our peers, teammates, and our boss frequently. My best estimate is that this lack of face-to-face contact should not exceed two weeks maximum. Better is once a week minimum contact for those working in a virtual environment.

*Comment.* Though it would have been nice to meet with people FTF, it wasn't necessary to the completion of the project. I think some of the review

processes would have gone more smoothly if the persons involved had met FTF at one point or another.

*Comment.* Comments from participants in each of our 6 pilots indicate a desire for FTF interactions to be incorporated into the course.

*Comment.* I found that initial contact and minimal periodic contact was essential in maintaining a cohesive team.

Questionnaire #3 comments:

*Comment.* FTF meetings are very important and may be the biggest lacking in a virtual team.

*Comment.* I still believe that except in very special cases, those being where a member of the team can work wholly on his/her own, without any communications with the rest of the group, that FTF promotes an understanding and a comprehension that is needed for the project to succeed.

Aspect 2: Face-to-face meetings were important in creating ties and relationships.

Questionnaire #2 comments:

*Comment.* More so, they're critical to MAINTAINING and REENFORCING relationships.

*Comment.* Participants who did experience a FTF kickoff meeting for the "virtual" experience felt like they really bonded and interacted as teams.

Questionnaire #3 comments:

*Comment.* FTF meetings help bind the team together, partly because other, "non-job" issues can be talked about and people get to know each other better.

*Comment.* Cultural boundaries are more understood FTF.

*Comment.* It is hard to realize that they may be something in common with the individual one is working with (i.e., fishing, bowling) where FTF may give a visual clue or chance remark that would not have occurred otherwise. It is these bonds that sometimes increase a feeling of "membership" in a team.

*Comment.* Initial contacts were extremely important to the success of the teams to establish consensus goals and mission statement.

Aspect 3: Face-to-face contact was important in order to understand each other.

Questionnaire #2 comments:

*Comment.* Especially where ethnic differences or handicaps come to play. Often times, ones ethnicity will cause a reaction to certain comments or actions. Also, a handicap, or a physical attribute that is not necessarily evident in voice meetings may lead to unfortunate comments by members of the team. Once face-to-face contact has been established, certain respect filters in to the team.

*Comment.* I agree. We pickup and transmit most of our communications via visual signals and body movements and positions. These clues, and this input, is lost in a virtual setting. Video conference calls don't replace being there; for instance, you can't see what the people off-camera are saying and doing.

Actions do speak louder than words, whether the words are written, spoken, or transmitted electronically.

*Comment.* We all communicate in non-verbal ways. Statements may be given more weight if body language or facial expressions support them.

Potentially, some miscommunication may have been avoided if FTF communication had been available.

*Comment.* All participants communicated quite effectively using group-ware (Lotus Notes) and were able to understand one another without the FTF interactions.

Questionnaire #3 comments:

*Comment.* Building understanding builds trust, and trust is what builds teams and binds it together.

*Comment.* I'll stay with "strongly agree" on this question for two primary reasons: (1) because of the absence of non-verbal cues in virtual interactions (cues that my experience has shown are fundamental to our ability to truly "understand each other"), and (2) because of the unavoidable fact that some people have limited writing skills, and are thus less able than others to convey their true feelings in a text-based medium.

Aspect 4: Face-to-face contact was important to address controversial issues.

Questionnaire #2 comments:

*Comment.* For several reasons, many mentioned above. In-person, time becomes less of a consideration, and sufficient time is sometimes all that's

needed to resolve misunderstandings. Virtual contacts can create artificial time constraints, either because people sometimes become aware of excessive computer or network time during resolution and seek to terminate the session, or because people's productivity begins to fall-off when they hang on the line too long. It's hard to stay focused when you're at the end of the food chain.

*Comment.* I can think of one occasion where disagreement occurred that was more effective because of the lack of FTF. Emotional response can be minimized in non-FTF communication.

*Comment.* There were no controversial issues.

*Comment.* All of these can be done at a distance. There are occasions; however, that it is BENEFICIAL to have FTF contact (i.e., contract negotiations, celebrations/recognition after controversial sessions or closure).

*Comment.* On occasion, this was important. However, my guess is that it was less than 30% of the time.

Questionnaire #3 comments:

*Comment.* Controversial issues require more time and more input to resolve. Most of what we communicate is transmitted and received via non-verbal (and therefore non-written) clues. These clues and this communication can only be effective in a FTF setting.

*Comment.* The bandwidth did not allow the emotion of the moment to be expressed. Some may feel that emotion should not be there, but it sometimes is

one's ability to express emotion that can convey a sense of urgency or lightness to an issue that others are misreading.

Aspect 5: Face-to-face contact was important to resolve conflict among team members.

Questionnaire #2 comments:

*Comment.* The few minor conflicts that did arise were managed via groupware or the telephone and were handled effectively. FTF was not an option.

*Comment.* Again, can be done at a distance.

*Comment.* On occasion, this was important. However, my guess is that it was less than 30% of the time.

Questionnaire #3 comments:

*Comment.* Comments were the same as for aspects 3 and 4.

Aspect 6: Face-to-face contact was important for planning.

Questionnaire #2 comments:

*Comment.* Once the team is established, planning can be done via other methods. FTF may help in some circumstances, however, there is a tendency to want the entire team present, and they cause too many open lines of communication for it to be conducive to quick planning, which is what you want in a one or two day meeting.

*Comment.* Agree, but less strongly than for establishing and maintaining relationships or for resolving misunderstandings.

*Comment.* I think FTF in the planning stage would have smoothed some future misconceptions and communications.

*Comment.* With regards to planning for the faculty before each pilot session, they requested one on one sessions with the coordinator to understand their responsibilities and the software. FTF put them more at ease and allowed their questions/concerns to be addressed immediately. There was no FTF planning on the part of the participants.

*Comment.* The review of planning documents suffers because we do not gather people around a table. Instead we tend to send out electronic copies of the planning documents, which few people read. Planning itself, however, seems to take on a life of its own after an initial FTF kick-off meeting.

*Comment.* Initial contact for planning purposes was crucial.

Questionnaire #3 comments:

*Comment.* A lot of planning stuff can be administered via e-mail and the written word, it's less "verbal-intensive" than people issues like personal conflicts. I'm neutral on this question.

*Comment.* If the team is professional and knows where they are headed, the planning stage can be done without meeting FTF. Only confirmation meetings may be needed, or nothing at all.

*Comment.* I still think this is crucial. The complexity of the project along with the naiveté of the users with respect to the virtual environment made this

very important. Finally, the element of trust that must be established with suppliers and team members is most easily gained in an initial FTF meeting.

Aspect 7: Face-to-face contact was important for problem solving.

Questionnaire #2 comments:

*Comment.* It may help to have had face-to-face in the past, however, for any particular problem, it is not necessary during the problem solving phase.

*Comment.* Remote problem solving takes a longer time and has more errors that FTF problem solving, no doubt related to miscommunication.

*Comment.* FTF was not needed for problem-solving. Most problems were solved by discussions in groupware. Most technical problems were solved by communications over the phone.

*Comment.* Free information flow and self-directed team members get problems solved very well.

*Comment.* For most problems, FTF was not necessary.

Questionnaire #3 comments:

*Comment.* Problem-solving, to me, requires more "content-rich" communications and therefore more FTF contact. I think it's important and more efficient to resolve problems FTF. Also, final agreement on the solution can be sealed with a handshake and a look into the other person's face–very important human commitment steps. These are not possible electronically.

*Comment.* My experience has shown that problem solving is one of the best examples of the utility of virtual interaction. Because participants can view

the problem critically, without the interruptions common in FTF meetings, and take time to consider possible options carefully before positing them, the solutions arrived at with the help of virtual interaction are generally better than those arrived at in FTF meetings.

*Comment*. The skill is doable alone, but team attacks on a problem are often more fruitful. It is easier to spend 6 hours in a room with someone else than 6 hours on a phone with them.

Summary of Question 9 and Question 9 Aspect Statement Responses

Face-to-face contact was generally considered important in most teams, especially in the formative stages, but less important in the operational phase.

Factors found important for team members in meeting face-to-face include: creating ties and relationships with other team members, reducing potential conflicts among team members, building a cohesive team, achieving consensus on team issues, improving the effectiveness of communications (social cues are evident), and for rewards and recognition.

Two factors were found in which face-to-face contact was considered less important. These two factors were: (1) the team members were relatively independent and produced individual work products, and (2) the team members knew each other and for this project, they agreed it was not necessary to meet.

Question 9. Can you provide examples of when team members met face-to-face? Did sub-teams meet more frequently? Was face-to-face contact

important? Why?

There were 12 responses to this question in questionnaire #2. There were 9 responses to this question in questionnaire #3.

Table 4.1

Distribution of Response Data to Aspect Statements of Question 9

| Aspect Statement | Mn Q2 | Mn Q3 | Md Q2 | Md Q3 | Rg Q2 | Rg Q3 |
|---|---|---|---|---|---|---|
| 2. FTF meetings were important in creating ties and relationships | 4.0 | 4.0 | 4,5 | 5 | 1-5 | 1-5 |
| 3. FTF contact was important in order to understand each other. | 3.5 | 3.67 | 4 | 3,5 | 1-5 | 1-5 |
| 5. FTF contact was important to resolve conflict among team members. | 3.5 | 3.56 | 4 | 3,4 | 1-5 | 1-5 |
| 4. FTF contact was important to address controversial issues. | 3.42 | 4.0 | 4 | 4 | 1-5 | 1-5 |
| 6. FTF contact was important for planning. | 3.25 | 3.0 | 3 | 3 | 1-5 | 1-5 |
| 1. FTF contact was not important. | 2.83 | 2.44 | 2 | 2 | 1-5 | 1-5 |
| 7. FTF contact was important for problem solving. | 2.75 | 2.89 | 2,3 | 4 | 1-4 | 1-4 |

Note: Mn refers to mean, Md refers to mode, and Rg refers to range.

Question 10. Can you provide examples of where individual or team accomplishments were celebrated? If not, would there have been any if the team had been collocated?

Four aspect statements were created from the responses to this question for subsequent study. These statements were:

8. There were no team celebrations of accomplishments.

9. Team members were given positive feedback, praise, or recognition on-line.
10. Accomplishments were celebrated FTF at the end of the project.
11. Accomplishments were celebrated during intermediate FTF meetings.

The rating of these aspect statements on the importance of celebration and recognition at the end of questionnaire #2 ranged from a mean of 2.3 to 3.4 or from a "do not agree" to just above a neutral rating. The highest rated aspect statement was on recognizing team members on-line. This is perhaps not too surprising due to the difficulty and expense in bringing distributed team members together. There was very little change in the responses from questionnaire #3. The range of responses in both questionnaires #2 and #3 were almost identical except for one aspect statement. The responses ranged from 1 to 5 for some aspects and 1-4 for others, indicating there was no real consensus.

The following four responses illustrate the notion of individual and team celebrations.

> We celebrated our accomplishments as a matter of course in our daily online communications.
>
> Team accomplishments are celebrated in two ways: Through e-mail acknowledgments from executive management, and through FTF celebrations.
>
> No. This team is for the purpose of sharing information and coordinating the development of that information (within the constraints of company budgets and priorities).
>
> Participants don't technically "celebrate" accomplishments, but rather receive positive feedback, words of praise, etc. for a job well done.

Table 4.2 presents the distribution of response data for questionnaire #2 and for the four related aspect statements.

The following comments were received from the respondents regarding this question.

Aspect 8: There were no team celebrations of accomplishments.

Questionnaire #2 comments:

*Comment.* They occurred by happenstance. Should we find ourselves in the same town at the same time, we would meet and celebrate past performance.

*Comment.* It's hard to answer this question with a 1 - 5 rating. I strongly agree there should be team celebrations of accomplishments, however, the reality for me was that virtual team members weren't always able to attend these celebrations.

*Comment.* Remote team members do not share in celebratory events.

*Comment.* There were no celebrations of any sort – sounds drab, doesn't it?

*Comment.* Our culture is one of publicly recognizing the accomplishments of others. Since the team has a high commitment to "getting the job done," taking time out to travel across the country for a backslapping session would be seen as a waste of time. We do manage to gather socially during the course of our work, and that feels more sincere than the big bash for the entire group.

*Comment.* There should always be some celebration for accomplishments–conducted according to level of achievement.

*Comment.* There were occasional celebrations.

