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**FACTORS INFLUENCING THE EFFECTIVENESS OF
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presented by

Betty Jo Barrett

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of the requirements for

Ph.D. degree in Labor and Industrial
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FACTORS

FACTORS INFLUENCING THE PERFORMANCE EFFECTIVENESS
OF GLOBALLY DISPERSED TEAMS

By

Betty Jo Barrett

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

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Department of Labor and Industrial Relations

2000

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ABSTRACT

FACTORS INFLUENCING THE PERFORMANCE EFFECTIVENESS OF GLOBALLY DISPERSED TEAMS

By

Betty Jo Barrett

In the absence of an accepted framework, practitioners as well as academics seeking answers about globally dispersed team performance have relied on the frameworks devised for collocated teams by scholars such as Hackman, Cohen, McGrath, and Gladstein. The value of this existing work is clear and unquestioned. Teams need to have effective leadership, clear goals, ample resources, and structural supports such as rewards and training. Leaders and managers helping to facilitate the work of dispersed teams must provide such essentials. However, questions remain about whether other factors must be considered when discussing dispersed teams. Among the alternative factors that offer additional information about dispersed teams are the type and nature of communications used by the team, the synchronous or asynchronous nature of the team's interactions, the organizational structures within which teams and team members are embedded, the nature and impact of diversity on team performance, and the effects of geographic dispersion.

At the core of this study are interviews and observations of a group of dispersed teams working on the same global initiative. A case study combined with surveys provides the quantitative and qualitative data that offer a multifaceted view of some of the factors vital to dispersed team effectiveness. Regression analyses point to significant relationships between the diversity of team members, their

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Dispersed teams

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knowledge and skills and performance effectiveness. Although it must be interpreted from a dispersed perspective, Hackman's model of group effectiveness identifies a number of contributing factors: goal clarity, leadership, rewards, diversity, and accountability.

Dispersed teams face a complex web of organizational relationships that cause great dilemmas for team members and leaders. Team members are primarily responsible for, and work in, a home location. They must then move to the global team and a potentially different set of interests, allegiances, and relationships. This study offers an introduction to these issues and attempts to add to a theoretical base to support further research on dispersed teams.

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To my mother, Mary

impor

To my mother, Mary Strickland Barrett Russell, whose love and support were so
important and whose example showed me the way

When one has first
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who were essential to the
my mother, Mary Barrett
much longer and darker
me when I was first introduced
Labor and Industrial Relations
will always be grateful to
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invaluable scholarly experience

My education was
were the Japan Project:
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Lin, Michael Moore, Bill
Ramanand, Kevin Smith
acknowledge all that I have

Projects such as
collective efforts by a number
Lynne Woods, Deb Bittner

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Projects such as this dissertation are never personal achievements as much as collective efforts by a number of exceptional people. Thanks and thanks again to Lynne Woods, Deb Bittner, Karen Markel, Jannifer Gregory, Linda Tillman, Liz

Dickinson, John Schwen

Thanks to all the

Sky friends, and support

task and still be smiling

Dickinson, John Schweitzer, and Victoria Hoelzer-Maddox.

Thanks to all the many other friends, colleagues, sisters, coworkers, Mackerel Sky friends, and supporters who helped make it possible for me to complete this task and still be smiling.

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Global Teams: What

In business today, every resource to solve every problem is an effective way to focus on the most important assignments. The collective knowledge that creates value for the company must optimize the way people are located. Global teams are increasing in number. Stamps (1997) defines a global team as "a group of people through interdependent relationships across organizational boundaries who use information technologies."

Geographically distributed teams work while also maintaining their respective locations. 2) Global teams work with the entire organization to help the organization to help

CHAPTER 1

INTRODUCTION

Global Teams: What Are They and Why Are They Important?

In business today, companies are continually challenged to effectively use every resource to solve complex problems. Teams may become one of the most effective ways to focus the resources of employees on important tasks and assignments. The collaborative strength of teams provides a rich and diverse base of knowledge that creates value as it develops solutions for the firm. Transnational companies must optimize the time and effort of their workforce no matter where the people are located. Globally dispersed or virtual teams are one of the solutions that companies are increasingly choosing. In their book, *Virtual Teams*, Lipnack and Stamps (1997), define a dispersed or virtual team “as a group of people who interact through interdependent tasks guided by common purpose. . . across space, time, and organizational boundaries with links strengthened by webs of communication technologies.”

Geographically dispersed teams pose fundamental problems: 1) how to foster teamwork while also maintaining the advantages of keeping team members in their respective locations; 2) how to effectively integrate the products of such team work with the entire organization; and 3) how to create a supportive environment within the organization to help these global teams perform effectively. This study will

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with knowledge, goals
global team performance

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inherently offers greater
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focus on the latter of these problems. How do elements of the organizational environment, such as accountability, reward structures, diversity, team relationship with knowledge, goal clarity, and the availability of resources, support or hinder global team performance effectiveness?

Research on teams has investigated many aspects of team performance effectiveness and the factors that affect it. The important work of scholars such as Hackman; Sundstrom, DeMeuse, and Futrell; Kolodny and Kiggundu; McGrath; Shea and Guzzo; Goodman, Ravlin, and Schminke; and Cohen and Baily have all provided in depth assessments of the factors that enhance or hinder the performance of work groups or teams (Hackman 1987; Sundstrom et al. 1990; McGrath 1964; Shea and Guzzo 1987; Cohen and Bailey 1997). This body of work deals with traditional collocated teams in which the members are all located in one place. Since we do not know how well these findings may apply, new research must be undertaken to investigate dispersed teams.

Traditional assumptions about organizational dynamics such as accountability, reward structure, and measures of productivity must be revisited to address the issues surrounding dispersed teams. Globally dispersed teams have unique characteristics. For example, they have a much greater reliance on the use of mediated communications such as electronic communication methods, teleconferences, or videoconferences. Diversity among the members of these teams inherently offers greater opportunity for complexity because the team members live and work in different ethnic cultures and may well work in organizations or organizational units with very different organizational cultures. Geographic dispersion also potentially creates great complexity in boundary-crossing and lines of

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control. Team members dispersed throughout the organization's units also have the potential to create valuable knowledge and diffuse this knowledge widely throughout the organizations.

This dissertation is about globally dispersed teams and how they differ from the collocated teams that have been the more dominant object of study to date. It expands the current research that is attempting to define globally dispersed teams and differentiate them from the more commonly studied collocated team. To date there has been little research done on the nature of global teams. This study will examine the existing team literature as well as the emerging work on dispersed or global teams and attempt to discover what impact geographical dispersion has on the effectiveness of teams and whether existing theories of effectiveness can be applied constructively to these groups.

Research on globally dispersed teams is increasingly important today as more and more companies expand to become transnational entities. Sproull says that "virtual teams are bound to become more prevalent because of the global nature of the marketplaces, the need to get projects done as quickly as possible in order to get new products to those global markets, and the necessity of tapping the best brains for those projects no matter where those brains may be" (Geber 1995). Townsend, DeMarie, and Hendrickson (1996) agree that virtual teams are a powerful form of work organization that allows "people to work together who might not otherwise be available to work together" (122). In addition they believe that virtual teams enhance the availability of resources from outside the organization while empowering those teams to work collaboratively. "Virtual teams involved in complex development projects, for example, will capitalize on their ability to access

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teams are managed

a broader range of expertise and to more easily link to diverse functional resources. The role of these teams will be to manage and execute traditional organizational processes, but with the advantage of resources and expertise unavailable save for their virtual construction” (26).

Experts and human resource professionals are finding that globally dispersed teams are invaluable tools in a rapidly changing competitive environment. In fact, “the beauty about global teams is that they’re reaching for the next stage,” says Tony Barnes, director of human resources development at the Japan Center in England. Barnes, who worked for decades with Edward Deming on team process in Japan, believes that global teams are the next wave of corporate development. Barnes goes on to express strongly what he feels is the importance of this new form of work organization:

Global teams address certain problems and affect the bottom line in ways that are fundamentally different from the ways individuals approach the same situation. They maximize expertise from a variety of people, provide companies a more accurate picture of international customers’ needs, and profit by the synergy necessary to unify the varying perspectives of different cultures and different business functions. I think corporations, as we’ve known them, have actually run their course and are beginning to break into autonomous business units, so the decisions are in the hands of the people carrying out the work. Global teams are one way of cross-pollinating—they move people who are successful in one branch of the organization to work with people in another country and another branch of the organization. In these situations people develop themselves as well as help develop others. It’s a program of both learning and teaching that enhances the ability and taps into the creativity of all people in an organization (Solomon 1995: 49–50).

The Opportunities and Challenges of Global Teams

Snell, Snow, Davidson and Hambrick (1998) report that when transnational teams are managed effectively they can “help firms achieve the autonomy and

flexibility needed to sustain
the efficiencies afforded by
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innovations from each
throughout the organization
team members at their
virtual team creates for
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flexibility needed to serve a variety of customers in different regions while obtaining the efficiencies afforded by an integrated organization” (147). This is an important factor because the team offers a structure that connects “the best ideas and innovations from each part of the company and uses them in ways that add value throughout the organization (147). Local responsiveness created by the presence of team members at their home locations is a key element of the global impact that a virtual team creates for a firm. This boundary-crossing characteristic of virtual teams may also require adjustments in the degree of autonomy that people at each location enjoy as collaboration increases (Klein 1991). Globally dispersed teams facilitate organizational learning when structures are in place to diffuse and integrate the knowledge created within such a team. Virtual teams also may provide an environment that fosters dialogue vital to the information sharing and knowledge creation that underlies organizational learning (Snell et al. 1998: 153).

Bhalla (1998) points out that “Organizations worldwide are rapidly adopting practices reliant on coordinating efforts in a geographically distributed, boundary-crossing environment.” Ancona and Caldwell (1992) have discussed the relationship of teams to entities outside the team boundaries with which interdependency is created. They state that since the team is dependent on these external entities to complete team tasks, research must also focus on these relationships. The boundary-crossing nature of dispersed teams is more complex than that of traditional co-located teams. Not only are these teams frequently ad hoc entities but their members come from work groups in separate facilities. Effectively managing such boundary-crossing issues may well be one of the challenges for organizations in the future.

Another challenge
will be creating and managing
teams to create the work
interaction. The following
mediated communication
element in the performance

virtual team:
members' primary
electronic communication
mail and computer
and Hendricks

Communication
primarily meet face-to-face
telephone, through electronic
conferencing. In each case,
difficult to achieve.
telephone, send faxes,
the work place may
increasingly rare for
mail services because
than face-to-meeting
building and team work
not yet a perfected skill
and Stamps 1997).

Another challenge for organizations as they set up globally dispersed teams will be creating and maintaining an electronic communication network that allows teams to create the working relationships necessary to build effective team interaction. The following definition of a virtual team indicates that the use of mediated communication is seen by some researchers and practitioners as a critical element in the performance of dispersed or virtual teams.

virtual team: A virtual team is characterized by the fact that its members' primary interaction is through some combination of electronic communication systems, such as telephone, fax machine, e-mail and computer-based video conferencing (Townsend, DeMarie, and Hendrickson 1996: 124).

Communication is critical to the performance of these teams. They do not primarily meet face-to-face and therefore must build working relationships over the telephone, through email or groupware messages, or through the use of video conferencing. In each case, the direct contact so vital to meaning and clarity is difficult to achieve. Team members may share a working language and, of course, telephone, send faxes, or email to one another but simultaneous communication in the work place may prove impossible when there is a 13-hour time difference. It is increasingly rare for today's workers to exchange information using conventional mail services because it takes too long. Reliance on mediated communication rather than face-to-meetings is another key element of globally dispersed teams. Team building and team work by people separated geographically and/or by time zones is not yet a perfected skill (Hackman 1990; Hollingshead and McGrath 1995; Lipnack and Stamps 1997).

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Diversity is another of the unique challenges that global or virtual teams provide for an organization as well as a researcher (Jackson 1991). For example, team members will be very diverse or will be working in settings that are diverse. This diversity of setting may be as minor as from one town to another in the same area but it may be that team members live and work around the world from each other. Global dispersion can add the complication of time zones to the challenges faced by team builders. When team members are in Japan and the United States for example, scheduling meetings at reasonable times for both groups is difficult.

Beyond geographic and time diversity, a much more complicated variation arises when people are of different sexes, races, or nationalities. Add to this yet another facet of diversity, namely the diversity or commonality of knowledge and expertise that is frequently featured in this group, and the situation can provide a real puzzle for all to solve.

Hofstede (1997) says that common practice is what allows transnational organizations to function effectively in a multicultural geographic environment. The organization develops practices that it diffuses to all its members. Practitioner consultants such as McDermott, Brawley, and Waite advise the “world class teams . . . need to create their own ‘culture,’ that is a set of values and operating agreements that will accommodate and bring out the best in each of their team members” (McDermott et al. 1998: 124). Milliken and Martins (1996) describe the impact of the diversity of group composition on organizational outcomes as the result of common patterns in “cognitive, communication, and symbolic processes” (402). Taking this one step further, researchers such as Jackson, May, and Whitney (1995) and Pelled, Eisenhardt, and Xin (1999) are categorizing aspects of diversity and

making distinctions at
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unique facet of study

Team Research and

While the nature
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making distinctions about the impact of these elements based on their observability and job-relatedness. Diversity in globally dispersed teams may well prove to be a unique facet of study.

Team Research and Theoretical Foundations

While the nature of globally dispersed teams and the issues surrounding their activities are complex and have not yet been widely studied, there is a well-established, multidisciplinary body of research on collocated teams and team performance effectiveness. This study relies on this body of work to provide its primary framework. In particular, the study has relied on Hackman's work (1987), which represents the theoretical starting point for this study of teams.

Collocated teams have been the object of many studies, which have then been reviewed by McGrath (McGrath and Altman 1966; McGrath 1984) and Bettenhausen (1991). Performance effectiveness studies have also been extensive as evidenced by reviews of that literature by Guzzo and Dickson (1996) and by Cohen and Bailey (1997). Although many of these studies have antecedents in the work of McGrath and later Hackman, a number of other theoretical approaches have been developed: the ecological approach of Sundstrom, DeMeuse, and Futrell (1990); the boundary management work of Gladstein (1984); self-regulating work groups of Pearce and Ravlin (1987); and the human resource/interdependence model of Shea and Guzzo (1987). Given the complexity surrounding globally dispersed teams, the dominant team or work group theories may not be adequate. Additional sources of information that will help in understanding the dispersed team phenomenon more completely may be found in other theoretical perspectives.

One emerging
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One emerging source of empirical information is the current research being done on virtual or globally dispersed teams. It is a nascent but growing body of literature. Practitioners and those who are offering advice to practitioners (Crandell and Wallace 1998; Fisher and Fisher 1998; Lipnack and Stamps 1997; McDermott, Brawley, and Waite 1998; O'Hara-Devereaux and Johansen 1994) have begun to create a body of experientially rich work. Here one finds much of the available information specific to virtual teams. These experts have also drawn from the existing team literature in their work as they try to unravel the problems they see each day. This study has been informed by both the empirical work done to date on virtual teams and the practitioner literature that reports activity in the field.

Work by Jarvanpaa (1995), Leidner (1997), and Knoll (1998) is, perhaps, the largest body of research done to date on virtual teams. Using controlled experiments with international student participation, these studies have looked at the use of mediated communication methods and the creation of trust in relationships among members of a global team (Knoll and Jarvenpaa 1997; Jarvenaa et al. 1998). This research suggests that members of global teams form 'swift' trust in order to complete their shared tasks. This 'swift' trust reflects the fragile nature of the intragroup relationships on these teams that are formed as needed, for the duration of a task, and across the cultural boundaries of the group members. The teams in these studies were true virtual teams who had no opportunity to meet face-to-face and had to rely on mediated communication to complete their tasks. The research is aimed at facilitating the development of trust seen by the researchers as essential for team performance.

Introduction to this

In this study, the
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Introduction to this Study of a Global Team

In this study, the main object of study is the Copy Exactly Initiative developed by the electronics division of Visteon Corporation (the former internal parts supply units of a large Midwestern automobile maker). The goal of the initiative was to commonize manufacturing processes and equipment across the seven plants in the division. The Copy Exactly Initiative was modeled on a proprietary project of a well-known computer chip manufacturer, which had as its goal to replicate everything about the fabrication process of semiconductors.

The people in the Copy Exactly Initiative were primarily engineers (mechanical, electrical, and industrial specialties) working in the worldwide plants and at the main Electronics Technical Headquarters. They were divided into 'teams' focused on specific areas of electronics manufacturing: soldering, reflow, board design, line configuration, etc. (for a more complete explanation of printed circuit board production, see Chapter 4: "A Tutorial on the Manufacture of Printed Circuit Boards"). Team members work in eight locations globally dispersed in seven countries. Their meetings take place most frequently (weekly or biweekly) through telephone conferences. Three to four times a year they meet face-to-face with the meeting place rotating around the different plant sites.

Each team was composed of a representative from each plant and people from the headquarters site as well as a coach. The coaches were members of a Core Team Group, who monitored progress and set midterm goals for the entire group. In addition, executives, plant managers, and supervisors were involved in peripheral bodies in the project such as the Management Review Committee.

This group

They were very

to interact, create

crossing issues.

both qualitative and

project as well as

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- What are the goals and goals of the teams?
- How do the nature of the teams change?

This group illustrates the opportunities and challenges mentioned above.

They were very diverse across most categories, used mediated communication modes to interact, created a shared base of knowledge, and were confronted with boundary-crossing issues. The investigation of this complex set of phenomena will utilize both qualitative and quantitative research methods. Members of the virtual team project as well as managers and others whose work is related to the project have been interviewed. Face-to-face meetings have been observed for each of five selected teams.

Data was also gathered using survey instruments. During each interview, participants were asked to complete short questionnaires on how they perceived the availability of resources for the team and how they judged the frequency of their individual use of various communication modes in their work with the team. In addition, the entire team and the non-team members who were interviewed were asked to complete a survey on their perceptions of accountability, rewards, teamwork, community of practice perceptions, and team performance effectiveness. Participants could respond to the survey via email or they could log on to a website and their responses were delivered via email (see Appendices C and D for copies of actual instruments).

Through observation, interview, archival research, and other methods as needed, the project has investigated topics such as:

- What aspects of the work environment such as rewards, accountability, and goal clarity are most important to successful performance in dispersed teams? Are accountability and performance effectiveness linked?
- How does the availability of resources affect a global team and has the nature of the essential resources such as time for face-to-face meetings changed?

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- What is the impact of diversity for a globally dispersed team? How important is the existence and enhancement of a shared base of knowledge among team members to team performance effectiveness?

In the chapters that follow these issues will be addressed in much greater depth. They are important issues because they begin to map out the dimensions of a future work organization system that will be used by many workers and organizations. Frances Cairncross (1997) declares that we are entering an era dominated by 'the death of distance' in which technology erases distinctions such as location and time by creating the ability for companies and their workers to alter all the patterns of where people work and how they work. Mohrman, Galbraith, and Lawler (1998) reinforce Cairncross' message as they discuss the dramatic changes in organizational design and performance measures that are increasingly a part of today's competitive environment. The broader perspectives offered by these authors signal the crucial need to study global teams as one critical element of future organizations and work places.

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CHAPTER 2

LITERATURE REVIEW

There is to date only a small body of empirical work on dispersed teams. Even as this dissertation is being written, many practitioners, consultants, and academic experts are studying globally dispersed, virtual, or distributed teams, with the goal of helping people succeed in this new work organization system. The lack of empirical research and study on this type of work organization system has led many people who are seeking answers to questions about team performance to refer to the literature on collocated teams. Thus, in any study of globally dispersed teams, the existing work on teams should be the starting point. Teams still need to have effective leadership, clear goals, ample resources, and structural supports such as rewards and training. Managers and others helping to facilitate the work of virtual teams must provide such essentials. However, there are additional questions: Are the same essentials sufficient? Or must other factors be considered, especially in a rapidly shifting work and competitive environment?

This study proposes to begin answering these questions, because it is clear that dispersed teams and collocated teams have significant differences. The spatial and temporal issues of not sharing the same workspace or geographic location are, perhaps, the most obvious of these differences. Another difference is the speed of change that increases as electronic communication and the tools of production

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become ever more sophisticated. People today form global groups, complete tasks, and move to other virtual projects without leaving their home location and, at times, without ever meeting their colleagues on any project face-to-face. Electronic communication mediates relationships, and it is not yet clear what impact that has on building interdependency and trust in these relationships. What factors are most essential is not yet known. In addition, organizations have been structured to accommodate collocated teams; but it is not yet clear that globally dispersed teams can be effectively supported using these same reward structures and leadership hierarchies.

The general plan of this review is to begin by examining the existing work by Hackman and others on collocated teams. Since this work provided much of the foundation for this study, it is important to understand the details. Beyond Hackman, this review will examine both collocated and dispersed teams literature that explores the differences in these types of teams and provides a more solid basis for an ongoing discussion of dispersed teams.

Although this study will only review selected aspects of the differences between collocated and dispersed teams, it has focused on essential exploration of the critical areas in which the two types of teams differ. Critical areas of the teams literature will also be addressed in this review: 1) aspects of organizational context for dispersed teams—accountability, rewards, and diversity; and 2) performance effectiveness. Because the answers or the “truth” are moving targets, it is of real importance to engage in ongoing dialogue about these issues. Many of us are now or will soon be working in some form of dispersed team. We will shape those experiences through our interactions; the experiences will in turn offer us

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Framing the Issue in the Teams Literature

Building on work by McGrath (1964), and an earlier model by Hackman and Morris (1975), Hackman created in 1987 a more fully developed model of group effectiveness that is used in this dissertation as the standard (see Figure 2.1). Understanding this model facilitates study of other researchers' work built on this model (Pearce and Ravlin 1987), work built on some aspect of the model (Gladstein 1984; Campion, Medsker, and Higgs 1993) and work that departs from it (Goodman, Ravlin, and Schminke 1987; Kolodny and Kiggundu 1980). Hackman's contribution to the study of groups is central to creation of further knowledge about teams and additional theories for understanding teams.

Organizational Context
A context that supports
and reinforces competent
performance

Material Resources
Sufficiency of materials
resources required to
accomplish the task well
and on time

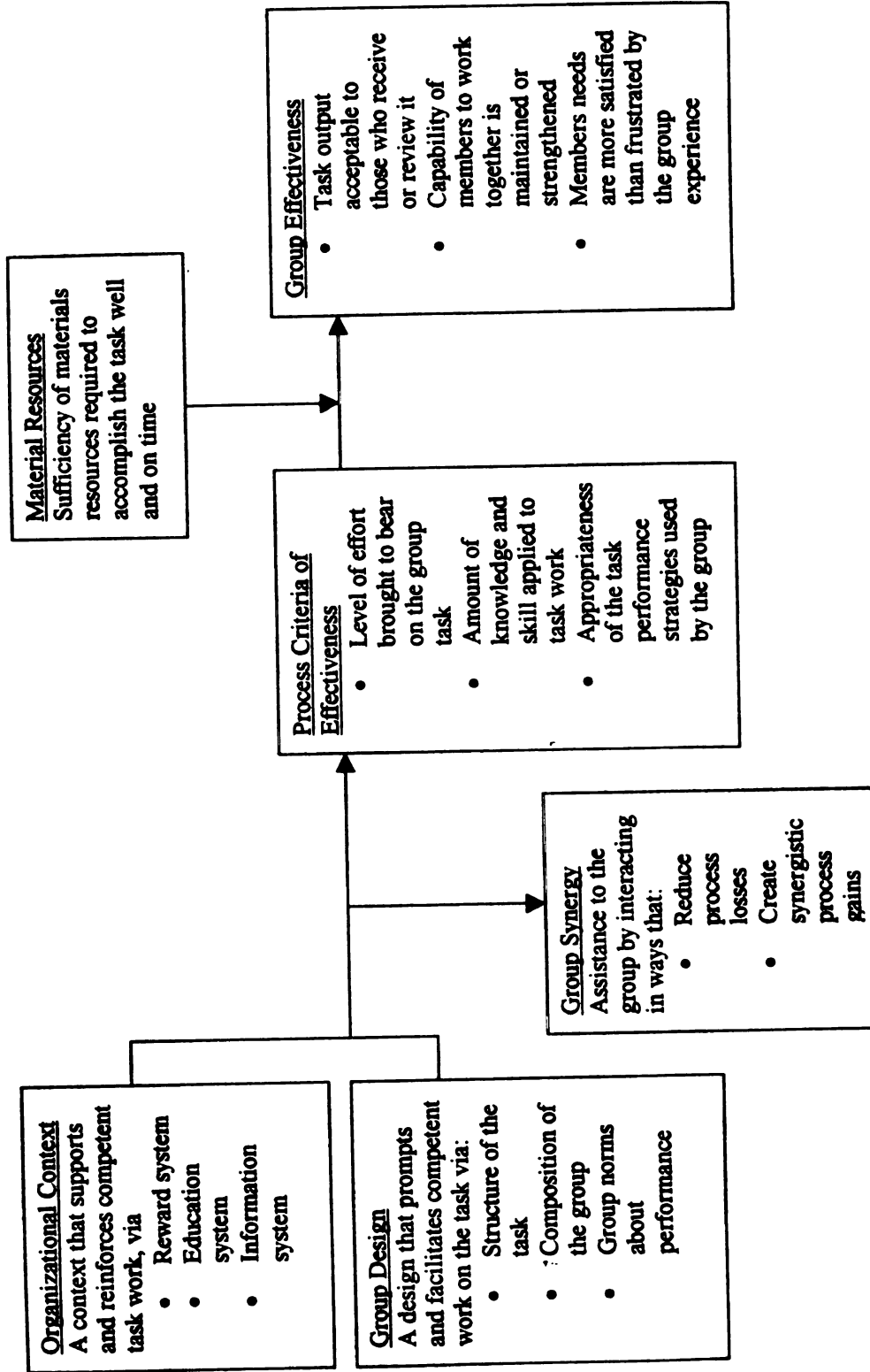


Figure 2.1 An Overview of the Normative Model of Group Effectiveness adapted from Figure 32.4, p 410, Interacting with Other: Social and Group Process, Prentice Hall Publishing

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This model is introduced as “a normative model of group effectiveness” because it focuses on a single multidimensional outcome—work group effectiveness—and it identifies aspects of the work group and context that may be manipulated to promote team effectiveness, as well as used to diagnose “the strengths and weaknesses of groups as performing units” (Hackman 1987: 316). Hackman focuses narrowly on work groups¹ and wants his model to “increase the possibility that constructive change can occur” (322).

Work group effectiveness is the subject of more in-depth discussion at the end of this review. However, Hackman’s (1987) criteria for effectiveness are of interest here as part of the discussion of the model. Three criteria are used to assess effectiveness: “The first deals with the actual output of the group, the second with the state of the group as a performing unit, and the third with the impact of the group experience on individual members” (323). Effectiveness is a function of group effort, the knowledge and skill of group members, and the appropriateness of the performance strategies the group chooses. The “inclusion of social and personal criteria in a definition of effectiveness is a departure from tradition as is the use of system-defined (rather than researcher defined) assessments of a group’s output” (323).

Although diagnostic criteria are important, Hackman’s model offers the ability to “design and manage a group so that task effective group processes emerge naturally” (324). He sets out three major factors that govern group behavior, which

¹ Work groups in organizations is defined as (1) real groups with “intact social systems with boundaries and differentiated roles;” (2) groups that have one or more tasks to perform resulting measurable group products; (3) “groups that operate within an organizational context” (Hackman 1987: 322).

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therefore will shape group effectiveness: “the design of the group as a performing unit; (2) the support provided by the organizational context in which the group operates; and (3) the synergistic outcomes of the interaction among group members” (331). Research on team effectiveness that incorporates these and other factors (Campion, Medsker, and Higgs 1993; Campion, Papper, and Medsker 1996) has sought to demonstrate that teams designed with these components can be effective. It is unclear whether any combination or all of these factors applicable to collocated teams are generalizable to globally dispersed teams. A brief discussion of Hackman’s three factors will allow greater understanding of the issues.

Group Design

A well-designed group will undertake a task that is structured to be motivational, to be meaningful, to provide autonomy, and to provide feedback on performance. Such a task, combined with group norms, will pave the way for task-effective behaviors to emerge. The group itself will be of a proper size for the task and possess the necessary task and interpersonal skills, as well as moderate amounts of diversity.

Organizational Context

The organization will provide rewards, education and training, and information flow to the group. The appropriate support is critical to the performance of a team and enhances the potential of the well-designed team. The organization must provide structural and material resources such as tools, space, human resources, and, in the case of dispersed teams, time. Time is a resource that dispersed teams

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Group Synergy

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Group Synergy

This factor is aimed at reducing the process losses that accompany group work (Steiner 1972) and helps the group coordinate its design and contextual elements. Hackman distinguishes between positive and negative group synergies. Positive synergies occur when the group takes advantage of favorable performance situations. Negative synergy occurs when the process losses exceed any gains due to synergy. “A highly coordinated and cooperative team can produce synergy or results that are more effective than the sum of the individual team members’ contributions” (Yeatts and Hyten 1998: 34).

Hackman seems to try to capture the process of knowledge creation or collaboration within the group. He discusses the idea that group members can learn from each other and foster collective learning or group outcomes different from those obtained by the individual members working alone. Cross-training of the type that occurs in autonomous work groups is the example he uses to illustrate this idea. While collective learning is one of the great strengths of collocated teams (Cutter-Gershenfeld et al. 1998), it is likely that in dispersed teams the opportunities for collective learning stretch across many locations.

Hackman’s model provides a well-developed framework for studying teams. It specifies the importance of a long list of factors including task structure, goal clarity, rewards, group composition, knowledge and skill levels, and feedback.

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These are all important elements for a team. However, they do not distinguish between a collocated team and a virtual or dispersed team.

Beyond Hackman: Teams Collocated and Virtual

In *Virtual Teams*, Lipnack and Stamps state that “A good virtual team is, at its heart, a good team” (24). For many people a good team would follow closely the guidelines in Hackman’s model. For others, alternative models are more satisfying. In the case of the theoretical work, each model examines collocated teams. However, those who are looking for answers to team performance questions may value the outcome and use whatever model works. The literature that follows was selected because it adds to the debate in this paper by extending the Hackman Model or challenging it in ways that seem relevant to the aspects of virtual or dispersed teams examined in this study.

In their ecological approach to team performance, Sundstrom, DeMeuse, and Futrell (1990) do not use an input-process-output format a la McGrath (1964). They propose that work team effectiveness is “dynamically interrelated with organizational context, boundaries and team development” and is “more a process than an end state” (Sundstrom 1990: 121). Teams “change and develop new ways of operating as they adapt to their contexts” (Yeatts and Hyten 1998: 37). The framework is developed to illustrate an approach in which the physical environment plays a role. In other words, work groups are embedded in a larger context with boundaries that separate the team from the organization and help to define “what constitutes effectiveness for the team in its particular context” (Sundstrom 1990: 124).

