Antecedents of Intergroup Conflict in Multifunctional Product Development Teams: A Conceptual Model

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Abstract— **Multifunctional teams are an increasingly popular way of organizing product development. While a considerable body of research has addressed process-related challenges facing teams in general, there is a relative lack of clarity on the specific challenges confronting multifunctional product development teams. This paper therefore elaborates on the challenge of intergroup conflict in multifunctional product development teams, proposing a model that explains how functional diversity within such teams can lead to task and emotional intergroup conflict. The model is developed through a synthesis of organizational behavior and social psychology literature, and illustrative examples are drawn from interviews with members of five teams in three manufacturing firms.**

I. Introduction

IN ORDER to improve the product development process, a growing number of companies are using multifunctional teams. In many organizations, the traditional product development process was a sequential one, relying on "hand-offs" between functions. The team method, in contrast, brings together representatives from marketing, manufacturing, R&D, quality assurance, and other departments so that together they can follow a product development project from start to finish. The functional heterogeneity in such multifunctional teams is potentially an asset because new knowledge from a broader range of departments is brought into the design process in its early phases, when much of the cost and quality of the final product is determined [23].

Functional heterogeneity in such teams can also be a source of problems, however. For example, when Chase Manhattan Bank combined a production group and sales group to form a new-products team, within six months the team was behind schedule, and member interactions were filled with hostility [14]. Unfortunately, there is a lack of understanding of what determines the effectiveness of multifunctional product development teams, for studies of such teams have been scarce.

Recently, Ancona and Caldwell conducted a set of investigations [2]–[4] that attempted to fill this gap in the literature. The first two studies examined the effects of individual and task characteristics on team member boundary activities (i.e., how members imported technical information) [2] and the effects of boundary activities on team performance [3]. The third and most recent study [4] not only addressed such external linkages, but also internal ones; it investigated whether communication with those outside the team and task process within the team (e.g., goal and priority setting, "behaviors aimed at organizing members to get work done as opposed to those that influence affect or the team's ability to maintain itself as a group over time") [4, p. 323] intervened between functional diversity and its performance consequences. Functional diversity had mixed effects on performance. While it indirectly increased performance by promoting external communication, it also had negative direct effects on team performance. Since task process did not explain these effects, the authors were left with a conjecture: "This raises the possibility that the negative direct effects may be a statistical artifact resulting from a missing mediating variable . . . " (p. 338).

The conflict and group literatures [6], [10], [47], [48], [56] suggest that conflict arising from heterogeneity may be a critical variable influencing team effectiveness. Some consequences of conflict are favorable: better problem solutions [24], [52], greater productivity [28], [40], increased ability to adapt and innovate [44], and enhanced decision quality (especially through avoidance of groupthink) [26]. Other consequences are unfavorable: decreased performance and productivity [9], [33] and higher turnover or withdrawal [12], [56].

Since the consequences associated with conflict have been well-documented, this article examines the antecedents of conflict—specifically, the processes by which functional background heterogeneity induces conflict in product development teams. In constructing a conceptual model of these processes, our intent is to help researchers and managers understand how the potential for conflict in such teams can be mitigated and/or channeled to good effect. Although we focus on conflict-inducing processes triggered by functional diversity, we expect that other kinds of diversity (gender, tenure, etc.) generate similar processes; however, we submit that these other kinds of diversity differ both in the degree to which they trigger these processes and in the contextual factors that moderate their effects.

Our specific interest in how *functional* differences trigger conflict results from several observations. First, group demography research has primarily focused on age and tenure diversity (e.g., [32], [36], [37], [54]). Research assessing the impact of functional background heterogeneity [5], [46]—with the exception of the Ancona and Caldwell study mentioned earlier [4]—has looked at top management teams rather than lower-level teams. The major findings in this body of group demography research are that age and tenure diversity are

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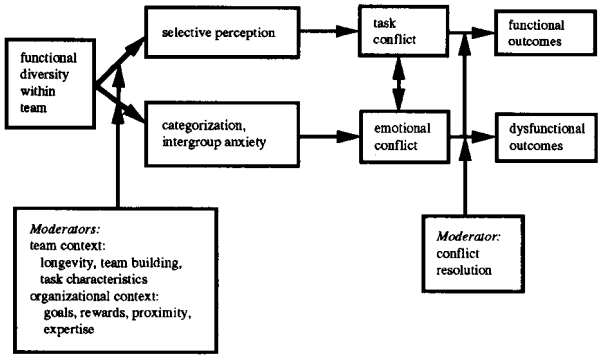

Fig. 1. Model of intergroup conflict in multifunctional product development teams.