Questionnaire #3 comments:

*Comment.* My experience was that there were team recognitions but that they heavily reflected the central location where most of the team was located. Things like team picnics. It was not practical or reasonable to fly the four or five "remote" team members there just for a picnic, but it did give us a feeling of being left out. . . . Likewise, rewards and recognition tended to be given nearer the headquarters. I was given the impression we at the end of the food chain should just be thankful we had a job.

*Comment.* Varied widely based on team, project time frame, and location of members.

*Comment.* Team celebrations done well, contribute to morale and to team members sense of worth in their job. As a team leader, I occasionally try to engineer a team celebration by getting us all in the same place at the same time. But shipping people across country for a large impersonal gathering with a lot of people they don't know would feel (to us all, I think) like a waste of time and money. These are highly motivated non-employee people and they would rather their efforts be rewarded with new opportunities than with junkets.

Aspect 9: Team members were given positive feedback, praise, or recognition on-line.

Questionnaire #2 comments:

*Comment.* A requirement for effective work.

*Comment.* This didn't occur and I'm glad, for the following reasons. (1) This type of feedback should best be accomplished by the boss in front of the team, and (2) electronic feedback just doesn't seem right when it comes to personal communications, whether positive or negative. There's something in our culture about shaking someone's hand when you're thanking them. This can't be replaced. In addition, in larger organizations, Human Resources people might have rules specifying how, where, and when certain awards must be presented.

*Comment.* Most communication of a personal nature such as "Job Well Done" was via telephone or voice mail, not by e-mail.

*Comment.* Participants were given general feedback; some of the coach's comments were positive, but most were simply thought provoking.

Questionnaire #3 comments:

*Comment.* I strongly disagree. The quality and quantity of on-line recognition was not the same for people working "more" in a virtual team environment. Maybe this is the basic problem I encountered, that is, our team was always a mix of "regular" team members at a central location and about one-third of us scattered around the country in a mostly virtual setting.

*Comment.* The difference here is simply attributable to my experience. In the virtual teams I've worked in, the on-line medium was commonly used as a vehicle for bestowing praise in a very public way.

*Comment.* We like keeping our team members. They do good, someone has to be told.

*Comment.* It is hard to really express or receive a feeling of praise without the response of a peer group at the moment.

Aspect 10: Accomplishments were celebrated FTF at the end of the project.

Questionnaire #2 comments:

*Comment.* No closing celebration was held, that I'm aware of, for the projects I worked on in a virtual setting. Projects kind of oozed into each other without formal openings or closures. In my case, I didn't see anyone from the team for the last 12 months I worked in that environment.

*Comment.* Accomplishments were not 'celebrated' at all.

*Comment.* Well, our customer keeps promising.

*Comment.* Projects can be big or small; flying people all over the country for a "small" matter of course project is expensive and time consuming; however, there are many ways to celebrate.

*Comment.* Time frames and the type of project along with other issues prevented this.

Questionnaire #3 comments:

*Comment.* Our team just seemed to evolve from one project to another with little firm beginnings and endings on specific projects. Rewards and summaries therefore were far and few between for us in the hinterlands.

*Comment.* Again, this is simply what my experience has been. In the teams I've worked in, praise was bestowed and accomplishments were celebrated on-line first and FTF later. The on-line medium was used to make celebrations timely.

*Comment.* One-to-one, we celebrate accomplishments FTF whenever we can.

*Comment.* There is a need for closure that can not be accomplished remotely. In some cases, there may be needs for "good byes" or final expressions of success or frustration with other team members.

Aspect 11: Accomplishments were celebrated during intermediate meetings.

Questionnaire #2 comments:

*Comment.* Celebrations were held, but not for accomplishment, they were drinks to the future. All too often, once the goal of the team was complete, they would hardly ever meet again.

*Comment.* See comment 2 under aspect 3. Occasional conference calls did recognize service anniversary dates and such things, not quite the same as a team celebration upon the achievement of intermediate team goals.

*Comment.* We try to acknowledge accomplishments at all meetings, but do not have a "celebration" agenda item for this purpose.

*Comment.* Rarely.

Questionnaire #3 comments:

*Comment.* Originally this would happen more often, but as time went on, we found this often made people feel like something was accomplished and that they could lay back a little. We did give bonuses, or send people out for a night/weekend with the significant other, or what ever, but too many parties tended to take focus away from the main goal.

*Comment.* Just didn't have time to make this happen on a regular basis. Too bad though because it is important.

Summary of Question 10 and Question 10 Aspect Statement Responses

In general, team celebrations were not used for a variety of reasons: (1) the team members were relatively independent and the team was in reality more of a workgroup, and (2) the time and cost required to bring team members together. Several respondents remarked about the cost or expense associated with bringing people together as one reason for not rewarding or celebrating the accomplishments of the project. Recognition of individual and team accomplishments was generally given on-line via e-mail or telephone – it conveyed the message at a very low cost.

Question 10. Can you provide examples of when team members met face-to-face? Did sub-teams meet more frequently? Was face-to-face contact

important? Why?

There were 12 responses to this question in questionnaire #2. There were 9 responses to this question in questionnaire #3.

Table 4.2

Distribution of Response Data to Aspect Statements of Question 10

| Aspect Statement | Mn Q2 | Mn Q3 | Md Q2 | Md Q3 | Rg Q2 | Rg Q3 |
|---|---|---|---|---|---|---|
| 9. Team members were given positive feedback, praise, or recognition on-line. | 3.5 | 3.67 | 4 | 4,5 | 1-5 | 1-5 |
| 11. Accomplishments were celebrated during intermediate FTF meetings. | 2.75 | 3.22 | 4 | 4 | 1-4 | 1-4 |
| 8. There were no team celebrations of accomplishments. | 2.42 | 2.33 | 1 | 1 | 1-5 | 1-4 |
| 10. Accomplishments were celebrated FTF at the end of the project. | 2.33 | 2.56 | 1 | 1 | 1-5 | 1-5 |

Note: Mn refers to mean, Md refers to mode, and Rg refers to range.

Question 11. Can you provide any examples of team members being challenged, encouraged, rewarded, participating in key decisions, coached, or listened to? How was their morale?

Three aspect statements were created from the responses to this question for subsequent study. These statements were:

12. Team members were continually challenged and encouraged to perform.

13. Team members were challenged by project activities or performance targets.

14. Rewards were primarily intrinsic, e.g., knowledge gained could be applied to future projects.

The rating of these aspect statements on the challenges, encouragement's, and rewards at the end of questionnaire #2 ranged from a mean 3.8 to 4.1 or from a slightly less than agreement to agreement. The highest rated aspect statement was that team members were challenged by project activities or performance targets. There was some overall improvement in both the mean and the range in questionnaire #3. There was general consensus on aspect statements (13) team members were challenged by project activities or performance targets and (12) team members were continually challenged and encouraged to perform.

The following three examples illustrate the range of responses.

> Challenged, encouraged, and coached are at the very nature of the editing and authoring process.
>
> Teams are being challenged by activities that force them to conduct in-depth analyses of their change projects and then create deliverables which, in many cases, they will present to their manager or project team.... The rewards stem from the application of the concepts they learn on their own client case combined with assessments that they can use back on the engagements.
>
> Each team member, partners, and associates, were responsible for the assignments and highly encouraged to interact with other members to identify problems, work tasks, reward efforts by others.

Table 4.3 presents the distribution of response data for questionnaire #2 and for the three related aspect statements.

The following comments were received from the respondents regarding this question.

Questionnaire #2 comments:

Aspect 12: Team members were continually challenged and encouraged to perform.

Questionnaire #2 comments:

*Comment.* As much as possible, however all teams I have formed part of have also tried to share the load as much as possible, trying to keep everyone involved even when they were not really needed.

*Comment.* I agree, but in my case the encouragement was generally in a negative vein.

*Comment.* I don't know if this is a function of remote teams, or a function of corporate climate and producer style. (The producer being the person who "drives" the project.)

*Comment.* Most participants felt that the activities they performed were challenging and they were encouraged to analyze further through thought-provoking questions from teammates and the coach. Participants also felt accountable for their assignments since many involved analyzing their teammates' deliverables and providing feedback.

Questionnaire #3 comments:

*Comment.* This is an issue of leadership and can be done effectively in a virtual environment.

Aspect 13: Team members were challenged by project activities or performance targets.

Questionnaire #2 comments:

*Comment.* The goals were very challenging.

*Comment.* Participants felt like they were challenged by the activity goals and tasks that were assigned to them throughout the course.

*Comment.* I think that project activities have been more important than targets, Most of our team consists of contractors, for whom the project is itself a customer. As a result, they tend to be highly motivated.

Questionnaire #3 comments:

*Comment.* Some team members found some activities unchallenging– "not rocket science," or "for this I went to college."

Aspect 14: Rewards were primarily intrinsic, e.g., knowledge gained could be applied to future projects.

Questionnaire #2 comments:

*Comment.* In the case of working teams, such as s/w development true. However in the case of User group conference organizations, there tended to be many perks, such as all expense paid trips to the conferences, dinners, and receptions, special team nights out . . . a few extra days in a different city with nothing to do but explore for the sake of it. Work teams get a salary. Volunteer teams get perks.

*Comment.* I would tend to disagree. As I answered during Round 1, our virtual group came into being partially to accommodate corporate downsizings and staff imbalances. The only intrinsic reward we received was the possibility of staying employed and to find another position within the company prior to our projects winding down. Again, little pre-planning went into our virtual team's set-up, it just happened.

*Comment.* There were no extrinsic incentives. Team members may have been personally motivated and self-challenging.

*Comment.* The knowledge gained from analyses (during the activities) was directly applicable to their current engagements.

*Comment.* That and the having of a job for another year.

*Comment.* It was anticipated by some team members that other rewards would be forthcoming.

Questionnaire #3 comments:

*Comment.* I'm neutral on this question. I guess upon reflection that I did take good experiences away from this experience, although my career wasn't necessarily helped by it.

*Comment.* Sometimes, but a pat on the back, and dinner and dancing or a ski weekend for someone who did exceptionally well was never that uncommon.

Summary of Question 11 and Question 11 Aspect Statement Responses

In general, respondents agreed with the importance of challenging, rewarding, and encouraging team members. Rewards tended to be more intrinsic, perhaps due to the nature of the virtual environment. Challenges tended to be in the nature of the work, not team leaders challenging team members to improve or work better and smarter. The rating for this aspect increased slightly from questionnaire #2 to #3. This could be a reflection of the interpretation of the statement however, and people responding from their perspective. Some respondents indicated that encouragement was negative. Overall, however, teams were clearly challenged by the projects they worked on.

Question 11. Can you provide any examples of team members being challenged, encouraged, rewarded, participating in key decisions, coached, or listened to? How was their morale?

There were 12 responses to this question in questionnaire #2. There were 9 responses to this question in questionnaire #3.

Question 12. Have you learned anything interesting about being on a virtual team? What would you have done differently if the team had been collocated?

Table 4.3

Distribution of Response Data to Aspect Statements of Question 11

| Aspect Statement | Mn Q2 | Mn Q3 | Md Q2 | Md Q3 | Rg Q2 | Rg Q3 |
|---|---|---|---|---|---|---|
| 13. Team members were challenged by project activities or performance targets. | 4.17 | 4.4 | 4 | 4 | 1-5 | 4-5 |
| 12. Team members were continually challenged and encouraged to perform. | 4.00 | 4.33 | 4 | 5 | 1-5 | 4-5 |
| 14. Rewards were primarily intrinsic, e.g., knowledge gained could be applied to future projects. | 3.75 | 3.56 | 3,4 | 3 | 2-5 | 3-5 |

Note: Mn refers to mean, Md refers to mode, and Rg refers to range.

Four aspect statements were created from the responses to this question for subsequent study. These statements were:

15. The virtual environment enabled the ease and convenience of communications among team members.
16. It was important to keep everyone informed of things taking place.
17. It was often difficult to get people to complete action items and tasks.
18. Consensus decision-making increased team commitment.

The rating of these aspect statements on interesting things learned about being on a virtual team at the end of questionnaire #2 ranged from a mean of 3.00 to 4.0 or from a neutral position to agreement. The highest rated aspect statement (16) was that it was important to keep everyone informed of things taking place. Responses on questionnaire #3 indicated a positive shift in the

mean values of three of four aspect statements considered in this section. These responses were high enough to indicate general consensus. These aspect statements are (15) the virtual environment enabled the ease and convenience of communications among team members; (16) it was important to keep everyone informed on things taking place; and (18) consensus decision-making increased team commitment.