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Described in terms of Lawrence and Lorsch (1967), a team is integrated into the larger system through coordination with customers, suppliers, managers, and others, while at the same time the team is differentiated from other work units through expertise or task specifics. "A work team is differentiated from its organizational context to the extent that it comprises an identifiable collection of people working in a specific place, over the same time period, on a unique task" (Sundstrom 1990: 126). In other words, external relations and internal processes both shape team effectiveness through the management of boundaries.

Despite the place/time constraints expressed in Sundstrom, DeMeuse, and Futrell's definition of a work team, this ecological approach has great appeal for those studying dispersed teams because of the issue of boundaries. Team members often have several sets of boundaries that define their context. Frequently they are responsible to a home location, as well as to a separate dispersed team. Thus, they have intragroup boundaries, intergroup boundaries, and boundaries distinguishing them from external entities as well. Ancona and Caldwell (1992) have presented a clear set of strategies that teams use to manage their relations with external groups. This literature, however, does not completely describe the conditions faced by virtual teams.

The boundary-crossing of dispersed teams may be more reflective of the characteristics of cross-functional teams, which may be collocated but work in different functional areas. Proehl (1996) proposes that cross-functional teams require different structures and support systems, because their projects may not be related to "the members' immediate work and members have many competing responsibilities and varying degrees of immediate management support for

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Sundstrom, DeMeuse, and Futrell (1990) also restrict their theory to collocated teams when they incorporate a temporal element into their approach, which only allows for a team to be in one place at one time. These last two factors, time and place, are critical distinctions for virtual or dispersed teams. In their book *Globalwork*, O’Hara-Devereaux and Johansen (1994) describe the options that must be considered when selecting the appropriate electronic communications software or groupware for use by a virtual team. The selection of communications software is central to the interaction of a dispersed team and an essential element of organizational support for a team, because it can help to dissolve some of the boundary-crossing issues such teams face.

The specifics of time and place may well be unique for each member of a global team. Table 2.1 shows the combinations of place and time that are possible for dispersed teams. These dimensions have a direct impact on how teams interact to complete their tasks. Lipnack and Stamps (1997) characterize the interaction across these differences as boundary crossing and use it to explain the virtual aspect of teams.

The day-in and day-out reality of communicating, interacting, and forming relationships across space, time, and organizations makes teams virtual (41).

The greater the degree of difference in time and place, the more complex these arrangements can become. At some point, time and place also begin to include

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Table 2.1: Virtual Teams: Potential Temporal and Spatial Combinations and Examples

Same Time/Same Place	Traditional synchronous face-to-face meeting
Same Time/Different Place	A synchronous group meeting mediated by conference call technology
Different Time/Same Place	Computerized media used by people at different times such as a shared computer data base consulted by all three shifts in a factory
Different Time/Different Place	Asynchronous links among distributed members such as email messages exchanged by group members on different continents

[Derived from discussion in *Globalwork*, by O'Hara-Devereaux and Johansen 1994: 79–88].

Lipnack and Stamps (1997) add another dimension to time and space when they suggest an organizational dimension. Formerly, organizational boundaries for work teams have been as narrowly drawn as an employee's own work area or as widely defined as cross departmental, but the boundaries were consistently inside the same organization. New technologies have allowed the creation of a new workplace "unrestrained by geography, time, and organizational boundaries" (Townsend 1998: 17). Not only are organizational structures flatter and more distributed, these organizations have increasingly complicated relationships with other organizations as

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companies collaborate and compete together simultaneously (Davis and Meyer 1998).

Within these complex structures, teams can occur in a variety of forms. Table 2.2 is adapted from Lipnack and Stamp (1997) and illustrates some of the ways that teams are constituted within and between organizations. Space and time are joined here into one idea in line with the precepts of physics in which distance in space takes time to cross. The new conceptualization of organizational diversity reflects these experiments with new types of relationships and the variation between team members in terms of organizational affiliation and culture.

Table 2.2: Types of Teams with the Dimension of Organizational Diversity

Spacetime (treated as one idea here since distance in space takes time to cross)	Organization	
	Same	Different
Same	Collocated (Conventional)	Collocated Cross-Organizational Virtual
Different	Distributed or Dispersed (Virtual)	Distributed or Dispersed Cross-Organizational (Virtual)

With increasing complexity there is greater impetus for new ways to explain and understand these phenomena. Consultants and practitioners are developing new materials to try to explain how globally dispersed teams function on a day-to-day basis in organizations. Some new approaches are emerging out of a mix of traditional teams research and observation of actual team situations. For example,

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Lipnack and Stamps (1997) propose a three-part model for virtual teams: The parts of their model are people, purpose, and links (47). They elaborate this model onto the inputs, processes, and outputs framework used by McGrath (1964) and Hackman and Morris (1975). Lipnack and Stamps enlarge upon each of these three elements by relating them to general team theory, then identifying differences the authors perceive relate to virtual teams (48). The basic premise is that “virtuality always adds a ‘spin’ to classic learnings about teams” (49). They briefly describe their approach in this way:

To start a virtual team, you need independent people, cooperative goals, and multiple media. As the team goes through its life cycle development process, people share leadership, undertake interdependent tasks, and engage in myriad boundary-crossing interactions. As the team’s life cycle unfolds, it produces concrete results, integrated levels of organization, and if the teaming is done with integrity, trusting relationships (48–49).

While it is not yet ready for use as an academic theory, the framework does focus on three critical areas of team development, each supported with examples from the field to illustrate details.

Mediated Communication

One element of the Lipnack and Stamps (1997) model is *links*, defined as the use of multiple media for boundary-crossing interactions that may evolve into trusting relationships. While this may be a bit optimistic, team member interactions and the use of communication media are serious issues for those who are working with virtual teams. It is one of the new dilemmas created by virtual teams. It is much more difficult to develop interpersonal ties of credibility and trust when communication is electronically mediated rather than face-to-face.

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Several groups of researchers have begun to study the problem of building relationships and interacting electronically. Warkentin, Sayeed, and Hightower (1997) looked at group cohesiveness, perceptions of group interaction process, and satisfaction with group outcomes among teams of undergraduates who completed a task either face-to-face or using computer-mediated communication systems (CMCS) in a controlled experimental setting. The face-to-face teams reported stronger relational links on all three variables than the teams using CMCS. In addition, slightly more information was exchanged in the one meeting of the face-to-face teams than in the three weeks allowed for the asynchronous CMCS teams to “meet” and complete the task.

Warkentin, Sayeed, and Hightower ask whether teams using mediated communication will be able to establish relational links that help create trust in the team and generate satisfaction with the process. Team members who are dissatisfied working in dispersed or virtual teams may not perform as effectively—just as might occur on collocated teams. The finding of interest in this study was that there was no significant difference in the effectiveness of information exchange between the face-to-face group and the CMCS group, despite the difference in satisfaction levels.

It is important to consider both the social psychological and the technological aspects of using CMCS with work teams. McGrath and others (1993) have suggested that dispersed teams might benefit from team building face-to-face at the startup of the team so that the impact of technology might be modified.

Technology can aid or hinder a group in its performance of processes that lie at the core of group existence—its development or norms, its members’ participation patterns, and its members satisfaction with themselves, their group, and its work. The technology can become an

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Technology changes group interaction and the experience of the people working in the group. This is an important element of the work in and on dispersed teams that depend on technology to function. For organizations, one concern may need to be whether the experience of working on a dispersed team still allows the optimal expression of the skills each team member brings to the job.

Issues of trust and communication are also at the core of a series of studies by Jarvenpaa, Leidner, and Knoll. This work asks whether trust can exist in virtual teams where there is a “lack of shared social context” (Jarvenpaa, Knoll, and Leidner 1998: 3). The “catch” in this situation is that trust is even more important in virtual teams than in face-to-face teams, because it prevents the creation of psychological distance to augment the effect of geographic distance (Jarvenpaa, Knoll, and Leidner 1998: 30). Trust built in virtual teams may be “swift trust,” or the trust that develops in highly active, but temporary teams such as cockpit crews or film crews (Meyerson 1996). In the Jarvenpaa and Leidner study, teams that reported a trusting relationship started early to exhibit trusting behavior. Trusting behavior was derived from early communications, which exhibited confidence, enthusiasm, support, and commitment. Virtual teams may need to pay close attention to their communication behaviors (Jarvenpaa and Leidner 1998: 28).

Jarvenpaa and Leidner (1998) assume in their study that virtual teams have three dimensions: no common past or future, cultural diversity and geographic dispersion, and electronic communication media. The participants in their study were master’s degree students in business schools at 28 universities around the

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Whereas these students had little concern about the long-term professional reputations they were building, it is possible that global team members who work together, work for the same firm, or in a professional capacity may have concerns about the long-term impact of performance on their relationships with other team members. This would coincide with findings in Meyerson, Weick, and Kramer (1996).

There is much that can be learned from the Warkentin, Sayeed, and Hightower (1997), Jarvenpaa and Leidner (1998), and Jarvenpaa, Knoll, and Leidner (1998) studies. It will be important to repeat similar studies with virtual teams in organizations. The studies point to potential areas for skill development among team members, such as greater awareness of communication skills, and greater ability to use electronic media comfortably and expertly and to develop a greater sense of ease in a virtual context.

Although Shea and Guzzo (1987) are building a theory that they apply to collocated teams, it is of value to apply it to dispersed teams. For example, they identify as a serious problem the need to create and maintain groups that are informed, inspired, and competent, and to do so quickly (327). The skills needed to integrate group work into the organization will become part of the skills set of each member of the organization. Additionally, the human resources choices that are customarily made for individuals must also be made about groups, given the increasing importance of groups in organizations. These two shifts in skills and emphasis are also important to consider today as they pertain to virtual teams.

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Given current trends such as those discussed by Townsend, DeMarie, and Hendrickson (1998), organization members will need to have the competencies required to integrate virtual teams into the work systems of their organizations. It also seems inevitable that the gamut of human resource decision-making areas such as selection, hiring, and rewards will need to integrate a set of assumptions that includes virtual interactions and global policy differences.

Three variables determine group effectiveness in the Shea and Guzzo theory: task interdependence, or “the degree of task-driven interaction among group members”; outcome interdependence, or “the nature of the fate shared by group members that is contingent on group performance”; and potency, or “the collective belief of group members that the group can be effective” by delivering the required products or services (331). In other words, the authors examine the task performance consequences of interaction, rather than the socio-emotional consequences examined by Hackman (1987).

Because this model does not emphasize group process, it may fit the constraints set up by a virtual environment. It may be that, by de-emphasizing the group and putting the emphasis on the nature of the task and outcomes, this theory could be useful. The goal or “charter” of the group must be clear and defined so groups know where they are going. Goal clarity among members of a dispersed team could be extremely important especially when team diversity might include language and culture norms.

Shea and Guzzo believe that the “primary task of work groups is work” (343). They go far in trying to develop a theory that avoids all of the socio-emotional ideas of theorists such as Hackman. This may be a bit too narrow a view,

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but some of their points are well taken. Work groups are complex, and they are distinct from the individuals who comprise them. The scope of the human resource decisions that must be made for virtual teams is as global as their locations and may cross organizational and governmental boundaries, which could provide challenges.

So although the extant teams literature provides significant insights into why some teams are more effective, and what characteristics are essential for team performance, it is not sufficient to answer all the questions. Especially when the questions pertain to virtual teams, there are gaps in the research to date. Existing theories about teams and groups are constrained by their basis in collocated teams, as this selective review has shown. The next part of this review will consider aspects of organizational context that affect dispersed teams. Considering contextual issues may lend additional insight into how these teams work.

Aspects of Organizational Context

The organizational context for dispersed teams is far from unitary. Each team member may be working in an environment very different from those of the other team members. To date no research has studied the virtual organizational context. Given this lack of specific research, two other areas of relevant research have been selected to provide some insight: the team theories of Hackman (1987) and Gladstein (1984), as well as the work by Ancona and Caldwell (1992); and the literature on cross-functional teams.

Hackman's (1987) position on organizational context is discussed above in this review, but, as Denison, Hart, and Kahn (1996) indicate, this model examines "context by looking at the interactions between individual teams and their

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organizational environment” (1006). Gladstein (1984) observes that external organizational variables influenced group effectiveness directly or indirectly (514). This interaction between the group and the environment is also a main ingredient in later research by Ancona and Caldwell (1992). Here the group is strategically trying to influence the external environment. The limitation of these studies is that they tend to portray the environment as somewhat unidimensional and do not capture the full complexity of the environment within which cross-functional and dispersed teams exist.

Sundstrom, DeMeuse, and Futrell (1990) report that “boundaries at least partly define how a group needs to operate within its context to be effective” (121). The question for many virtual teams may be which boundaries to use and when to use them. The questions become more complicated when organizational structures such as reward and incentive systems are not connected to the actual performance of the team.

Denison, Hart, and Kahn (1996) offer a description of the context of cross-functional teams that reflects many of the complexities of virtual teams. They say that the context “differs from more conventional teams in that it includes hierarchical, lateral, and inter-team dependencies that require constant negotiation” (1013). As we have already seen, for virtual teams these boundaries could extend to cross organizational and cross cultural.

Such complexity makes it difficult for members of virtual teams to define their identities as team members and to organize their complete set of tasks (team and home location responsibilities). In this review we will examine three aspects of

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the organizational context that can cause problems for dispersed team members and potentially affect team effectiveness: accountability, rewards, and diversity.

Accountability

Accountability is a fundamental element of organizations and social systems at all levels. All employment systems share at least some form of accountability, in that they have lines of accountability (Kraines 1996). Therefore, accountability in any work setting can be a potential source of tension. Expectations must be carefully and clearly expressed or they will not be met properly, which then can trigger grave consequences. Yet our understanding of the dynamics that occur when members of virtual teams are held accountable for decisions and actions remains somewhat limited.

According to Ferris et al. (1995), accountability can be defined from an external (to the person) or internal perspective. On a team, members often deal with both internal and external perspectives. From the external perspective,

Accountability (a) emphasizes a system of review of behavior by some constituency, and (b) includes having salient rewards or punishments contingent upon the review. Thus, in organizations, accountability implies a system of rewards and sanctions for conformity to organizational standards, or a control system (Ferris et al. 1995).

For this system of accountability to succeed, people will need clear understandings of rewards, sanctions, and standards of performance, as well as other factors, in order to make decisions about performance. In addition, they will need to know to whom they are accountable. Accountability theory suggests that perceptions about our audiences and related rewards or sanctions serve to direct decisions and effort allocations when we face decisions or choices (Tetlock and Boettger 1989: 390).

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Frink and Ferris (1998) define accountability as “the perceived potential of being evaluated by someone and being answerable for decisions or actions” (1260). They cite research that indicates that accountability affects how people approach their tasks and set goals in the workplace. Further implications of accountability include the idea that behavior will be reviewed and that rewards or punishments will be contingent on that review. People conform to standards or expectations that are linked to organizational structures of reward or sanction.

The issues of accountability can become complex for workers whose jobs are structured around activities on teams, and this is especially true when those teams are not collocated. Fundamental relationships may become uncertain when one’s supervisor is at a home location and the locus of one’s duties on a project team is an undefined virtual work site. This local versus global tension arises when goals, task design, resources, and rewards come from different sources in the organizational hierarchy. Team members may have trouble sorting out a clear set of expectations. For example, goals may be set by a distant authority at a headquarters, tasks may be designed or assigned by team leaders or project managers, while performance evaluation and rewards may be the purview of the supervisor in the home location. Team members may feel accountable to their team relative to interdependent tasks (Sundstrom 1990; Shea 1987; Hackman 1987).

Internally, accountability leads to the “assessment of and response to external conditions to gain both intrinsic and extrinsic rewards, and it also implies the efficacy of the concept of the self as an audience” (Schlenker and Weigold 1989: 28). Intrinsic rewards or sanctions, such as feelings of well-being, satisfaction with one’s performance, or acceptance, are by implication present and serve to influence

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responses. Individuals may well experience tensions about their performance, especially as they attempt to optimize outcomes. It appears that there may also be tensions between the concept of individual accountability and the current drive to install team-based work systems.

Rewards

Edward Lawler (1998) proposes that pay systems must be designed to fit business strategies and organizational structures. “Pay systems are effective to the degree that there is alignment among the organization’s core values, its process, and its practices and structures” (Mohrman, Galbraith, and Lawler 1998: 288).

According to Lawler (1998: 293) pay systems have demonstrated that they can motivate performance, learning, and development. In addition, they impact the organization’s culture and help to “reinforce and define the organization’s structure” (Lawler 1987: 255; Mohrman, McGrath, and Lawler 1998: 294). The reward systems of organizations will need to be designed to support the work of dispersed teams. Unfortunately, “evolving team settings are trapped within a reward system that was designed for a different kind of organizational logic” (Mohrman, Cohen, and Mohrman 1995: 230). Mohrman, Cohen, and Mohrman (1995) found that there was wide variation in reward practices across firms, but that the more people were rewarded for individual performance, the worse their team performance was. Team performance rewards, on the other hand, had lead to better team performance and better business unit performance. The teams in question in this example appear to be collocated teams. When the locus of rewards systems is dispersed teams, the issues become more complex. For example, how do transnational corporations

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Proehl (1996) offers advice from her paper on cross-functional teams:

Organizational leaders need to clearly identify the rewards and repercussions for achieving (or not) the team's purpose. One of the serious challenges with cross-functional teams is to establish accountability for team performance. Organizational leaders need to explore ways to connect team participation with existing reward systems and/or to develop alternative systems for rewarding team performance (Proehl 1996: 23).

There appear to be few, if any, pay structures that have been created especially for global teams, although they may yet develop. Crandell and Wallace (1998) suggest:

The differences between traditional and virtual workplaces regarding base pay is that a traditional company pays the job and a virtual company pays the person. The virtual workplace pays people not for the job they hold, but for the role they must play. The role is less formal, more flexible, and overlaps much more with other roles than did jobs (164).

The assumption here is that the entire set of duties is now in a virtual mode.

However, there will be many people who have jobs that are mixed, traditional and virtual. This could pose a problem.

Wageman (1995) warns that mixed rewards, in this instance "half provided to individuals and half to the team, emerge as the most common error in reward system design." In studies of autonomous teams, Wageman (1995, 1997) has looked at the relationship between task design and interdependence and rewards. Findings indicate that trying to introduce team incentives for interdependent tasks is best not done in a mixed manner, since "mixed rewards send mixed signals to the team and undermine its ability to operate as an effective unit" (1995: 165). In subsequent

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Collective rewards helped motivate highly interdependent groups to perform well, whereas rewards for individual excellence energized members of independent groups, demonstrating that outcomes either enhance or undermine motivation for the kinds of work behaviors that are elicited by the task. The pivot, then, is how the work is structured. Work design shapes individuals' preferences, their behavior, how they experience their rewards, and the impact of those rewards on their performance (1997: 58).

Wageman recommends that in those jobs where cooperative behavior is essential, companies should design the job so that it is interdependent, then create a support system of interdependent rewards. The details that are critical to pay systems are missing, and it does not appear that there are clear answers to this problem.

O'Hara-Devereaux and Johansen (1994) offer advice for the cross-cultural setting. "Individual rewards for performance are not particularly motivating in cultures that put a high value on working for the good of the group. A range of reward systems may be necessary in many cross-cultural situations" (60).

So it appears that team pay structures for dispersed teams would need to be connected to what team members actually do and maintain equity across all the members of the team at all home locations. This raises questions about the pay differential between the dispersed team member and either other team members or co-workers in home locations, which location administers the pay system, what the criteria for success are, and whether the criteria apply to individuals or teams. One central question this raises is: why, in the absence of properly designed reward systems, are virtual teams performing? No clear answers to these questions seem to

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Diversity

Research on the effects of diversity in organizations has been characterized by mixed findings according to Guzzo and Dickson (1996). These authors conclude that, in spite of its recent popularity, there is little consensus about either what constitutes diversity or how it affects performance (331).

Nonetheless diversity is a fundamental element of globally dispersed teams. It is inherent in the nature of these teams that they exist in different settings and are created by combining a variety of people. There can be no formula for the perfect combination of people for every team, because each team's task will help define the types of skills and expertise needed. The people who have the necessary skills will be different or similar according to need and availability. Dispersion of team members ensures that there will be a variety of races, genders, and nationalities, as well as a mix of skills, talents, and abilities on any one team. Milliken and Martins (1996) explain that the changing nature of multinational work as well as the changing composition of the work force will increase the frequency with which diverse people will interact. They highlight an emerging understanding of diversity that fits the context of global teams:

The term diversity often provokes intense emotional reactions from people, who, perhaps, have come to associate the word with ideas such as "affirmative action" and "hiring quotas"; yet it is a word that simply means "variety" or a "point or respect in which things differ" (American Heritage Dictionary of the English Language 1993, and Webster's Dictionary of the English Language 1992) (402).

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The catch is that this same variety that is fast becoming a central element of work places is the source of some confusion among researchers. Variety or heterogeneity has been named as the source of barriers to team effectiveness (Baugh and Graen 1997) and has been negatively associated with lower levels of “group social integration” (O’Reilly, Caldwell, and Barnett 1989; Harrison, Price, and Bell 1998). On the other hand McLeod, Lobel, and Cox (1996) see variety as driving greater creativity in group problem solving (McLeod, Lobel, and Cox 1996). In other words, there is great ‘diversity’ among research findings. Whether this research was done in an experimental setting (McLeod, Lobel, and Cox 1996) or in an actual workplace (Watson, Kumar, and Michaelson 1993), much of it was not done with virtual or globally dispersed teams. However, recent research on work group diversity seems to indicate that there are new ways to appraise the impact of diversity. In addition, researchers are examining the nature of diversity and describing it in very different ways.

Jackson (1992, 1995) describes diversity as being both observable and underlying. That is, certain characteristics such as race, age, and gender are observable, while other characteristics, such as education level and functional background, are not observable.

Harrison, Price, and Bell (1998) describe some of the same attributes as surface level (race, age, and gender) or deep level (attitudes, beliefs, values). These distinctions are important, because these factors affect how people in work groups interact. The study points to a shift, over time, in the degree of importance of these two types of characteristics. Surface level characteristics diminish in importance as work group members continue to interact, while dissimilarity in deep-level attitudinal

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characteristics, such as job satisfaction or organizational commitment, increasingly impacts group relationships.

Yet another set of categories is advanced by Pelled, Eisenhardt, and Xin (1999). These authors describe diverse characteristics in terms of their relationship to the work being performed. Job relatedness is the factor that decides whether a characteristic might be more likely to lead to task conflict in a group. Two especially important factors, functional background and tenure with the company, are related to experience and knowledge, which are critical for cognitive tasks (Ancona and Caldwell 1992; Milliken and Martins 1996; Pelled, Eisenhardt, and Xin 1999). Characteristics such as functional background are permeable or easily altered to allow a person to move from one category to another (Pelled, Eisenhardt, and Xin 1999: 3). In addition, task conflict may have a positive effect on performance. “Exposure to opposing points of view encourages group members to gather new data, delve into issues more deeply, and develop a more complete understanding of problems and alternative solutions” (Pelled, Eisenhardt, and Xin 1999: 11).

The idea that “different types of diversity have different effects” (Pelled, Eisenhardt, and Xin 1999: 16) is most interesting when applied to dispersed teams. If permeable characteristics, such as functional background and years with the firm, are beneficial to performance in complex tasks, then diversity in global teams may be a driver rather than an obstacle. Pelled, Eisenhardt, and Xin (1999) tested job routineness as well and found that when jobs were quite routine, task conflict was more likely to increase where functional background was diverse.

Table 2.3 summarizes the categories described above, with the addition of national origin to the “Surface Level, Observable or Low in Job Relatedness and

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Less Permeable” group and depth of international experience in the deep level, underlying, or “Higher in Job Relatedness and More Permeable” group. The diversity characteristics in global teams must also consider these international categories. National origin is decided at birth; although citizenship can be changed, the ethnicity is permanent. Depth of international experience is a permeable characteristic, since a person may acquire international experience, and having this experience may well enhance skills and attitudes in the workplace.

Table 2.3: Comparison of Diversity Characteristics

Surface Level, Observable, or Low in Job-Relatedness and Less Permeable
Race
Gender
Age
National Origin
Deep Level, Underlying, or Higher in Job Relatedness and More Permeable
Educational background
Professional or functional background
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Depth of international experience

Diversity may also be present in terms of a variety of cultures. The most obvious type of culture is ethnic but there are also organizational cultures, professional cultures, and functional cultures that may be present in work places or workgroups. O’Hara-Devereaux and Johansen (1994) focus their work on the new multicultural global workplace. Hofstede (1997) contributes to the study of cross-

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culturalism in organizations, while Schein (1991) offers insights into organizational culture. All of these types of culture may be present in the operation of a global team and may well be essential to understanding how these teams perform. Every type of culture has values, norms, and patterns of behavior that it instills in its members. Hofstede (1997) calls this 'layers of culture' and warns that these 'mental programs' may not all be in harmony (10).

O'Hara-Devereaux and Johansen (1994) draw on Edward T. Hall and Mildred Reed Hall when they discuss the cultures in a workplace (38). The analogy that the Halls (1989) draw is one that describes culture "as a system for creating, sending, storing, and processing information," much the same as a computer (179). The Halls' computer metaphor has three layers: physical bodies are the hardware, the primary social or national culture is the operating system; and work cultures, including professional and corporate cultures, are the software applications.

Schein (1991) is most helpful when he provides a thoughtful discussion and definition of organizational culture.

The culture of a group can now be defined as [a] pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration, that has worked well enough to be considered valid and therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems (12).

Organizations learn these cultures through the efforts of the leadership to create and maintain a culture that most supports the objectives of the leader and the organization. Corporate culture is a tool that the organization uses and can change as competitive or economic conditions surrounding the organization unfold (O'Hara-Devereaux and Johansen 1994: 44).

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Learned corporate and professional cultures can shape and reinforce behaviors. O'Hara-Devereaux and Johansen (1994) make an important point when they state that "Professional cultures offer common ground globally, since their values and behaviors are often similar across the larger boundaries of nationalities and ethnic groups" (44). They use an example that is very apt for this study when they find great similarity between the professional values of electrical engineers in Nigeria and Brazil. These values are reinforced by educational and training disciplines, in addition to professional structures (such as the Society for Automotive Engineers) that promote professional values as well as growth and development. The authors suggest that this similarity of professional culture may mirror the development of global patterns of functional cultures, such as a convergence of values among global managers (46).

Combining the idea of professional culture with the positive outcomes that were foretold by Pelled, Eisenhart, and Xin (1999), it may well be that for global work teams the unifying factor may be shared professional or functional knowledge. This may not be in a dominant sense but rather in an interest-based sense. The various layers of culture may coexist with the proper combination of people, task, and organizational support. Hofstede (1997) puts it nicely: "The principle of surviving in a multicultural world is that one does not need to think, feel, and act in the same way in order to agree on practical issues and to cooperate" (237).

This is in contrast to research proposed by Kirkman and Shapiro (1997) that investigates resistance to the implementation of team-based work systems that results from cultural values. In particular, the authors suggest that there is resistance to goal setting, self evaluation, and self management among people from certain

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cultures. This resistance to management initiatives may possibly lower the effectiveness of initiatives that try to introduce self-managing work teams (735). Kirkman and Shapiro were offering a theoretical approach that they had not yet tested.

Recent research by Chatman, Polzer, Barsade, and Neale (1998) offers some support for a more pragmatic approach. The authors studied how organizational values of individualism or collectivism interacted with “social interaction, conflict, productivity, and perceptions of creativity” among a group of MBA students. They report:

Our findings suggest that the purported benefits of demographic diversity are more likely to emerge in organizations that, through their culture, make organizational membership salient and encourage people to categorize one another as having the organization’s interests in common, rather than those that emphasize individualism and distinctiveness among members (748).

They also found evidence to support the Pelled, Eisenhardt, and Xin (1999) finding that “benefits will accrue from demographic heterogeneity in organizations by increasing the variance in perspectives and approaches to work that members of different identity groups can bring” (Chatman et al. 1998).

Effectiveness

Team performance effectiveness is a much-discussed topic in the team literature. A number of scholars have reported both theoretical as well as empirical findings about effectiveness (Hackman 1987; Cohen, Ledford, and Spreitzer 1996; Gladstein 1984; Sundstrom, DeMeuse, and Futrell 1990; Cohen and Bailey 1997; Wageman 1995). Team effectiveness has been measured against numerous

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standards, including productivity, costs, group attitudes, and knowledge creation. Studies have been done measuring effectiveness in work teams as varied as those in “blue collar” jobs (Wageman 1995), product development teams (Ancona and Caldwell 1992), and knowledge workers (Janz 1997).

While performance effectiveness in collocated teams has been the focus of numerous empirical studies, performance effectiveness in virtual teams has not. Even among those who are studying global teams, such as Lipnack and Stamps (1997); O’Hara-Devereaux and Johansen (1994); Fisher and Fisher (1998); Duarte and Snyder (1999); and McDermott, Brawley, and Waite (1998), the emphasis is still very much on how to start a virtual team, train the members, facilitate communication, and build solid collaborative team work. There has as yet been very little discussion of what makes these teams effective.

McDermott, Brawley, and Waite (1998) offer a chapter on measures of success for world-class teams in which they offer an exercise to allow teams to develop their own metrics. After completing the exercise, readers are left with three questions that are cited as “key to measuring the success of the team”: 1) Do team products meet stakeholders’ expectation? 2) Is team competence increasing? and 3) Are individual team members learning and developing through their team work? These are the Hackman effectiveness measures applied to virtual or globally dispersed teams. It may well be that the traditional measures developed by Hackman (1987); Gladstein (1984); Sundstrom, DeMeuse, and Futrell (1990); or Campion, Medsker, and Higgs (1993) are the best measures of effectiveness in virtual teams. It is also possible that other measures may have to be developed to capture the value of dispersed teams adequately.

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Cohen and Bailey (1997) “categorize effectiveness into three major dimensions according to the team’s impact on (1) performance effectiveness assessed in terms of quantity and quality of outputs, (2) member attitudes, and (3) behavioral outcomes” (243). These dimensions are influenced by environmental factors, design factors, group processes, and group psychosocial traits. This framework is complex but flexible enough to help capture the relationships in and between the levels of context within which teams reside. Although Cohen and Bailey do not directly discuss dispersed teams, their framework might offer guidance with determining the effectiveness of dispersed teams.

It is of interest that Cohen and Bailey (1997) have included both tangible measurement categories (performance outcomes and behavioral outcomes) as well as intangible measurement categories (member attitudes). It seems somehow important to push measurement dimensions into more intangible areas when discussing virtual teams, since some of what these teams need to produce is intangible. Effectiveness has generally been measured using “some aggregation of specific, concrete, and quantifiable accomplishments and failures” (Campbell 1977: 26). Campbell was discussing organizational effectiveness, but as Jones (1997) states, the “theoretical work most pertinent to the measurement of team performance originated in organizational effectiveness theory” (116).