The following three responses with respect to learning something interesting about being on a virtual team are illustrative.

> But overwhelmingly, authors found this process useful because of the ease and convenience in communication between themselves and the editors especially, and also among other authors. Authors commented that regular updates from us [team leaders] were important in giving them a sense of "ownership" or "community " in this effort compared with other edited works to which they had contributed.
>
> It's always important to be courteous and tactful to other team members. Whenever possible try and keep everyone informed of things that are taking place. When teams work well together, the results can be very exhilarating.
>
> Yes, virtual teams seem to suffer more political tension than collocated teams. Differences are covered and tend to explode instead of being brought to the surface when needed. The bandwidth provided by technology is not sufficient to address these issues.
>
> Location does not make or break success. Communication of many different kinds can produce effective results without co-location.

Table 4.4 presents the distribution of response data for questionnaire #2 and for the four related aspect statements.

The following comments were received from the respondents regarding this question.

Aspect 15: The virtual environment enabled the ease and convenience of communications among team members.

Questionnaire #2 comments:

*Comment.* Our teams made heavy use of e-mail.

*Comment.* I have to respond yes and no to this question. At times it made communications easier, at other times I think it made things worse. The personal feedback item was hampered by this environment, while the transfer of data was increased by the use of things like voice and e-mail.

*Comment.* Because of the geographic and time zone differences, there was only a three hour window in which timely communication could occur. Otherwise a team member would wait at least a day for a response to a question or other concern.

*Comment.* It enabled the convenience of communications in that the participants did not have to leave their client engagements to come to a central location to network. However, the communications were not as rich and not as "easy" because of the fear of misinterpretation of written words (most communications was text).

*Comment.* We use e-mail, phone, fax, and pagers. We make little use of the Internet and videoconferencing. We have one project member who does not

yet have a PC; I have noticed much more time and fax paper being spent in keeping him in the loop.

Questionnaire #3 comments:

*Comment.* Overall, I think my team was working around the limitations to communications presented by the virtual setting. A "normal" team environment would have experienced improved and better communications in my opinion.

*Comment.* Getting easier day by day!

*Comment.* If an entire virtual environment had been established, I would agree. In my case, communication was sneakerlan at times when electronic communication would have worked perfectly.

*Comment.* It all depends on an individual's ability to adapt to the virtual environment metaphor. If one can't, then there is no ease and convenience of communications to that individual.

Aspect 16: It was important to keep everyone informed of things taking place.

Questionnaire #2 comments:

*Comment.* To a certain extent. No more so than if they were in the same office. We informed of completed tasks, and big picture responsibilities, but not too detailed. Caused too many problems.

*Comment.* I strongly agree it was important but this didn't always happen. For instance, a meeting might take place at the headquarters location, changes would be made, actions initiated, yet no one remembered to send copies of the changes or the discussions to virtual team members. Some of this oversight can

be attributed to our very dynamic team situation and the customers we were supporting.

*Comment.* Not all team members need to know what the other team members are doing. (I don't know if this comment is appropriate here, but I think the importance of a design document is greatly increased in virtual environments).

*Comment.* Yes, in a virtual environment, participants can easily become lost if they feel they are not receiving communications or being informed of the happenings. Frequent communication is critical.

*Comment.* As team leader, I spend a lot of time as a central point of information distribution: from the team to management, customer, etc., and from these places to the team.

Questionnaire #3 comments:

*Comment.* I strongly agree with this statement, partly because this wasn't my experience on my team. I do think it's important to keep everyone informed, it just didn't happen often enough for me.

*Comment.* Yes, but don't let them get bogged down in details that do not concern them. They have a job to do.

*Comment.* Not of ALL things. There are strata of information that apply to various organizational groupings in a virtual team.

Aspect 17: It was often difficult to get people to complete action items and tasks.

Questionnaire #2 comments:

*Comment.* Volunteer teams this was sometimes true. Work teams, much less so.

*Comment.* I strongly agree. Much of project management in my experience consists of personal meetings with process owners, to clarify what actions were taken and to discuss (real time) whether the action item could be closed; seldom are there black and white closure points. A virtual environment made these personal discussions and closure points more difficult.

*Comment.* I always feel that my questions and concerns are of a top priority, therefore any delay in addressing them causes difficulty. Sometimes I had to proceed on the faith that what was said will be, will in fact be.

*Comment.* One benefit of our course was that it is mandatory for the participants. They need to take the course to be promoted to manager, the next level on their career path. The only issue that has arisen is potential conflicts with concurrent client responsibilities, which has forced some participants to drop out of the course completely (to take it a later date).

*Comment.* Our team consists of very self-directed individuals. I don't know whether we're just lucky, whether we have the right people, or whether the environment has created the "right" behavior in the individuals.

*Comment.* Agree would also be my answer in a FTF location. Virtual teams do not have a major disadvantage to task completion.

*Comment.* With respect to outside suppliers that were involved, it became a problem which I am not sure FTF would have helped greatly. Intra-team this was not a problem anymore so than a normal team environment because the team leader knew each team member well.

Questionnaire #3 comments:

*Comment.* As a former project manager I found it important to sit down with people to determine where they were on any specific action item. Answers were rarely black or white, and much discussion was required to determine the actual status of an action item. I don't think much of this discussion and dialogue could have occurred in a virtual setting; at least it wouldn't have occurred as efficiently.

*Comment.* The only thing I would say to this is that this was my experience in the virtual teams I worked in, and that it wasn't in any way attributable to the fact that the team has a virtual dimension to it. I think this has been true in most team situations I've worked in.

*Comment.* Still a 2 [disagree], but this was more due to the dedicated individuals involved.

*Comment.* Some people lend themselves well to this environment, others not so well.

Aspect 18: Consensus decision-making increased team commitment.

Questionnaire #2 comments:

*Comment.* With the trade off of slowing down the process.

*Comment.* I don't know how to rate this item based on my experience. I'm not sure if we ever had consensus team building and decision making.

*Comment.* The producer on this job was god, there was no consensus decision making.

*Comment.* There was no consensus decision making. (Our definition of a team was different from the typical definition).

*Comment.* We use consensus for certain types of decisions, such as who will do what.

*Comment.* Consensus generates more responsibility and buy-in.

Questionnaire #3 comments:

*Comment.* I believe real team commitment comes at the personal level and that authentic communications is required. FTF settings are the best for this activity. The loss of non-verbal clues and communications is probably significant here. I believe stronger consensus-building and team commitment result from FTF experiences, and that virtual teams suffer when compared to them.

*Comment.* Consensus decision-making increased team commitment.

*Comment.* It also made the losers of a vote feel even more adamant. If the word of God was handed down from above (like the CEO) then no one won, they just do as told.

Summary of Question 12 and Question 12 Aspect Statement Responses

In many respects, the aspects covered here apply equally to virtual teams and collocated teams. Respondents generally agreed that it is important to keep people informed, the virtual environment enabled the ease and convenience of communications, and that consensus decision-making increased team commitment. Respondents also indicated professional team members accomplished their tasks in a virtual environment. Perhaps surprisingly is that the virtual environment enabled the ease and convenience of communications of team members. An interesting research question would be: Is it easier to communicate with people face-to-face or is it easier to do so electronically, and if so, why?

Question 12. Have you learned anything interesting about being on a virtual team? What would you have done differently if the team had been collocated?

There were 12 responses to this question in questionnaire #2. There were 9 responses to this question in questionnaire #3.

Question 13. What were some of the major problems or challenges attributable to working in a virtual environment (e.g., trust, collaboration, leadership, communicating, decision-making, team or individual focus)?

Table 4.4

Distribution of Response Data to Aspect Statements of Question 12

| Aspect Statement | Mn Q2 | Mn Q3 | Md Q2 | Md Q3 | Rg Q2 | Rg Q3 |
|---|---|---|---|---|---|---|
| 16. It was important to keep everyone informed of things taking place. | 4.17 | 4.56 | 5 | 5 | 2-5 | 3-5 |
| 15. The virtual environment enabled the ease and convenience of communications among team members. | 3.92 | 4.33 | 5 | 5 | 1-5 | 2-5 |
| 18. Consensus decision-making increased team commitment. | 3.50 | 4.11 | 5 | 5 | 1-5 | 3-5 |
| 17. It was often difficult to get people to complete action items and tasks. | 3.08 | 3.11 | 3 | 3 | 1-5 | 1-5 |

Note: Mn refers to mean, Md refers to mode, and Rg refers to range.

Four aspect statements were created from the responses to this question for subsequent study. These statements were:

19. Time delays in responding to e-mail messages or telephone calls were a common or frequent common problem.
20. It was often difficult to reach people because there was no visibility of when people were out of the office due to meetings, travel, vacation, or illness.
21. Current technology is insufficient to carry the right messages, (e.g., real-time human and social cues).
22. There was a perception that some team members were not really working (out of sight, out of mind).

The rating of these aspect statements on major problems or issues at the end of questionnaire #2 ranged from a mean of 2.50 to 3.50 or from a slightly

disagree to slightly agree. Just looking at the mean value it would seem that these four aspects are not really a problem. The modes of these aspect statements gives a different picture. The responses from questionnaire #3 don't indicate any real change. In general the responses vary around neutral on the aspect, but with a wide range.

The following four examples illustrate the variety of responses.

> I do think that virtual team members weren't "trusted" enough, that somehow the feeling was that they were "getting away" with something, or that they weren't working as hard. I know we lost valuable visibility, with our boss, their boss, the organization, and within the company–all of these were career effecting. Communication is critical in a virtual environment, processes must be built which make up for the loss of normal communications. Concerning decision-making, my experience is that I was less a part of the decision-making process, whether through time and distance issues, or because of a lack of trust issues–I'll never know for sure.
>
> Two of the major challenges include: scheduling of participants' time and effectively communicating in a virtual setting.
>
> The only one from my perspective that is constantly frustrating is "non-responsiveness." It is easier to just ignore e-mail than when I as project manager would be "in a person's face."
>
> Communication in a virtual environment has its own set of challenges. It is sometimes difficult to derive the meaning from text-based messages, especially if the person is attempting to be sarcastic or facetious at times. Guidelines on how to let others know the intention of your message (whether it's through the use of emoticons or whatnot) are important.

Table 4.5 presents the distribution of response data for questionnaire #2 and for the four related aspect statements.

The following comments were received from the respondents regarding this question.

Aspect 19: Time delays in responding to e-mail messages or telephone calls were a common or frequent communications problem.

Questionnaire #2 comments:

*Comment.* Occasionally, however it was part of the culture of the team members to place a strong importance on these facets of communications.

*Comment.* To get around this problem, if a really big issue had to be resolved, people were flown back to the headquarters or other locations to work on the solution in-person as a "real" team. In other words, the virtual team concept was abandoned when high priority activity had to be completed.

*Comment.* The delay in communications caused for a sense of abandonment to come over some of the participants. They felt like they were all alone out there. As a result, we have shortened the length of some of our pilots so participants communicate more frequently over a shorter period of time.

*Comment.* The team is very good at this. My management and administration staff, who live in a non-virtual environment, are not as good. My immediate boss (coach), however, is getting better. I still often have to use many messages in many media to get her attention.

*Comment.* This is dependent upon individuals not the method or location.

Questionnaire #3 comments:

*Comment.* One has no control over when the other party will respond to an e-mail.

*Comment.* Not the end of the world, but yes, a problem.

*Comment.* Some individuals use these media better than others.

*Comment.* This was just not a major problem. I wonder how many of the other respondents of this questionnaire were involved in working with outside suppliers whose paychecks were represented by making these connections when necessary.

*Comment.* This is true even if the person is one office away and the caller feels a sense of urgency about the message that needs attention.

Aspect 20: It was often difficult to reach people because there was no visibility of when people were out of the office due to meetings, travel, vacation, or illness.

Questionnaire #2 comments:

*Comment.* Although this was true in some cases, for the most part there was slack time provided for this issue. When things were tight time-wise, most people devoted time directly to the projects, and sat near the phone. Should they be required to be absent, they generally left other methods of being reached (cell phone, pager, etc.).

*Comment.* I'm neutral, and may be disagreeing with this statement. We knew how to reach people, and did, if it really mattered. Another level of decision-making was required however. For instance, do I really want to call (X) out of a meeting or on vacation, to discuss what I feel is more important?

*Comment.* Any time one of the team members was scheduled to be absent, prior notice was given to the rest of the team. On one occasion, the project director was out for several days with a sick child, the rest of the team accommodated his absence.

*Comment.* It wasn't difficult to reach the participants, except for the few who ended up dropping out.

*Comment.* We do not have a calendaring system, but keep track of movements by virtue of frequent "where are you today?" exchanges during teleconferences.

*Comment.* Meetings/calls were scheduled; many people wear pagers and/or were accessible by cellular phone. Voice mail is checked frequently by team members.

Questionnaire #3 comments:

*Comment.* There were ways to reach people, since most had backups or covered for themselves while they were gone.

*Comment.* I'm neutral on this one because I have found that, with some widely-distributed teams, vacation, travel, etc., can be a problem. It certainly is not a problem with localized virtual teams because vacations and travel can be communicated to the entire organization through the use of e-mail bases "aliases" or mailing lists.

*Comment.* It made it harder to know when someone was not there ahead of time, but it also made it simpler to deal with those that are normally hard to get a hold of, as the virtual environment is made to deal with just those issues.

*Comment.* We have a small group, and keep track of each others' movements.

*Comment.* I guess the response to this one is dependent on the technology used by the group. We did not have calendar functions so we could not have visibility of an individual's movements.

Aspect 21: Current technology bandwidth is insufficient to carry the right messages (e.g., real-time human and social cues).

Questionnaire #2 comments:

*Comment.* Bandwidth is a TOOL, not a total solution. There are other tools being put into place for social cues etc. (e.g., smilies, ...). The phone is also VERY important in conveying a large part of that message.

*Comment.* I strongly agree. See responses to aspect statements 1,2, and 3. I'm not sure if the issue is "technology bandwidth" however. To me, the issue centers more on human social needs and the way we communicate as a species than it does on technology.

*Comment.* Hmmmm, tough statement, is this the responsibility of technology? Don't we need to be aware of limitations and accommodate them, as well as be tolerant of those who do not understand or recognize the limitations.

*Comment.* There are certainly issues with bandwidth, however, the participants' communications are not intended to be real-time. I thing real-time chats might be valuable in the future, but they are not critical for the success of virtual interactions.

*Comment.* We could do more with better technology, but we get along OK.

*Comment.* There are many forms of communication at our fingertips. Bandwidth is not a limit in my circumstance.

Questionnaire #3 comments:

*Comment.* We humans communicate across a wide spectrum of verbal and non-verbal signals and information transfer, and by definition, the virtual environment limits a large portion of this bandwidth.

*Comment.* Obviously, one's answer to this question is totally dependent on how they define "right messages." In our case, the mixture of virtual and FTF interactions used relieves us of the "need" for high-bandwidth technologies such as videoconferencing. I have found that we are more being "pulled" into new ways of communicating by new technologies than being "pushed back" from communicating the way we want to by limitations in technology.

*Comment.* This is changing, but so is the message!

*Comment.* Not everyone has the text-based verbal skills to express themselves fluently in e-mail and documents. But then there's always the

telephone. Some team members may not be proactive in communication what's on their minds, and bandwidth may not be the solution.

*Comment.* I believe that as the need for distributed groups is realized, technology will provide what is needed. At this point, a project could be structured that is not limited by bandwidth by increasing the FTF experiences.

Aspect 22: There was a perception that some team members were not really working (out of sight, out of mind).

Questionnaire #2 comments:

*Comment.* That tended to be within the rank and file of the team, and was for the most part quelled by the team leader. It is his/her duty to keep everyone aware of what one might be doing, as well as why someone might be quiet for a while. This is however, true management by objectives, and the objectives being met speak for themselves.

*Comment.* I strongly agree. The official communications never stated this, but it's the feedback I received from trusted peer members at the headquarters location. For their part at headquarters, my peers were subject to higher work loads and additional stress due the management techniques employed by the then-current boss (e.g., "Drop what you're doing, get over here, this is the way we're going to do it from now on!"). Virtual members weren't subjected to much of this frantic activity, and maybe some resentment and negative perceptions developed.

*Comment.* Perception? We're on a team with programmers. Everyone knows they don't work. Okay, joke. I think that perception is omnipresent in any virtual or telecommuting environment, particularly where there is a lack of understanding of others' jobs.

*Comment.* I don't think participants felt others weren't working, especially because everyone can see the deliverables each person posts to the class database. The only time this perception becomes a reality was in the case of the few participants who dropped out (and, therefore, truly weren't working).

*Comment.* This thought occurs easily to a manager or team leader. It requires a light touch with oneself, and in any conversation with a team member in which the thought comes up. Sometimes we even joke about it. Today I asked a team member, "Are you busy right now?" and he replied, "Are you my boss, or as someone who needs something done right away?" Focusing on positive achievements, and having plenty of them to focus on, keeps the anxiety at bay.

*Comment.* Dependent upon individuals not location! People in the same office can appear out of sight/mind too.

Questionnaire #3 comments:

*Comment.* As previously mentioned, my team was a hybrid, with most people at a central location and about a third of us scattered around the country. This reality may have affected the attitudes of team members at the central location. I do believe they were under more stress than the rest of us, and that they therefore may have felt "put-upon" by those of us who weren't there on a daily

basis. Maybe the best configuration for a virtual team is one where all team members work in a virtual setting.

*Comment.* Or that they have set themselves to an easy schedule because few people were there to check up on them. You can never change that issue completely. It always has and always will be a problem. Especially when someone becomes behind schedule with a single item deliverable. There are no intermediary products that show progress.

*Comment.* The team leader remains susceptible to these ideas.

*Comment.* Unfortunately there was some of this. In retrospect, this was attributable to lack of management rather than the mode of team involvement.

*Comment.* Results were the indicator of an individual's work. It should not be a concern of team members as to the question of the individual's work effort or habits unless results are not achieved.

Summary of Question 13 and Question 13 Aspect Statement Responses

There was little overall agreement on the four aspect statements. Responses to both questionnaires #2 and #3 were actually rated less than "4" or less than "agree." There were a variety or range of experiences on teams. In general, some teams experienced communications problems related to time delays, while other teams didn't. At least one team that didn't experience many time related communications problems used a variety of communications devices such as pagers and cellular telephones in addition to standard telephones and e-mail. In addition, some non-technical approaches were used such as

scheduling telephone calls in advance and making it a habit to check voice mail frequently. A few respondents experienced the "out of sight, out of mind" problem, but interesting, most respondents didn't think this was a problem.

Question 13. What were some of the major problems or challenges attributable to working in a virtual environment (e.g., trust, collaboration, leadership, communicating, decision-making, team or individual focus)?

There were 12 responses to this question in questionnaire #2. There were 9 responses to this question in questionnaire #3.

Table 4.5

Distribution of Response Data to Aspect Statements of Question 13

| Aspect Statement | Mn Q2 | Mn Q3 | Md Q2 | Md Q3 | Rg Q2 | Rg Q3 |
|---|---|---|---|---|---|---|
| 19. Time delays in responding to e-mail messages or telephone calls were a common or frequent communications problem | 3.50 | 3.11 | 4 | 4 | 2-5 | 2-4 |
| 21. Current technology bandwidth is insufficient to carry the right messages (e.g., real-time human and social cues). | 3.50 | 3.67 | 2,5 | 4,5 | 2-5 | 2-5 |
| 20. It was often difficult to reach people because there was no visibility of when people were out of the office due to meetings, travel, vacation or illness. | 2.50 | 2.44 | 2 | 2 | 1-5 | 1-4 |
| 22. There was a perception that some team members were not really working (out of sight, out of mind). | 2.50 | 2.2 | 2 | 2 | 1-5 | 1-5 |

Note: Mn refers to mean, Md refers to mode, and Rg refers to range.

## Analysis and Findings from the Case Study and Comparison with the Delphi Study

There are many different ideas about what leadership is. Almost every writer has his or her own definition. Fortunately, there is sufficient overlap in these definitions and leadership practices that there is some general agreement. This section explores various practices or aspects of leadership that are considered important by researchers in leadership and evidence of these practices or aspects found in the case and Delphi studies. The case study team is referred to as the ABC team in the remainder of this chapter.

### Effectiveness

Was the leadership of the ABC team effective? The mission was accomplished. The ABC conference was successfully held in November 1996. Yukl (1994), a leading researcher on leadership in organizations, would answer the question this way:

> The most commonly used measure of leader effectiveness is the extent to which the leader's organizational unit performs its task successfully and attains its goals (p. 5).

From the perspective of the accomplishment of its mission, the ABC team leadership would have to be considered effective.

Several team members responded about the success of the ABC team and gave credit to the team's leadership. One team member summarized team success this way.

> I have experience in other remote teams that give insight, but the program committee is structured in a way that it WORKS even though people are around the world.

Another team member looked at team success specifically through the perspective of team leadership.

> I believe this team succeeded because there was strong and thoughtful MANAGEMENT going on. The co-chairs are good leaders and I believe leadership (in any team) makes all the difference in the world. There is NO substitution for leadership, particularly in this type of virtual environment.

The successful experience of the case study was typical of what was observed in the Delphi study. Only one of the 13 teams in the Delphi study failed to complete their goals. Successful completion of goals does not mean there were no problems; on the contrary, there were lots of problems–many attributable to working in a virtual environment–but that the teams were successful in solving their problems and accomplishing their mission.

There are also other perspectives of effectiveness. One such perspective is consideration of team members. Does the leader satisfy the needs and expectations of team members? Do team members resist leadership? Do team members work together? A team may meet the established objectives, but if the team members would not want to work together or with the team leader in the future, team leaders would not be considered effective. This perspective was not explored in either the Delphi or case study. Another perspective of team leadership effectiveness is the leader's contribution to the quality of group processes (Yukl, 1994, p. 6). For example, does the team leader enhance team work,

communications, decision-making, or conflict resolution? This perspective was not explored in either the Delphi or case study. These perspectives of leadership effectiveness could be another study.

Team Structure

One team member described the overall team structure this way. "The ABC team was a fairly large team, very flat, and very highly distributed." In fact, the structure of the ABC team was not as flat as it seemed to some of its members. It appeared flat to those team members who generally worked independently on individual work products with limited interaction with other team members. This arrangement worked effectively for some tasks resulting in a successful conference.

However, in those cases where the work products were sufficiently complex and time consuming that one person could not do them, the responsible team member also led a sub-team to accomplish the work. For example, the team member who lead the Papers Committee had about twelve Associate Chairs and about fifty reviewers. There were some other complexities in the team structure as well. For example, some team members had a dual reporting role and some team members were on two or more committees.

The structure of the ABC team was in marked contrast to the structure of the teams in the Delphi study. Whereas the ABC team was fairly large, with 34 people on 24 committees with dozens of other people in various supporting roles, teams in the Delphi study generally were under 10 to 12 people with a very

flat structure. The following example is one of the few exceptions, but here again its structure is very flat.

> [The XYZ publisher] and I were the editors, the rest of the 100+ team were authors of individual chapters.

Face-to-face Interaction

Team leaders considered face-to-face interaction important as seen from the number and importance of these meetings. Despite difficulties in bringing people together, two major face-to-face team meetings were held before the conference–a team meeting in February 1996 and the Program Committee meeting in June 1996. Other, smaller meetings were held by various team members who were geographically collocated. Face-to-face contact was considered important by several team members for different reasons. One team member put it this way.

> I believe in face-to-face interaction on a limited basis, enough to preserve the 'human aspect' of the business, for example, matching a voice to a face, eye contact, and so on.

Face-to-face contact helped in other ways such as building trust for some team members, as this example illustrates.

> I met them (committee members) several times and it was a trust building experience–both ways. There was good partnership because there was a healthy respect for the fact that each party brought to the table differing skills that would be necessary to produce a successful result.

In addition to interpersonal interaction and building trust, three additional perspectives of meeting face-to-face are provided below. These perspectives revolve around the exchange of information and problem-solving.

> I have to deal with a bunch of problems that it would be nice to meet in a room and thrash them out. It's not so much meeting people as it is coordinating the various inputs. I talk to somebody and he gives me information that other people don't have. It's having all the information universally shared that face-to-face provides.
>
> Committee meetings were face-to-face, and it was valuable to meet together. A lot of group opinion, interaction, ad hoc subgroups, exchange of physical materials, and individual networking was accomplished via meeting.
>
> We had one group meeting in February prior to the conference. This was a two day meeting to organize and handle issues that affected everyone. This meeting was very important, since many issues were very complex and could not be resolved easily by e-mail.

Face-to-face contact was clearly important for most team members. Communications, problem-solving, team building, exchange of information and materials, and trust were all enhanced through meeting face-to-face. And yet, some committees never met face-to-face at all.