Specific, concrete accomplishments or failures cannot be the only measures of team performance effectiveness. This is especially true for globally dispersed teams in which the team members must create trust, generate innovative ideas and solutions, and operate in virtual relationships. Effectiveness must also be measured using intangible metrics. This point is driven home by authors like Solomon (1995),

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who says, “Global teams offer numerous benefits, including the *expertise* of a variety of people, *deeper insights* into the requirements of the international marketplace, and *the synergy needed to harmonize the differing perspectives* of dissimilar cultures and business functions” (51). In this set of benefits, Solomon identifies only intangible outcomes. This emphasis on intangibles reflects the current need for greater development and inclusion of employee knowledge and expertise in each company in order to meet the rapid changes in the marketplace (Blackler 1995; Nonaka and Takeuchi 1995).

In this study, the company has two metrics in place for measuring the effectiveness of the team: participation and percent of match.² Both measure specific, concrete elements of the team’s performance. Interestingly, the most important component of each measure may well be the intangible elements. For example, participation is a pure measure of how often a team member is present during teleconferences or at face-to-face meetings. It is a very straightforward measure that is compiled and cited as a percentage; i.e., the team had 95% participation. The goal is 100% participation. This is a tangible, objective measure. Participation is also absolutely tied to building relationships among team members, drawing on the deep base of shared knowledge that resides in the team members, and creating new solutions or knowledge from the collaborative efforts of the team. These are all intangibles that derive from counting the tangible instances of participation.

² These are defined and discussed in Chapter 4: “The Plan.”

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The company also measures percent of match or the amount of commonization reached in each location in the areas of equipment and process. The goal is to become 100% matched in every operation, so products can be moved easily from location to location, economies of scale might be active in purchasing, and costs due to multiple manufacturing methodologies can be reduced. This is a very tangible measure as well and yet it offers great intangible assets around shared knowledge and greater facilitation of problem solving across sites.

Summary

So it seems in this study that several threads in the literature have come together. The traditional model of team effectiveness (Hackman 1987) can be applied and will help to discover some aspects of the team's performance. The diversity of the team may help to increase performance, since the tasks of the team appear non-routine (Pelled, Eisenhardt, and Xin 1999). The interdependent design of the team task may contribute to effectiveness (Wageman 1995). There may be other measures of effectiveness, tangible and intangible, that will help to add clarity to some of the complex issues of organizational context. In as yet largely unexplored territory, the 'map' of where to go and what to study is not completely clear. Although this study will not be able to explore all areas of this phenomenon of globally dispersed teams, the goal is to make the path a little clearer and to set up some further avenues of investigation for others.

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CHAPTER 3

METHODOLOGY

The main research questions in this study are: 1) What aspects of the organizational environment are most important to successful performance in dispersed teams? and 2) What is the impact of diversity for a globally dispersed team? The research design calls for qualitative and quantitative elements throughout, with the goal of giving greater validity to the study's findings by using both methods. This is important because the study is an attempt to generate theory about globally dispersed teams.

This project uses primarily a case study methodology, supplemented with structured interviews, survey instruments, and archival data in an attempt to more completely investigate performance effectiveness in a globally dispersed team. The research work on teams provides a rich resource for ongoing exploration. It has, however, focused on the more traditional, collocated form of teams. These are the teams that we see everyday, working together in an office or on an assembly line. They work in a common home location, live in a common time zone, and most probably share a common organizational environment. The subject of this study is teams that are dispersed or distributed globally. The members of these teams do not all share the same home work locations, time zones, or, in many cases, cultural elements and environments.

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Dispersed teams have not as yet been the subject of a great deal of scholarly scrutiny. In the absence of an accepted framework, practitioners as well as academics seeking answers about effective team performance have relied upon the frameworks devised for collocated teams by scholars such as Hackman, Cohen, McGrath, and Gladstein. The value of this existing work is clear and unquestioned. Teams need to have effective leadership, clear goals, ample resources, and structural supports, such as rewards and training. Managers and others helping to facilitate the work of dispersed teams must provide these essentials. However, questions remain: Are the same essentials sufficient? Must other factors be considered when discussing dispersed teams? Among the main alternative factors that offer additional information about dispersed teams are the type and nature of communications used by the team, the synchronous or asynchronous nature of the team's interactions, the organizational structures within which teams and team members are embedded, the nature and impact of diversity on team performance, and the effects of geographic dispersion.

This study begins to explore the relationships between these factors and to build a theoretical base that will support further research on dispersed teams. Team performance effectiveness is the dependent variable in this study; the independent variables include rewards, diversity, accountability, mediated communication, goal clarity, knowledge and skills, leadership, and organizational support. The model shown in Figure 3.1 illustrates this basic research plan and analytical focus.

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Figure 3.1: Proposed Model of Team Performance Effectiveness

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A combined quantitative and qualitative assessment offers a multifaceted view of these relationships. For example, participants in the study respond in the interviews about their opinions on a series of factors including team tasks, goals, rewards, selection criteria, success factors, and obstacles to effective performance. Later, these same participants offer their perceptions of many of these same factors on a survey instrument. In this way, factors are explored in greater depth and from several perspectives. This offers an opportunity for results to be compared and triangulated, to give greater confidence in the results.

The goals of this study are straightforward and modest. By combining traditional and new elements in the analysis, it is possible to add some key elements to the current understanding of teams and their performance.

Hypotheses

As this dissertation is designed to contribute to the foundations of a theory of dispersed teams, the following hypotheses reflect some fundamental starting points in the research. Literature from various divergent sources is used to outline the reasons for the direction of each hypothesis.

Hackman (1990) and Lawler (1996) argue that teams should be supported by the development of appropriate pay systems that are designed to fit business strategies and organizational structures. Mohrman, Cohen, and Mohrman (1995) found wide variation in reward practices across firms, but concluded that when people were rewarded for individual performance, their team performance worsened. Team performance rewards on the other hand generally lead to better team performance and better business unit performance.

In studies of autonomous teams, Wageman (1995, 1997) looks at the relationship between task design and interdependence and rewards. Her findings indicate that “collective rewards helped motivate highly interdependent groups to perform well, whereas rewards for individual excellence energized members of independent groups, demonstrating that outcomes either enhance or undermine motivation” and that the key element is how work is structured. “Work design shapes individuals’ preferences, their behavior, how they experience their rewards, and the impact of those rewards on their performance” (1997: 58). Wageman recommends that in those jobs where cooperative behavior is essential, companies should design the job so that it is interdependent and then create a support system of interdependent rewards. In cross-cultural settings the impact of rewards may be mitigated by cultural norms that put different values on working for the good of the group (O’Hara-Devereaux and Johansen 1994: 60). In absence of clear direction, this study proposes to test the following hypothesis:

- H1—Reward systems designed to reward individuals will not positively motivate dispersed team performance effectiveness.

As with rewards, there are deep disagreements over the effect of diversity (Guzzo and Dickson 1996). The more traditional view identifies diversity as variety in race, gender, and national origin. Variety or heterogeneity has been named as the source of barriers to team effectiveness (Baugh and Graen 1997) and as negatively associated with “group social integration” (O’Reilly, Caldwell, and Barnett 1989; Harrison, Price, and Bell 1998).

Alternative views are taken by scholars such as Jackson (1991, 1995) and Harrison, Price, and Bell (1998), who differentiate among types of diversity.

Jackson describes two categories as observable and underlying, while Harrison, Price, and Bell label these attributes as surface level (race, age, and gender) or deep level (attitudes, beliefs, values). They maintain that certain characteristics such as race, age, and gender are observable, while other characteristics, such as education level and functional background, are not observable. As people work together, the importance of a category of distinction shifts: Surface-level characteristics diminish in importance as work group members continue to interact, while dissimilarity in deep-level attitudinal characteristics, such as job satisfaction or organizational commitment, increasingly impacts group relationships. Pelled, Eisenhardt, and Xin (1999) describe diverse characteristics in terms of their relationship to the work being performed. Job relatedness is the factor that determines whether a characteristic might be more likely to lead to task conflict in a group. Task conflict may have a positive affect on performance: “Exposure to opposing points of view encourages group members to gather new data, delve into issues more deeply, and develop a more complete understanding of problems and alternative solutions” (11).

These findings lead to the idea that “different types of diversity have different effects” (16), and this is most interesting when applied to dispersed teams. It appears that traditional diversity, while inherent in globally dispersed teams, may not have the negative impact originally espoused by some scholars. This study tests the following hypothesis:

- H2—Diversity in race, gender, and national origin, as traditionally defined, is positively related to team performance effectiveness.

Although all employment systems have some form of accountability in the form of lines of accountability (Kraines 1996), dispersed teams often are accountable

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to both local and global authorities. This can be a source of tension and a barrier to team performance effectiveness. Ferris et al. (1995) state that individuals face internal as well as external accountabilities. Externally “in organizations, accountability implies a system of rewards and sanctions for conformity to organizational standards, or a control system” (176). Accountability relationships affect how people approach their tasks and set goals in the workplace (Frink and Ferris 1998). Further implications of accountability include the idea that performance is reviewed and that rewards or punishments will be contingent on that review. People conform to standards or expectations that are linked to organizational structures of reward or sanction. These considerations imply the following hypothesis:

- H3—Clear organizational lines of accountability will have a positive effect on team performance effectiveness.

Dispersed teams rely far more on mediated communication than do collocated teams. Lipnack and Stamps (1997) call this the use of links, defined as the use of multiple media for boundary-crossing interactions that may evolve into trusting relationships. While this definition may be a bit optimistic, team member interactions and the use of communication media is a serious issue for those who are working with virtual teams. It is much more difficult to develop interpersonal ties of credibility and trust when communication is not face-to-face, but is mediated by some type of electronic interface.

In their study of group cohesiveness, perceptions of group interaction process, and satisfaction with group outcomes, Warkentin, Sayeed, and Hightower (1997) looked at teams of undergraduates who completed a task either face-to-face or using

computer mediated communication systems (CMCS) in a controlled experimental setting. The face-to-face teams reported stronger relational links on all three variables than the teams using CMCS. The concern raised by this study is that teams using mediated communication are not able to establish relational links that help create trust in the team and generate satisfaction with the process.

Hollingshead and McGrath (1995) have suggested that dispersed teams might benefit from team building face-to-face at the startup of the team so the impact of technology might be modified. Technology can either aid or hinder a group in developing successful patterns or processes for interaction and completion of its task. Technology changes the group interaction and the experience of the people working in the group. For organizations one concern may need to be whether the experience of working on a dispersed team still allows the optimal expression of the skills each team member brings to the job.

The issues of trust and communication are also at the core of a series of works by Jarvenpaa, Leidner, and Knoll. This work explores the question of whether trust can exist in virtual teams, where there is a “lack of shared social context” (Jarvenpaa and Leidner 1998: 3). The “catch” in this situation is that trust is even more essential in virtual teams than in face-to-face teams, because it prevents the creation of psychological distance from augmenting the effect of geographic distance (Jarvenpaa, Knoll, and Leidner 1998: 30). Virtual teams need to pay close attention to their communication behaviors. This study tests the following hypothesis:

- H4—The use of mediated forms of communication such as email and telephone conferences rather than face-to-face communication is negatively related to team performance effectiveness.

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Locke and Latham (1990) report that goals are effective for individuals because they indicate the level of performance that is acceptable. Clear goals establish a minimum acceptable performance level, while ambiguous goals do not indicate the range of appropriate performance. Hackman (1990) emphasizes the importance of goal clarity for groups. In groups, ambiguity surrounding the definition of acceptable performance may be compounded, because several goals operate simultaneously: each team member's individual goal, the team member's goal for and within the group, and the group's goal for and within the organization. As O'Leary-Kelly, Martocchio, and Frink (1994) note, "In view of the existence of these numerous and potentially inconsistent goals, it is likely that goal specificity is also critically important to the group goal effect" (1286).

Steiner (1972) also suggested that groups are often less than maximally effective because of such process losses as poor coordination and differing group member perspectives concerning the correct pattern of collective action. These process losses may be exacerbated by the condition of dispersion. The type of group and the time period over which the goal effect is studied are also important in assessing the generalizability of the group goal effect. Most definitions of the term "group" suggest a collection of individuals with a shared past and an anticipated, shared future (McGrath 1984). Dispersed teams fit McGrath's definition and often have "numerous and potentially inconsistent goals" (O'Leary-Kelly, Martocchio, and Frink 1994). These considerations imply the following hypothesis:

- H5—Close alignment and clear understanding of the shared goals of the team (goal clarity) among members of the team and organization is positively related to team performance effectiveness.

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Hackman (1987, 1990) establishes three criteria for work group effectiveness: group effort, the knowledge and skill of group members, and the appropriateness of the performance strategies the group chooses. In other words, he states that effectiveness is based in a system that counts social and personal interactions and decisions as critical to performance. He uses cross-training, or the sharing of work-related knowledge and creation of interdependence, as an illustration of the way the system reinforces these criteria (Hackman 1987).

Hackman tries to capture the process of knowledge creation or collaboration within the group. He supports the idea that group members can learn from each other and foster collective learning or group outcomes different from those obtained by the individual members working alone. While collective learning is one of the great strengths of collocated teams (Cutcher-Gershenfeld et al. 1998), it is likely that in dispersed teams the opportunities for collective learning stretch across many locations. In one firm with many sites, a professional or organizational culture can develop that provides deep roots of shared knowledge.

Participation is tied to building relationships among team members, drawing on the deep base of shared knowledge that resides in the team members, and creating new solutions or knowledge from the collaborative efforts of the team. Engineers (the majority of the sample in this study) acquire, disseminate, and store technical knowledge using knowledge management techniques such as intranet databases and concurrent engineering (Jones and Jordan 1998). Knowledge is shared and embedded in a dispersed team through interaction, training, professional skills and experience, as well as through participation in groups. It provides a basis for

the ongoing creation of additional knowledge. This study tests the following hypothesis:

- H6—Embedded knowledge and skills, such as a shared educational background, professional training, or experiences among members of the dispersed team are positively related to team performance effectiveness.

Leadership in teams has been emphasized by many researchers. Katzenbach and Smith describe the strategic and visionary role of organizational leadership in developing teams that perform effectively (Katzenbach and Smith 1992). The style and skill of leaders are important elements in the motivation and direction of teams. New and more flexible "transformational" leadership styles, such as leading the networked organization, have become topics of study.

Group leader skills also influence effectiveness. Groups with leaders who are more skilled at coordinating and directing group activities or at communicating with superiors often perform more successfully than those with less skillful leaders. Katzenbach and Smith (1993) report on a number of leader-performance relationships. Langfred and Shanley (1997) report that while "group leader skills may help preserve group performance in a status quo situation, they will also enable the group to survive and prosper during major organizational changes and transitions, such as from restructuring, mergers, and acquisitions, and joint ventures" (362).

Leadership also impacts the belief a group develops in its ability to perform well. From a study of manufacturing teams, Little and Madigan (1997) have come to believe that efficacy has been conceptualized as operating at the collective level and that it would motivate team behavior. This collective belief would be

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influenced by the team's experiences of success or lack of success, comparison to other teams, and persuasive leadership. Leadership, in conjunction with contextual factors such as incentives, possession of necessary skills, and shared goal clarity has great motivational potential (Little 1997). Wageman (1997) agrees with the importance of leaders but believes that their role changes at various stages of the team's life. Given the importance of leadership, this study tests the following hypothesis:

- H7—The involvement and direction of leadership in team activities and tasks is positively related to team performance effectiveness.

Organizational support in this study was described as more than resources, training, and time. It was a sense that the project was regarded as important at the highest levels of the organization. High regard can be implied through high-level championship of the project and recognition of project contributions to organizational goals. Alignment between the initiative and strategic organizational decisions can reinforce other types of organizational support.

Mohrman, Cohen, and Mohrman (1995) describe organizational support systems as guiding the nature and the quality of the processes that take place in the organization. They outline two types of processes, "integration processes (communication, decision making, and direction setting) and performance management processes (defining, developing, reviewing, and rewarding performance)" (298). This distinction is critical because it allows the separation of human resources policies, such as compensation and rewards, from the processes that allow alignment within the firm.

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Kirkman and Rosen (1999) also suggest a duality in which the team's sense of importance or potency, combined with external leadership support, social support, and team-based human resources policies together create a sense of empowerment and commitment that leads to greater performance effectiveness. Organizational support may take many forms, but it is clearly an element that affects performance. At higher organizational levels, corporate strategies and leadership decisions reinforce the importance of the team's goals and tasks. The importance that higher level management attributes to an initiative is communicated in many ways, and the message is heard at every level of the organization (Guzzo and Noonan 1994). This study tests the following hypothesis:

- H8—Organizational support has a negative relationship to team performance effectiveness.

Subjects

The participants in this study are employees of Visteon, an auto parts producer that was until 1997 an internal component supplier of the Ford Motor Company. Visteon employs approximately 82,000 people in 125 locations in 21 countries with estimated sales in 1999 of \$18.2 billion (The Auto Channel 1999). Executives at the highest level of the company are interested in increasing the effectiveness of globally dispersed teams. They recommended study of the teams within this internal electronics division project. Five teams were selected from the nine that comprise the project group within the Copy Exactly Initiative. The initiative was designed and has been in existence since 1997.

The name reflects the task of the team, which is to ensure that electronics manufacturing technology and processes are duplicated exactly across all the plants

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within the electronics division at Visteon. The Copy Exactly Initiative is organized in a traditional hierarchical manner (see Figure 3.2), both horizontally and vertically, within the Visteon structure. It includes top-down involvement of executives, managers, and engineers, as well as lateral involvement across the Dearborn headquarters staff and the seven plants in the division. There are nine major Continuous Improvement Teams (CITs) organized by process focus within the Copy Exactly Initiative. In addition, there is a Management Review Committee (MRC) of executives, middle managers, and plant managers. Also of particular interest is the Core Team, which is comprised of supervisors and managers at the division or plant level who serve as champions for the project as well as coaches for the Continuous Improvement Teams.

For the purposes of this study, Visteon management in Dearborn was asked to select four of the CITs to participate. One criterion was set for team selection. Management was asked to include both teams that were performing effectively and teams that were performing less effectively according to Copy Exactly performance metrics.

Copy Exactly has two main metrics: participation and percent matching. These two metrics represent two important elements of a team's performance and overall effectiveness in the initiative. Participation refers to the attendance of members at team meetings, while percent of match is the shared level of procedural and technological consistency in printed circuit board manufacture across the seven sites. Participation is a critical part of the team's performance, since people cannot make contributions or facilitate the flow of information as capably if they are not present.

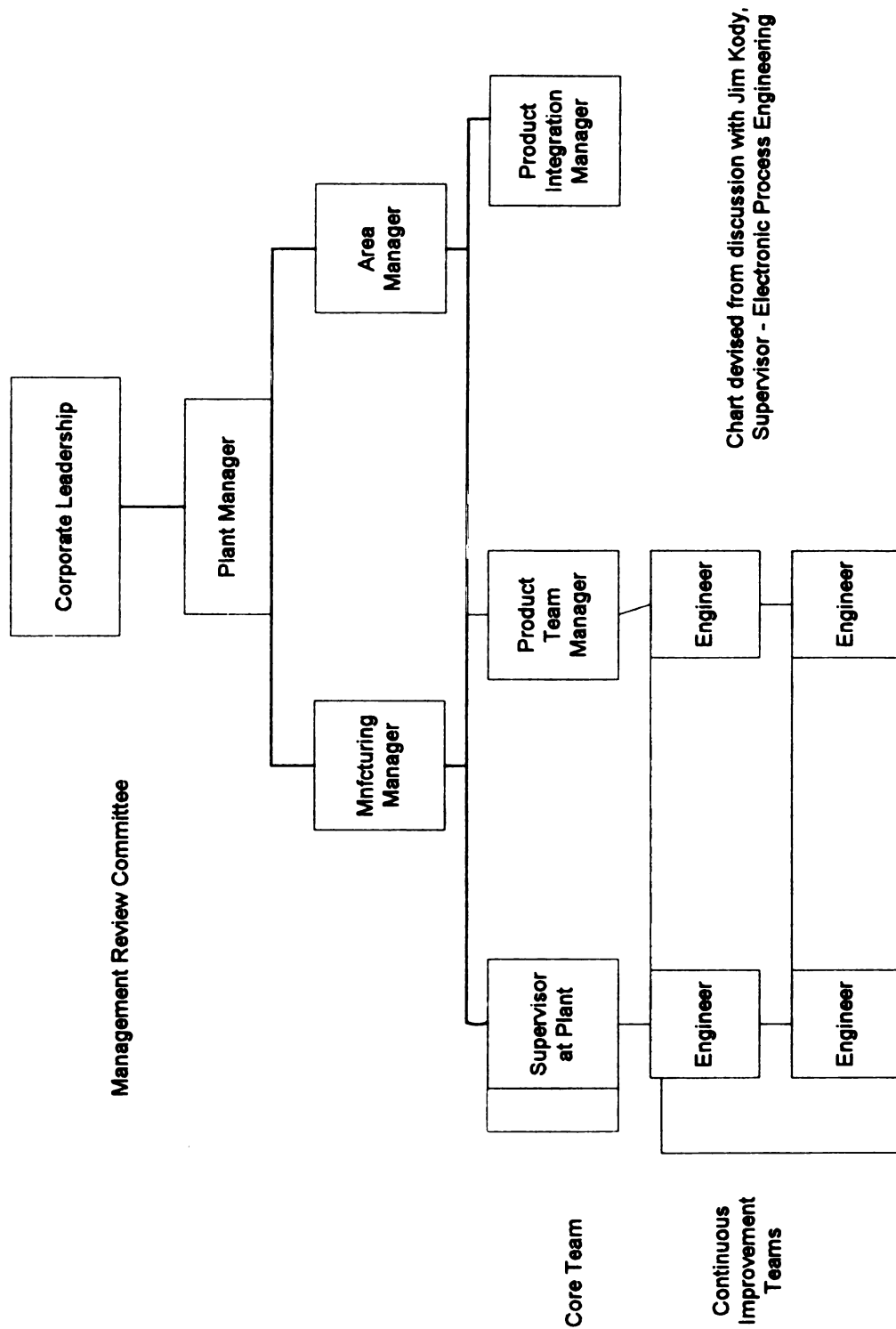


Figure 3.2: Copy Exactly Hierarchy

Percent of match for each team is different, since each team deals with the details of a separate aspect of circuit board manufacture. Members of each team consensually develop matrices for the manufacturing segment assigned to the team, then work to make the changes necessary to accomplish these goals. The plans include process and equipment selection recommendations called best-known methods (BKMs).

Each team member reports his or her plant's achievements on these two metrics during face-to-face meetings scheduled two to four times a year. The level of alignment is registered and reported. An overall team average is created and reported to the Core Team, whose members report progress to management at the division level. While these two metrics allow the company to measure team progress, the metrics are too broad to be of genuine use in this study. Initially the research design of this study included comparison of levels of team performance effectiveness using the company metrics and metrics derived from study results. Potentially this would have provided a comparative tool to see if teams ranked as more effective on the measures in the study are also effective on the company's metrics. This comparison was not possible since the company did not provide the team scores on the metrics.

The participants in this study are dispersed across eight locations—plants in seven countries and headquarters in Dearborn. They are located in “home locations” where team activities form varying proportions of their daily responsibilities. Each “home location” selects engineers to serve as team members. Selection is based on expertise in specific focus areas (such as surface mount placement, solder, design rules, etc.).

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In addition to the Core Team, the four teams selected include the Printer/Oven CIT, the SMD Placement CIT, the Design Rules CIT, and the Wave/Selective Solder CIT. Each of these teams is designed to have eight members and one coach. Each of the eight plants that originally constituted the Electronics Division was to provide one member on each team. In practice the teams frequently did not have a full complement of members but only one of the teams in the study had two members from the same plant. Engineers with the necessary expertise can also be members of up to two teams at the same time. Membership varies both in numbers and in actual individuals on the team, as individuals shift jobs within the company or are assigned to other duties. The frequency of change is not predictable.

In addition to CIT members and coaches, this study also includes participants who are not directly members of the team, but who have other functional roles, such as engineering consultants, manufacturing managers, and plant managers. Wherever possible, individuals at each plant in each of five categories were interviewed: Core Team member, CIT member, representatives of functions (such as production) that support or are supported by the team, mid-level plant supervision (such as Area Managers or Product Team Managers), and plant manager. Individuals in comparable roles were interviewed in Dearborn.

Due to the constraints imposed by geographic dispersion, not all members of each team were interviewed. The team members at Visteon Electronics Technical Center (ETC) in Dearborn and at three of the seven plants were interviewed. The plants also were selected with the goal of including both well-performing and less well-performing sites from among the entire group. As stated above, the plants are rated by the same metrics as the teams: attendance or participation and percent of matching. The

four sites visited were the North Penn Electronics Facility near Philadelphia, Pennsylvania, in the United States, Altec near Chihuahua, Mexico; Markham near Toronto, Canada; and the Design Factory or Advanced Manufacturing Unit at the Visteon Electronics Technical Center in Dearborn, Michigan, in the United States.

For the web-based survey, the participants were all the members of the Copy Exactly Initiative, as identified by management in Dearborn, as well as all those who were interviewed. In addition, engineers who work closely with the design rules team and in several plants were subsequently asked to fill out the survey. These people provided additional strength to the group of non-team members who inhabit the team's environment. The final response rate was 76%—or 55 responses from 72 participants.

Data Collection and Instrumentation

The qualitative and quantitative elements of the research design for this study are aimed at facilitating a study of globally dispersed teams that combines the examination of factors traditionally studied in collocated teams with the scrutiny of elements aimed at furthering an understanding of the differences that might be found in dispersed teams. The primary methodology, the case study, is complemented by two brief and one more lengthy survey assessment tools (see Appendices A and B). In addition, an interview protocol was developed, using Hackman's (1990) team performance effectiveness characteristics as a base (see Appendix C). Although there is a relatively small base of empirical work to date on characteristics of effective dispersed teams, the existing literature provided further background for interview

questions, as well as for survey assessment tools (Knoll 1995; Townsend 1996; O'Hara-Devereaux 1994).

In this section the five distinct data collection points are identified and described.

- **Part A:** observations of multi-day face-to-face meetings of five teams with members from eight globally dispersed home locations. Each team is tasked with specific subsets of the overall initiative goals.
- **Part B:** interviews with team members of five teams with specific subsets of the overall task, as well as with participants from managerial and support sectors of the organization across four sites (N = 30).
- **Part C:** administration to each of those interviewed of two short surveys designed to gather information on perceptions of resource availability and frequency of communication using mediated modes of communication.
- **Part D:** a web-based, electronically administered survey sent to the entire Copy Exactly Project roster, as well as to all those who were interviewed (approximately 75 people).
- **Part E:** archival data on past performance, i.e., team reports on the Copy Exactly metrics, cost savings, and examples of the matrices being developed in the teams.

Part A: A series of multi-day observations of the face-to-face meetings of each of the selected teams provided a large portion of the data for the case study. In addition, a trip to the face-to-face meeting site also included a site tour and opportunities to gather more details and other information, such as newsletters. At several team meetings, there were also opportunities to join team members in the evening for dinner or at some social event. Although this was not formal observation time (i.e., no overt note taking), these informal experiences enhanced the more formal observations.

Each team was observed during its face-to-face meeting. These meetings lasted from three to five days depending on the agenda. Attendance at most

meetings was quite good, although a couple of teams were smaller than usual due to absences for a variety of reasons or open positions that had not yet been refilled.

Often other participants from the host location, such as managers, engineers, members of other teams, or executives attended part or all of the meetings. In addition, engineering or technical specialists from Dearborn, Core Team members, or supplier representatives were at times invited to attend.

The formal face-to-face sessions allowed the researcher to observe the following items with each of the selected teams:

- how the team interacted,
- the topics important to team tasks,
- the exchange or diffusion of information among team members,
- creation of new knowledge and the interplay of shared knowledge among members,
- the interplay of aspects of cultural diversity such as language,
- the roles of the team leader and team members,
- elements of meeting organization,
- the relationships between teams and their customers or suppliers, and
- the relationship of the team to the organizational hierarchy within which it existed.

No interviews of team members were done during these observation sessions to minimize the influence of the researcher's presence. Observation notes (in all but one case) were typed directly into a laptop computer. No tape recordings were made. Handwritten notes taken during tours or after hours were transcribed as soon as practicable.

Part B: A second fundamental data source was a series of interviews with team members and other selected participants. The interviews were structured by an interview protocol that was developed from Hackman's (1990) team performance criteria (see Appendix A). Participants were asked to comment on team selection, roles, details of team meeting procedures, team task and goal, what helped team

success and what did not, leadership's role, metrics, diversity, rewards, other experience on teams, and lessons learned. The interviews were planned to last an hour to an hour and a quarter. The interviews took place in the work setting, at the interviewee's desk, if no more acceptable alternative, such as a private conference room or the cafeteria, was available.

Wherever possible, individuals at each plant in each of five following categories were interviewed; Core Team member, CIT member, representatives of functions (such as production) that support or are supported by the team, mid-level plant supervision (such as Area Managers or Product Team Managers), and plant manager.

In most cases the participants were asked all the questions. In a few cases it was not appropriate. For example, since the plant managers were not team members, they would not be asked how they were selected for the team. They might instead describe how team members were selected (if they were involved in that selection process).

Interviews were not tape-recorded. Notes were taken by hand and transcribed later. In total 30 interviews were done. Prior to each interview, the researcher discussed issues of confidentiality with participants, who then completed permission forms agreeing to be interviewed and allowing use of their comments. In addition, each participant interviewed also filled out a one-page demographic information sheet (see Appendix D), which collected individual data on a range of demographics including age, job title, years with the firm, educational level, languages spoken, and international work and living experience.

Part C: After each interview, participants were asked to complete two short assessments. In general, the interviewees are quite similar to the larger group. One difference to note is that the three interviewees who do not report an engineering background are in the group of managers. A brief overview of the demographics of the interviewees shows:

- all but one are men,
- 70% are between 31 and 45 years of age,
- 43% have lived overseas,
- 50% have worked overseas,
- 36% speak only one language,
- 27 of 30 are educated as engineers, and
- they average 12.25 years for their current employer.

These data differ from the demographics compiled in the case study in Chapter 4 because those data refer to the larger sample of people who responded to the survey.

The short assessment tools were administered together on one sheet (see Appendix A). The first assessment entitled “Resources” is designed to discover how participants at the plants, in their various team-related roles, perceive the availability of resources for the team. The list of potential resources includes items compiled from the academic and practitioner literature on teams, from discussion with outside experts, and from input provided by Visteon personnel who know what resources may be available. Participants were asked to decide among three conditions: if they believed that the team needs much more of a specific resource, has enough, or needs less of the resource.

Scores are tallied for each resource in order to create lists ranking the resource for each plant and each team. In addition, these scores are compared for team members and those who are in support or related roles as well as by facility to see whether different groups perceive resource availability differently. This

assessment provides insight into team needs and team member's opinions regarding the effect of resource availability upon team success. Availability of resources, such as time for face-to-face meetings, is an important aspect of group formation and performance (Lipnack and Stamps 1997; Hackman 1990).