The Delphi study also found a variety of experiences regarding face-to-face interaction. Some teams thought face-to-face interaction to be very important while other teams did not. One example where face-to-face interaction was considered important was this.

> Face-to-face is VERY important. You yell at the girl from Bell when your phone bill is messed up, not because she is responsible, but because you do not know her face. Once you have met, you have

> more compassion and understanding for your fellow team members.

This example from the Delphi study is similar to many of the opinions expressed in the case study. Compassion and understanding are factors in trust and team work.

Although face-to-face meetings were important in this case study and in many of the Delphi study teams, some virtual teams can work successfully without ever meeting. For example, one Delphi respondent reported.

> We never met face-to-face during this project. I don't think it was necessary to have that contact is this instance. This was an upgrade of an existing product, so everyone had fairly substantive knowledge and expectations of the product.

This example provided a different insight into virtual teams than was found in the case study--the perspective of the context or situation of the team. In the example above, the situation was stable and the problem statement was well defined and relatively straight-forward.

Trust

Trust is one of the most important factors for team leadership. Evidence of trust was found in two ways in both the case and Delphi studies. First, team members were given significant tasks to accomplish and they generally worked remote from team management. Second, face-to-face meetings help to build trust for some team members. See previous examples on face-to-face interaction and trust in this section. Handy (1995), a British management consultant and author of several management books, put trust in this perspective:

> If we are to enjoy the efficiencies and other benefits of the virtual organization, we will have to rediscover how to run organizations based more on trust than on control. Virtuality requires trust to make it work. Technology on its own is not enough (p. 44).

Given the geographic distribution of the team and the length of time team members worked in primarily a virtual environment, it is clear that the team leaders trusted team members to complete their tasks. At the same time; however, team members risked their professional reputations if they failed to deliver.

Collaboration

While some team members undoubtedly collaborated to accomplish their tasks, there were few references to collaboration in either the case or Delphi study responses. Looking at collaboration from the perspective of Schrage (1990), the author of Shared Minds, one of the key rules or heuristics for effective collaborating is shared space:

> If there isn't some sort of shared space–if there isn't a clear, explicit place where individuals can jointly create value–a yellow pad, a white board, a computer screen, a prototype, etc.–then the chances are you aren't collaborating (p. 223).

While some team members on some teams may have had a shared space for collaboration, the teams as a whole did not appear to have a shared space.

Fostering collaboration is considered one of the ten best commitments or practices of leadership by two researchers on leadership (Kouzes & Posner, 1995). But then, considering the relatively independent nature of the work of the committee chairs, collaboration was not generally required. Collaboration may have been very important for some sub-teams where collective work products

were produced. The subject of collaboration in a virtual environment may be a good candidate for further study.

Electronic Communications

While face-to-face contact was limited in the case study, electronic communications were used extensively. E-mail and the telephone were the primary information and communications technologies used. This was one aspect that everyone agreed on. The volume of e-mail varied considerably. One team member received over 200 e-mail messages during a six month period of time while another team member reported sending and receiving only a few messages. Lotus Notes was used to manage the review process which included reading and selecting the papers to be presented at the conference. U.S. Mail and Federal Express were used to mail documents. Computer supported cooperative work applications such as Lotus Notes were not used by everyone because not everyone had access to the required communications infrastructure. It was interesting to note that while ABC researchers are considered experts in computer supported cooperative work, only e-mail was used by the team.

Most respondents to the Delphi study considered e-mail and the telephone to be the primary information and communications technologies used as well. However, most Delphi respondents were not considered expert in computer supported cooperative work technologies. One team leader used telephone conferencing successfully to keep everyone up-to-date. This method

required pre-planning and discipline to execute successfully. Team members had to be willing to set aside specific times for team communications even if it occurs during non-working hours.

Coaching, Encouragement, and Rewarding

There were few examples of coaching, encouragement, or rewarding found in the case study; however, there were several good examples provided by respondents to the Delphi study. The following example was one of the few examples found in the case study on these subjects.

> Coaching, rewarding, and encouraging did happen by e-mail, but this was generally part of the overall discussion and not a specific e-mail.

Two examples from the Delphi study are the following comments.

> Challenged, encouraged, and coached are at the very nature of the editing and authoring process.
>
> Each team member, partners and associates, were responsible for the assignments and highly encouraged to interact with other members to identify problems, work tasks, and reward efforts by others.

Not all respondents from the Delphi study offered positive examples; many examples were negative. However, in general, the responses were positive.

These are good practices for leaders, even in virtual teams because they not only make people feel better about their work, but also performance may be improved. A follow-up study on virtual coaching might be another interesting area of research. Yukl (1994) covered the subject this way.

> Positive reinforcement has been the subject of extensive research for several decades in psychology, and a strong interest in positive reward behavior (usually defined as a combination of contingent rewards and recognition) can be found in the leadership literature. Similar results were found in most subsequent studies measuring contingent reward behaviors by leaders Together these related lines of research indicate that contingent rewards often increase subordinate motivation and satisfaction, even though results were not significant in every study (p. 134).

Common Vision

A common vision, purpose, or goal agreed to by all team members is very important for both commitment to the job and for understanding the job. In the case study, it was clear to all team members who volunteered. This conference is held every two years. Everyone knew this. Team leaders did not have difficulty with this aspect of the team. The situation was similar for the Delphi respondents. While they were not volunteers, they worked on projects with clear objectives.

Ground Rules

Effective teams need to shape their own ground rules or group norms. There was little evidence found in the responses or collected artifacts on group norms in either the Delphi study or the case study. There may or may not have been a set of established group norms. The data were inconclusive. It is possible that some of communication problems experienced may have been mitigated if teams had developed group norms related to team behavior in communications.

Learn from Experience

There was little evidence found in either the case or Delphi study, but then again this was not an area that was fully explored. It seemed from some case study interviews that team members did not have access to historical data. Some team members expressed difficulty in completing tasks for a variety of reasons such as limited or lack of knowledge of: who could help them, how to ship physical items, conference room configurations, event interdependencies, possible help or assistance available at the conference itself, and in general all the typical problems that come up.

This is an area that team leaders could influence by documenting "lessons learned" at the end of a conference and by providing the following team a copy of a well documented project workbook. Note: This researcher found out in a conversation with a team member at the close of the conference that historical data was actually collected. A final report was created and handed to the next team. In addition, conference participants were surveyed and the information was distributed to at least some team members.

Individual Recognition/Team Celebrations

Kouzes and Posner (1995) consider individual recognition and team celebrations to be two important

commitments or practices of leadership. Yukl (1994) would agree with Kouzes and Posner. He wrote, "Recognizing is one of the most neglected managerial

practices, even though it can be one of the most effective for increasing commitment and job satisfaction" (Yukl, 1994, p. 130).

The primary team celebration for the case study team occurred at the end of the conference in Boston. It was a social event with refreshments and dinner. Recognition and other celebrations occurred throughout the conference planning process. For example, the Program Committee met for dinner in Ann Arbor in June. Praise and thank you messages were sent via electronic mail for jobs well done. At the end of the conference, one team member wrote.

> Now that the conference has come and gone, I just wanted to send a note of thanks to all of you who submitted. . . . I appreciated all of your hard work in creating materials and getting them to me on time throughout the process.

Recognition and celebrations are important practices of team leadership. While it can be difficult to meet face-to-face, the thought and expression of recognition is important and sending these thoughts electronically is certainly better than no recognition at all.

Respondents to the Delphi study gave a wide variety of comments on recognition and team celebrations, but in general there were few team celebrations at the close of a project due to the time and costs involved in bringing people together face-to-face. On-line recognition was given in different ways such as by a private telephone conversation, e-mail, or telephone conference. One significant reason for a team celebration in the case study example is that the team members were already physically together at the end of the project–the

conference itself. It was not necessary to incur the expense and time to bring people together at the end of the project.

This is a subject that team leaders could likely improve on. Perhaps a survey could be used to determine what team members think about recognition and celebrations and how they should be practiced.

Communication

Communication with other people is difficult enough in face-to-face situations. It can be a serious problem in virtual environments for such reasons as time delays in replies, misinterpretation of the meaning of messages, and misinterpretation of intent (without normal social cues to help). Communication is a critical success factor (something that must be done well) for team leaders.

Working in teams can be frustrating for a variety of reasons and working as a team in a virtual environment across multiple time zones only adds complexity to interpersonal dynamics and project visibility. One team member in the case study described the frustration and difficulties this way.

> How hard it is. The work is not my main work. It is occurring intermittently and at odd hours–late at night. When I'm working on it, they're (other team members) not. I would say that it is a lot harder not having ready communication with other team members, especially when I have no sense of their progress. . . . It would be nice to have a timeline or project milestone that we could all see. We have no status review or project visibility. As chair, you see it all, but don't realize that other people don't. . . . Each of us need to be thinking of the rest of the team.

This last comment, "each of us need to be thinking of the rest of the team" is very important for team members because thinking about the rest of the team is the first step in actively communicating and collaborating with them.

Another team member commented that if the team had been physically collocated, coping with the frustration of communication would have been easier. In addition, team members would have been able to develop or improve relationships and readily exchange or share information. There is clearly a downside to working in a virtual environment–some things are simply lost. For example:

> It might have been easier to tell if people were in town versus on vacation. When critical information was needed, I could have looked for them in their offices. We might have shared more informal information over lunch and so on.

The theme of frustration with communication problems came up frequently in the case study. One team member had this comment about collocation and communication.

> Some information would have been easier to get if we were collocated. One chair was particularly non-communicative by e-mail, which made my job very difficult. Had we been collocated, I could have tried to resolve some issues face-to-face.

Another team member made this comment about working with another team member.

> The [chair] was a nightmare to work with. [The chair] would not give any specifics about what he wanted.

The comments above were clearly highlighted by this comment from another team member. This comment vividly illustrates the importance of face-to-face interaction.

> A core of the team was collocated. The chairs said they couldn't count the number of times they walked over to one anothers' offices. So the operational and decision-making core was collocated, but the rest were not.

A final example from the case study was this general comment on communication. This example clearly illustrates the frustration and delays that can occur in a virtual environment with electronic mail being the only way to reach someone.

> Not being able to get a response from people as soon as you like. Weeks can slip by and we are all doing other jobs. You send out a question and in some cases an answer never comes back. You don't know how to interpret it. They don't want to answer or what.

The three hour time difference between the East Coast and the West Coast combined with busy schedules made telephone conversations difficult to establish. "Telephone tag" was a common and frustrating experience.

One respondent to the Delphi study explained the time zone problem this way.

> Because of the geographic and time zone differences, there was only a three hour window in which timely communication could occur. Otherwise a team member would wait at least a day for a response to a question or other concern.

It's clear that face-to-face interaction in communication is not going to be completely replaced anytime soon. We still need to meet, at least at times, to

work through some problems. Face-to-face interaction removes many barriers to effective communication, reduces or even eliminates time delays, and provides an opportunity to exchange much more information than is currently possible with information and communications technologies.

Overall Assessment of Working in a Virtual Environment

There were differences of perspective regarding working in a virtual environment in both the case and Delphi studies. At least one team member in the case study felt isolated and not really part of a team. This person "missed interaction with other people." A similar perspective from another team member was voiced in this comment.

> It does not substitute for a real environment! [But] sometimes it was nice not to have to respond to different cues.

Another example from the case study, which also expressed the nature of working isolated from other team members, was this.

> The lack of warmth–of a real person. The immediacy of access of other people to respond via e-mail–feedback. The telephone solved some of the problems. There is a hierarchy of means. There is a lack of means to deal with urgent issues–e.g., you cannot simply go looking for someone who is not in (at their desk), but might be around the corner or at the coffee pot.

Another team member in the case study agreed with the comment above by expressing the difficulty in this way. "We are a distributed committee, not a team." In other words, this team member believed that the team was not cohesive enough to be a real team but that it was more of a collection of individuals or

a work group. This feeling was expressed by other team members in different ways.

One respondent from the Delphi study offered this comment about the potential for being lost in a virtual team.

> In a virtual environment, participants can easily become lost if they feel they are not receiving communications or being informed of the happenings. Frequent communication is critical.

Some team members were frustrated for a variety of reasons by working in a virtual environment and yet other team members liked it. One team member from the case study offered this positive comment.

> The virtual team concept is very attractive to me in that it provides freedom of time and space, in spite of deadlines. For this reason, collocation is irrelevant.