In the second assessment, entitled "Communication" each participant was asked to estimate the frequency of his or her use of various types of communication. The list of communication types was compiled from the literature describing the types of communication normally used by dispersed teams, as well as from sources within Visteon (Lipnack and Stamps 1997; Mankin, Cohen, and Bikson 1996; O'Hara, Devereaux, and Johansen 1994). Communication linkages are critical for the operation of a dispersed team (Jarvenpaa and Leidner 1998). Since dispersed teams do not see each other on a regular basis, their work must be done electronically through modes that include phone, videoconference, or email. Analyzing communication patterns can provide insight into the interactions among the team members.

Part D: The final data collection that involved participants directly was a survey administered to all those interviewed and to all additional members of the team. The 68-item survey contains both items informed by previous research as well as new scales developed by the researcher for this topic area (see Appendix B). Seventy-two participants received the survey via email. Participants could mark their answers on an email reply message or they could go to a website and take a web-based version. The email versions (11 of 55 responses) were returned with an address so they were not anonymous replies, while the web-based responses (44 of 55) were anonymous.

The survey instrument contains a series of scales that reflect topics derived from Hackman's (1987, 1990) team performance effectiveness model, topics that were shaped by the concerns participants raised during the interviews, and topics from the combined academic and practitioner literature. This decision was reached after careful analysis of existing work on dispersed teams. The goal was for the survey to provide support for the findings from the quantitative data and to push the boundaries of research done to date on dispersed teams.¹

The items developed for the survey were written and revised through several iterations. Revisions emerged from further exploration of the existing literature, in particular the more practitioner-oriented work focusing on field work (Coutu 1998; Crandall and Wallace 1998; Fisher and Fisher 1998; Lipnack and Stamps 1997; O'Hara-Devereaux and Johansen 1994; Schrage 1995). Revisions were also driven by the outcome of several Q-sort procedures. The small potential sample size precluded a pretest; i.e., there were not enough participants to permit both testing and administration of the survey.

All the questions on the survey were answered using a five-point Likert scale: 1 = strongly agree, 2 = somewhat agree, 3 = neither agree nor disagree, 4 = somewhat disagree, and 5 = strongly disagree. Subsequently, some items were reverse coded for analysis; and those items in the following list are labeled (r) to identify them. Eleven scales were constructed from the survey items. Reliability tests were run on each scale prior to further analysis, although the small sample size

¹ Items from this survey have been adapted and used in surveys in the MIT Systems Design and Management Master's degree program, in the MIT Global Teams Research Project, and by at least one PhD student in the MIT Engineering School.

may impact the reliability test results. A brief description of the constructs (variable names and reliability scores in parentheses) and the items used to form the scales follow.

Originally it was hoped that respondents to the survey would be sorted according to their membership in individual teams, role groupings such as team leader, or organizational role such as manager. One set of questions was inserted in the survey to be answered only by team members. Questions 60 through 66 were to be answered by members of the individual teams and the Core Team (see Appendix B). Analysis of the survey responses indicates that these questions were answered by some respondents, who did not indicate in the demographics that they were members of either a CIT or the Core Team. Although this aspect of the analysis was discarded, subsequent analysis reports sample sizes that vary due to this aspect of the research design.

The questions that form the diversity (DIVERST - $\alpha = .61$) scale are all related to aspects of diversity in the Copy Exactly Initiative. Due to the global nature of the project's structure, diversity of national origin and race is inevitable. The literature on global teams highlights the potential for traditional diversity factors to be a problem. Current findings in the diversity literature point to the increasing importance of what might be termed non-traditional factors, such as competency and experience. These questions attempted to capture some of these topics.

10. Language is not a barrier to Copy Exactly Team success.
11. Team members of different countries do not work well together on the Copy Exactly Team. (r)
12. The variety of skills among Copy Exactly Team members complements each other.

13. Variation among people on the Copy Exactly Team helps create better solutions.
14. Cultural differences hinder Copy Exactly Team performance. (r)

One of the more serious concerns for companies and team members involved with globally dispersed teams is the effect of lines of accountability (ACCOUNT - $\alpha = .56$). Dispersed teams are established for strategic organizational level initiatives, but these teams are staffed by people who work and report to local-level managers. This situation can lead to tensions and affect individual as well as team performance, if team members cannot balance the demands of different hierarchical levels.

15. The work of the Copy Exactly Team is an important priority to plant management.
16. The Copy Exactly Team is accountable to the highest levels of company management.
61. I cannot focus on Copy Exactly Team work when my boss wants other work completed first.

The rewards and recognition (REWARDS - $\alpha = .49$) that people receive for their work is generally considered a critical motivating factor. While there are very few detailed plans for compensating or rewarding global team members as individuals or as a team, scholars and researchers all discuss the importance of this factor. It was an essential topic in the interviews done with participants in this study, and the results of those interviews pointed to the inclusion of this topic on the survey to corroborate the findings.

17. Work on the Copy Exactly Team is not linked to the compensation I receive from the company.
19. Any rewards I receive for my work with the Copy Exactly Team must come from my immediate supervisor.
21. No matter how global the focus of some of my work is, it's what I do locally that gets rewarded.

The main dependent variable in this study was team performance effectiveness (EFFECTIVE - $\alpha = .84$). Effectiveness is important for any corporate entity, but for globally dispersed teams it becomes an especially crucial issue. The team members may have to meet differing sets of expectations and measures at the different organizational levels at which they operate. For example, in the Copy Exactly Initiative, plants that used resources to commonize their processes and equipment might optimize corporate gain and suboptimize local interests.

This set of questions tries to capture some of the ways that global teams can perform effectively that were different from the metrics used by the company. Those metrics looked at very tangible factors, such as percent of commonization of equipment and process and cost savings. Teams had other types of “products” that were less tangible but equally important to effectiveness. For example, was the team able to build enough common language, experience, and trust to make decisions quickly and well? The members of the CITs were beginning to call each other and help each other resolve problems. This was an important part of the cost-saving process that was not part of the formal measures. The questions in this scale try to answer the effectiveness question from both a tangible and an intangible perspective.

22. The Copy Exactly Team solves complex problems.
23. The common process for selecting equipment devised by the Copy Exactly Team saves individual plants a lot of money.
24. Time to market for electronic products is being reduced through the work of the Copy Exactly Team.
25. The Copy Exactly Team makes fast decisions.
26. Copy Exactly Team decisions are of high quality.
27. An important information-sharing network has been created among members of the Copy Exactly Team.
28. The longer the Copy Exactly Team members work together, the more smoothly the team functions.

Goal clarity (GOALCLAR - $\alpha = .64$) has been identified as a critical element of team performance effectiveness (Hackman 1987; McGrath 1984; Steiner 1972).

Participants in the interviews commented that there were frequently gaps in understanding the goals of the initiative at different levels of the organization.

These questions are aimed at discovering how the participants perceive the alignment of understanding of the initiative's goals.

36. My boss understands the goals of the Copy Exactly Team.
37. All members of the Copy Exactly Team agree on the team's goals.
38. Top management understands the goals of the Copy Exactly Team.

One of the critical aspects of global team success over the long term is how well the efforts of the team are supported by the decisions and activities of strategic-level executives and policy makers. This organizational support (ORGSUPPT - $\alpha = .73$) refers to the alignment of organizational policies, structure, and priorities and how that supports team performance. For example, a decision to create a decentralized structure of individually responsible business units makes it increasingly difficult for a team that is trying to achieve commonization across the company. In this study, aspects of organizational support have been divided into two categories—integration processes and performance management processes (Mohrman, Cohen, and Mohrman 1995). This scale is measuring the effect of integration processes. These questions try to assess the ways members of the organization perceive this factor.

30. The company does not understand what the Copy Exactly Team needs to be successful. (r)
31. The company needs to learn how to manage teams as well as individuals for efforts such as Copy Exactly to be effective. (r)
32. The Copy Exactly Team is a global initiative but the company has no global structure of policies and procedures to support it. (r)

One very different characteristic of globally dispersed teams is their geographic and temporal separation. In order to communicate and operate as a team they must rely on electronically mediated forms of communication (MEDIACOM - $\alpha = .6983$). Communicating via email, telephone conference, or videoconference is very different from face-to-face communications. This difficulty can be increased by differences in time zones as well as in native languages. These questions represent a first attempt at trying to capture participant perceptions of these differences and to begin to discuss them in terms of organizational learning (Goodman and Darr 1996; Barker and Camarata 1998).

In addition, interviews indicate there is a difference in the types of tasks that get accomplished and the levels of perceived success achieved during different types of meetings. It may be an important part of team effectiveness training if different modes of communication facilitate different types of tasks. Mediated communication also affects the creation of personal relationships and bonds of trust that are important for effective performance on all teams but even more difficult for dispersed teams to build.

40. The time the Copy Exactly Team spends at face-to-face meetings is key to team effectiveness.
41. During teleconferences the Copy Exactly Team work is less creative and more routine than it is during face-to-face meetings.
42. Time zone differences are easily overcome by electronic communications.
43. The team has learned how to develop personal relationships while using electronic media.
44. Copy Exactly Team members get the most accomplished when they meet face-to-face.

The dilemma for team members about leadership (LEADERSHP - $\alpha = .81$) is similar to the issues raised about accountability. Several levels of leadership are responsible for the team's activities. In some cases it is clear that the leadership has ownership in the project and is actively creating an environment in which the project can be successful. In other situations, there appear to be some mixed messages and motives at work. These questions endeavor to discover how participants at all levels perceive the roles of leadership in this situation.

46. The Copy Exactly Team is more successful because team leaders actively work to remove barriers.
47. Coaches on the Copy Exactly Team help members to learn how to work together effectively.
48. Company leadership and the Copy Exactly Team share common goals.
49. Company leadership is committed to the changes that the Copy Exactly Team makes.
50. Managers responsible for Copy Exactly help link the project to the rest of the company.

As in previous research on how teams create useful knowledge among themselves (Cutcher-Gershenfeld et al. 1998), it was important to assess team member perceptions of the knowledge and information network created by work on the team. These items create a scale called knowledge and skill (KNOWSKL - $\alpha = .74$). This aspect of team-based work is beginning to capture attention as part of the knowledge management efforts of some large companies (Nonaka and Takeuchi 1995; Edvinsson and Malone 1997; Stewart 1997). It is increasingly clear that information and knowledge can provide a basis for greater flexibility, which may then be translated into a competitive advantage (Myers 1996).

55. I never expected a team to generate so much useful knowledge.
56. Working on the Copy Exactly Team gives me access to useful knowledge I can get nowhere else.

57. I never expected to learn as much as I do from other members of the Copy Exactly Team.
58. Working together the Copy Exactly Team creates solutions that I could not create working alone.

Part E: A small portion of the information used in this study was obtained from archival sources within the company, such as data on past performance levels and reports on team activities. In addition, team-meeting agendas were sent out via email to the researcher prior to a face-to-face meeting. When the researcher went out to plants for visits, materials such as plant newsletters and flyers provided details of the local climate and culture.

The company shared data on team performance on the metrics within the Copy Exactly Initiative. These data were complemented by newspaper and magazine articles used to describe the general competitive climate and events in the company's history.

Language and Cross-Cultural Research

One final issue must be addressed in this section on instrumentation. Although the participants in this study live and work in eight different locations, they interact in English. All survey materials are written in English, and all interviews were conducted in English, since that is the common language of the team and the corporation. Despite this fact, cultural and nationality differences are compounded by language barriers, which may not even be visible to the participants (Zachary 1998). In general, the team members seemed to have little trouble with language and made allowances patiently when any difficulties arose. It is impossible

to know whether language made a difference in the information gathered in this study, but it is safer to assume that it did.

Data Analysis

Due to the qualitative as well as quantitative nature of the data collected, data analysis must be designed to use the methods that fit the data and the purpose of the study. In this section the analysis plans for both types of data are discussed.

The results from the two short instruments, “Resources” and “Communication” (see Appendix A) are analyzed simply by compiling the scores and frequencies. Each instrument generates a different view of participant perception of these two aspects of the Copy Exactly Initiative teams. The information is of great interest to the company and to the teams, because it may reflect areas where the status quo is adequate, or areas where improvements might help team performances.

The quantitative data collected from the administration of the web-based survey require multivariate analysis. The main analysis tool is multiple linear regression analysis. Regression analysis is most useful in investigating whether relationships exist between the variables and what the magnitudes of the effects might be. Given the theory building nature of this study, the primary focus is to discover the most useful model for predicting the dependent variable, team performance effectiveness.

Hackman and others who have studied collocated teams have determined a series of factors that they believe are essential for performance effectiveness. In this study a selected group of those factors are considered: goal clarity, rewards,

leadership, and diversity. A series of factors are identified that may differ when studied in dispersed teams: mediated communication, organizational support, accountability, and knowledge and skills. It is important to discern how these variables affect performance effectiveness.

The scores of individuals at each of the study locations were also scrutinized. Here again the average or mean scores for the locations were compared to their scores on the corporate metrics of participation and percent of match. Locations that rank higher on the corporate metrics also score above average on the survey results.

Analysis of this data is limited by the sample size ($N = 55$). Although 76% of those surveyed responded, the population for this study was constrained by membership on the teams at the time of the survey. In fact, for one team there were only two respondents, so while those scores can be used in analysis of the total sample, any analysis of team scores was precluded. These small numbers impact the results of statistical analysis.

A separate issue that impacts the sample size is the result of research design. Initially the design called for comparison of scores across groups of respondents such as team members, managers, or people in related support functions. One section of survey questions, numbers 60–66, was to be answered by team members only with the goal of seeing whether responses differed across groups. The actual pattern of responses on the survey combined with the overall small sample size forced a change in research design as well as caused variance in sample sizes in the results.

In the qualitative analysis, data were, of course, used in the construction of the case study that is part of this overall research study. The details of site visits,

physical surroundings, and other elements of the teams' environments were described. Data from observations, interviews, and records such as newspapers or magazines were used to animate and enrich a description of the interactions, relationships, tensions, and successes of the people inside and near the Copy Exactly Initiative.

Further qualitative data analysis followed the traditional iterative process of studying and refining the data. Initial coding of the data was framed by the variables inherent in the structure of the interview protocol: information about team tasks, goals, roles, selection, performance metrics, drivers and barriers for success, rewards, leadership, lessons learned, and information diffused, among others. Subsequent iterations of analysis attempted to discover the patterns that lie within each of the large blocks of data creating dimensions or subtopics of information to explore. Finding patterns or categories among the data led to further analysis of linkages and interactions with an eye to beginning to build theory.

The broader outlines of the organizational context became visible during analysis of the qualitative data. Relationships are illustrated in comments and interview responses in ways that the rigor of survey methodology precludes. It is a good match to fit the details of quantitative data into the contextual frame of the qualitative perspective. Integrating the results of the various analytical methods chosen for this study results in a "story" that informs discussion and stimulates further questions.

The analysis of the data collected in this study provides some initial insights into factors that affect the performance effectiveness of globally dispersed teams. Some factors were identified that have greater predictability than others. This serves

to drive further research to confirm, discredit, or expand these findings. Although generalizability is limited by the sample size, some effects were found that will lead to further inquiry. Use of the two types of data to compare and contrast findings allows the findings a degree of validity that might not be present under other conditions.

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CHAPTER 4

CASE STUDY: GLOBALLY APPLIED STRATEGY AND LOCALLY EXERCISED EXPERTISE

Transnational organizations have spent a great deal of time and money building global enterprises that are effective in the market and optimize the use of resources. The people of these organizations are asked to undertake new challenges such as the new, dispersed, team-based work arrangements that are the focus of this study. The following case study examines the dispersed teams of one global initiative as they work within this new system. This story is based on interviews and observations with team members and archival data from the teams and the firm.

Investigating the context within which the teams operate deepens one's understanding of the individual data gathered in this study. Factors in the environment external to the teams and company are a powerful influence both on the strategies and tactics of the firm and on the activities of the team. Internally one of the most interesting aspects of globally dispersed teams is the fact that they operate across local and global organizational levels. At the team level, complexity increases as the team members work together electronically and periodically face-to-face for they create shared knowledge and interests that can and do conflict with the local interests that form the day-to-day responsibilities of each individual team

member. The interaction of the details at all these levels is at the core of the following story.

Of primary interest in this study is the effect of factors within the organizational environment factors on the performance effectiveness of globally dispersed teams. Up to a point, as we have seen in Hackman's model, dispersed teams have much the same needs as collocated teams. They need material resources, clear goals and objectives, leadership, trust, and the opportunity to complete their tasks. Each of these factors exists for the teams in this study, but the impact of geographic separation and different home locations is very great and difficult to overcome. Indeed, most organizations have not yet fully recognized the profound impact of geographic dispersion.

For example, few employment relations policies and procedures support the work of global teams at any level of the company. Team members are generally governed by the policies in effect at their home location. These policies are certainly shaped by legal and cultural issues unique to each country within which the team members live. Local employment relations often do not support global strategies: at the Altec plant, to cite one example, the Copy Exactly engineers are very conscious that they are not Visteon employees and do not have the benefits of the same employment relationship as other members of the team.

The lack of global corporate integration can also be seen in the complaints of a manager at the North Penn plant about the difficulty of retaining qualified engineers, while at the same table, his counterpart from Arbor in Brazil relates how engineers there had just been laid off. The lack of alignment in human resource

activities is only one example of the current levels of dissonance that global business is creating for these employees.

Discrepancies also arise from of the general lack of explicit mechanisms to diffuse the information and knowledge generated by dispersed teams throughout the corporation. When teams work on a shared task, they create a unique base of shared knowledge that allows team members to work in their home locations with a global view of corporate activities not available to people at all levels of the company. This shared knowledge base is one team product that as yet cannot be measured or rewarded. Few formal opportunities exist for information generated by the team or in team activities to flow to home location supervisors or managers who are not members of a small group of supervisors associated with the project (see below, the Core Team). The lack of shared information can cause disruption and misunderstandings that act as barriers to achievement of corporate goals.

This case study will offer a glimpse of some of the complexities facing the globally dispersed teams of the Copy Exactly Project and their employer, Visteon. The locations visited for this study include the North Penn Electronics Facility in Lansdale, Pennsylvania, United States; Altec Electronics in Chihuahua, Mexico; the Markham Electronics Plant in Toronto, Ontario, Canada; and the Electronics Technical Center in Dearborn, Michigan, United States. The five teams are the Printers/Ovens Team, the Wave/Selective Solder Team, the Design Rules Team, the SMD Placement Team, and the Copy Exactly Core Team. The names of the teams derive from the aspect of printed circuit board manufacture that they are responsible for communizing.

The first part of the case will look briefly at aspects of both the global competitive environment and the corporate environment that affect team performance, followed by an overview of the project, a tutorial on electronic circuit board manufacture, descriptions of the study locations, and introductions to the participating teams. In each section, factors that influence team performance will be highlighted.

Perspective on the Global Competitive Environment

The story of the Copy Exactly Initiative is one governed by a strategic decision to strive for super integration in a product line, as well as to improve the performance effectiveness of a globally dispersed team. The story has roots in the history and future of Ford Motor Company. It evolves out of a rich and complex environment about two years before this study began. Visteon was created in response to global competitive forces that pressured the parent company, Ford Motor Company, to establish an independent entity that must adapt to new relationships with its customers and competitors. Three primary factors continue to have critical impact on Visteon and Copy Exactly: restructuring in the global auto supply industry; redirection of internal organizational structures and product strategies; and rapid, successive changes in organizational leadership.

Three Factors Affecting Copy Exactly

Industry Restructuring

An April 1999 *BusinessWeek* article describing the restructuring of the global auto parts industry cites industry executives who predict that “the parts industry will

shrink from more than 1,000 first-tier companies today to as few as 25 well-financed, global suppliers” (Galuszka et al. 1999: 121). This trend began more than seven years earlier, in 1992, when a new leadership team at General Motors announced the consolidation of the automotive parts units into a separate entity, Delphi Automotive Systems. In 1997, Ford followed with the creation of Visteon, the second largest auto parts supplier in the world. (GM’s Delphi is number one, with \$26 billion in sales in 1996 [Versical 1997].)

Product Strategies

A second major trend is the original equipment manufacturers’ (OEM) demand for modular units and components systems. Increases in this trend are forcing parts makers to design and produce systems and subsystems. To build this type of product most effectively, parts suppliers must integrate product lines and manufacturing processes. Product integration became and remains a priority at Visteon (Sorge et al. 1997).

However, production of integrated systems also requires more cooperation between suppliers and OEMs than exists today, according to John Gioia, president of a program management services firm. This cooperative relationship may be problematic for Visteon, since the company has traditionally dealt with suppliers from the perspective of an OEM (Sorge et al. 1997; Fleischer 1998). Success in building better relations with suppliers will also be essential in realizing the maximum benefits from lean manufacturing, especially in terms of faster cycle times and lower inventories. Competitive pressure to be the lowest cost, highest quality, and most responsive supplier can only increase.

The auto parts giants continue to try to acquire an edge in the market by consolidating their advantages. For example, Visteon lost out to Lear in a 1998 bid to buy the Delphi Automotive seating business (Anonymous 1998d). Charles Szuluk, Visteon chief executive at that time, shifted to a strategy that drove Visteon to attain modular or systems capabilities, which he believed would be the core of the industry in the future. Szuluk “predicted that 50 percent of the value of the car will be in electronics in a few years” (Young 1998).

In August of 1999, business and industry sources were full of a potential reverse acquisition of Visteon by the Lear Corporation.¹ The deal, rumored to be a stock swap, would have created a parts supply operation equal to Delphi Automotive Systems. Although Visteon promised the UAW that there would be no spinoffs, many inside and outside of the company believe that the creation of Visteon was a strategic move aimed at the ultimate creation of an independent entity with a destiny that diverged from Ford’s.²

Organizational Change and Restructuring

Organizational change and restructuring have been a consistent part of the story of Visteon. In October 1996, former Ford Automotive Operations president and newly named vice chairman in charge of components, Edward E. Hagenlocker,

¹ The 1998 Delphi purchase made “Lear the world’s No. 5 auto parts maker based on annual sales, behind Delphi; Ford Motor Co.’s Visteon, Germany’s Robert Bosch GmbH, and Japan’s Denso” (McCracken 1999).

² On February 12, 1999 GM sold off the first 17.5% of its shares in Delphi with the rest to be sold this year (Versical 1997). This is an event the import of which could not be lost on Visteon (Eisenstein 1999).

ordered the components operations turned into a self-funding profit center. A month later, the Ford Automotive Products Operations was formed, combining the automaker's four divisions: automotive components, electrical and fuel handling, glass, and chassis (Winter 1997).

About a year later, in September 1997, Ford Automotive Products Operations became Visteon. Employees learned of the change from President Charles Szuluk via global satellite broadcast.³ Visteon was structured into seven divisions and 24 strategic business units (SBUs). Szuluk focused on electronics as the competency that was pervasive throughout the firm and wanted employees to shift to a customer responsive, lean organization. In order to facilitate needed change, employees had to begin to think differently. Among the tactics used to make this shift, Visteon leadership attended classes in how to become a learning organization taught by Peter Senge at MIT (Sorge et al. 1997).

In November, 1997, the efforts to stimulate internal growth and change continued as Visteon benchmarked Dell, Intel, and Hewlett Packard with the goal of radically improving cycle time and reducing inventory (Vasilash 1997). These goals were linked to lean manufacturing through the Ford Production System. Another outgrowth of benchmarking was the adoption of the process used in the Copy

³ The new name is the result of a year's worth of meetings and memos between Ford officials and representatives of subsidiaries of Young & Rubicam. The name is coined from the two words "visionary" and "eon." The name search began in October of 1996 and the new name was announced at the Frankfurt Motor Show in 1997. Szuluk broadcast the announcement via satellite to Visteon employees world wide. The name change was accompanied by the adoption of the new logo of swirling orange dots (Gazdik 1997; Sorge et al. 1997).

Exactly Initiative, which was developed at Intel and adapted to Visteon by people in the Electronics Division.

Throughout the winter of 1997 and 1998, Visteon reacted to external pressures by attempting to develop more markets as well as more products. Among the tactics employed were ventures into theater seating, windshield wiper systems, and components parts acquisitions in Poland and France, as well as new plants or facilities in England, Portugal, and the Philippines (Anonymous 1998a; Anonymous 1998b; Anonymous 1998c; Ott and Sedgewick 1998; Buchholz 1998).

The people of Visteon, coming of age in a highly charged automotive parts industry, had to learn new skills and behaviors at a staggering pace. Customarily, a strong, consistent leadership vision facilitates such corporate change. In fact, the personal experiences and charisma of a corporate leader often drive these visions. Inevitably tensions arise when there is discontinuity between the new strategy or mission and extant components of a corporate identity. In the case of the fledgling Visteon, shifts in corporate leadership removed even this leadership factor as an element of consistency.

Leadership Change

In a company with the heritage and traditions of Ford Motor Company, there is a deeply ingrained culture that reflects and promotes corporate identity. When the corporation needs to change this culture, a former strength can become an obstacle as employees struggle to learn or unlearn the critical elements that make the new initiatives successful. At Visteon, change has occurred rapidly as organizational

structures are re-aligned and leadership positions are filled. These large-scale changes have occurred at a furious pace—every ten to thirteen months.

In September 1997, the newly appointed president of Visteon, Charles Szuluk, announced that the new business entity, Visteon, was to remain an enterprise of Ford Motor Company but actively create its own brand recognition, with an eye to increasing its share of non-Ford business from 5% to 20% in the next five years. Szuluk's background in electronics shaped his business strategies for the new enterprise, which became a virtually autonomous profit center (Winter 1997).

Just over a year later in October 1998, Craig Muhlhauser was promoted to president of Visteon after Szuluk retired. Muhlhauser's experience in marketing in the aerospace industry helped him create a new global marketing force for the firm. At the same time, Marcos S. Oliveira became vice president and general manager of electronic systems, replacing Gary VanderHaagen (Anonymous 1998e). The shift in leadership in the electronics division caused some concern among the Copy Exactly participants, because they were unsure of ongoing commitment to their initiative.

In November of 1999, leadership changed again when Peter Pestillo was named chairman and chief executive of Visteon. Pestillo helped negotiate 1999 contract language that guarantees Visteon's blue-collar workforce jobs and wage parity with Ford employees (White 1999). Pestillo's ability to maintain good labor relations is seen as an asset as Visteon is moving toward the time when it will become an independent company. The Copy Exactly leadership was also affected

by the high-level leadership changes, and the initiative had no budget or corporate 'home' until February 2000.⁴

Despite leadership changes, corporate policies in human resources, labor relations, or compensation and benefits often do not change fast enough to reflect the day-to-day reality of the workplace. In other words, an orange sweater with a dynamic logo might remind an employee that she now works for Visteon, but it is a superficial change, a change that might not really inform her of the critical strategic direction and goals that leadership believes vital to organizational success. This may be especially true if leadership is changing as frequently as it is at Visteon. Rumors fly for weeks or even months that more changes are imminent, which may derail initiatives before they even take hold. Uncertainty and ambiguity make it hard for people to move forward day-to-day with their work, without clear knowledge of the impact these changes will have either on that work or on the security of their positions.

Strategic Alignment

As the history of the company unfolds, it is possible to see the importance of alignment between leadership goals and support or existence of individual strategies like Copy Exactly. The clear path of strategic thinking that provided the impetus for the Copy Exactly Initiative was somewhat diverted when Szuluk retired and Muhlhauser became president. Ongoing reorganizations occurred as leadership

⁴ Ongoing conversations with people at Visteon chronicle the shifts in leadership emphasis and interests. As of February 17, 2000 the Copy Exactly Initiative was now part of Electrical Core Design for the North American Cockpit SBU.

structures changed, and the Copy Exactly Initiative eventually found itself without a budget or specific champion.

Szuluk, and later Craig Muhlhauser, who officially took over as Visteon president in January 1999, were able to make major strides toward their shared goal of making Visteon a stand-alone supplier. One major need was met when, in his 13-month tenure as vice president of sales and marketing, Muhlhauser put together a global marketing division with offices in all the major automotive capitols and a sales staff of several hundred (Sedgwick 1998). Then, in 1998, Visteon booked \$1.8 billion in new business, of which non-Ford business accounted for 45% (Sedgwick 1998).

Szuluk and Muhlhauser shared a belief that the workforce was the one key element in the potential success of their company that had yet to be fully engaged. Both men expressed frustration with the time needed to design, develop, and market a new product (Young 1998). Muhlhauser strongly stated his belief that Visteon people need to “have a sense of urgency” and to think differently so they will act differently (Vasilash 1999). In essence he was saying that the success of the company depends on the proper combination of globally applied strategy and locally exercised expertise.

How this drive to activate local expertise and stimulate a change in work force attitudes will play out is unclear, especially after the recent contract negotiations in which the UAW negotiated job security language for Visteon workers with Ford. Concern over the future of these employees pushed the union to insist on a level of job security for the Visteon workforce. The final agreement allowed Visteon’s hourly workers to remain Ford employees despite any subsequent

sale of the firm within a certain period. Pestillo, current chairman and chief executive of Visteon, has proven expertise in maintaining good labor relations with workers at Ford. He brings this emphasis to his leadership role and will want to continue his good relations with the workforce. Although a sense of security allows people to work and contribute freely without fear of losing their livelihoods, it will require real balance to generate excitement and change while maintaining that sense of security.

Under the leadership of Pestillo and his staff, the firm has apparently shifted back to a system within which the individual plants are profit centers, which could once again raise the competitive barriers between sites and reduce the impact of the commonization efforts of Copy Exactly. In addition, the contract provisions on job security do not cover the engineers who are the members of the global Copy Exactly project. At *every* Copy Exactly team face-to-face meeting there was at least one extended period of uneasy discussion about changes that had just occurred or were rumored to be happening very soon.

In an environment so full of change it will be difficult to create a consistently competent, pervasive brand presence for the electronic systems that Visteon produces. Success at this effort, however, will allow the company to attain its stated goal of having a Visteon system in every car in the world (Young 1998). Given the ubiquitous nature of electronics in today's automobiles, the depth of expertise within the firm, and the base of shared processes and information created by Copy Exactly, Visteon has some powerful tools. It is to be hoped that the company will be able to capitalize on these factors as it continues to separate from Ford.

A Brief Overview: The Copy Exactly Initiative

The Plan

Craig Muhlhauser’s strategic blending of globally applied strategy and locally exercised expertise finds apt expression in the activities of the Copy Exactly Initiative. The initiative was launched in 1997, after a benchmarking trip to Intel. Copy Exactly is a process by which printed circuit board manufacture and design are commonized. All processes, materials, and equipment used across all the electronics manufacturing operations are scrutinized and compared to a consensually established set of best-known methods (BKMs). Every detail is to be analyzed so it can be controlled and copied (see Figure 4.1). Quality is to be absolutely controlled as well. Process uniformity allows for faster problem solving, sharing of solutions across manufacturing sites, and greater ease in ordering and planning production.

1	General Placement	BKM	TSMD L1	Match ?	Yes = 1	No = 1
1. Machine						
1.1	Manufacturer	Universal	Universal	Y	1	
1.2	Model	GSM	GSM1	Y	1	
1.3	Software version	3.03	3.01	N		1
Number Matched to BKM/Total Items					88	15
Overall Matching %						0.8543

Figure 4.1: General Placement Machine Commonization Matrix

[Segment of BKM Matrix adapted from matrix developed by The Visteon SMD Placement Team in 1998. Received from Tony Boccardi, Team Leader.]

In fact, one of the primary performance metrics in this initiative is the percent of match achieved with the BKMs for each segment of printed circuit board design and manufacture. Copy Exactly team members monitor the percent of match of their plant on each item in these detailed outlines. Reports are submitted periodically.

A second principal metric is participation or attendance at meetings and conference calls. This is also a critical metric, since information and solutions to problems are diffused in these interactions. The larger the group of people present in the conversation, the greater the pool of experiences from which to develop potential options for solutions to problems.

The object of these efforts is to create the optimal system for manufacturing circuit boards. One outcome would be the cost savings realized through simplified purchasing and procurement as materials became standard across product lines and plants. In addition, the company could confidently shift product from plant to plant without fear of reducing quality or production numbers. As engineers supporting Copy Exactly create a network of information and problem solving, they become a resource useful far beyond their individual plants. The greatest impact from Copy Exactly activities will be felt over the long term as more and more variation is removed from the production system.

A large group of people from each of the electronics operations in Visteon does the work of developing and implementing these BKMs. At the start of this study, the Electronics Division was one of seven divisions (24 strategic business units) within Visteon (chassis, climate control, electronics, exterior, glass, interior, and power train), with each unit accountable for overall profit and loss. There were

eight plants in the Electronics Division, although several were shared by more than one SBU. These plants were in seven countries: the US, Canada, Mexico, Brazil, England, Spain, and Portugal. In addition, the Advanced Technology unit at the Electronics Technical Center in Dearborn, Michigan, provided oversight, support, and technical experts for the project.

The Initiative at Visteon had a well-considered design. The three structural components included corporate executives and plant managers in the Management Review Committee (MRC), immediate supervisors as members of the PWB (Printed Wire Board) Core Team, and engineers at each plant on the CITs. Initially each group had a set of defined duties and intervals of communication (see Table 4.1).

The Implementation

Table 4.1 indicates the membership of each component of Copy Exactly, their tasks, and the meeting/communication schedule. Added to this chart is a column that indicates where each unit has its primary strategic focus. This refers to the level of decision-making and analysis that is most dominant in the group. For example, the MRC is a high-level leadership group that focuses on the overarching plan, corporate resources, and outcomes. The view at this level is on the impact of the initiative on the activities and profits of the company as a whole. Even though the plant managers are members of this group, the primary focus is global rather than local. In a company that has changed so much in a short time, the comments of one Visteon engineer are not surprising: "In my opinion, the MRC at Intel was very strong because it shared a commitment to the project, but the MRC at Visteon is less single minded in its commitment."

Table 4.1: Component Units of Copy Exactly Initiative

Name of Unit	Membership	Strategic Focus	Tasks	Meeting/ Communication Schedule
Management Review Committee	Divisional leadership, corporate executives, and plant managers	Global	Set policies Metric reviews Development of project issues and plans Review and approve technical roadmap Resolve non-compliance issues Ensure resource availability Recognition and celebration	Trimester face-to-face Monthly steering group conference calls
Core Team	Advanced manufacturing managers or supervisors at each location	Global and local	Coordinate the global strategy for Copy Exactly Act as liaison between the CITs and upper levels of management Set budgets and goals for overall group Provide information and other support as needed to the teams	Face-to-face meetings 2–4 times a year Monthly conference calls
Continuous Improvement Team	Selected expert engineers and technicians	Local and global	Development of best-known methods Inventory of existing conditions Implementation of communication plans	Face-to-face meetings 2–4 times a year Weekly or biweekly conference calls

It is also, perhaps, not unexpected that as the initiative moves down through the organization, the analysis and decision-making of the units becomes more involved with and focused on local operations. The Core Team has a mixed focus that derives from its role as the link between the MRC and the CITs. Core Team members coordinate the global strategy for Copy Exactly with the needs of team members. They have global understanding and knowledge but must also coordinate the progress of teams and team members at each of the plants. In addition all the Core Team members have a home location at *a plant* except for one who is based in Dearborn.

CIT members do their Copy Exactly related tasks predominantly at the local level, in their home locations; but they acquire extensive information on global operations through interaction with other team members. Their strategic focus is at the local implementation level, but they are working on a task with global implementation and outcomes.

Figure 4.2 shows a gap in the diffusion of global information. Here, the hierarchical levels of the Copy Exactly Initiative are overlaid on the structural levels of the organization. There is a clearly visible gap, which could easily impact the performance effectiveness of the teams/initiative. There is no representation in any unit of the initiative at the level of manufacturing or area manager. This creates a group that is focused on local production and functions without the same access to the detailed global information available to others and with no direct strategic impetus to engage at the global level. While this group may be aware of Copy Exactly, it is *not* a primary responsibility for group members, and the resources used for Copy Exactly activities may actually detract from accomplishing their duties.

In addition, the Core Team Members are all generally supervisors in Advanced Manufacturing at the various locations, and there are sometime issues with others such as area managers or product team managers, who are responsible for production and the actual manufacturing work in the plant. They are not represented in the project, but engineers working on Copy Exactly might be pulled from daily production tasks to Copy Exactly-related advanced manufacturing tasks. Tension arises when the demands of day-to-day activities and the demands of new product and equipment decisions clash.

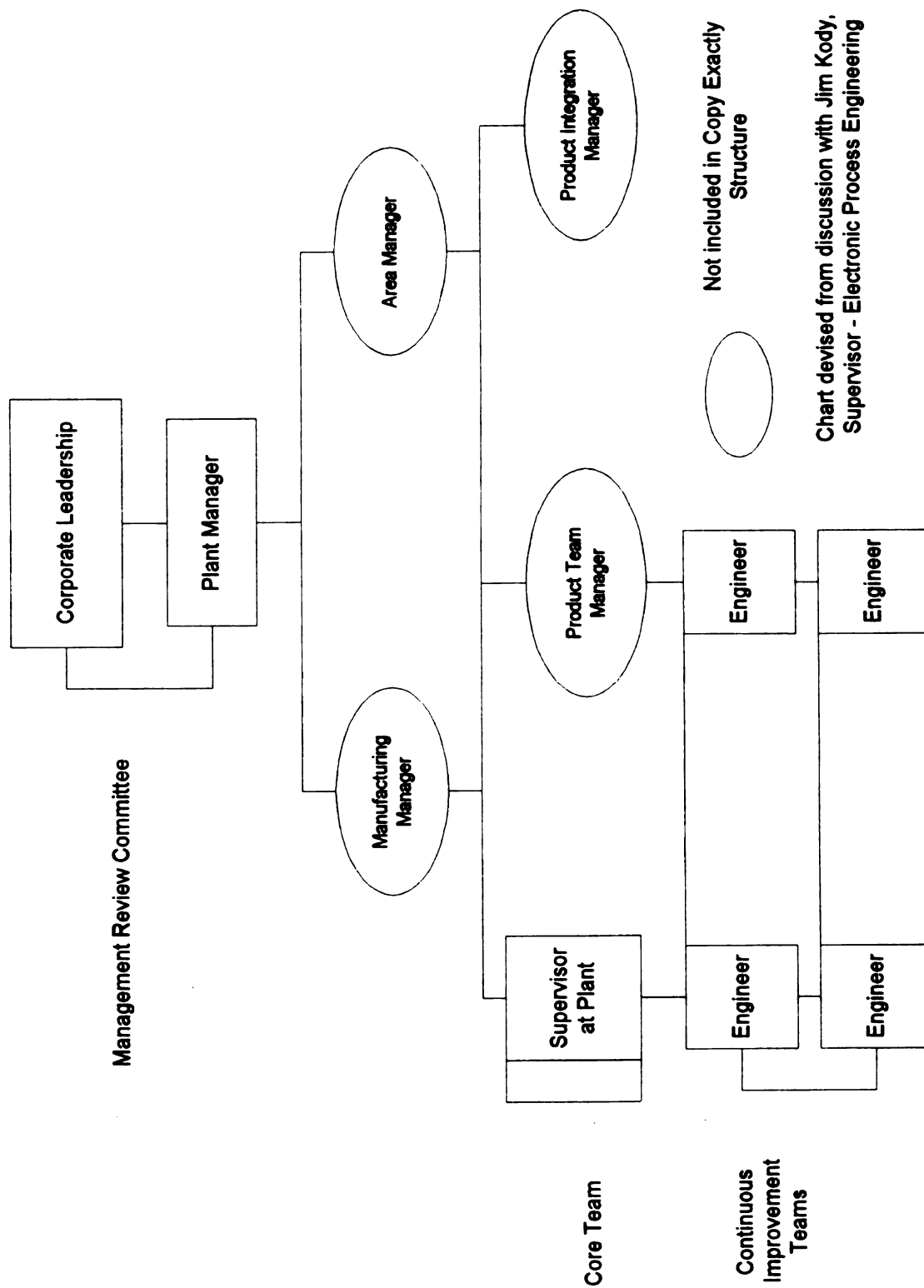


Figure 4.2: Copy Exactly Hierarchy Gap

A related area of potential conflict may develop because CIT members may be drawn from several areas. A team member may be specially assigned to work for Copy Exactly as a part of his or her duties but be responsible to another supervisor for the remainder of his or her daily duties. Team members estimate that they spend from 4 to 20 hours a week working on Copy Exactly-related activities. Such an arrangements can cause problems with accountability and performance evaluation, especially if a supervisor is not otherwise involved in Copy Exactly.

Engineers at several locations reported that their supervisors often expected them to finish other tasks before doing Copy Exactly work, which meant that the engineers were forced to try to balance the work and accountability demands. As several of them reported, they were not linked to the performance objectives of their managers when they were doing Copy Exactly team work.

Another difference between the components is communications frequency. Although all the groups have periodic face-to-face meetings, most regular communication is via conference calls or email. The conference calls occur much more frequently (weekly or biweekly versus monthly) for the teams as they compare their progress on the details of the communization process. Participation in these calls is requested and is recorded, although it is difficult for some engineers on the teams to participate if a locally urgent task requires attention.

The conference calls seem to have taken on a certain role in the overall communication of the CITs. Generally the calls provide an opportunity to report test results or task progress. The telephone calls are a forum for setting up issues that can then be discussed in greater depth face-to-face. CIT members regard face-to-

face meetings as the most productive way to communicate, although they sometimes miss these meetings due to locally urgent tasks or local travel budget restrictions.

Face-to-face meetings are critical to team progress. As one team member put it:

“The face-to-face meetings are where the tough decisions are made. There is more time to interact than on the telecon. It is difficult to agree and the biggest steps for Copy Exactly are made at the face-to-face meetings.”

During this study each of the five teams had at least one face-to-face meeting. These meetings usually lasted three to five days; they were held on a rotating basis at each of the electronics plants. The team leader developed and distributed an agenda. The team met in a conference or workroom at the plant. As expected, the agenda contained updates on previously discussed items, new topics, and a plant tour. On at least three occasions the meeting also allotted time to hear from supplier representatives.

The Copy Exactly Initiative was well underway when this study began. Because of the results that this project was generating, it was recommended as a good ‘team’ to study—it is one of the best dispersed team efforts within Visteon. The recommendation is also remarkable because it came from a manager in the process leadership sector of the firm rather than the electronics systems area. One of the teams within the initiative, the Print Reflow or Printers/Ovens Team, had also been recognized with a CDQA Award, presented by Visteon top leadership, for excellence in performance. Clearly the Electronics Division had much to be proud of in the teams of the Copy Exactly Initiative.

Getting Oriented

A first introduction and interview meeting was held on September 29, 1998, with a manager and a supervisor in the Electronics Division. Both men were instrumental in the project's ongoing success and serve in liaison capacities to parts of the organization, up and down the hierarchy. The manager took some time to give me an overview of Visteon strategies during this period as it becomes increasingly independent of Ford Motor Company.

Within Visteon's Electronics Division there were four separate SBUs. However, there was no clear division between the domains of the individual SBUs; in fact, one plant within the division was shared by multiple SBUs. The manager described his role as that of a link between SBUs and the plants. Furthermore, his operation provided links between the plants. The Design Factory was to play an integrating role, and Copy Exactly was one of the processes used as a tool in this integration effort.

The previous history of changes in strategic tactics that characterized the business when it was the in-house supplier for Ford complicates plant integration efforts. Each of the plants had evolved differently in response to Ford's changing business strategies. Now, Visteon was developing a strategy based on business centers, rather than profit centers. This would further distance the plants from the competition that previously characterized their relationships.

Commonization or standardization of the manufacturing process was another strategic step in the evolution of Visteon. According to the manager, the company was looking at the manufacturing arena and wanted to redeploy resources to reduce duplication. At a recent nine-month review of the initiative, vice president and

general manager of electronic systems, Gary VanderHaagen, had wanted to accelerate the commonization process. Not only was the process to move faster, but also at a different level, with the introduction of *Centers of Excellence*, created for specific aspects of the project at specific plants. The plants would be empowered and accountable for delivering a specific process or solution. The plan was that innovations would be shared with all the other plants.⁵

The matrix organization of the teams is designed to encourage integration by having a member from each plant on each team. Such a team structure ensures diversity of nationality and experience while also allowing the internal culture of each plant input into the workings of the teams.

A final issue with the teams individually, and the project as a whole, is the potential for creating knowledge and diffusing information, not only throughout the corporation, but also in the supplier network as well. This group is at the edge of becoming what Botkin calls a “knowledge community” (Botkin 1999). They are a purposefully organized group with a shared goal and interest in transforming the way Visteon designs and manufactures electronic automotive parts. In addition, they have links to suppliers that already allow for the exchange of information. Discussing shared interests might reveal even more points of mutual interest between the plants and between the plants and suppliers. This dimension would help to resolve one of the larger environmental dilemmas mentioned earlier. If closer ties

⁵ Although this plan was discussed during the time I observed the teams and met with them, it was not implemented. Subsequent changes in leadership and organizational structure may have ended this idea. One month after my initial conversation at Visteon, Vander Haagen’s retirement was announced.

with suppliers could be forged, then there would be greater options for flexibility and that would be value added when serving Visteon's customers.

A Tutorial on the Manufacture of Printed Circuit Boards

One of the central elements of this story is the product. The printed circuit board forms the basis of electronic components, and commonization of the manufacturing process is the focus of the Copy Exactly Initiative. What follows will serve as a description of the process as explained and as observed in a number of electronics plants. While this explanation is not as thorough as the reader would receive from any one of the engineers in this study, it will help to illustrate some of the tasks described and to define unfamiliar terms used in this case study.

Production lines may be straight or u-shaped. At North Penn, they were u-shaped rather than straight to conserve space and allow operators more easily to service several machines. At Altec, portions of the lines were housed in a special room to avoid the dust of the manufacturing floor. Tony Boccardi, an engineer at North Penn, provided my first real explanation of the sequence of the circuit board manufacturing process.⁶ The first machine on the line is a destacker that selects one basic circuit board and starts it down the conveyor to the screen printer, where lead-based solder paste is 'squeegeed' through a stencil of the circuit design onto the board. At the screen printer an operator spoons a gray solder paste onto the screen from a small aluminum pie dish.

⁶ Tony is not to blame if my description contains erroneous information.

After the solder paste is screened onto the board, the board runs down conveyors to a series of 'chip shooters'—machines that mount chips to the surface of the board. These machines vary according to the size and number of parts they add to each board. Bigger components are added by a machine that operates at a slower pace; even then, some of these pieces must also be glued to ensure that they stay properly attached before the reflow process. The smaller electronic chips currently are shipped on paper tapes that have each part encased in a plastic pocket. These tapes are threaded through special tape cartridges.⁷ Backup cartridges are kept on wire racks at the machine and spare rolls of tapes are brought over as needed from a storeroom. Inside each machine there are a number of vacuum heads that dispense the parts in the correct sequence onto the solder paste stenciled onto the proper place on the board. Proper placement is checked by laser beams and cameras as well as by an operator where visual verification is possible.

The boards then move into a reflow oven to reheat the solder until it flows to fuse the chips to the board. The finished boards are removed and transferred to special containers to move them to the next phase of production. Across the aisle at North Penn is the 'second path,' in which the backs of two-sided boards are assembled, using a similar process. The work environment where boards are assembled is clean and fairly quiet. People work at several machine stations and do inspection. Each line has inspection stations with large round magnifying glasses. There are also electronic testing devices. The u-shaped lines are equipped with

⁷ Tony Boccardi showed me a new type of dispenser that is much more compact. The parts are packed in a plastic box that looks like a tictac box, which will feed into the machine very differently and take up much less space.

‘gates’ that are activated by footpads in the floor. The operator steps on the pad, the line stops, and a gate is created as one segment of the conveyor lifts up. After the worker steps through, the section closes and work continues. These gates apparently are an innovation in the line design that made it possible for one person to more easily service a larger number of machines.

This description captures the broad outlines of the process, but there are many more details that teams of experts must carefully analyze in each phase of the board design and manufacture. These details are the ‘bread-and-butter’ tasks of the Copy Exactly teams.

The Local View: The Plants

In this study I visited four locations: the Altec Plant in Chihuahua, Mexico; the Markham Plant in Toronto, Canada; the North Penn Electronics Facility in Lansdale, Pennsylvania; and the Design Factory in Dearborn, Michigan. The other plants include Palmela in Portugal; Cadiz in Spain; Enfield in England; and Arbor in Brazil. Each location visited in the study will be described in this section. Table 4.2 shows the name, location, and primary products for each site visited as well as selected demographic data for the manufacturing sites.

Table 4.2: Visteon Locations Included in the Study

Name of Facility	Location	Primary Products	Data Collected
North Penn Electronics Facility	Lansdale, Pennsylvania, United States	Air suspensions, electronic engine controls, mass airflows, temperature sensors, anti-lock braking systems, ignition systems	Plant Tour Observations Interviews Survey
Technical Center	Dearborn, Michigan, United States	All Visteon products and systems —support and research related to electronics	Observations Interviews Survey
Altec	Chihuahua, Mexico	Audio systems, instrument clusters, speed control, vehicle controls	Plant Tour Observations Interviews Survey
Markham	Markham, Ontario, Canada	Restraint control modules (single-point, multi-point and adaptive), side crash sensors, body electronics control modules, passive remote anti-theft system controls, total anti-theft systems, single/dual zone electronic automatic temperature control modules	Plant Tour Interviews Survey

The Technical Center in Dearborn, Michigan, United States

The central office for the entire Copy Exactly Initiative is located at the Electronics Technical Center in Dearborn. The manager in this office has overall responsibility for the project and the staff of engineers and technical specialists that support this work. The offices visited during this study are located in a multistoried office building within sight of both Ford World Headquarters and Visteon World Headquarters. Most of the people active on this project work in individual cubicles with enough space for a desk, computer, and reference materials as well as the occasional snapshot or cartoon. The area bustles with activity and there is a low hum as people work. The people in this office are assigned to teams or work on computer-

related development of prototypes. For example, many of the people who support the Design Rules Team (see below), setting the parameters for printed circuit board layouts, work in Dearborn.

This group in Dearborn is an application engineering group called the Design Factory. They are a core product design group, often referred to as the 'how people,' whose task is to help the 'what people' manufacture the product more effectively. The manager expressed a real sense of urgency about how well Copy Exactly could improve performance to meet the aggressive goals set by Visteon leadership. In its new form as a Ford enterprise, Visteon must become more self-sufficient. The business goals are to double profits in five years and become extremely competitive in the auto supplier market. Of course, resources to accomplish these goals are controlled and constrained so growth will have to come from becoming more 'lean.'

This drive to become more cost effective was the most important impetus for the Copy Exactly Initiative. The manager explained some of the early history of the initiative, describing the benchmarking trips and the visit to Intel. Visteon's goal with the process was to commonize all chip manufacturing processes and equipment in electronics manufacturing sites across the company, in order to establish consistency and predictability in their chip production.

He hoped that people in Visteon would begin to acquire a mindset that will encourage greater independence from Ford culture, as well as a greater sense of belonging to Visteon. One of his concerns was that people needed to give up their internal competition and work together to attract and retain Ford's business, as well as the business of other customers. It will be a challenge to create large-scale change in

organizational attitudes and activities in order to develop entrepreneurial spirit within the workforce.

Approximately one month after this first meeting, Craig Muhlhauser took over after Charlie Szuluk retired. Marcos Oliviera, who now has control of the advanced manufacturing and technology section, replaced Gary VanderHaagen. Copy Exactly had another challenge—to win the confidence of a new champion.

Altec in Chihuahua, Mexico

The factory in Chihuahua seems to be at the edge of a rapidly moving urban sprawl. It is a large moss-green and maroon structure embellished with architectural elements that might be cousins to the flying buttress. The manufacturing complex contains several buildings with designated areas for manufacturing, training, and a main cafeteria inside (we also ate in an adjacent canteen area with tables and chairs outside and more informal food service). The parking lot contains a large area where red-and-white buses pick up employees and drop them off. Once we go through security and receive our badges, we walk into an open yard between two manufacturing buildings. There is a small building containing an infirmary with an ambulance and a bank with an automated teller machine.

Altec produces thousands of audio systems and instrument clusters per year. The manufacturing floor bustles with blue-smocked employees working at a number of assembly lines. In the ‘clusters’ section, each assembly line had its own set of documentation and data that was displayed at the head of the area. There were charts for mission development group, production, OEE, scrap, and agendas/minutes, among others. In addition, there is a separate room for the printers and ovens used

to create the necessary electronic circuit boards. Banners and posters with Ford Production System slogans hang about the building.

Inside the manufacturing areas, the facility is clean, well lit, and seemingly modern. It is clearly high volume, with a huge variety of products. The number of people populating the workroom floor 'feels' too high. On average these production workers are paid about \$2.50 an hour (including benefits). They also receive meals and transportation to and from work each day. It is a non-union facility, and one of the engineers commented that it is easier to move people from job to job without the rules that unions want to impose.

The labor market is reported to be fiercely competitive, as workers leave one company and move to the next without a thought. At the time of this study, TRW had just opened a plant in Chihuahua; and hourly as well as salaried workers had moved to that firm.

The Printers/Ovens team was meeting for its regular face-to-face meeting when this visit to Altec occurred. Their sessions were held in the training building, where rooms were named after famous scientists such as Pasteur, Curie, and Einstein. This facility was pleasant and equipped with a computer room where the Visteon employees eagerly read their 'profs' mail each day.⁸

Although this facility had all the linkages and trappings of a Visteon facility, it technically is not Visteon. The employees do not have the privileges of Ford/Visteon employees and this situation was raised by some as an irritant. One engineer commented that he was reminded of the lack of equality at every

⁸ 'Profs' was the word used to describe the internal email system.

interaction. It was unclear exactly what economic or legal conditions caused this arrangement, but it was clear that at least some of the Mexicans felt that it put them at a personal disadvantage.

Markham in Markham Ontario, Canada

Opened in 1961, the Markham Plant is in a suburban area at the northern edge of Toronto, Ontario, Canada. The neighborhood around the plant contains some residential areas, as well as a number of what appear to be newer commercial properties—office buildings as well as manufacturing facilities. The plant itself is a long, low building of just two to three stories. One enters through a security arrangement in the front lobby. Visitors must call to receive an escort through the locked doors.

Markham manufactures a wide variety of sensors (restraint controls and crash sensors, for example), anti-theft devices, temperature control modules, and many other products. The actual workroom floor is fairly open and appears quite large. There are a number of assembly and production areas, but they are not heavily staffed. The electronic components are largely produced by machinery carefully arranged in straight lines or u-shapes. Each component machine is selected based on its capacity to produce certain parts to a precise set of specifications. The machines are tended by a mostly female work force that wears white smocks made from an antistatic material. These workers must monitor the parts levels, restock the machines, and do quality inspections. Although most of the operators were women, the work force did appear culturally diverse. The International Association of

Machinists (IAM) and the Canadian Automobile Workers (CAW) represent segments of the work force.

Markham has made a reputation for itself by receiving the Canadian equivalent of the Malcolm Baldrige Award for Quality. In addition, the plant has been recognized by Visteon leadership for meeting two of the important strategic manufacturing goals set by Charlie Szuluk. Cycle time, the time needed for material to arrive at the plant dock, be processed, and leave as product, has been reduced from 12 days to less than one (Vasilash 1997; Buchholz 1998). In addition, by October, 1997, the plant has reduced “finished product inventory from 16 to 3 days and parts returned by customers from 1900 to 130 parts per million” (89). When visited for this study, the plant was showing its responsiveness by building a manufacturing cell to meet the specific requirements of one customer.

North Penn Electronics Facility in Lansdale, Pennsylvania, United States

The North Penn Electronics Facility opened in its present building in 1990. The building is set into a suburban landscape with rolling hills and trees. Ambrish Gor, manager of advanced manufacturing technology, and my contact person at the plant, remembers the older facility and helping to design this one. At the time of this study the plant newsletter was reporting the demolition of this earlier structure. When the product line shifted from radios to electronic components, a different, more sterile environment became important. The present building is divided into two wings, with an automated storage and retrieval system at the center. Automated vehicles move about the facility carrying materials.

The A side of the plant is the manufacturing area, where the environmental and emission control products are assembled. These products are highly sophisticated units that control and align the environmental functions of the vehicle such as exhaust and emission control, fuel mix, and air conditioning. The emission control product is a core component that directs many other internal engine activities.

Operators wear protective gloves and clothing, usually a blue or white lab coat made from antistatic material. Most workers wore blue smocks over casual clothing. Skilled trades people wore light blue shirts with patches and darker blue pants. The work force throughout the building appeared quite diverse. I saw many African Americans as well as Asians working in assembly. There were as many women as men. In the offices men outnumbered women, but there was still some diversity. In general, the atmosphere throughout the plant was busy but relaxed. People chatted as they worked; and there were small areas with a desk or two, which appeared to be break or meeting areas, where people sat, read newspapers, and drank coffee. Meetings seemed to occur naturally in the work area, as well as while groups of skilled trades people or engineers walked about or stood and observed machines.

North Penn has been recognized for its efforts to become leaner and more cost effective. As of September, 1998, "parts per million returns are now running below 100 ppm, versus 2,900 ppm in 1990" (McCormack 1998: 109). In addition, high ranking Visteon executive Steve Delaney says that "Managing material flow efficiently is the key to success" (McCormack 1998: 109). North Penn is making a transition to cell-based manufacturing, which is reducing cycle time and inventory.

These changes are happening in a unionized facility where the United Auto Workers (UAW) represents hourly workers. A longstanding agreement exists between the union and plant management, which allows a team-based system with high levels of employee involvement (Chaneski 1998).

The Teams

Five teams are the focus of this study: four of the nine functional teams in the Copy Exactly Initiative, and the Core Team or Coach/Champions, who have more of an oversight and coordination role. The plan for Copy Exactly created functional teams for certain parts of the printed circuit board manufacturing process. Generally, the team consisted of one representative from each plant and one from the Technical Center in Dearborn.

No engineer could serve on more than two teams, but a couple did, in fact serve on two. In the box that follows is a list of facts that are true of all the teams. Reporting on the shared facts in this way will allow the team descriptions to focus more on elements that may be unique to each team.

Facts about the teams:

- The teams operate as self-directed work teams.
- Each member is expected to contribute eight hours a week to the work of the team.
- Teams leaders are elected by each CIT and approved by the Core Team.
- Teams have a representative from each plant selected because of expertise in that area of circuit board manufacture.
- Teams meet two to four times a year for face-to-face sessions.
- Teams arrange for telephone conferences every week or every two weeks.
- Each functional team in the Copy Exactly Initiative is responsible for developing a set of BKM's for a segment of the printed circuit board manufacture and design process.

- Team members generally shared the consistent overall goal of the initiative i.e., to create exactly the same processes for manufacture of each electronic product at each facility in the Visteon system.
- Team members are engineers.
- 71% of team members are between 31 and 45 years old.
- 27 % report working overseas at some point.
- 45.5% report living overseas at some point.
- Fourteen team members report speaking three or more languages (English and Portuguese are the two most reported languages.)
- Eighteen report speaking only English.
- Team members report an average of 12 years of employment with the company.
- Decisions are made by consensus of those attending each meeting.
- Each team reports the use of meeting protocols such as agendas and minutes, which are generally organized by team leaders.

In studying and analyzing these data, it is important to recognize that it was not part of the design of this project to interview every member of the teams studied. Distances made it impossible to go to every location and the valuable face-to-face time was scheduled for business use. Thus, any discussion of an individual team is based on a partial sampling of the team. Additionally, some teams are not as large as others, because some facilities had not yet appointed replacements, or team members were absent at the time of the visit.

Observations took place over two or more days for each team. In addition, after the work sessions, there were often social events sessions such as dinners or shopping trips in local markets that offered more informal insights into the relationships and interactions among members of dispersed teams.

The Printers/Ovens Team

One of the first impressions that the Printer/Ovens Team made during the observation of their face-to-face was the care they took to listen to each other,

waiting for speakers to finish ideas or thoughts completely. The people on this team appeared respectful and yet relaxed with each other. One member put it this way: “Consensus at this meeting was easy but they are reasonable. I can say what I think, and these guys will listen.” Their meeting was well organized and effectively run. As was typical, this team leader took his job seriously as “coach, organizer and secretary.”

Each member contributed and participated freely. A new member joined the group at this face-to-face. He was welcomed and integrated easily into both official and social activities of the team. In fact, this introduction was so congenial that the new engineer felt comfortable joking that he was waiting for his welcome gifts. Everyone laughed, and then laughed again the next day, when the team leader started the day with a “serious” welcome speech and the presentation of the ‘welcome gift’—a 3-inch rubber soccer ball.

Analysis of the team’s interview responses revealed that the shared understandings among the members were distinct. For example, when asked what came to mind when they heard the words Copy Exactly, Printers/Ovens Team members used the words “sharing” and “working together” more frequently than the members of other teams. The ability of this team to work well together is certainly one factor in its success.

When asked to estimate the average amount of time that he or she spent on team tasks, team members estimated an average of 17.5 hours a week. This indicates that members are able to spend a reasonable amount of their work time on Copy Exactly Initiative efforts. The general consensus among team members was

that each one was selected by a supervisor or manager at their home location based on his or her specific expertise in the technical area upon which the team focused.

Goal clarity was high among the members of this team. All but one mentioned that the specific goal was to reach consensus about the best-known methods for the print/reflow process, which would then improve quality and value for the customer as well as save money. One member expressed a bit of cynicism, saying that the goal “should be to set best practices, but it comes down to money.” Another member reframed the goal of the process stating, “The goal is to transfer knowledge from team members to other team members.”

While team members believed that they “worked well with a well-defined problem that could be reduced to common goals,” they felt that the process “doesn’t work as well when there is a big issue with smaller, plant-specific goals.” This illustrates a recurring theme among all the teams—the juxtaposing of local interests and global programs. “There can be big conflict between team priorities versus plant priorities. The different SBUs and the work for the plant—those are put first.”