Yet, collocation provides options in communication not generally available in a virtual environment. These options include the same communication options found in the virtual environment such as the telephone and electronic mail plus the option of meeting face-to-face and the additional possibility of finding the person you have been trying to reach by the "water cooler." Collocation also provides the possibility of meeting over lunch or meeting after work. Communication can be supplemented by team building.

There was no real consensus on the upside or downside of working in a virtual environment from team members in either the case study or the Delphi study. For some team members, it was a positive experience, and yet for other team members, it was isolating, frustrating, and difficult. On the other hand, for

these projects, there was no real alternative to working in a virtual environment at least part of the time.

## Summary of Case and Delphi Study Findings

Responses from both the case and Delphi studies were remarkably similar. The case study team and teams in the Delphi study were generally successful in meeting their goals while working in a mixed environment of face-to-face interaction and electronic communication. Both case study and Delphi study teams experienced problems in electronic communication; coaching, encouragement, and rewards were limited; there was little evidence of learning from previous experience; there was limited individual recognition and few team celebrations; and some general frustration of working in a virtual environment. Finally, face-to-face interaction is still very important in most teams.

The case study seems to confirm what was found in the Delphi study and vice versa. Taken together, both studies confirm recently published reports on virtual teams. For example, one reported problem was identified by Snizek (1995):

> The tendency for full-time telecommuters to quickly feel a sense of isolation from fellow workers and the larger organization. This alienation can be minimized by bringing telecommuters to a central location for periodic meetings (p. 16).

In order words, face-to-face interaction is still required at times. The sense of isolation was also expressed by some respondents in both the case and Delphi studies.

Barner (1996) identified some of the implications in virtual teams and wrote as follows:

> First, people will need to develop specialized communication and planning skills to succeed in the virtual work environment. Second, managers and team members will have to form clear upfront agreements regarding: (1) performance expectations; (2) the team's priorities; (3) how communications are to be carried out among members; and (4) the degree for resource support (p. 14).

Both the case and Delphi studies looked at performance expectations via the team's mission. Team ground rules were not explored in detail, but they clearly map to item 3 above–"how communications are to be carried out among members."

In general, the outcome of both the case and Delphi studies indicates far more commonality than difference. Follow-up studies exploring leadership in virtual teams in greater detail will likely find more specifics.

# CHAPTER 6

## Recommendations and Conclusions

This chapter provides recommendations and conclusions that were derived from observations from both the case and Delphi studies and some final concluding remarks.

## Recommendations

### Include Face-to-face Time

Have an initial face-to-face team meeting for the team members to get together, meet each other, and socialize. Meet face-to-face periodically throughout the life of the project. These meetings will help to establish ties, relationships, and trust among team members which are important for an effective team. In addition, many problems can be resolved when people meet face-to-face.

### Keep the Project Visible

Many team members consider overall project visibility important. This includes the overall schedule, progress toward goals, and how each team member fits in. Team leaders can send team members copies of the project schedule or provide an electronic view of the project schedule on-line using the Internet. For example, project management schedule charts can be published on the Internet using the teams web site. The primary idea here is to improve the quality and type of communications with all team members.

Avoid or Reduce Communications Delays

Team leaders should recognize that the combination of multiple time zones, busy team members, and electronic communications will likely result in communications delays. This may become a significant problem. One way to begin to address this problem is with the establishment of ground rules or group norms. The team could establish ground rules that could include a principle of acknowledging a request for information with 24 or 48 hours for example. A complete response to a request might require more time, but at least the person requesting the information would know that the request was received and would be worked. Note: this will probably require peer pressure to be effective, and there are no guarantees.

Keep Team Members Visible

Use the Internet or work-group calendaring software to store team members calendars. While this could be difficult to maintain on a daily basis, it should not be difficult to keep up with scheduled out-of-town absences such as vacations or business travel. Another approach is to include in the ground rules that when a team member is going to be out of town that other team members will be notified by electronic mail or telephone. Electronic mail with a distribution list is both effective and efficient.

Augment Text Only Communications

Text only communications is good for basic communications, but it is not a replacement for graphics or images for many purposes. For example, a diagram

illustrating a conference room layout can be very effective in communicating seating arrangements. If graphical forms of communications are important, there are several ways this can be accomplished: (1) some email systems will support graphics, but this can be limited if different types of email systems are involved; (2) Federal Express or U.S. Mail works even if it is slow by electronic standards; (3) FAX; and (4) electronic publishing on the Internet. The key is choosing the appropriate means of communications and following through.

Use Computer Supported Cooperative Work Technologies Where Possible

Computer supported cooperative work applications are designed for people working together in a variety of times and places situations. Unfortunately for many distributed teams, there is no common information and communications technology infrastructure available except for basic email or the telephone. Lotus Notes is probably the most widely used application, but not everyone has access to it. The World-Wide Web is the closest universal application that most people have access to. The Internet/World-Wide Web combined with email can provide reasonable communications capability and visibility to many teams today.

Establish Ground Rules or Group Norms

Ground rules are important for teams to establish. They are useful in determining how team members interact and what kind of behavior is accepted. These ground rules assist in preventing misunderstandings and disagreements (Scholtes, 1988).

Take Time Out for Self-assessment

Periodic assessment is important to determine where the team is vis-à-vis where it is going. Team leaders should periodically stop to examine how well the team is functioning and see if anything is interfering with its effectiveness (Parker, 1996). Early detection of problems combined with early correction will save the project time and money later.

Recognize People

If team leaders recognize peoples' contributions to team goals, people will respond to recognition. Recognition does not have to be in the form of a raise, a promotion, or stock options; recognition can be as inexpensive as a simple "thank you." Recognition should be public. Organizations and teams can adopt and adapt the example of recognition from Military organizations where recognition in the form of medals and insignias is given in a public setting. Kouzes and Posner (1995) make the point that, "public recognition also builds commitment, because it makes people's actions visible to their peers and therefore difficult to deny or revoke" (p. 287). In a virtual environment, where the team cannot physically meet, recognition could be given in a voice or video conference setting or perhaps even more informally using email with all team members copied in a distribution list.

Learn from Experience

Team leaders can learn from other team experiences. Data collected over time can be organized into knowledge bases, FAQs can be established,

and other useful forms of information can be made available for sharing. For example, collecting information about hosting a conference and storing it in a data base, and refining it over time would most likely improve the ability for new teams to be successful. Finally, keep a well documented project workbook and turn it over to the next team.

## Conclusions

The following observations are noted by comparing the outcomes of both the Delphi study and case study.

There were few major leadership differences between the teams studied in the Delphi study and the case study. There was more variation in perspectives and responses in the Delphi study possibly because there were more than one team studied. Most teams studied meet face-to-face at least once and it was important in team building and in creating trust. Some communications problems and difficulties were attributable to time and distance. Information and communications technologies used by the teams were the same.

Some implications for virtual teams are the following.

1. Virtual teams are effective. Virtual teams work. With one exception, virtual teams achieved the targeted goals of the project.
2. People can be trusted in a virtual environment. This is related to the finding above on effectiveness. Team members were given significant tasks and these tasks were accomplished without being directly observed by a manager.

3. Electronic mail and the telephone were the primary information and communications technologies used. These information and communications technologies will change over time as new technologies such as Internet access, desktop conferencing, and electronic whiteboards become widely deployed.
4. Few virtual teams were 100% virtual. Most teams had at least some face-to-face interactions. Face-to-face interactions were considered very important in most teams studied. In teams that were essentially work groups with little interaction required between team members and where team members produced primarily independent work products, face-to-face interaction was not as important.

## Concluding Thoughts

Two concluding thoughts regarding the study are as follows:

First, this is one of the first studies on leadership in virtual teams this researcher is aware of in the public domain. This study only touched on a few aspects of leadership such as the importance of face-to-face contact, information and communications technologies used, and rewards and recognition. There are many other aspects of leadership in virtual teams that could be studied such as setting and shaping mission statements, setting goals, and establishing ground rules in a virtual environment, leading virtual teams with team members of different cultures, leadership of virtual teams where security issues such as access to computers and team members maintaining "confidential" or "limited" materials at

home is important, power and influence or charismatic leadership in virtual environments, education and training requirements of team members in a virtual environment, and education and training delivered electronically to virtual teams.

Second and last, the pace of change is quickening today driven by transportation, information, and communications technologies which in turn support the forces of change we see around us: globalization, population migrations, increasing gaps between rich and poor, and the shift to knowledge based economies to name a few. "In a future of compressed time windows and dwindling margins and budgets, where ad hoc teams are formed overnight to solve problems the next day, teams will be unable to physically materialize from the far corners of the earth" (Knoll, 1995, p. 2). Virtual teams are here to stay. As information and communications technologies advance over the next few years enabling real-time video conferencing virtual teams will tend to become almost real, as team members will be able to see each other at the same time and work on the same documents at the same time using all the normal social cues. Where differences in time and space prevent teams from coming together in real-time, technologies will enhance this virtual environment as well. Teams are able to work together anytime and anywhere today–it is only going to become easier.

# APPENDIX A

## Request for Nomination Letter

Dear :

I am a doctoral student in Educational Leadership at Seattle University. My doctoral study is on leading virtual teams – or teams of people who primarily interact electronically and who meet face-to-face infrequently or in some cases not at all. Examples of virtual teams include team members who telecommute and team members who work and live in different cities. This study will use the Delphi technique and electronic mail to survey people who have been on a virtual team, preferably in a leadership role, to gain insights into leadership patterns and information technologies used.

I am writing to request your help in identifying one to three people you know who meet this criteria (possibly yourself) and may be interested in participating in this study. I will then contact them to see if they would be willing to participate in and contribute to this study.

Copies of the outcome of this study will be provided to all participants and nominators because without them, there would be no study.

Please respond MMM DD, YY. If you have questions, please contact me at daveg@seanet.com. Thank you.

Very truly yours,

Dave Gould (daveg@seanet.com)
Seattle University
Seattle, Washington

# Appendix B

## Request for Participation Letter

Dear :

I am a doctoral student in Educational Leadership at Seattle University. My doctoral study is on leading virtual teams – or teams of people who primarily interact electronically and who meet face-to-face infrequently or in some cases not at all. Examples of virtual teams include team members who telecommute and team members who work and live in different geographic locations.

You have been identified by xxx as someone who is involved in virtual teams.

I am writing to ask if you would be interested in participating in a Delphi study on virtual teams. The information obtained will be used to explore patterns of leadership and information technologies used. The outcome of the study will be distributed to both the nominators and participants in this study.

Participants will be asked to respond to a series of three questionnaires, designed to gain consensus on the subject. My best estimate is that about three hours of time over three months will be required.

Please respond by email by MMM DD, YY. If you have questions, please contact me at daveg@seanet.com. Thank you.

Very truly yours,

Dave Gould (daveg@seanet.com)
Seattle University
Seattle, Washington

# Appendix C

## Cover Letter and Questionnaire 1

Dear :

Thank you for agreeing to participate in my doctoral study on leading virtual teams. You are one of xxx independent participants who will be responding to the questions provided in the three questionnaires.

The first questionnaire containing thirteen questions is enclosed. I estimate that it will take about an hour to answer the questions. A second and third questionnaire will be developed from the responses to this questionnaire.

Please respond by email by MMM DD, YY. If you have questions, please contact me at daveg@seanet.com. Thank you.

Very truly yours,

Dave Gould (daveg@seanet.com)
Seattle University
Seattle, Washington

**Delphi Study: Leading Virtual Teams–Questionnaire 1**

Name: _____

The overall question for this Delphi Process is: How do you lead virtual teams – teams of people you don't see on a day-to-day basis or may have never met – in terms of leadership and information technologies?

Examples of virtual teams include teams of people who work at home or telecommute and a project composed of team members who live in different cities.

The following questions relate to the overall question but are more specific.

1. What was the mission or purpose of the team and how was this mission or purpose created or shaped?
2. What has happened so far on the project? When did it start? What's next?
3. What was the structure or organization of the team?
4. What was your role on this team (team leader, committee chair, team member, etc.)?
5. Who did you primarily interact with (all team members, project leaders, etc.) and how? Did you have any previous interaction with these people before this project?
6. Where were the team members physically located? Why were they not all collocated?
7. How were the team members selected and why?
8. What information and communications technologies (telephone, email, conferencing, project management software, etc.) did the team use?
9. Can you provide examples of when team members met face-to-face? Did sub-teams meet more frequently? Was face-to-face contact important and why?
10. Can you provide examples of where individual or team accomplishments were celebrated? If not, would there have been any if the team had been collocated?
11. Can you provide examples of team members being challenged, encouraged, rewarded, coached, listened to, or asked to participate in key decisions?
12. Have you learned anything interesting about being on a virtual team? What would you have done differently if the team had been collocated?
13. What were some of the major problems or challenges attributable to working in a virtual environment (e.g., trust, collaboration, leadership, communications, decision-making, etc.)?