This conflict of interest seems to have two dimensions. One is clearly the potential for conflict between the plant’s interests and those of the company. There is “competition among members from the plants to protect their plant and move business to their plant.” A second conflict of interest occurs internally in the plant, where there is “a separation of team and daily ops [operations].” As one engineer said, “Daily life distracts people with other priorities, and the face-to-face meetings reinforce the habit of considering Copy Exactly as important.”

Despite this tension, the Printers/Ovens team members expressed little frustration with team interaction. They listed management support or commitment

and communication as two of the top needs for team success. Trust was also considered important. “Without trust there is no buy-in from the team; and while that might work in the short run, it would not in the long run.” When questioned about barriers to effective team performance, team members targeted lack of trust and management support. One team member said, “Management is the biggest barrier to team performance. If you are on a team working for global improvement, and if local management doesn’t support it—they have to buy in—then the different direction of the group may mean it won’t happen.”

At the beginning of this study, it seemed that diversity would be an obvious barrier since that was an inherent characteristic of global teams. Team members did not support this. Their comments were almost universally positive. When asked whether diversity was an issue, one member from an overseas plant replied:

“I don’t think so—that’s something that is not an obstacle, (it) makes it more rich. We are from every race, every country, and at the end of the week that has made it rich with discussion. I feel better in Copy Exactly—because we are at the same level of knowledge and experience. We understand each other. On other teams we have to explain, so more similar knowledge also helps.”

Another engineer recognized that diversity added to the richness of their discussion: “I like different cultures and to make people equally respected, and equally important, adds to the discussion.”

This team also appreciated the contribution that social interaction made to their technical progress. One team member remarked, “I see a value as I am more aware of the little things that offend people.” Another engineer observed, “It is easier to work with a person you know, because you know the good and the bad—the background both cultural and technical.” There was a clear appreciation

for technical expertise, which was as important as cultural or other areas of diversity. A team member summed up the feelings about diversity very well, when he said, “The biggest lesson for me was the value of diversity. The experience of diversity in this group is intrinsic to the experience and it also has great value for the corporation.”

Working together was a powerful experience for this team and one of the pleasant outcomes. A more formal recognition of their work came when the team won the CDQA in 1998. These outcomes were not part of the formal compensation that team members received. In fact, these other rewards were described as “not in the compensation.” The recognition achieved through winning the CDQA had a big impact on this team and was for more than one member a highlight of the team experience. One team member put it this way, “We get recognition for a good job and there’s the CDQA, but it doesn’t affect merit or compensation.”

The final item in each interview was a request for the person to tell one story they remembered, or a lesson learned. For the Printers/Ovens Team the experiences shared winning the CDQA and working together were part of everyone’s “lesson” answer. As one engineer recalled, “I guess the biggest lesson was being able to get all the people from around the world to work together and make the right decisions together. It is powerful if people want it to be.”

The SMD Placement Team

SMD is an acronym for surface mount device. This team works to establish common equipment and processes for the portion of the circuit board manufacturing process in which electronic chips and components are placed on the board. During

the face-to-face for this team, a thread of concern about matching ran through many of the items up for discussion. For example, the team spent quite a long time discussing the fact that management found it easier to use numbers as measures, rather than to take the time to understand how matching really works. One result of this situation was the dilemma faced by a plant that could not afford to make an equipment change or that had problems scheduling a specific process in a certain way due to union contract rules. The plant was perceived as intransigent or not in compliance even though some required changes were more systemic than the team was authorized to address.

Another aspect of this discussion on metrics was the level of detail that should be considered acceptable in the matrices. At this time the SMD matrices were very detailed, and the team was discussing whether they should be reviewed to remove some items that might represent too fine a level of detail. As one team member explained it:

“There is real concern about using just the number and using this as a tool. Numbers are important to other groups—it’s on their objectives—where are the numbers? Where are the numbers? [My manager] runs around gathering the numbers, and they are often the only things understood by outsiders. Once a month those numbers are important to [executives in Dearborn]. Maybe they are too detailed.”

This discussion reflects the concern of individual plants about their ability to be effective and viable, as well as the concern arising when metrics are used that do not adequately reflect a complex situation.

In one very real sense, the team was highlighting another aspect of the global versus local discussion that was raised by the printers/ovens team. When management at a global level looks for results, the details are complex and more

difficult to understand than “numbers.” Within the team it is clear that “Copy Exactly tries to streamline the commonization process.” Alignment, however, is not easy—as we hear from one team member who said, “Team objectives are not always aligned with plant objectives, so we have to pull people away from the local. There is a tension between local and global Visteon vision.”

The tensions outside the team seem to stir tensions inside the team. There is less agreement on some critical issues. For example, when asked to describe the goal for Copy Exactly, the team members interviewed gave four different answers:

- 1) “to create similar equipment for every plant”
- 2) “to take product and move it quickly”
- 3) “to come down to one or two suppliers for price advantage and support”
- 4) “to commonize software”

It may be that this variety in answers reflects a lack of agreement among team members, and that can have an effect on overall team effectiveness.

When asked about metrics, each team member did identify percent matching as one metric; and the team leader added attendance. Each identified his or her supervisor or manager as the person whose performance expectations had to be met.

The team members’ answers varied again when they were asked what the team needed for success. The items identified were time and money to work on team objectives, manpower in the form of representation from each location, and agreement within the team. The engineer who wanted agreement was referring to the ongoing discussion about chip shooters, as Markham buys the Universal brand, and the other plants buy Panasonic. Apparently this is a long-standing issue. The team member who felt the need for more manpower expanded his answer by saying that having representatives from each plant facilitated information flow and built a

network that provided the “means of accessing, changing, and modifying information.” Despite competition between plants, the SMD Team at least had become convinced that there was a great deal of benefit to sharing information. Another team member said, “Sharing information saves time, so we each could launch a different concept but spread [it] to every plant.”

Several members of this team considered the face-to-face meeting the most important factor for success:

“It is paramount to success to get together and lock ourselves in a room and hash out issues. It appears to be the only time that difficult issues can be resolved. The telephone doesn’t work, and it’s not just language—requests over the phone don’t take it, because it is easy for people to forget and get pulled off.”

Another team member returned to the issues of local support for Copy Exactly when he expressed his opinion about why face-to-face meetings are considered important:

“Phone and email may not work as well, because at the local level support is not as strong as it should be. It has come up as a concern—not getting appropriate level of support or commitment to team activities. The plants support the product first. What can be done?”

This person was hoping that the team members would build stronger relationships at the face-to-face meetings and that these bonds might motivate people to work harder to accomplish the Copy Exactly work in their own plants.

Other barriers to team performance effectiveness were identified. One team member was concerned about personnel changes within the team. “It takes a long time to name a successor, sometimes weeks or months at other plants, and there is no one to call in or to be at the meetings.” He was also concerned that once a person was named to the team, it was often hard to bring him or her “up to speed” because there is “no cross training at personnel change.” He cited an example in

which a senior engineer who spoke Spanish was able to help a new person using that language, and that “made the learning curve shorter.” Interestingly enough, language was the other barrier identified. The concern was that the non-English speaking team members “don’t say much.”

Diversity on this team was also perceived as an asset rather than as a problem. Each team member’s comments acknowledged the important contribution that the expertise of the different members made to the work of the group. One member said, “I guess every person is truly experienced in all aspects of SMD at the other plants, and a lot of expertise helps the team.” One member did offer a warning, “It [diversity] has not deteriorated the performance of the team. We need to be aware, and not make it an issue, or it can mushroom as an issue.”

On this team, as on others, rewards were not linked to performance. As one man put it, “There is no link between team performance and rewards. There are no consequences positive or negative. It’s all personal initiative.” Another member echoed this, saying that “Better performance is not linked to a higher raise. The reward is intrinsic.” Although the team apparently received a plaque in recognition of their work, at least one member felt that there was some reward in knowing that “the other plants have the same problems.”

The number one change that this team attributed to Copy Exactly was the cost savings realized through more targeted equipment testing and assessment since one plant was now able to test new equipment and share the resultant information with everyone. One team member commented that communication was better now, and “That makes the job easier.” Another remembered a fight over wave soldering machines that delayed a launch but got the proven machine. The last response to the

interview question about lessons learned was very positive: “I’ll remember the successes like now—the global divisional processes. They were once a figment of my imagination, and now they’re implemented and rolled out. It’s fabulous.”

The Design Rules Team

The Design Rules Team is responsible for the creation and diffusion of the rules that govern the layout of printed circuit board in the electronics systems at Visteon. Their work is detailed and complicated. They work to establish the placement rules for all the components of the circuit board. The rules are designed to fit the component specifications, so as new parts enter the system, new rules must frequently be created to accommodate them. One engineer described the process from another perspective:

“For example, we have a production problem—maybe a solder bridge that requires repair, and we want zero defects, so we have to change the rule within the board to fix the problem. Then we submit the rule change, and analyze it, and formulate a solution, and then submit it. Everyone should then use it or copy it exactly in each plant.”

The Design Rules Team face-to-face meeting took place in early November 1998, at the Electronics Technical Center in Dearborn. The meeting happened against the backdrop of a change in leadership. The atmosphere was charged with the surprise that accompanied the retirement of Charlie Szuluk and the promotion of Craig Muhlhauser. Although the new leadership caused some uncertainty among the people in the Electronics Division, since Szuluk was seen as a real advocate and supporter of electronics due to his electronics background, the reaction was generally positive.

The face-to-face meeting was also attended by a number of engineers who support the team but are headquartered in the Dearborn area. Several managers welcomed the group and addressed the meeting.

One of these managers announced a new phase of Copy Exactly, to be called Centers of Excellence.⁹ Why this topic was introduced at this meeting is not clear. Few details were forthcoming when the inevitable questions arose. A short section of dialogue is contained in the following text box. The dialogue offers a glimpse of the concerns felt by team members as they deal with the dilemma of local interests versus global interests. The plant representative is worried about the new proposed plan for Centers of Excellence. He is concerned that the plant does not have the appropriate resources to compete to be a center; if the plant is not a center, does that mean that its output is not excellent or vital to the larger corporate success?

The potential global strategic importance of Centers of Excellence as one component of a commonization plan was not part of the discussion. There was no indication of how this plan might benefit individual plants, nor was there any reassurance that the plants could all consider themselves vital to the final outcome of the strategic plan. [Concerns such as these appear justified because, less than seven months later, layoffs occurred among the engineers at the plant this man represents.]

This dialogue does not represent ideas unique to the Design Rules Team but was merely observed during that face-to-face meeting. However, it is important because it focuses on the core of the issues surrounding the local versus global dilemma that these dispersed team members face. Although the members of this

⁹ The name was later changed to Centers of Product Development.

team share common opinions on the meaning of Copy Exactly and a belief that they were selected for their expertise, they are still divided by deep concerns about potential outcomes for their home locations. The concerns deepen when the rules and processes of the Copy Exactly Initiative force increased costs on to an individual plant. Every bit of increased cost is seen as impeding the assignment of potential product to the plant.

Another member of this team expresses his concerns over the company's drive for profits and how it will affect both his job and those of his coworkers when he says

"Each area is so fine-tuned it's impossible for one person to do it all. At phone conferences there are questions about rule changes. Normally we vote for it and collect data to back up change, and then the rest of the gang is going to adopt it. All plants have done this. Sometimes there is a little cooked up way of reporting and sometimes kind of competition. We're open-minded, but if we tune it too well, they send the job to cheap labor. It's a concern about losing jobs."

Conversation Extract from Design Rules Face-to-Face, November 4, 1998

Question from Dearborn-based Team Member A: "Centers of Excellence—how do we fit into the puzzle?"

Answer from Manager B: "Well, it's not formalized yet, but it is important to be aware of how we might interact. If a plant is selected, that plant is pilot and needs design rules to be copied exactly!"

Question from Dearborn-based Team Member A: "Would we be facilitators? Would we push it to others or parts of it?"

Answer from Manager B: "This is a shared mental model."

Second answer from Manager C: "There's lots of mental models. It depends. Plants met, manufacturing managers met, there was good rich discussion, but more is needed."

Question from plant representative D: All the plants are similar—how are we going to come up with one that is excellent? Any plant could be the best.

Answer from Manager C: "It's a focus idea, task, focus resources, too. Read that as you will. Some plants run lean, some have lots of talent."

Reply from plant representative D: "These plants have lots of engineers. North Penn has lots but [my plant] has few—how to balance that?"

Answer from Manager C: "Not 100% commonize—does the Center of Excellence understand all the plants . . . the real details."

Reply from plant representative D: "Money is real reason—everyone knows how to get to 100%. The constraint is money."

Rebuttal from Manager C: "The large contractors are \$6–7 billion companies who are triple our size. They are running technology centers and can show that to the customers. For us, we bring customers to a lab in the back—covered with dust—not a real good sell job. We need a showcase."

Question from Dearborn-based Team Member A: "In these technical centers are they separate—like prototype lines or take existing lines? How do you handle conversion?"

Answer from Manager B: "That's not defined yet. There are lots of mental models; just be aware—look for it—think about how might plug in."

Question from plant representative D: "Yes, the machines are not the same. The name—Centers of Excellence—does it mean that one is not good?"

Another member of this team describes his experience as a team member with the pressures of local responsibilities versus his Copy Exactly work. His experiences point out a tension between the need for short-term results and long-term results. It is not always apparent that the long-term work of creating effective design rules and ensuring their use is one essential for zero-defect product quality and cost effectiveness.

“I have two functions—tech and CFT cluster (cross functional team for the instrument cluster). I am 100% technician and CFT is definitely 80% of the time. There is a huge conflict for time. My manager felt the CFT came before Design Rules, so I had to get results on CFT. There is less opportunity to get results in design rules. Design rules need time, investigation, and computer updates.”

Metrics are problematic for team members who are unclear about how to determine when rules are commonized and how to measure percent of match. The words of one team member sum up the opinions of the rest,

“That’s tough. How many parts are commonized and with what percent of commonization? It’s difficult, because it is a moving target. New parts are coming all the time. Now we can’t even put a number on it. It’s unrelenting frustration that you can’t say at the end of the day that you’re successful.”

Given this level of frustration, it doesn’t seem so surprising that the interviewed members of this team chose simple markers for success. One engineer reports that he knows the team is performing well if they “simply during the conference call stay on track with the discussion on the proposal.” Another team member says, “It feels good when you feel like you’ve accomplished something. The team performed well. It went through the steps and it worked.”

When the interview questions shift to what the team needs to be successful, the team expresses desires for both tangible and intangible resources. One team

member says, "All the managers need to be more involved in Copy Exactly activities to understand the purpose of the initiative." Another team member says, "Money is another resource." A third member says, "The team is struggling with a commonized drafting system to be used worldwide, so if a sketch is submitted, we all use a common format." It seems as though one engineer is frustrated with the team's inability to deal with systemic problems when he says,

"We need some cross functional team work—association with other Copy Exactly teams like solder, placement, and PWB. I know the logistics of a global team are difficult. Many things can go wrong, especially on the phone."

Problems with language and telephone communications were also mentioned when team members were asked about the impact of diversity. One engineer said, "From a technical point of view, I think what I've seen is a lot of plants are a little intimidated and a little, maybe embarrassed, because they can't get their point across, due to the difficulty in speaking and understanding. The phone is garbled and makes it more difficult." Another team member reported, "No it [diversity] doesn't come out in the team. It's a non-issue. In technical issues the problems go across cultures." Variety or diversity in points of view can be "both positive and negative, double edged, but the possible impact is of more benefit."

Only two team members answered the question about rewards and how they were related to the team's performance. In both cases they indicated that there were no real rewards, except possibly some satisfaction. One said, "I don't see any impact on performance reviews." The other said, "The advantage is in having problems solved."

Team members have a matter-of-fact attitude about their work in some ways. For example, when asked about the role of organizational leadership, one team member responded, “They impact resources, but they’re busy with something else and are never presented with the true details. It would be helpful if the leadership visited the guy doing the details to figure out what’s happening.”

Since Copy Exactly began, the team feels that there have been changes in the ways people work together and help each other “to solve similar problems.” One said, “I have learned to respect the opinion of others, of all team members. It’s a big lesson growing to respect them even more. There is rapport and friendship.”

The Wave/Selective Solder Team

One of the team members interviewed for this study said that when he heard the words “Copy Exactly,” he thought of “a gathering of experts, sharing technology with the positives and negatives that go along—trying to protect the plant and still see the bigger picture.” When this team was observed at the face-to-face, their agenda included a presentation by a group from one of their suppliers. The discussion before the supplier representatives came was as interesting as watching the subsequent interaction. As the team was going through the agenda for the three days, they were fine tuning the items. The following text box contains the dialogue that developed as the team added to the agenda item on suppliers.

Team Member A: “Suppliers”—need to get a support plan from Equipco so supplier education goes on list of objectives”

Team Member B: “ah... Understand Equipco’s support plan for BKMs 2000 [machine model] on list.”

Team Member A: “What else do we want to know from Equipco?”

Team Member C: “Ask about their plan and list the items included in support plan—Walter and Sergio getting the worst support—are they willing to continue with equipment suppliers’ needs?”

Team Member A: “I got a note from Pascal [supplier representative] that he wants to come to weekly meetings—he’s speaking out of both sides of his mouth—when they continue to give us poor plant support. I made it clear as possible to Pascal to only talk about support but you know how suppliers try to pull the wool over our eyes.”

The suspicion that team members expressed toward this supplier was based on a history of poor support for soldering equipment that the company had purchased. The supplier representatives were waiting in the meeting room after lunch. The team appeared suspicious of this group from the outset. The presentation hyped how much Equipco has changed and reorganized with a new structure that will allow more responsiveness. The firm asserted that it is trying to be responsive to its customers. For example, they have established a new call center with an 800 number that is staffed 24 hours a day and available worldwide. When one team member, who had complained of poor support for over a year, asked about the global dimensions of this service, he was told that the typical response time is 15 minutes. In a follow-up comment the same team member said, “the global service is important for people to know—if after hours we call, it is dramatic problem and we’ve tried a lot of highly complicated stuff already, so your responsiveness needs to be at that level.” This comment did not receive a response. Instead, one of the supplier reps began to explain the startup of “a total customer satisfaction group, and all company representatives will have pagers, cell phones, computers, etc.”

The presentation reached a new level of intensity when one of the supplier representatives explained that his company had stopped building a machine that is important to Visteon. He followed this up with a slide put together as he said, “just for Ford.” The team was not impressed, especially as Visteon has more of these machines than anyone else in the world. Spare parts availability became an issue and there was a volley of intense dialogue over the length of time the company will maintain parts for the machine.

Clearly the supplier was trying to minimize its responsibility for supporting this product; and the customers on this team were concerned. Parts failures or the unavailability of parts could jeopardize some “high-profile products that rely on the components made by this machine.”

After sparring back and forth, the team members related examples of poor support and machine performance. The supplier representatives appeared to squirm as they listened. The end result was that the supplier and the team agreed to a firm 60-day timeline during which they would determine their needs and the risks they face.

Finally, the discussion dropped off, and the representatives left. It felt as though the team was dissatisfied with the meeting, and this feeling was expressed by one team member who said, “Same shit, different smell.” The entire team spent the next few minutes in a very cohesive, us-against-them mood trying to figure out how to resolve this problem the best way. Overall, neither they nor the supplier representatives were able to connect in a way that would ensure a mutually beneficial relationship. This is serious, because if auto parts industry experts are

correct, Visteon needs to build a collaborative relationship with suppliers as an important component for success.

When these team members were interviewed, they were consistent in their belief that they were selected for their expertise. One team member expanded his response by saying that an important consideration was whether the person could deal at the process level rather than the product level. In effect, he said, “We have people who are experts in certain equipment—specialists in optimizing the process.”

The team’s weekly teleconference calls are an hour in length and the team leader gathers input from team members, then sends the agenda out before the meeting. However, one team member says, “The face-to-face meetings are where the tough decisions are made. There is more time to interact than on the telecon. It is difficult to agree, and the biggest steps for Copy Exactly are made at the face-to-face meetings.” The team members estimated that an average of 10.3 hours per week was spent on Copy Exactly Initiative work and they generally agreed on the goals of the project.

When asked about the metrics by which team performance is measured, the team members each mentioned percent of match, with cost savings and quality as alternatives. As one team member put it,

“Money savings is one key driver—by commonizing we see how matched we are. Overall quality is another, but we have done little to achieve that so far, because we had to get equipment in line, and so now design rules make sense. Quality will be significant. Percent of match for each plant to the BKM is another metric.”

Team members also felt accountable to their own personal expectations as well as those of their team mates and their immediate supervisors. When feedback is received, it is most meaningful from co-workers such as the others on the team. In

fact, it seems generally rare for team members to receive feedback from anyone outside the team itself.

There were a number of suggestions about what the team needed to be successful. One engineer said:

“I would recommend to have a face-to-face first. It happened to me, and I didn’t know any names or faces, and I wished not to have to talk. In a face-to-face you break the ice, and the guys are people, so that the next telecon you connect the voice and the face, and it’s easier to talk.”

Another of the team members made the following suggestions: “Representation from each facility, and then the team needs a budget . . . each team needs direction—to have the objectives worked out and whatever it takes to bring our ideas to reality.”

A final series of issues was addressed by a team member who said:

“We need continuous management focus at [the manager’s] level. We need money for actual plans and for travel. Travel is a big fight because the managers at the plants have to be convinced. Sometimes I get ‘beat up’ when they ask how their specific plant will benefit. There is still a plant focus. The global focus is not there. They are still measured by plant-based measures. There is a conflict between the plants and Visteon.”

Once again, the issue of local versus global interests surfaced. It is a fundamental factor in the work of these teams.

Language was one of the issues highlighted when the team members were asked about diversity. One team member said, “There is a language of choice, and speaking it is a huge reason why some plants are well known. If everything was held in Portuguese, it would be different. People would have more to say if the meeting were held in their languages.” This team felt that there were times when cultural differences can cause an insensitivity problem. One engineer commented

that “We haven’t had any training, and we don’t do anything as a team, i.e., come in a day early—so we never had any relationship building time.”

There was general agreement that the only rewards for Copy Exactly work are personal, rather than official. One team member said that, although rewards are not linked, if you create a “better process, it means more free time to improve the process further, which can lead to better quality and greater speed.” The team’s opinions on rewards were summed up well by the team member who said, “There is no link between team performance and rewards. There are no consequences positive or negative. It’s all personal initiative.”

Rewards are linked to one of the lessons that a team member recounted:

“I will remember how difficult it really was to get the team to agree on basic things like equipment. It took hours and hours—six months to come to consensus. The people didn’t want to change and didn’t understand what a BKM was. Copy Exactly is additional—the team building is even more crucial because there are no rewards. People want to be rewarded in a materialistic fashion. A good team needs to get bonuses.”

The tone of this lesson is reflected in another told by one of the team members:

“What will stay in my mind is that the people who brought Copy Exactly had the right intentions. It was brought from Intel, with similar products, to our plants with diverse products. If it were ever achieved I think it will be a very significant accomplishment, but the ability to change BKMs has to be speeded up.”

This team is thoughtful and concerned about the pace of change as they talk about their work. It coincides with Craig Mulhauser’s concerns discussed earlier in this case. He said he believed that people had to be more flexible.

One member effectively contrasted the impact of their dispersed team to that of a collocated team, saying:

“On a global team participation is not accountable. There is no accountability. A good leader makes it easier to control a collocated team. The good things about a virtual team are the ability to interact and see different cultures and different countries. It needs a much higher commitment from the organization to get it working versus the collocated team. However, a well-organized virtual team can have more impact while the collocated team only affects one location. This virtual team impacts seven plants very powerfully.

The Core Team

The members of this team are advanced manufacturing managers or supervisors at each plant who serve to coordinate, support, encourage, and help guide the other teams. One team member said, “I’m a Core Team member so I set strategy. As a coach I try to be in synch with the CIT team leader, but the Core Team is more of a strategy team than an implementation team.” Another member of the team described his role: “I keep the momentum going. As the coach I should make sure there are resources (people dedicated by plants) and give guidance if there is no direction. I am also the source of impasse mediation, although I want the team to work it out.”

This Core Team face-to-face meeting was held at North Penn during the week of June 8, 1999. The atmosphere within Visteon was very tense, due to the effects of yet more internal restructuring, as well as further rumors of some sort of impending action such as a Visteon sale or spinoff by Ford Motor Company. Plants were feeling the impact of the loss of engineers to firms with more competitive wage and benefit packages. The Arbor Plant in Brazil had just experienced layoffs, which is always unsettling. Add to these issues an article in the May 1999 *Automotive Manufacturing and Production*, which quotes Visteon president Craig Muhlhauser as saying, “One challenge is to allow people to see that this is an

industry that recognizes that it needs to change—and change dramatically from its current paradigm” (Vasilash 1999).

A senior manager kicked off the meeting with a report on the potential outcome of some of the restructuring. It was not yet entirely clear who would ‘own’ Copy Exactly, since plants were being divided into different business units and divisions. The Electronics Division was being folded into Interiors “to allow direct contact with customers.” The manager emphasized a need to increase flexibility and responsiveness in meeting customer demands. He used the phrase “to be able to turn on a dime.” Capacity must be identified and linked to collaboration, to quickly optimize the production configuration.

Meeting participants affirmed the idea that keeping cohesiveness within the electronics ‘community’ was important. The changes made by the restructuring meant that Copy Exactly became one of the few elements that gave electronics manufacture in Visteon any coherence. The goals of Copy Exactly, “process commonization and common quality across the plants,” were part of the reason. In addition, the members of the Copy Exactly teams formed a network of people who shared a common base of knowledge across the plants.

The Core Team was responsible for “a much larger vision,” as one member put it. Another team member said the goal of Copy Exactly “is to have methods and equipment help get the best out of people—best efficiency. It is to define the best way to do things and apply it across all plants.”

Project metrics were identified as “percent attendance, percent of BKMs identified, and overall percent matched.” Team members were generally in agreement that the whole initiative’s performance is judged by people outside the

team, such as customer/managers in production and management in the SBUs. For these folks cost savings are the important metric. As one team member said, “The savings numbers—that’s when upper management gets excited.”

The team is responsible for building and maintaining a consistent plan or roadmap for conversion and a roadmap for technology. Each of the functional area teams constructs a roadmap for their area and it is then funneled into the larger initiative-wide roadmap. The functional area team leaders or plant champions report to the Core Team at their meetings. The meeting structure is similar to the functional teams—weekly telephone conferences and periodic face-to-face meetings. At the face-to-face meetings the reports are shared, and “the plants see their metrics as compared to others, and the team makes recommendations.”

As might be imagined, this group has definite ideas about what the teams need to be successful. Among their suggestions are:

- Travel budget
- Measurables
- Support from the plant
- Money for modernizing equipment
- Time to do Copy Exactly work in the plants
- Time to go to meetings
- Management support and feedback if they are doing a good job
- Training in how to do Copy Exactly

The teams need “a person to step out and look and tell them where to concentrate. We need to divide the resources to concentrate on this, so that people can step out of the tornado of production and look from the outside. We need to give them some thinking time, along with clear priorities, rather than mixed objectives.”

The Core Team’s comments on diversity were clear and straightforward. The comments speak for themselves: “Diversity will improve team performance.”

“Diversity helps us move outside the box, and diversity breeds success.” “With enough diversity we tend to see more of the ‘world’ of process effects, and we learn from each other.” This is a strong message and one that is projected into the work of the team as well as outward to the functional team members.

When the interviews turned to the effect of team performance on their rewards, this team answered very much as the others did. Two team members commented that there was no structural reward system for rewarding their efforts. One commented, “The team should be recognized for progress, but there is no way to recognize effort.” The other said, “It is seen as one portion of your job, so it does come into the picture. You become known in the company and get global exposure, so that’s a reward in a sense.” A third team member said, “I’m rewarded more indirectly during the overall performance review.” A fourth member of the team was more blunt, “Zero. There is no compensation. Copy Exactly is viewed as a part-time effort, measured on local rather than global objectives.”

During the face-to-face, one team member emphasized that the team needed to be more aware of the need to be more embedded in a business framework, at the same time that he reinforced Craig Muhlhauser’s key strategic goals.¹⁰ The Core Team members were aware of the need to engage upper management but they expressed some frustration at what they see as a short-term approach. As one man put it, “They’re driven by quality and cost savings—that’s really it. The ‘want

¹⁰ A manager delivered a strong message that echoed elements of Craig Muhlhauser’s plans to position Visteon as a highly competitive supply organization. Three elements that will lead to Visteon’s success include becoming faster at almost everything, taking advantage of the expertise available among the workforce, and fully supporting a vision of a more competitive organization (Vasilash 1999).

impact today' syndrome—and if they don't get it the program ends. It's shortsighted to want it cheaper, better, faster." Another team member said:

"The responsibility of leadership is to support the answers that come out and agreement on common end points. They must support the successes and failures, especially support the spectacular failures because everything is not a success. Leaders must sacrifice short-term objectives locally to have long-term successes at a distance, but this company's culture is to compete against each other."

The manager also tied Copy Exactly work to the idea of making electronics production leaner and more cost effective. It is interesting though that the Copy Exactly Initiative is not more tightly linked to the lean manufacturing goals of the Ford Production System, which is being implemented across plants in Visteon. When asked about the apparent lack of a relationship between the two programs, one team member said, "Copy Exactly is viewed as a separate entity. We don't see the interrelationships, like trying to match tools with the Visteon Production System."

Core Team members identified some significant differences since the beginning of Copy Exactly. For example, "the range of decision making is smaller. There are 3 options rather than 32, which makes life easier for decision makers." Another team member reports:

"Now, there is a whole new level of respect between the plants than there was 2-3 years ago. Before, they never had the opportunity for respect and understanding. There are still issues, but it makes it easier to do process development. Management can't measure it, except the tangibles."

The fact that Copy Exactly is a team project is important for its success as well. The cooperation and collaboration that can grow within a team seem to be what one team member is speaking of when he says:

“The last thing I want is some one telling me from the outside that my line will look like this or that but this team approach helps with that resistance—you consense to change because you agree to most of the change and you think you can live with it. The structure helps to make it work because the people who make it work are part of the team.”

It was fun to ask these team members to share a story or a lesson.

Unfortunately most just chuckled and then told me ‘a better story.’ One team member said that the lesson for him was that “Visteon will grow—is growing—and we need to free up engineers to quote new business. We must contain costs and push growth.” Several Core Team members told stories about events that happened during the face-to-face meetings, a combination of business and personal—birthday cakes, long hours hammering out solutions, watching controversial issues melt away over dinner in the evenings, and making rules such as no meetings in Canada in the winter.

Conclusion

The people of the Copy Exactly Teams in this study were all great representatives for their plants and their company. It was difficult not to be impressed with the efforts they were making to accomplish a huge task in an ever-changing organizational context. In the earlier part of this case study, some of the contextual factors in the global competitive environment present in this story were outlined: restructuring in the global auto supply industry; redirection of internal organizational structures and product strategies; and rapid, successive changes in organizational leadership. Each of those factors has had an impact on the Copy

Exactly Teams. This study has examined those impacts through the words of team members, coworkers, and members of management.

Industry Changes

As the changes in the auto parts supply industry push Ford to change its relationship with Visteon, employees are faced with many challenges. The greatest concern is probably for job and employment security. What will happen to me and my plant when the company restructures the next time? It is a serious question, and it has an impact on how people respond in their day-to-day work. We have heard the team members talk about the competitive feelings between plants, and how they work within that constraint.

The shift from original equipment maker to parts supplier is a mindset change that Visteon employees are gradually absorbing. At one face-to-face we had a brief glimpse of how one team interacted with suppliers. While it may have been an extreme situation, coupled with other Copy Exactly team observations, it shows that there is a need to build greater trust if those relationships are to be of mutual benefit. The suppliers of equipment and materials selected as the BKMs by the teams may need to eventually be brought into a more integrated team effort to continue to gain incremental improvements.

There was no solid link between the work of Copy Exactly and Visteon's efforts to create a more 'lean' operation. The Ford Production System or Visteon Production System was in evidence throughout the plants, yet these engineers who were supporting and designing production processes were not involved and had not been given much information on how the lean manufacturing method would impact

their work. Both North Penn and Markham had been recognized for achievements in cutting costs and cycle time, but in both cases the introduction of lean principles could have been more solidly linked to Copy Exactly. Commonization or integration of efforts to make improvements might make it possible to show greater cost savings.

Changes in Organizational Structure

The ongoing changes in organizational structure have changed the network within which the teams operate. The Electronics Division has been subsumed into the Interior Systems Group. The plants still exist, but as parts of different strategic business units. The one integrating structure for electronics is the Copy Exactly Initiative. Even the manager who first made this assessment has been assigned to a new job elsewhere in the company.

As this is being written Copy Exactly is at 'home' in the Electrical Core Design group for the North American Cockpit SBU. Copy Exactly Teams will have changed their 'home' divisions, group, system, or business unit any number of times, just during the course of this study. Each change meant a change in the hierarchy and politics of their existence. Small wonder that they feel organizational support is one of their greatest needs.

Copy Exactly was envisioned as an integrating and unifying project that would, over the long term, cut costs and make circuit board manufacturing more competitive. Decisions for the system would only be optimized for each plant if there was no competition between plants for survival. As one manager explained it before the latest organizational reordering:

"The results are that the organization is a living thing. We are learning how to restructure to meet new business requirements. Now we are close to [organizational] restructure and that's linked to Copy Exactly. Distributed processes move to a more centralized form, and Copy Exactly leads to a critical mass."

The strategic organizational changes seem to have made this goal more difficult.

Plants have reportedly been told that they are again going to be profit centers, which may well enhance rather than minimize competition. It is to be hoped that it will produce what one manager called a "manufacturing community, which we can take to the division level."

The network of relationships and shared knowledge that the members of the Copy Exactly teams have built is extraordinary. Engineers in at least seven countries know where they can call to get specific information and ask for help. They have first-hand knowledge of the other plants and the equipment they operate. Information sharing has increased as team members begin to trust each other as well as the information they provide. Plant tours that were a standard part of each face-to-face have also helped to build the network. If the commonization process continues, the amount of knowledge that can be shared will grow, as plants share solutions and difficult technical information. This network is an as yet unacknowledged 'structure' within Visteon. If it is given support and nurtured, the company and each plant will reap benefits that will never be strictly measurable, but they will be of inestimable value.

This professional network might be strong enough to create a sense of belonging to the company, rather than to one's home location. However, with all the changes and uncertainties, there is a good likelihood that people will feel much more attachment to their home locations than to the company. As the company

itself may metamorphose into something else, with a merger or buyout, internal loyalties may well reside most strongly at the home location level.

Changes in Leadership

Leadership for the Copy Exactly teams had many faces: team leaders, coaches or champions, local management, and corporate management. When problems arose within the teams, team leaders called on coaches from the Core Team to help. The lines of authority for Copy Exactly matters ran directly up this path to Dearborn, where the supervisor or manager might get involved. Local management did not get involved in Copy Exactly concerns to any great extent. The manager worked as the liaison to executive levels of the company, through the Copy Exactly hierarchy and through his own personal leadership structure.

Team leaders were critical to the success of the teams. They facilitated the meetings, distributed minutes and agendas, and generally kept the team on track. This work was extra, above and beyond their work at their home locations. They were able to combine technical expertise with interpersonal skills.

The most troublesome leadership issue for Copy Exactly endeavors is the lack of clear upper-level endorsement and promotion—missing for the most part after Charlie Szuluk retired. Szuluk's interest and knowledge of electronics made a natural link to a project like Copy Exactly. His successors came into the top position with other interests and priorities framed in different ways. This led to mixed signals and allowed a sense of flagging support to filter downward.

Local leadership responds to the signals that support their manufacturing charge. This translated into a lessened emphasis on Copy Exactly in some plants.

Attending meetings became increasingly difficult as travel budgets were redirected. Time needed to do the work of the teams conflicted with the time needed to do plant related daily work. It is a dilemma that has been framed as a mismatch between local versus global interests. It may well be the single most powerful force running counter to the efforts of the Copy Exactly teams. Each team singled it out as an area of concern. Competitive pressures and short-term cost cutting are causing, as one team member said, a “want impact now” attitude among managers accountable for plant productivity. Therein may lie the secret to the continued success of Copy Exactly—it must be more completely integrated into both the corporate structure and the values that support that structure.

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CHAPTER 5

FINDINGS

This chapter contains the quantitative results of this study. The results will be discussed in two parts. The first section will contain the results of the shorter surveys that were administered to those participants who were interviewed. The second section is a report on the results of the longer, web-based survey administered to the entire participant list of the project—non-team members who were interviewed and participants who support the team or do related work. Where appropriate, the qualitative data will be used to support quantitative results, thus validating the results of both data collection modes. Unfortunately, insufficient archival data was received from the company to complete the planned comparison of study findings with corporate measures.

Recall that at the end of each interview ($n = 30$), the participants were requested to complete three forms: a demographic information sheet and two short survey instruments (see Appendices D and A, respectively) related to their perceptions of resources available to the Copy Exactly teams and the frequency with which they used specific modes of communication.

Results

The responses to the resources survey were tabulated for six groups organized by role, the five function-specific teams, a group of managers, and a group of coworkers who worked on other Copy Exactly teams that were not included in the study. The mean scores and standard deviations for each resource are reported by group and location in Tables 5.1 and 5.2. Low scores indicate the perception of a deficiency in the amount of the resource available to the group.

In Table 5.1, the totals for six groups are displayed. Every group except managers selected “support from other parts of the organization” as their most needed resource (managers selected it as the second most needed resource after “non face-to-face time”). The next most needed resources are:

- time for non face-to-face meetings,
- people,
- training in how to be an effective team,
- information needed to complete task.

Interestingly, “skills in the group to complete the task” was most frequently listed as the resource least in need at this time along with “tools for non face-to-face interaction,” and “materials to do the task.”

Since twenty-nine of the thirty people interviewed were engineers by training, it is not surprising that skill levels were viewed as satisfactory. In addition, this result fits with the quantitative data in which team members reported that team selection was based on skills and expertise. The teams whose members work primarily in the plants had higher ratings for skill resource needs than the managers and headquarters group. These latter two groups reported a perceived need for higher skill levels.

The teams reported that they also needed time for non face-to-face meetings but did not perceive a need for tools for non face-to-face meetings. Team members seem to need more time to communicate on the phone or via email, but feel that those tools are currently adequate. This may also reflect a stated need for more time to do the work of the team. In general those groups that were more involved in administrative work, managers, the headquarters group, and the core team reported a need for greater amounts of non-face-to-face time.

Team 2 consistently reported higher perceived satisfaction with levels of resources than the other teams. None of the data collected on this team provides an explanation of why this is the case. An ANOVA comparing the team means shows differences between the team mean scores, but none of them are significant.

In Table 5.2, the scores are distributed by site visited; and once again, low scores indicate a perceived need for greater amounts of the resource. In every case, the greatest perceived resource need is support from other parts of the organization. Thus, the lack of support is felt across teams and locations. It is not just a symptom of one group or facility. Throughout the project as well as within the ranks of managers, there is a real sense of the lack of organizational support for the initiative. This result matches the observed reality described in Chapter 4.

The site scores also indicate perceived needs for more people, training, and time. In the least-needed category for the sites were skills, tools, facilitation, and materials. This list mirrors the perceived least-needed resources identified by the groups. Site 1 indicates less resource deficiency than the other sites in every category except materials, while Site 3 reports the greatest perceived need for more resources in six out of ten categories. Site 1 is not in the United States. The mean

scores for this site are above the average mean score in every category. This result might be related to cultural norms but such a conclusion is difficult to support since Site 3 is also not in the U.S. This is clearly an area where additional, more focused research is needed.

An ANOVA comparing the mean scores across sites shows differences significant at the .05 level in only two categories: information and skills. In the case of information, Site 3 prides itself on having accurate levels of information, as well as documenting it carefully. The people working at this site might be overly concerned about information levels. The differences in perceptions of skills needed may result from the fact that Site 1 (lowest mean score) must respond to the problems of the other sites, and this may alter their perceptions of the skills of the members of the project.

There is remarkable agreement between the perceived resource needs of the teams and the sites. The participants have collectively marked several needs that they feel would improve their performance. In the case study in Chapter 4, the issue of strategic alignment between the strategic goals of the organization and the Copy Exactly teams was identified as a key barrier to the success of the initiative at the organizational level.

Both qualitative and quantitative results support the serious need for organizational alignment and support as critical for the effectiveness of dispersed teams. Within the team and within the initiative, performance was generally high; and team members accomplished many things. The key to commonization was local change, as the plants implemented the globally driven Copy Exactly recommendations. Locally, the Copy Exactly changes were frequently seen as costly

and potentially detrimental to a plant's competitiveness within the organization.

Without clear and sustained organizational support, local concerns can hamper the change process.

A second issue with alignment has to do with the potential clash between production needs and engineering processes. Changing machines means readjustments to the manufacturing process, which would generally cause delays in production. There is a clash between the measures by which these two corporate areas are evaluated. Further issues of organizational support will be discussed in the following sections.

Table 5.1: Resources Survey: Average Means—Responses by Group

Group	Information	Training	Materials	People	Skills	F2F time	Facilitation	Tools	Not F2F Time	Support
Team 1 Mean (N = 5)	2.80 (.45)	2.40 (.89)	3.00 (.71)	2.60 (.55)	3.20 (.84)	3.00 (.00)	3.00 (.71)	3.00 (.00)	2.40 (.55)	1.60 (.89)
Team 2 Mean (N = 4)	3.25 (.50)	3.25 (1.50)	3.75 (.96)	3.25 (1.71)	3.50 (.58)	3.75 (1.50)	3.25 (1.26)	3.75 (.96)	3.50 (1.29)	3.00 (1.83)
Team 3 Mean (N = 3)	2.67 (1.15)	3.33 (.58)	3.00 (1.00)	1.67 (.58)	3.33 (.58)	3.00 (1.73)	3.67 (.58)	4.00 (1.00)	2.67 (1.15)	1.67 (.58)
Team 4 Mean (N = 4)	2.25 (.50)	2.50 (.58)	2.75 (.50)	2.50 (.58)	2.75 (.50)	2.75 (.50)	2.75 (.50)	2.50 (.58)	3.00 (.00)	1.75 (.50)
Team 5 Mean (N = 4)	2.83 (1.29)	2.25 (.50)	3.50 (.58)	2.50 (1.00)	3.50 (.58)	2.50 (1.29)	3.00 (.82)	3.00 (1.41)	2.25 (.96)	1.75 (.50)
Managers Mean (N = 6)	2.83 (.41)	2.67 (1.21)	3.17 (.75)	2.42 (.80)	2.92 (.80)	2.58 (.49)	2.83 (.41)	2.50 (.84)	2.17 (.41)	2.33 (.52)
Coworkers Mean (N = 3)	3.33 (.58)	2.67 (.58)	3.33 (1.15)	3.00 (1.00)	4.00 (.00)	3.67 (.58)	3.67 (.58)	3.67 (1.53)	3.67 (.58)	2.33 (1.53)
Total Mean (N = 29)	2.79 (.73)	2.69 (.93)	3.21 (.77)	2.57 (.92)	3.26 (.67)	2.98 (.97)	3.10 (.72)	3.10 (1.01)	2.72 (.88)	2.07 (1.00)

Table 5.2: Resources Survey: Average Means and Standard Deviations—Responses by Location

Site Name	Information	Training	Materials	People	Skills	F2F time	Facilitation	Tools	Not F2F Time	Support
Site 1 (N = 8)	3.25 (.71)	3.13 (1.13)	3.38 (.92)	2.88 (1.13)	3.75 (.46)	3.38 (.92)	3.25 (1.04)	3.63 (1.19)	3.13 (1.13)	2.63 (1.06)
Site 2 (N = 8)	3.00 (.53)	2.63 (.74)	3.25 (.71)	2.81 (.37)	3.31 (.70)	3.06 (.68)	3.25 (.46)	3.00 (1.07)	3.00 (.53)	2.13 (.83)
Site 3 (N = 7)	2.29 (.76)	2.29 (.76)	2.71 (.76)	2.14 (1.22)	3.14 (.69)	2.57 (1.27)	2.86 (.38)	3.00 (.58)	2.57 (.79)	1.71 (1.11)
Site 4 (N = 6)	2.50 (.55)	2.67 (1.03)	3.50 (.55)	2.33 (.82)	2.67 (.52)	2.83 (.98)	3.00 (.89)	2.67 (1.03)	2.00 (.63)	1.67 (.82)
Total (N = 29)	2.79 (.73)	2.69 (.93)	3.21 (.77)	2.57 (.94)	3.26 (.69)	2.98 (.97)	3.10 (.72)	3.10 (1.01)	2.72 (.88)	2.07 (1.00)

Communication

The results for the communication survey are less dramatic than those for the resources survey. Since the survey was designed before the field work began and was based on the literature describing the work of dispersed teams, the survey included videoconferences as one of the communication choices. The Copy Exactly teams did not use videoconferencing for their work and that category was not a useful part of the survey. As of September 1999, the team has begun to explore videoconferencing as a less expensive alternative to the travel needed for face-to-face meetings.

The patterns of responses to this survey show that generally there are two face-to-face meetings each year, weekly or biweekly telephone conferences, some written communication, and infrequent to rare conferences using internet software. Informal telephone calls and email are the two most frequent modes of communication for all groups and at every site. The estimated use of email was slightly higher than the use of telephone calls. This makes sense given the dispersion of these teams globally and the differences in time zones at these sites.

These results support the role of mediated communication in the performance effectiveness of these dispersed teams. Email would be a comfortable alternative, since it allows people to compose their remarks and reply at their own speed. Certainly, every global team will have different patterns of communication mode usage, based on the availability and ease of use of certain modes, as well as the characteristics of the communication network within which they are used. Mediated communication is among the variables discussed in the next section of this paper.

Hypotheses

Table 5.3 provides means, standard deviations, sample size, Cronbach's alphas, and correlations for all variables. A multiple regression analysis was used to test the relationship between the independent variables in the model (LEADRSHP, ORGSUPPT, GOALCLAR, REWARDS, ACCOUNT, DIVERST, KNOWSKIL, and MEDIACOM) and performance effectiveness (EFFECTIV), the dependent variable. The analysis highlights the significant positive relationships between effectiveness (EFFECTIV), diversity (DIVERST) and knowledge and skills (KNOWSKIL).

Table 5.3: Descriptive Statistics, Correlations, and Reliabilities

Variables	Means	s.d.	N	α	1	2	3	4	5	6	7	8
1. EFFECTIV	27.69	4.73	55	(.84)								
2. DIVERST	21.08	2.81	54	(.61)	.698**							
3. ACCOUNT	7.44	2.76	40	(.56)	.370*	.285						
4. REWARDS	10.25	2.67	54	(.49)	-.388**	-.239	-.116					
5. GOALCLAR	12.19	1.82	55	(.64)	.505**	.494**	.520**	-.217				
6. ORGSUPPT	6.94	2.68	55	(.73)	.168	.116	.477**	-.198	.207			
7. MEDIACOM	18.28	1.86	55	(.70)	.372**	.325*	-.097	-.169	.234	-.155		
8. LEADRSHP	16.38	3.82	55	(.81)	.484**	.440**	.567**	-.171	.400**	.383**	.102	
9. KNWSKIL	15.78	3.21	54	(.74)	.652**	.472**	.155	.452**	.288*	.106	.417**	.326*

Organizational support (ORGSUPPT), the variable that stood out sharply in the analysis of the short resources survey, is related positively to accountability (ACCOUNT) and leadership (LEADRSH). This is reasonable given the natural relationships of these factors in the employment environment. Not surprisingly, ORGSUPPT has small, non-significant relationships with the other variables, including effectiveness. Copy Exactly participants view the perceived lack of organizational support from other parts of the organization as an element of the organizational context that they work around to perform effectively. Effectiveness has a positive and significant relationship to all the variables except organizational support. The qualitative data discussed in Chapter Four support these results.

Table 5.4 reports the regression results for two models. Model 1 is composed of variables that are more traditionally representative of the key elements of team performance (Hackman 1987). These five variables (LEADRSH, ORGSUPPT, GOALCLAR, REWARDS, ACCOUNT) produced mixed results. The overall model explains 42% of the variance and has a highly significant F score. REWARDS is significant to .05 but is negative, while GOALCLAR and LEADRSH are positive and statistically significant. These regression results mirror both the correlations of these variables with effectiveness, as well as the perceptions of the participants in the qualitative interviews.

Model 2 reflects the addition of three variables predicted to be more important for the performance of dispersed teams than for collocated teams (DIVERST, KNOWSKIL, and MEDIACOM). Diversity in dispersed teams must be defined more carefully than it might be for collocated teams. Differences in race, sex, or national origin are an inherent component of globally dispersed teams.

However, these factors become far less visible when team members communicate via electronic media.

Table 5.4: Regression Results

Variables	Model 1	Model 2
	b	b
LEADERSHP	.44*	.12
ORGSUPPT	-.18	.05
GOALCLAR	.68*	.20
REWARDS	-.57*	-.19
ACCOUNT	.06	.22
DIVERST	----	.61**
KNOWSKIL	----	.17
MEDIACOM	----	.17
R Squared	.422	.673
	F (5,34) 4.967**	F (8,30) 7.72***

- * p < .05
- ** p < .01
- *** p < .001

Other elements may become more important, such as shared professional competence and variety of experience that may be applied to problem solving (diverse work settings, familiarity with different languages, or assignment to multiple projects). DIVERSTY is tied closely to knowledge and skills, although KNOWSKIL is more strictly defined as education, training, and work skills. Mediated communication (MEDIACOM) becomes an essential element for optimal use of the former two variables. If there are no appropriate means for

communicating, the dispersed team is severely handicapped. Therefore, there is a dynamic relationship between these variables that has special meaning for the globally dispersed team.

Before continuing this analysis, it must be noted that the sample size is smaller (30–34) than the total sample for the survey ($N = 55$). This occurred due to the construction of the survey and subsequent scale construction. Initially the research design included a comparison of results for team members with those of other groups, such as managers or project support staff. This comparison was not possible because participants misunderstood the survey directions. As a result some questions have somewhat fewer answers than others. This causes missing data that leads to smaller sample size despite efforts to maximize sample size, including the use of a pairwise deletion method.

When Model 2 is run with the addition of these three factors (DIVERST, KNOWSKIL, and MEDIACOM), it allows us to account for far more of the variance. The dramatic difference in the R squared (.673) for Model 2 over Model 1 (.422), plus the highly significant F score, prompted additional analysis.

Further regression analyses were run, using the stepwise method of variable entry and the backward elimination method of variable entry. Table 5.5 reports the results of the backward elimination method. In this method of regression, variables are all entered into the equation and then at each step the variable that causes the smallest change in R squared is eliminated. Three variables are left in the sixth model (DIVERST, KNOWSKIL, and MEDIACOM). These three variables explain over 65% of the variance in this model.

Table 5.5: Post Hoc Analysis Results of Regression (Backwards Mode of Variable Removal)

Variables	1st Model	2nd Model	3rd Model	4th Model	5th Model	6th Model
1. LEADRSHP	x	x				
2. ORGSUPPT	x					
3. GOALCLAR	x	x	x	x	x	
4. REWARDS	x	x	x	x		
5. ACCOUNT	x	x	x	x	x	x
6. DIVERST	x	x	x	x	x	x
7. KNOWSKIL	x	x	x	x	x	x
8. MEDICOM	x	x	x			
R squared	.673	.673	.668	.663	.658	.649
F Values	F (8,30) 7.716	F (7,31) 9.086	F (6,32) 10.732	F (5,33) 13.009	F (4,34) 16.339	F (3,35) 21.617

Variable removed if it was not $p < .10$ of F, not b

The regression analysis using the stepwise entry method also leads to the same conclusion. Table 5.6 reports the R squared for each model, as well as the F scores and significance. Notice that once again these three variables explain a larger percentage of the variance (R squared =.626). Mediated communication is the least predictive of the three variables, although it is moderately but significantly correlated to effectiveness.

Table 5.6: Regression Results: Stepwise Entry Method

Model	R Squared	DF	F	Sig.
1	.375	5, 32	3.839	.008
2	.626	8,29	6.060	.000

These results help us to answer the research questions driving this study. Globally dispersed team effectiveness in this study is influenced by factors similar to those of collocated teams. However, performance is more heavily influenced by factors such as diversity, knowledge/skills, and mediated communication. Diversity in race, gender and national origin is inherent in global teams and is less important when team members are not face-to-face. However, broader diversity of experiences, problem solving modes, and professional attitudes takes on great relevance for globally dispersed teams.

These team members are selected because their local manager believes they possess a high level of knowledge and skills that pertain specifically to the tasks they perform. Professional educational curricula form an element of this shared base

of knowledge, as does on-the job training. Team members come to rely on this level of knowledge and skill even more when they are not collocated, communicate primarily electronically with others on the team, and must be self-directed. One result of these conditions is that competence assumes greater importance as a foundation for trust building in the team.

Mediated communication plays a crucial role in the interactions of the team. In this study, the team did not yet use videoconferences but relied on email, telephone, a website, and face-to-face meetings. According to the qualitative data, this team used electronic communication as an expedient tool but really believed that the most important work was done face-to-face. The process they described was one in which the work done electronically built up to face-to-face decisions.

In summary, the regression analyses distinguished the value of three variables—diversity, mediated communication, and knowledge/skill—from the other five variables—leadership, organizational support, goal clarity, rewards, and accountability. The former were either not in Hackman's model (mediated communication) or take on enhanced meaning when viewed through the spatial and chronological differences of globally dispersed teams (diversity and knowledge/skill).

The results of the analysis generally supported the hypotheses. In line with Wageman's work (1995, 1997) on rewards alignment, there is a negative relationship and highly significant correlation between rewards and effectiveness expressed in the figures in Table 5.3. This supports the hypothesized effect of individually awarded compensation on collective work expressed in Hypothesis 1. Compensation and performance evaluation occurs for team members in their home locations and is

based on the work they do for their supervisors in these workplaces. It follows that these conditions could negatively impact performance effectiveness for the global team, as individual team members optimize their own rewards through greater emphasis on locally rewarded tasks. Additionally, this result reflects the situation described in the qualitative data by participants who reported that there were no links between rewards and performance.

As hypothesized, diversity has a strong impact on the performance effectiveness of dispersed teams. Hypothesis 2 is strongly supported by the results of the regression analyses, which all highlight the relationship between diversity and effectiveness. In this study the definition of diversity was expanded beyond the outwardly visible characteristics of race, gender, and national origin, to include the more intangible aspects of difference such as competence, functional background, and attitudes (Jackson 1991; Jackson, May, and Whitney 1995; Harrison, Price, and Bell 1998; Pelled, Eisenhardt, and Xin 1999). The visible factors are inherent in the composition of the global teams that make up the Copy Exactly Initiative, while the intangible factors acquire emphasis due to the unique dispersed nature of the teams' work organization.

Notice that diversity is both highly and significantly correlated with effectiveness. Additionally, regression analyses indicate that this variable is one of the strongest predictors of performance effectiveness in the overall model. These results are supported by team member comments on the value of the variety of experiences available in each group.

As predicted, accountability has a small, positive, significant relationship to effectiveness. This provides some support for Hypothesis 3. Of interest here is the

relationship between accountability (ACCOUNT) and goal clarity (GOALCLAR).

The qualitative data clearly illustrate the clarity of purpose that team members share and the accountability that many of them feel to others on the team. Accountability relationships affect how people approach their tasks and set goals in the workplace (Frink and Ferris 1998).

Participants describe the lack of clear accountability to a global supervisor, as each team member operated under local management. On the other hand, they do see the team leaders and members as people whose feedback is important. Additionally, many team members identified a strong sense of responsibility and accountability to their immediate supervisor.

Contrary to Hypothesis 4, mediated communication has a positive, significant relationship to team performance effectiveness. Despite concerns about the impact of technology on team performance, and the link between trust and team performance (Hollingshead and McGrath 1995), and the link between trust and team performance (Warkentin et al. 1997; Jarvenpaa and Leidner 1998; Jarvenpaa, Knoll, and Leidner 1998), regression results in Table 5.4 in Model 2 show that mediated communication (MEDIACOM) is important to the effectiveness of the dispersed teams in this study.

The use of modes of mediated communication is a crucial part of the work of dispersed teams. Team members report that it is sometimes difficult to accomplish all they would like during telephone conferences, because people are reluctant to speak up, have difficulty understanding, and the technology is not always as effective as possible. Nonetheless, telephone conferences and email are one of the main modes of communication for these teams; and there are few other options that

are as cost effective and available. So the results and the literature together suggest that because mediated communication is essential to team performance effectiveness, the teams work with it even when it is not the optimal communication mode.

Different modes of communication seem to be used for different types of work. Phone conferences are used to plan and put details in place so that decisions can be made during the face-to-face meetings. It is also during the face-to-face meetings that team members build the strongest relationships among themselves (Warkentin et al. 1997).

The strong, positive, and significantly correlated relationship that goal clarity (GOALCLAR) has with performance effectiveness supports Hypothesis 5. Just as goal clarity is an important element of Hackman's model, it is an important element in Model 1. In fact, it is the largest single element among the variables in that model. This changes in Model 2, where it is not nearly as strong an element.

Goal clarity among members of the dispersed teams in this study was somewhat varied. Even this general level of clarity was not shared with those outside the teams, such as local supervisors or people from other functional areas. Thus, the range of ambiguity was quite large for these teams and establishing an "acceptable performance level" was difficult. In other words, the dispersed nature of the team and the local nature of accountability may create conflict between the importance of goal clarity inside the team and goal clarity inside the local facilities where each team member works.

The results of the analyses support Hypothesis 6 as predicted. Knowledge/skills (KNOWSKIL) has a strong, positive, highly correlated relationship to effectiveness. In the regression results, it is one of the three variables added in

Model 2 (see Table 5.4) and it explains a large percentage of the variance in effectiveness. During the interviews the participants commented on the beneficial effect that knowledge had on team tasks—especially jobs that required problem solving and testing. The knowledge shared in these teams spread across people who worked in a number of sites. This moves beyond the collaboration that Hackman describes in a collocated team to a collective collaboration at a global level.

Beyond effectiveness (EFFECTIV), knowledge and skills (KNOWSKIL) was the only variable to have a positive and significant relationship with rewards (REWARDS). Evidently team members believe that their skills are recognized due to the local nature of the reward structure.

In addition, it is of interest to notice the significant relationship between mediated communication and knowledge/skills. In order for dispersed teams to share knowledge and skills, they must primarily use mediated modes of communication. This is an important point, which highlights the critical nature of appropriate communication, as well as a real need to ensure that team members use it optimally.

Consistent with Hypothesis 7, leadership has a positive, significant relationship to performance effectiveness. This supports the contention of Katzenbach and Smith (1992), Little and Madigan (1997), and Wageman (1997) that leadership is important to the performance of a team. Wageman (1997) believes that the importance and role of the leader changes over the life of the team and with the strategic alignment of the team within the organization. In Chapter Four, the constant churning of people in the top leadership roles in the company results in the Copy Exactly Initiative losing its budget and organizational ‘home.’

In the regression analysis of Model 1, leadership plays a much larger role without the influence of the three alternative variables. When they are added into Model 2, leadership assumes a much smaller role. This reflects the more self-directed nature of the work of global team members whose day-to-day team work is largely unsupervised but whose global team experience is often shaped by the activities of the team leaders and staff support people from headquarters.

When the team members talk about leadership, they distinguish between team leadership and corporate leadership. The team level leadership they believe in and support, while they are quite cynical about what they perceive as a very short term attitude among upper management. This ambivalence may have affected the relationships described in the results.

The inconsistent nature of organizational support for the Copy Exactly Initiative is reflected in the insignificant relationship between organizational support (ORGSUPPT) and effectiveness (EFFECTIV). In the regression analyses, the negative relationship is reflected in Model 1, while there is a small shift to a limited positive relationship in Model 2. In this study there is no doubt that the participants felt a serious lack of organizational support. They reported their perceptions in the short resources survey completed during the interviews and discussed above. Additionally they describe their frustrations with flagging support in the quantitative data.

Guzzo and Noonan (1994) report that the importance higher level management attributes to an initiative is communicated in many ways, and the message is heard at every level of the organization. Shortly after the end of data

collection in this study, the Copy Exactly Initiative was without funding or an organizational champion. This reflects the message displayed in these data.

Summary

From the beginning this study was planned to add to the body of knowledge concerning globally dispersed teams. It was built on the fundamental elements of Hackman's 1987 model of collocated teams. The variables in this study derived from the Hackman model and the literature on dispersed teams. This combination of theories has allowed this study to look at dispersed teams from a broad base. It is hoped that the results reported here will lead to further research efforts. For example, globally dispersed teams must balance their activities between two sets of demands, local and global. This leads to complex rewards and recognition issues for globally defined team work. In addition, team members who are rewarded locally for individual efforts may face some dilemmas if their work for the globally situated team takes away from meeting their local performance expectations.

As the results show, diversity does not negatively affect performance effectiveness in this study. In fact, diversity is a strong positive influence on effectiveness. Globally dispersed teams may find that their inherent diversity is a strategic problem-solving advantage. Teams will have to exercise that advantage primarily through electronic communication media such as email and telephone. Geographic dispersion results in the need for new methods of sharing information that rely on graphics and text as frequently as voice. This will moderate the effects of language differences and social custom. Mediated communication may force

teams to rely more on competence to build trust in relationships rather than the more visible characteristics that often shape relationships in collocated teams.

Model 1 and Model 2 are early indicators that there are, of course, similarities between the needs of collocated and dispersed teams. Teams still need goal clarity, leadership, and resources, but the dispersed teams need to be aware of the need for different ways to build team spirit and perform team activities. In the next chapter the implications of these results will be discussed in greater detail.

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CHAPTER 6

CONCLUSIONS AND IMPLICATIONS

At the heart of this study are two research inquiries about the effectiveness of globally dispersed teams. These teams are a new way of organizing work.