# APPENDIX D

## Cover Letter and Questionnaire 2

Dear :

The outcome of the first questionnaire on leading virtual teams is complete. Thank you for participation and prompt reply.

The second questionnaire is enclosed. You are asked to rate each of these statements on a 1 to 5 scale, with 1 representing strongly disagree and 5 representing strongly agree. Space is provided for additional but optional comments.

I estimate that it will take about 15 minutes to respond to this questionnaire.

Please respond by email by MMM DD, YY. If you have questions, please contact me at daveg@seanet.com. Thank you.

Very truly yours,

Dave Gould (daveg@seanet.com)
Seattle University
Seattle, Washington

## Delphi Study: Leading Virtual Teams – Questionnaire 2

January 11, 1997

Directions

- There are twenty-two (22) aspect statements on leadership in virtual teams. Please rate them on the following scale:

5 - Strongly agree
4 - Agree
3 - Neutral
2 - Disagree
1 - Strongly disagree

- Optionally, please comment on any rating or statement you think is appropriate.

Aspect statements

Face-to-face (FTF)

1. FTF contact was not important.
Rating (1,2,3,4, or 5):
Comments (optional):

2. FTF meetings were important in creating ties and relationships.
Rating (1,2,3,4, or 5):
Comments (optional):

3. FTF contact was important in order to understand each other.
Rating (1,2,3,4, or 5):
Comments (optional):

4. FTF contact was important in order to address controversial issues.
Rating (1,2,3,4, or 5):
Comments (optional):

5. FTF contact was important to resolve conflict among team members.
Rating (1,2,3,4, or 5):
Comments (optional):

6. FTF contact was important for planning.

Rating (1,2,3,4, or 5):
Comments (optional):

7. FTF contact was important for problem solving.
Rating (1,2,3,4, or 5):
Comments (optional):

Celebrations

8. There were no team celebrations of accomplishments.
Rating (1,2,3,4, or 5):
Comments (optional):

9. Team members were given positive feedback, praise, or recognition on-line.
Rating (1,2,3,4, or 5):
Comments (optional):

10. Accomplishments were celebrated FTF at the end of the project.
Rating (1,2,3,4, or 5):
Comments (optional):

11. Accomplishments were celebrated during intermediate FTF meetings.
Rating (1,2,3,4, or 5):
Comments (optional):

Challenges, encouragement, rewards

12. Team members were continually challenged and encouraged to perform.
Rating (1,2,3,4, or 5):
Comments (optional):

13. Team members were challenged by project activities or performance targets.
Rating (1,2,3,4, or 5):
Comments (optional):

14. Rewards were primarily intrinsic, for example, knowledge gained could be applied to future projects.
Rating (1,2,3,4, or 5):
Comments (optional):

Interesting things

15. The virtual environment enabled the ease and convenience of communications among team members.
Rating (1,2,3,4, or 5):
Comments (optional):

16. It was important to keep everyone informed of things taking place.
Rating (1,2,3,4, or 5):
Comments (optional):

17. It was often difficult to get people to complete action items and tasks.
Rating (1,2,3,4, or 5):
Comments (optional):

18. Consensus decision-making increased team commitment.
Rating (1,2,3,4, or 5):
Comments (optional):

Major problems

19. Time delays in responding to email messages or telephone calls were a common or frequent communications problem.
Rating (1,2,3,4, or 5):
Comments (optional):

20. It was often difficult to reach people because there was no visibility of when people were out of the office due to meetings, travel, vacation, or illness.
Rating (1,2,3,4, or 5):
Comments (optional):

21. Current technology bandwidth is insufficient to carry the right messages (e.g., real-time human and social cues).
Rating (1,2,3,4, or 5):
Comments (optional):

22. There was a perception that some team members were not really working (out of sight, out of mind).
Rating (1,2,3,4, or 5):
Comments (optional):

# APPENDIX E

## Cover Letter and Questionnaire 3

Dear :

The outcome of the second questionnaire on leading virtual teams is complete. Thank you again for your participation and prompt reply.

The third questionnaire is enclosed. It is essentially the same as Questionnaire 2. The modal response of all the Delphi participants, your response, and sample responses to each aspect statement are provide.

The purpose of this questionnaire is to determine if there is a consensus. To respond to this questionnaire, please review the responses and if the modal response does not represent your opinion, rate the response again on the 1 to 5 scale and briefly state your opinion.

I estimate that it will take about 20 minutes to respond to the questionnaire.

Please respond by email by MMM DD, 1997. If you have questions, please contact me at daveg@seanet.com. Thank you.

Very truly yours,

Dave Gould (daveg@seanet.com)
Seattle University
Seattle, Washington

**Delphi Study: Leading Virtual Teams – Questionnaire 3**

February 11, 1997

Directions

For each statement (22 total) below, please review the summaries of the written comments from questionnaire #2 (at the end of this questionnaire), the modal response of the group (given with each statement), and the rating that you assigned last time (given with each statement).

Please re-rate given the additional information - the scale is provided below:

5 - Strongly agree
4 - Agree
3 - Neutral
2 - Disagree
1 - Strongly disagree

Optionally, please state your reason(s) for each of your new ratings that is different from the group modal response provided.

Please complete and respond by March 8, 1997 if possible.

Aspect statements

1. Face-to-face (FTF) contact was not important.
Your previous rating: Modal rating: 2 - Disagree
Please rate this questionnaire (1,2,3,4, or 5):
Comments (optional):

2. FTF meetings were important in creating ties and relationships.
Your previous rating: Modal rating: 4,5 - Agree, Strongly Agree
Please rate this questionnaire (1,2,3,4, or 5):
Comments (optional):

3. FTF contact was important in order to understand each other.
Your previous rating: Modal rating: 4 - Agree
Please rate this questionnaire (1,2,3,4, or 5):
Comments (optional):

4. FTF contact was important in order to address controversial issues.
Your previous rating: Modal rating: 4 - Agree

Please rate this questionnaire (1,2,3,4, or 5):
Comments (optional):

5. FTF contact was important to resolve conflict among team members.
Your previous rating: Modal rating: 4 - Agree
Please rate this questionnaire (1,2,3,4, or 5):
Comments (optional):

6. FTF contact was important for planning.
Your previous rating: Modal rating: 3 - Neutral
Please rate this questionnaire (1,2,3,4, or 5):
Comments (optional):

7. FTF contact was important for problem solving.
Your previous rating: Modal rating: 2,3 - Disagree, Neutral
Please rate this questionnaire (1,2,3,4, or 5):
Comments (optional):

8. There were no team celebrations of accomplishments.
Your previous rating: Modal rating: 1 - Strongly Disagree
Please rate this questionnaire (1,2,3,4, or 5):
Comments (optional):

9. Team members were given positive feedback, praise, or recognition on-line.
Your previous rating: Modal rating: 4 - Agree
Please rate this questionnaire (1,2,3,4, or 5):
Comments (optional):

10. Accomplishments were celebrated FTF at the end of the project.
Your previous rating: Modal rating: 1 - Strongly disagree
Please rate this questionnaire (1,2,3,4, or 5):
Comments (optional):

11. Accomplishments were celebrated during intermediate FTF meetings.
Your previous rating: Modal rating: 4 - Agree
Please rate this questionnaire (1,2,3,4, or 5):
Comments (optional):

12. Team members were continually challenged and encouraged to perform.
Your previous rating: Modal rating: 4 - Agree
Please rate this questionnaire (1,2,3,4, or 5):
Comments (optional):

13. Team members were challenged by project activities or performance targets.
Your previous rating: Modal rating: 4 - Agree
Please rate this questionnaire (1,2,3,4, or 5):
Comments (optional):

14. Rewards were primarily intrinsic, for example, knowledge gained could be applied to future projects.
Your previous rating: Modal rating: 3,4 - Neutral, Agree
Please rate this questionnaire (1,2,3,4, or 5):
Comments (optional):

15. The virtual environment enabled the ease and convenience of communications among team members.
Your previous rating: Modal rating: 5 - Strongly Agree
Please rate this questionnaire (1,2,3,4, or 5):
Comments (optional):

16. It was important to keep everyone informed of things taking place.
Your previous rating: Modal rating: 5 - Strongly Agree
Please rate this questionnaire (1,2,3,4, or 5):
Comments (optional):

17. It was often difficult to get people to complete action items and tasks.
Your previous rating: Modal rating: 3 - Neutral
Please rate this questionnaire (1,2,3,4, or 5):
Comments (optional):

18. Consensus decision-making increased team commitment.
Your previous rating: Modal rating: 5 - Strongly Agree
Please rate this questionnaire (1,2,3,4, or 5):
Comments (optional):

19. Time delays in responding to email messages or telephone calls were a common or frequent communications problem.
Your previous rating: Modal rating: 4 - Agree
Please rate this questionnaire (1,2,3,4, or 5):
Comments (optional):

20. It was often difficult to reach people because there was no visibility of when people were out of the office due to meetings, travel, vacation, or illness.
Your previous rating: Modal rating: 2 - Disagree
Please rate this questionnaire (1,2,3,4, or 5):

Comments (optional):

21. Current technology bandwidth is insufficient to carry the right messages (e.g., real-time human and social cues).
Your previous rating: Modal rating: 2,5 - Disagree, Strongly Agree
Please rate this questionnaire (1,2,3,4, or 5):
Comments (optional):

22. There was a perception that some team members were not really working (out of sight, out of mind).
Your previous rating: Modal rating: 2 - Disagree
Please rate this questionnaire (1,2,3,4, or 5):
Comments (optional):

Aspect 1: Face-to-face contact was not important.
Comment: It is much more difficult to have friction between people that you can put a face to.

Comment. We are at essence still social creatures and we need to SEE our peers, teammates, and our boss frequently.

Comment. Though it would have been nice to meet with people FTF, it wasn't necessary to the completion of the project.

Aspect 2: Face-to-face meetings were important in creating ties and relationships.

Comment. More so, they're critical to MAINTAINING and REENFORCING relationships.

Comment. Participants who did experience a FTF kickoff meeting for the "virtual" experience felt like they really bonded and interacted as teams.

Aspect 3: Face-to-face contact was important in order to understand each other.

Comment. Especially where ethnic differences or handicaps come to play.

Comment. We pickup and transmit most of our communications via visual signals and body movements and positions. These clues, and this input, is lost in a virtual setting.

Comment. All participants communicated quite effectively using groupware (Lotus Notes) and were able to understand one another without the FTF interactions.

Aspect 4: Face-to-face contact was important to address controversial issues.

Comment. Virtual contacts can create artificial time constraints, either because people sometimes become aware of excessive computer or network time during resolution and seek to terminate the session, or because people's productivity begins to fall-off when they hang on the line tool long.

Comment. I can think of one occasion where disagreement occurred that was more effective because of the lack of FTF. Emotional response can be minimized in non-FTF communication.

Comment. All of these can be done at a distance. There are occasions; however, that it is BENEFICIAL to have FTF contact (i.e., contract negotiations, celebrations / recognition after controversial sessions or closure).

Aspect 5: Face-to-face contact was important to resolve conflict among team members.

Comment. The few minor conflicts that did arise were managed via groupware or the telephone and were handled effectively. FTF was not an option.

Comment. Again, can be done at a distance.

Aspect 6: Face-to-face contact was important for planning.

Comment. I think FTF in the planning stage would have smoothed some future misconceptions and communications.

Comment. Initial contact for planning purposes was crucial.

Aspect 7: Face-to-face contact was important for problem solving.

Comment. FTF was not needed for problem-solving. Most problems were solved by discussions in groupware. Most technical problems were solved by communications over the phone.

Comment. For most problems, FTF was not necessary.

Aspect 8: There were no team celebrations of accomplishments.

Comment. They occurred by happenstance.

Comment. There were no celebrations of any sort - sounds drab, doesn't it?

Aspect 9: Team members were given positive feedback, praise, or recognition on-line.

Comment. A requirement for effective work.

Comment. This didn't occur and I'm glad, for the following reasons. (1) This type of feedback should best be accomplished by the boss in front of the team, and (2) electronic feedback just doesn't seem right when it comes to personal communications, whether positive or negative.

Aspect 10: Accomplishments were celebrated FTF at the end of the project.

Comment. Accomplishments were not 'celebrated' at all.

Aspect 11: Accomplishments were celebrated during intermediate meetings.

Comment. Celebrations were held, but not for accomplishment, they were drinks to the future. All too often, once the goal of the team was complete, they would hardly ever meet again.

Comment. Occasional conference calls did recognize service anniversary dates and such things.

Aspect 12: Team members were continually challenged and encouraged to perform.

Comment. Participants felt accountable for their assignments since many involved analyzing their teammates' deliverables and providing feedback.

Aspect 13: Team members were challenged by project activities or performance targets.

Comment. Participants felt like they were challenged by the activity goals and tasks that were assigned to them throughout the course.

Aspect 14: Rewards were primarily intrinsic, e.g., knowledge gained could be applied to future projects.

Comment. There were no extrinsic incentives. Team members may have been personally motivated and self-challenging.

Comment. The knowledge gained from analyses (during the activities) was directly applicable to their current engagements.

Aspect 15: The virtual environment enabled the ease and convenience of communications among team members.

Comment. I have to respond yes and no to this question. At times it made communications easier, at other times I think it made things worse.

Comment. It enabled the convenience of communications in that the participants did not have to leave their client engagements to come to a central location to network. However, the communications were not as rich and not as "easy" because of the fear of misinterpretation of written words (most communications was text).

Aspect 16: It was important to keep everyone informed of things taking place.

Comment. No more so than if they were in the same office.

Comment. Yes, in a virtual environment, participants can easily become lost if they feel they are not receiving communications or being informed of the happenings..

Comment. As team leader, I spend a lot of time as a central point of information distribution: from the team to management, customer, etc. And from these places to the team.

Aspect 17: It was often difficult to get people to complete action items and tasks.

Comment. Volunteer teams this was sometimes true. Work teams, much less so.

Comment. I strongly agree. Much of project management in my experience consists of personal meetings with process owners, to clarify what actions were taken and to discuss (real time) whether the action item could be closed; seldom are there black and white closure points. A virtual environment made these personal discussions and closure points more difficult.

Aspect 18: Consensus decision-making increased team commitment.

Comment. The producer on this job was god, there was no consensus decision making.

Comment. We use consensus for certain types of decisions, such as who will do what.

Comment. Consensus generates more responsibility and buy-in.

Aspect 19: Time delays in responding to email messages or telephone calls were a common or frequent communications problem.

Comment. Occasionally, however it was part of the culture of the team members to place a strong importance on these facets of communications.

Comment. The delay in communications caused for a sense of abandonment to come over some of the participants.

Comment. This is dependent upon individuals not the method or location.

Aspect 20: It was often difficult to reach people because there was no visibility of when people were out of the office due to meetings, travel, vacation, or illness.

Comment. Although this was true in some cases, for the most part there was slack time provided for this issue.

Comment. Any time one of the team members was scheduled to be absent, prior notice was given to the rest of the team.

Comment. We do not have a calendaring system, but keep track of movements by virtue of frequent "where are you today?" exchanges during teleconferences.

Aspect 21. Current technology bandwidth is insufficient to carry the right messages (e.g., real-time human and social cues).

Comment. Bandwidth is a TOOL, not a total solution. There are other tools being put into place for social cues etc. (e.g., smilies, ?). The phone is also VERY important in conveying a large part of that message.

Comment. I strongly agree.. I'm not sure if the issue is "technology bandwidth" however. To me, the issue centers more on human social needs and the way we communicate as a species than it does on technology.

Comment. There are many forms of communication at our fingertips. Bandwidth is not a limit in my circumstance.

Aspect 22. There was a perception that some team members were not really working (out of sight, out of mind).

Comment. I strongly agree. The official communications never stated this, but it's the feedback I received from trusted peer members at the headquarters location.

Comment. I don't think participants felt others weren't working, especially because everyone can see the deliverables each person posts to the class database.

Comment . This thought occurs easily to a manager or team leader. Focusing on positive achievements, and having plenty of them to focus on, keeps the anxiety at bay.

Comment. Dependent upon individuals not location! People in the same office can appear out of sight / mind too.

# APPENDIX F

## Cover Letter and Outcome of Delphi Study

Dear :

The outcome of the Delphi survey on leading virtual teams is complete. Enclosed is your copy of the Delphi study.

Thank you very much for your help, cooperation, and contributions.

If you have questions please reach me daveg@seanet.com.

Very truly yours,

Dave Gould (daveg@seanet.com)
Seattle University
Seattle, Washington

# APPENDIX G

## Case Study Interview Questions

The overall question for this research study is: How do you lead virtual teams – teams of people you don't see on a day-to-day basis or may have never met – in terms of leadership and information technologies?

Examples of virtual teams include teams of people who work at home or telecommute and a project composed of team members who live in different cities.

The following questions relate to the overall question but are more specific.

1. What was the mission or purpose of the team and how was this mission or purpose created or shaped?
2. What has happened so far on the project? When did it start? What's next?
3. What was the structure or organization of the team?
4. What was your role on this team (team leader, committee chair, team member, etc.)?
5. Who did you primarily interact with (all team members, project leaders, etc.) and how? Did you have any previous interaction with these people before this project?
6. Where were the team members physically located? Why were they not all collocated?
7. How were the team members selected and why?
8. What information and communications technologies (telephone, email, conferencing, project management software, etc.) did the team use?
9. Can you provide examples of when team members met face-to-face? Did sub-teams meet more frequently? Was face-to-face contact important and why?
10. Can you provide examples of where individual or team accomplishments were celebrated? If not, would there have been any if the team had been collocated?
11. Can you provide examples of team members being challenged, encouraged, rewarded, coached, listened to, or asked to participate in key decisions?
12. Have you learned anything interesting about being on a virtual team? What would you have done differently if the team had been collocated?
13. What were some of the major problems or challenges attributable to working in a virtual environment (e.g., trust, collaboration, leadership, communications, decision-making, etc.)?

# APPENDIX H

## Cover Letter and Outcome of the Case Study

Dear :

The outcome of the case study on leading virtual teams is complete. Enclosed is your copy of the outcome of this study.

Thank you very much for your help, cooperation, and contributions.

If you have questions please reach me daveg@seanet.com.

Very truly yours,

Dave Gould (daveg@seanet.com)
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Seattle, Washington

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ABSTRACT

LEADERSHIP IN VIRTUAL TEAMS

GOULD, David A., Ed. D. Seattle University, 1997. 200 pp.
Supervisor: John J. Gardiner, Ph. D.

This study identifies characteristics of virtual teams and leadership in virtual teams. This study uses two methodologies: A Delphi survey and a case study.

The Delphi survey consists of three rounds to determine consensus on these characteristics. The first round requested responses to a thirteen question survey or questionnaire. The second round requested responses to twenty-two aspect statements regarding leadership in virtual teams. In addition, respondents were asked to, at their option, comment on each aspect statement. Survey data were then tabulated to compute both mean and mode. The third round used the same questionnaire and supplied both the original respondent's rating and the group modal rating and asked for a final rating. The mean and mode for each aspect statement was then calculated. Over seventy (70) people working in the field of computer supported cooperative work were contacted about responding to the Delphi survey on virtual teams. Thirteen (13) people responded to the first questionnaire, twelve (12) of these thirteen people responded to the second questionnaire, and nine (9) of these twelve responded to the third and final questionnaire.

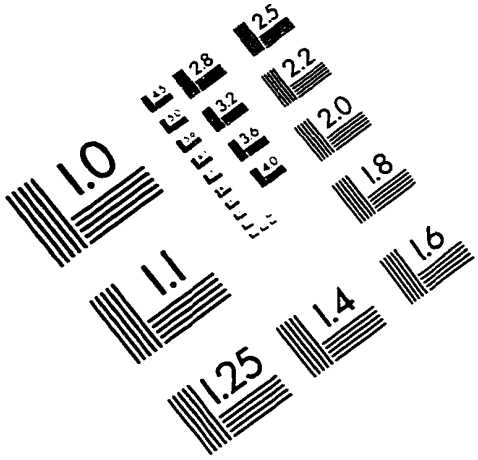
The case study used the same research questions to interview thirteen members of the team that planned and hosted a computer conference. In

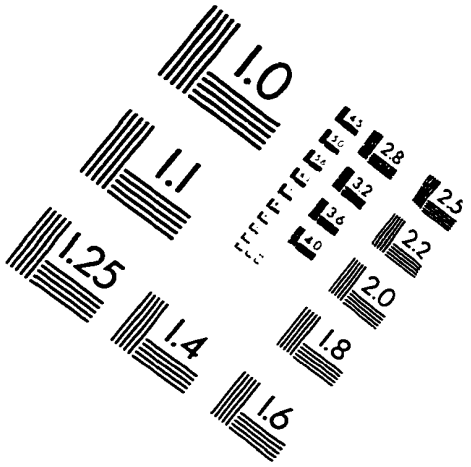
addition to the interview responses, over 250 pages of artifacts were collected. The interview responses and the artifacts were analyzed to determine how these characteristics unfolded in a specific virtual team.

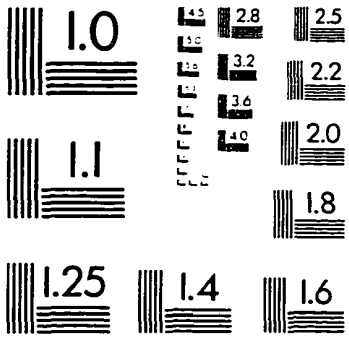
The outcomes of both studies were examined and reported in this dissertation.

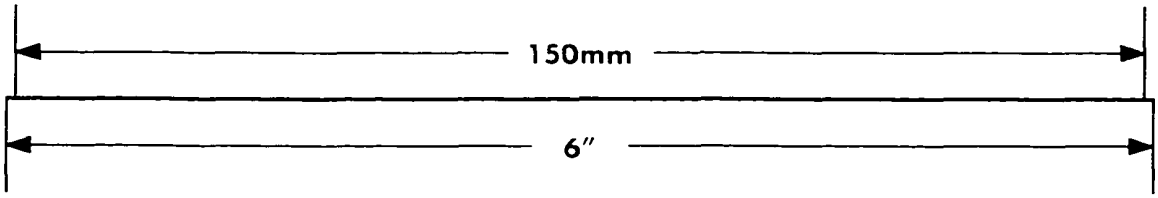
Significant findings are the following: (1) Virtual teams are effective. With one exception, virtual teams achieved the targeted goals of the project. (2) People can be trusted in a virtual environment. This is related to the finding above on effectiveness. Team leaders can verify that people are working on assignments by reviewing project deliverables or through conversation. It was not necessary to observe people working. (3) Electronic mail and the telephone were the primary information and communications technologies used. (4) Finally, few virtual teams were 100% virtual. Most teams had at least some face-to-face interactions.

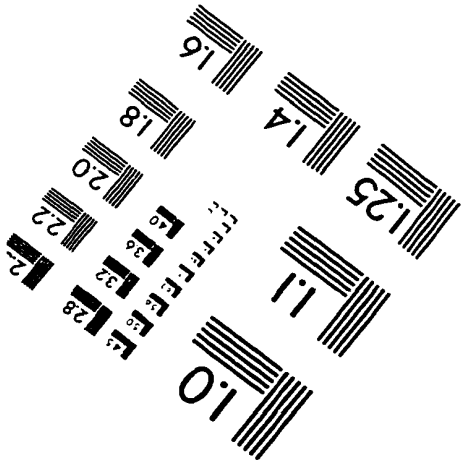
# IMAGE EVALUATION TEST TARGET (QA-3)

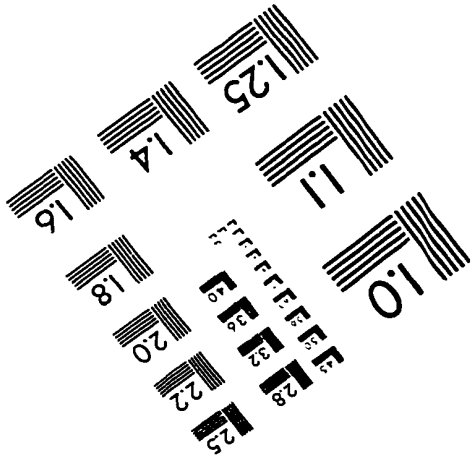
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