Dispersed teams bring the people of a transnational firm together to form vital new linkages that may bring inestimable value to the organization. Nonetheless, it is wise to keep in mind that, even at their most effective, these teams are not a panacea for all the problems that businesses face as they rush into globalization.

Through a combination of quantitative and qualitative data, this study explores one set of possible answers to the questions about team performance effectiveness. It serves as a beginning point for future research that will push outward the boundaries of the current investigation. The information is presented to serve as a guidepost for further, more detailed research into dispersed teams.

In this study the dispersed teams needed all the things that Hackman and others predict are necessary for effective collocated teams. For example, dispersed teams need a full range of resources similar to those needed by collocated teams. They also need unique resources, such as a fully realized system of mediated communication and face-to-face time to resolve certain tasks more expeditiously.

Resources are only one aspect of the environment surrounding these dispersed teams for they are ad hoc groups created by and operating in existing organizational

structures. This chapter will discuss a number of the potential dilemmas facing team members, dispersed teams, and the organizations that house them, as well as some of the implications of this new work organization system.

First, a return to the beginning of this study—Hackman's (1987) model of team effectiveness. It appears that Hackman was right, and his model of collocated team effectiveness explains the phenomenon well. It is hard to imagine how Hackman's model could be improved upon, and in this study of dispersed teams elements that he applies to collocated teams are translated into elements that apply to dispersed teams. Of course, the scope of this study did not allow for an investigation of every element of Hackman's model; and the omitted factors may well be the critical factors.

Nonetheless, dispersed teams are different from collocated teams by virtue of their geographic and temporal separations. These two characteristics serve to amplify and transform other team characteristics such as accountability, leadership, diversity, rewards, and organizational support. Diversity is a good example of this interaction. In a collocated team diversity is counted in much more visual terms, so traditional traits such as race, gender, and national origin may have very different effects than in a dispersed team. Aspects of diversity such as professional cultures, ethnic cultural norms around autonomy, and organizational status will have an amplified impact on dispersed team performance.

Proximity to leadership, organizational structure, and corporate strategy are but a few of the factors that can have great impact on the performance of a dispersed team. In this study, members of the global teams reported that high levels of diversity helped the teams to make better decisions. It is clear from the

interviews that this diversity had to do with a greater number of viewpoints and options for problem solving, rather than with race or gender.

The structure of the teams made each team member more autonomous as he or she returned to a home location. Project leadership was quite distant, while local supervision often had other agendas, as well as the authority to reward and promote the individual. Klein and Barrett (2000) describe how these relationships can create a series of dilemmas for global team members about where to focus their accountability, how to balance their local work world and their global work world, and how to judge the importance of their project in the overall corporate environment. The complexity that these team members face will need to be captured in models of team performance effectiveness that arise out of this or future research.

The Local versus Global Dilemma

One of the critical dilemmas for the team members in this study is the tension they feel between the expectations of supervisors and responsibilities for duties at their home location and the expectations and responsibilities for duties in the global team. This dilemma is heightened by employment relations/human resources policies or even legal/legislative positions that mandate local oversight of compensation, performance evaluation, and other aspects of the employment relationship. In other words, global team members have no global accountability for team performance. Evaluation, promotion, and compensation are all aspects of the relationship that team members have with their supervisors in their home locations.

A second aspect of this dilemma is the impact of global team work on the interests of the home locations (Klein and Barrett 2000). If collaboration among team members helps another plant or the corporation become more productive or profitable, how will that affect the home location? One team member clearly expresses this when he says, "The process is for the good of the company, not for the good of [my plant]."

A third aspect of this dilemma is the discrepancy between the level of information that team members possess and the information levels of their supervisors or immediate managers at the home location. Team members have detailed information and competitive details about the other plants' capabilities. The potential exists for real tensions between subordinates and managers over manufacturing and design decisions based on this gap in simultaneous meaning.

The final aspect of the local versus global dilemma in this study is the locus of resource and budgetary control. The travel budgets for the Copy Exactly Teams were controlled by their home locations. Supervisors can and have directed the use of time and money toward local priorities. The results of such resource allocation is that team goals are not met as rapidly as they could be, and team members lose the benefits of attendance and participation in team processes.

Local and global tensions between units of the corporation reduce team performance effectiveness, diminish motivation to press forward with the global tasks, and decrease levels of collaborative products such as shared knowledge or unique solutions for shared problems. They are unexpected consequences of new work systems. Conflicts that arise may be blamed on cultural misunderstandings, differing levels of language proficiency, or interpersonal problems, and may in

actuality result from concerns about the viability and security of employment in home locations.

The Paradox of Rewards

Motivation theory relies on rewards to explain performance. Compensation specialists struggle to set up pay and benefit plans that meet worker expectations and company budgets. The pay structures for global teams have not yet been fully realized. Corporations have not worked out all the tangles that can occur with multinational operations and ad hoc global team work. Human resource managers will need to develop programs and policies that optimize performance in the global environment. This study uncovers a small part of why that is a critical concern for organizations.

Regression results in this study indicate that rewards were negatively correlated with dispersed team performance effectiveness. It is important to remember that rewards systems for these dispersed team members were based on their performance at their home location. With this in mind, the results reflect two aspects of the relationships of rewards to performance. First, the team members in this study were clear that there was little to no linkage between their team performance and their compensation. This is serious, but may be overcome by motivation or team cohesiveness. More seriously, the negative correlation reflects a tension related to the local versus global dilemma discussed above. Team members who are rewarded and promoted based on the recommendations of local supervisors may feel it is wiser to put their energies into local work. In that situation, any work

done for the global team could be detrimental to personal interests. Clearly this could cause team performance effectiveness to drop.

Rewards have intangible or intrinsic as well as tangible components. In specific circumstances one aspect of rewards will have more power than another. For instance, in this study one of the teams was presented with a corporate-wide award for the quality of their team efforts. When team members were interviewed, each one mentioned this award; and for several it was a highlight of their experiences on the team. Recognition for their efforts and the camaraderie of preparing a presentation for the awards ceremony was very important to these team members. The team's performance is still high caliber and the team enjoys a level of cohesiveness not seen in other teams.

The cohesiveness among the members of this team contributed to the collaborative team environment observed among the team members. A new member joined the team during the observation. He was immediately included in the team's interactions and was learning as he joined in the discussion. Effecting these team transitions from new member to participant swiftly and easily is of real value to the team and to the organization. The expertise of the new team member was utilized almost immediately to aid in resolving team problems. This is an example where a team's skill is not recognized or compensated and an example of the real value added by good interpersonal skills. Incentives and reward systems must be developed that recognize the importance of factors like group dynamics and employees who have skills that enhance the positive development of these dynamics.

Strategic Alignment Issues

Global teams are particularly sensitive to instability in corporate alignment. If the corporation shifts from a centralized system to a more decentralized system of management, the team's activities will be affected by a ripple effect of changes at both the local and the global levels. In this study, the Copy Exactly Initiative was focused on commonization of circuit board manufacturing processes and equipment across the electronics plants in the company. When the project started, the chief executive of the firm advocated for the project as an important component of the overall company strategy. When he retired, his successors shifted focus to their own management agendas.

As executive attention focused increasingly on other projects, the members of the Copy Exactly Initiative began to notice that there was less money for travel, more pressure for results, and greater priority on other areas. Belt-tightening reduced the money available to support the equipment purchases and process changes recommended by the teams. Even before funds became more restricted, the team recognized the shift in corporate focus. More subtle messages preceded radical changes as managers pulled people off initiative tasks to do work that by implication was more important. The impact on team performance metrics such as attendance was obvious. For example, overall attendance among the team members on one team dropped 65% between 1999 and 2000 to date.¹

Global teams are networks within an organization. Teams can function as integrators, coordinators, transmitters of information, innovative hotbeds, or any of a

¹These figures were provided by the company.

number of other roles. Considering the team's role vis-à-vis overall corporate strategies is an integral part of establishing a global team. Nadler and Tushman (1997) advise those designing new organizational structures or reconfiguring existing structures to consider the importance of linkages and processes at three levels: strategic, business, and support. Mankin, Cohen, and Bikson (1996) agree: "The nature of the organization itself—its structures, policies, and technology platforms—must change to support the teams and their technologies as they operate within, and increasingly across, its boundaries" (9). Global teams need to be part of what Hamel and Prahalad (1994) call the 'strategic architecture' or the plan for deployment and configuration of the structural competencies needed for future success. The interaction and role of organizational units within the strategic business objectives is an important area for future study as new structures such as global teams arise.

Cross-Functional Teams, Matrix Teams, and Globally Dispersed Teams

Although cross functional teams and matrix organizations are not part of this study, these two organizational structures share common elements and dilemmas with globally dispersed teams. In an article on cross-functional sourcing teams, Trent (1998) discusses the individual and collective nature of the input and attitudes required of members of cross-functional teams. This perspective provides a generalizable way of discussing these three structures.

The complexity of the managerial relationships among these three structures is also similar. Matrix teams have differing hierarchical structures that can present problems for those who must try to make several managers happy. While a matrix

team may have a functional manager and a project manager, the potential tensions must have common characteristics with those experienced by team members caught between a local manager and a global manager. Chaudron (1995) states that creating cross-functional teams that cooperate is one of the major problems faced by those leading such an effort. Teams find that past histories of competition between departments or functions can cause friction. Again this reflects elements experienced by the teams in this study. Future research will be valuable in the effort of teasing out the exact nature of the similarities and differences between these organizational structures.

Knowledge Creation and Management Issues

Most management initiatives are aimed at learning how to do something faster, better, or cheaper. Learning is required to attain any one or all of these goals. At Visteon, knowledge management is an espoused goal with liberal input from experts such as Peter Senge (Senge 1990). One of the critical roles that global teams can play in an organization is the creation of innovative solutions and the diffusion of information for use throughout the firm.

Nonaka and Takeuchi (1995) state, "The role of the organization in the organizational knowledge-creation process is to provide the proper context for facilitating group activities as well as the creation and accumulation of knowledge at the individual level" (74). This description resonates with this study's goal of uncovering information about the influence of the environment or context on dispersed teams. Viewing the Copy Exactly Initiative as an organizational

knowledge creation process allows for a different angle of reflection on the utility of dispersed teams.

Above, the discussion focused on strategic intent and Nonaka and Takeuchi discuss intention as one of five conditions an organization requires to promote organizational learning and knowledge creation. In the case of Copy Exactly, the deliberate creation of knowledge was never mentioned as a direct goal, but the attendance metric was a limited strategy to create knowledge by encouraging participation. Team structure also supported information sharing by including people from every plant. Finally, selecting team members for their experience and expertise also makes high levels of information available on each team. At a corporate level there does not appear to be any plan for optimizing or utilizing the knowledge created and residing in these teams.


The second condition for promoting knowledge is autonomy, at both individual and group levels. Team members were not just allowed to work autonomously, as Nonaka and Takeuchi (1995) recommend: the global team structure ensured that team members had to exercise some autonomy just to get their tasks completed. Team autonomy allows workers to express and share original ideas in ways that amplify the individual perspectives. Copy Exactly teams developed their own recommendations for the BKM's in each step of the circuit board manufacturing process. Their autonomy was limited by the constraints on resources necessary to implement these plans as fully as possible.

Fluctuation and creative chaos are the third conditions for knowledge creation. The global teams in this study certainly met this condition. They were continually faced with situations that challenged routines and questioned existing

organizational practices. The rapid changes in leadership and constant uncertainty created a sense of tension and ambiguity that might match that prescribed to stimulate creativity. However, in order for these factors to have their most positive effect, people must have the time “to reflect upon their actions” (Nonaka and Takeuchi 1995: 79). It is not clear that team members in this study had an opportunity to develop enough perspective on the changes. It is also unclear how much of the constant fluctuation was an attempt to change how people think and to encourage them to move out of their ‘comfort zones.’

Redundancy in the knowledge creating organization is “the existence of information that goes beyond the immediate operational requirement of organizational members” (80). Redundancy increases the speed of creating new knowledge in a group, since the gap in simultaneous meaning between individuals is smaller. The global teams in this study were good examples of this condition. Team members shared enough information that they were able to finish each other’s sentences. In addition there were frequent moments when one team member would say: “Remember when this happened and we did that?” The group would be off and running in search of a solution after just such a simple remark. In a very real sense, redundancy of shared knowledge parallels the commonization of manufacturing processes that the group was addressing. Plants shared capabilities that allowed product to be moved easily from one to another.

The final condition is requisite variety. Nonaka and Takeuchi draw on Ashby’s belief that “an organization’s internal diversity must match the variety and complexity of the environment in order to deal with challenges posed by the environment” (82). Surely, the importance of diversity in a global team is a



reflection of this idea. Team members in this study reflect much of the variety and complexity of the organizational environment. In addition, they have ready access to information and the expertise of team members, which allows quick responses to situations in their home locations, as well as in the team setting. Typically, at an organizational level such variety would be optimized in a flexible and hierarchically flat structure of the kind that seems most characteristic of the ad hoc networks formed by global teams. Additional research on the design and structure of global teams, especially as they relate to overall organizational design, will add to our knowledge in this area.

Limitations and Additional Implications for Future Research

A number of concerns arise over the limitations of this study. Because it is exploratory in nature, the study is limited in its scope. There is a small sample of teams and those teams are all from one company. In addition, this is a view of global teams in only one industry, so study results may not generalize. Changes within the organization constrained the data collection to four sites rather than five sites, thereby reducing the number of interviews possible within the new parameters. Future researchers will want to greatly expand the scope of the investigation to include more teams and participants, as well as more companies across industries. Of greater importance is the introduction of bias due the fact that the participants in this study were working in a highly ambiguous and rapidly shifting corporate environment. The constant concern over employment security and competitive factors could skew outcomes in all forms of data collection. This may be of greater importance in an exploratory study such as this, where limits existed on the amount

of traditional and vetted research that could be applied to complement this study's research design.

As noted above, many more variables need to be studied. For example, of interest would be the relationship of dispersed team effectiveness to job design and task interdependency. Training on how to be an effective global team member and the impact of the presence or absence of such training are topics relevant to performance effectiveness not touched on in this study. Greater scrutiny of issues such as shared mental models and collective learning would make valuable contributions to our understanding of this phenomenon.

Re-examination of the model and model specification may allow for greater explanation of the variance in the model. Researchers will want to pay close attention to issues of moderating variables and interactions between variables. Multidisciplinary research that includes aspects of the technical, in conjunction with the more social/human aspects of dispersed teams, will add an additional and worthwhile dimension to study outcomes.

This study raised more questions than it answered. For example, how can technology be most effectively used to overcome geographic and temporal differences characteristic of dispersed teams? What types of compensation structure reconfiguration will be optimal for dispersed teams? Are the motivational factors and influences different for members of dispersed teams? What is the relationship between dispersed teams and other programs or processes, such as lean manufacturing and total quality management? Are certain organizational designs, such as networks, more appropriate for the effective performance of dispersed teams? Can management rethink or reconfigure organizational metrics to make them

applicable across functional and structural boundaries? Obviously, there is much more to discover about dispersed teams.

Finally, it would be beneficial to undertake long-term studies of dispersed teams rather than the more short-term studies exemplified by this research. Long-term studies would involve observation and study of longitudinal aspects of dispersed team development, interaction, and effectiveness.

Workplace teams are clearly not a fad but an integral aspect of the today's organization and current management theory and practice. Globalization and technology now encourage multinational corporations to establish and support teams that fit in a rapidly changing environment. Globally dispersed work teams will continue to evolve and grow in importance. This study is a small step to a better understanding of the concept of globally dispersed teams, the interaction of team members, the dilemmas they face, and some factors that influence their effectiveness.

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APPENDICES

APPENDIX A

Communication and Resources

Please help me to gather some data on two crucial areas for dispersed teams: communication links and resource availability. Answer as many questions as you can. Please try to answer as accurately as possible. Your participation is voluntary and you may withdraw at any time.

Please select the answer that best describes how you feel about the availability of the following resources.

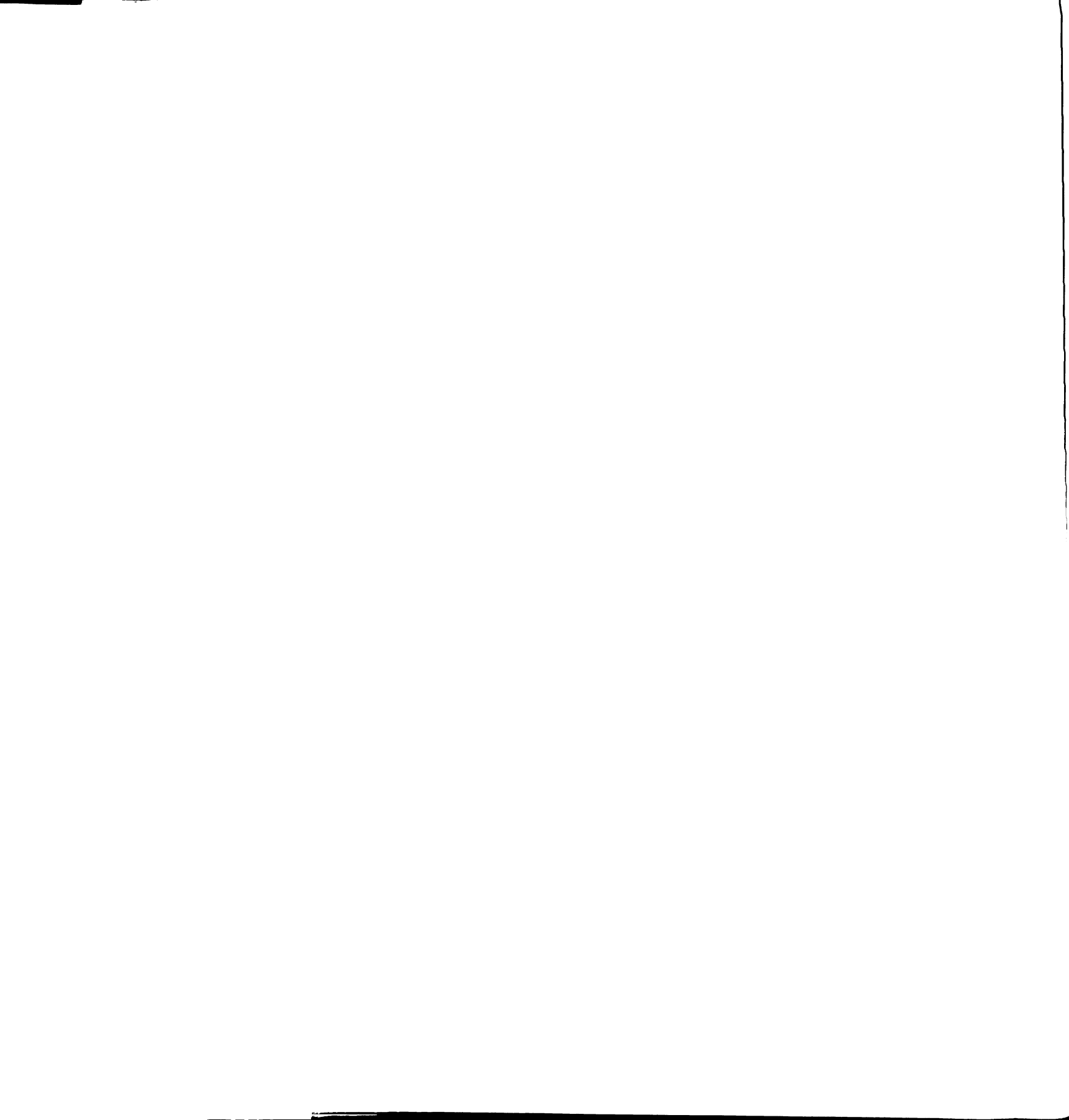
Resources

Type of Resource	Need Much More		Enough		Too Much
Information needed to complete task (directions, goals, expectations, etc.)	1	2	3	4	5
Training in how to be an effective team	1	2	3	4	5
Materials to do the task (computers, software, space, etc.)	1	2	3	4	5
Number of people	1	2	3	4	5
Skills in the group to complete task	1	2	3	4	5
Time for face-to-face meetings	1	2	3	4	5
Facilitation of meetings or team work	1	2	3	4	5
Tools for non face-to-face interaction (telephones, fax, email, groupware, etc.)	1	2	3	4	5
Time for non face-to-face meetings	1	2	3	4	5
Support from other parts of the organization	1	2	3	4	5

In this section, think about the types of communication links that you use on your team and estimate how often you use any of the following types of communication. Pick the ONE time period that is most appropriate. For example, if you meet 6 times a year as a team face-to-face then you would put '6' in the yearly column and leave the other columns empty.

Communication

Type of Communication	Daily	Weekly	Monthly	Quarterly	Yearly
Face-to-face meetings					
Formal telephone calls, i.e., conference calls					
Informal calls to other team members					
Mail or written communication					
Video-conferences					
Conferences using electronic/internet software					
Email messages					
Other, please specify					



APPENDIX B

Primary Survey Document

Thank you for taking a few minutes to help me with this final stage of a study of global teams. The Copy Exactly Team has been at the core of this study and I have been pleased to meet many of you already. You may also have heard about the study through a recent message from Johnson Yun. Please assist me by completing a survey about the Copy Exactly Team.

Your participation is vital to the success of this study. All individual answers will be confidential and your participation is voluntary. The survey takes 15-20 minutes to complete. **Answers need to be returned by August 20.**

You have two options for completing the survey:

- 1) If you have outside access to the internet, please answer the questions on the web at the following address:

<http://www.nbn.com/~willyboy/barrett/survey.html>

- 2) If you do not have outside access to the internet, you may answer the questions in the complete version of the survey enclosed with this message. Just "edit" the message with your answers and 'reply' to the message. Select the answer that best reflects how you feel about each question.

Please select the version that you can complete most easily.

Thank you in advance for your help with this project.

Begin survey here:

Dispersed Teams Survey

This survey is a vital element of a study of globally dispersed teams within Visteon. Your participation is very important to the success of this project and your answers will be kept confidential. Completion and return of this survey will indicate that you understand that your participation is voluntary.

Please complete the survey as accurately and carefully as you can. ALL the questions should be answered by selecting the one answer that most closely reflects how you feel about each question.

Part I: Attitudes towards Teams

1. Work in a team may not be easier but the results are better.

- | | |
|--------------------------------|-----|
| 1 = strongly agree | () |
| 2 = somewhat agree | () |
| 3 = neither agree nor disagree | () |
| 4 = somewhat disagree | () |
| 5 = strongly disagree | () |

2. I am not comfortable sharing what I know with a team.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

3. Working with a group is better than working alone.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

4. If you want something done right, you've got to do it yourself.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

Part II: Attitudes towards the Copy Exactly Team

5. I believe that the work the Copy Exactly Team does is excellent.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

6. I can rely on the Copy Exactly Team to make good decisions.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

7. The members of the Copy Exactly Team know how to do their team-related work well.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

8. I have complete confidence and trust in the Copy Exactly Team members get the job done.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

9. The members of the Copy Exactly Team have the technical expertise needed to do the team's work.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

Part III: Attitudes toward Global Team Membership

10. Language is not a barrier to Copy Exactly Team success.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

11. Team members of different countries do not work well together on the Copy Exactly Team.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

12. The variety of skills among of Copy Exactly Team members complements each other.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

13. Variation among people on the Copy Exactly Team helps create better solutions.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

14. Cultural differences hinder Copy Exactly Team performance.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

Part IV: Accountability and Rewards

15. The work of the Copy Exactly Team is an important priority to plant management.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

16. The Copy Exactly Team is accountable to the highest levels of company management.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

17. Work on the Copy Exactly Team is not linked to the compensation I receive from the company.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

18. I don't need extra compensation, working with the people on the Copy Exactly Team is rewarding enough.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

19. Any rewards I receive for my work with the Copy Exactly Team must come from my immediate supervisor.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

20. My immediate supervisor doesn't understand the importance of the work I do for this team.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

21. No matter how global the focus of some of my work is, it's what I do locally that gets rewarded.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

Part V: Opinions on Copy Exactly Team Effectiveness

22. The Copy Exactly Team solves complex problems.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

23. The common process for selecting equipment devised by the Copy Exactly Team saves individual plants a lot of money.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

24. Time to market for electronic products is being reduced through the work of the Copy Exactly Team.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

25. The Copy Exactly Team makes fast decisions.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

26. Copy Exactly Team decisions are of high quality.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

27. An important information-sharing network has been created among members of the Copy Exactly Team.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

28. The longer the Copy Exactly Team members work together, the more smoothly the team functions.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

Part VI: Copy Exactly Team Goals Clarity and Organizational Support

29. Production goals take priority over the goals of the Copy Exactly Team.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

30. The company does not understand what the Copy Exactly Team needs to be successful.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

31. The company needs to learn how to manage teams as well as individuals for efforts such as Copy Exactly to be effective.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

32. The Copy Exactly Team is a global initiative but the company has no global structure of policies and procedures to support it.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

33. No one within the company but the team members believes the work of the Copy Exactly Team is important.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

34. The Copy Exactly Team has all the material resources (e.g. money for equipment, travel funds, computers) needed to make it successful.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

35. My local boss supports global teams as useful so long as they don't disrupt local activities.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

36. My boss understands the goals of the Copy Exactly Team.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

37. All members of the Copy Exactly Team agree on the team's goals.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

38. Top management understands the goals of the Copy Exactly Team.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

Part VII: Communication Links

39. Members of the Copy Exactly Team are trained to use electronic media effectively as work tools.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

40. The time the Copy Exactly Team spends at face-to-face meetings is key to team effectiveness.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

41. During teleconferences the Copy Exactly Team work is less creative and more routine than it is during face-to-face meetings.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

42. Time zone differences are easily overcome by electronic communications.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

43. The team has learned how to develop personal relationships while using electronic media.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

44. Copy Exactly Team members get the most accomplished when they meet face-to-face.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

45. The Copy Exactly Team does not communicate details of its work effectively to the rest of the company.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

Part VIII. Leadership

46. The Copy Exactly Team is more successful because team leaders actively work to remove barriers.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

47. Coaches on the Copy Exactly Team help members to learn how to work together effectively.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

48. Company leadership and the Copy Exactly Team share common goals.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

49. Company leadership is committed to the changes that the Copy Exactly Team makes.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

50. Managers responsible for Copy Exactly help link the project to the rest of the company.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

Part IX: Copy Exactly as a Community of Practice

51. The details of the Copy Exactly Team's work are often defined by the group as they talk with each other.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

52. Over time the Copy Exactly Team is creating its own unique 'history' of stories and ways of doing things.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

53. Sharing knowledge with the members of the team is an important part of my work with Copy Exactly.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

54. As the Copy Exactly Team continues to work toward a shared goal, the relationships among team members are stronger and more important.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

Part X: Knowledge

55. I never expected a team to generate so much useful knowledge.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

56. Working on the Copy Exactly Team gives me access to useful knowledge I can get nowhere else.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

57. I never expected to learn as much as I do from other members of the Copy Exactly Team.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

58. Working together the Copy Exactly Team creates solutions that I could not create working alone.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

59. I use the Copy Exactly website regularly to get answers to my questions.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

The following questions are for Copy Exactly Continuous Improvement Team and Core Team members only. All others, please skip to Part XII.

Part XI: For CIT and Core Team Members Only

60. I do the best I can in my Copy Exactly work because my team members' success depends on me.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

61. I cannot focus on Copy Exactly Team work when my boss wants other work completed first.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

62. I am satisfied with my performance on the Copy Exactly Team.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

63. The benefits of working on the Copy Exactly Team are often not tangible.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

64. I can do Copy Exactly Team work without concern because I know my boss supports my efforts.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

65. I completely understand the goals of Copy Exactly.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

66. I derive great personal satisfaction from my work with the members of the Copy Exactly Team.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

Part XII: Final Questions

67. Copy Exactly is a critical element of corporate strategy.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

68. Copy Exactly has little value and we should stop it now.

- 1 = strongly agree ()
- 2 = somewhat agree ()
- 3 = neither agree nor disagree ()
- 4 = somewhat disagree ()
- 5 = strongly disagree ()

Demographic Information

Location of facility where you work:

Number of years working for company _____ years.

I have lived overseas: yes _____ no _____

I have worked overseas: yes _____ no _____

If you are a member of a Copy Exactly Team, please check the appropriate team/s:

PWB Core Team _____

Printers/Ovens _____

SMD Placement _____

Wave/Selective Solder _____

Line Configuration _____

Design Rules _____

PWB Technology _____

Automatic Inspection _____

If you are a team coach, please check here _____

If you are a team leader, please check here _____

Male _____ Female _____

Please select the correct age group.

20-25[] 26-30[] 31-35[] 36-40[] 41-45[] 46-50[] 51-55[] 56-60[] 61-65[] 66-70[]
older than 70[]

Nationality:

First Language:

Other Languages Spoken:

Thank you for completing this survey.

APPENDIX C

Interview Protocol

- a) When I say the words 'Copy Exactly Team' what do you think of?
Are you a regular member of the team?
Or: What is your relationship to the team?
How do people get selected for the team?
What tasks do you perform related to the team?
How would you describe your role?
Roughly what percent of your total work time is spent on Copy Exactly?
When do you meet with the team and what is that like?
What works well and what doesn't when the team meets?
What is the overall goal of the team?
- b) In your opinion what are the essential performance metrics for this team?
In your job whose performance expectations must you meet?
How do you know when the team is performing at a high level?
Whose feedback do you value most?
- c) What does the team need to perform successfully?
Are there conditions within the team that could cause it to perform poorly?
Is there a relationship between diversity among team members and team performance?
- d) Describe the role of organizational leadership in the performance of the team.
- e) How does team performance affect your rewards?
Are there hard choices to make about your work with the team?
- f) Are you/your facility doing anything you wouldn't normally have done if you weren't working with the team/other plants?
- g) How does the Copy Exactly team link to other initiatives within the company, such as FPS?
- h) Have you worked on teams that were dispersed like Copy Exactly and how were they different?
- i) What lessons have you learned as a Copy Exactly team member?
*Tell me something you will remember about this team even after its work is finished.

APPENDIX D

Participant Information Form

Participation in this study is voluntary and all information that you provide will be kept confidential. Please fill out this form carefully and clearly. You may skip any questions that you are not comfortable answering.

Name: _____ Position: _____

Division of Visteon: _____ Facility: _____

Facility Location: (city and country) _____

Number of years working for Visteon _____ Ford _____

I have lived overseas: yes _____ no _____

I have worked overseas: yes _____ no _____

I am currently a member of this team or teams; (give name/s commonly used at Visteon)

Demographic Information

Male _____ Female _____

Please select the correct age group.

20-25[] 26-30[] 31-35[] 36-40[] 41-45[] 46-50[] 51-55[] 56- 60[] 61-65[]
66-70[] older than 70[]

Nationality: _____

First Language: _____ Other Languages Spoken _____

Education Level Attained:

High School Graduate:	4 Year College Degree (indicate major):
2 Year Associate Degree:	Master's Degree (indicate area):
Vocational Degree:	PhD (indicate area):
	Other (please list):

If there are clarifying questions or for other aspects of the research, please contact me at the following work number (indicate country code, extension, etc. as needed).

My email address is _____