TABLE I
SAMPLE DESCRIPTION

Organization/Team	Approximate Team Size	Functional Areas Represented on Team	Number of Interviewees from Team
Company 1			
1.A	12	Hardware design, software, marketing, new product introduction	2
1.B	6	Hardware design, materials engineering, mechanical packaging, software, manufacturing, QA	3
1.C	12	Design, manufacturing, marketing, QA	5
Company 2	13	Product (design) engineering, manufacturing engineering, production planning	3
Company 3	5	R&D, product design, manufacturing, QA, sales/marketing	2

associated with greater turnover [32], [36], [54], and less innovation [37], [4], and that functional diversity has generally positive or mixed effects on performance and innovation [4], [5], [46]. These findings lead us to expect that a product development team's functional diversity will enhance its effectiveness but also, albeit less frequently, will result in greater turnover and diminished effectiveness. Clearly, additional empirical research is needed to test these expectations. By building a theoretical foundation for studies of diversity and its consequences in product development teams, we hope to encourage and facilitate such research.

In the following section we build our conceptual model, drawing upon relevant literature and illustrative examples from three firms using such teams: a computer firm, a defense contractor producing military equipment, and a company producing components for electrical systems. At these firms we interviewed fifteen managers and engineers from five multifunctional product development teams. Table I describes key features of the teams whose members we interviewed.

II. CONCEPTUAL MODEL

Figure 1 summarizes our model of the antecedents of conflict in product development teams. In this model, functional diversity leads to intergroup task conflict and emotional conflict via a set of cognitive and motivational processes, notably selective perception, categorization, and intergroup anxiety. The impact of functional diversity on these intervening processes is moderated by team context variables (notably team longevity, task characteristics, and the use of team development techniques) and by organizational context variables (notably goal orientations, physical layout, reward structure, and technical expertise of the organization).

Triggered by functional diversity, selective perception results in intergroup task conflict, which, in turn, tends to enhance team effectiveness; categorization and intergroup anxiety, on the other hand, result in intergroup emotional conflict that tends to reduce effectiveness. Just as contextual variables may moderate the impact of diversity on the cognitive and motivational processes that induce conflict, conflict resolution techniques may moderate impact of task and emotional conflict on team effectiveness.

As mentioned earlier, this paper focuses on the antecedents of conflict rather than its consequences and the conflict resolution techniques associated with it. The following subsections discuss in turn the focal elements of this model, first presenting relevant theory and then illustrative examples. We begin with our categorization of types of conflict.

A. Types of Conflict

Theory: Organizational scholars have suggested that conflict can be classified according to its content (i.e., task vs. emotional) [22], [45] and its level (i.e., interpersonal vs. intergroup) [7], [42]. If a disagreement between two colleagues is characterized not by hostility and anger but by relatively good-natured disagreement about work content or procedures, it may be described as an interpersonal task conflict. If, on the other hand, the disagreement evokes feelings of dislike or hostility and is relationship-centered rather than task-centered, it may be described as an interpersonal emotional conflict. (Note that, under some circumstances, task conflict may evolve

into emotional conflict. If team members harbor particularly strong feelings about a task issue, they may become emotional about it. As Ross [45, p. 140] observes, "It is also possible for such [task] differences to generate emotionally harsh language, which can be taken personally. We then have both task and psychological conflicts occurring at the same time." Conversely, emotional disagreements may stimulate task conflict, for team members may channel their hostility toward each other into an ostensibly task-related conflict.)

This paper focuses on task and emotional conflict at the *intergroup* level. As Rahim [42, p. 120] notes, intergroup conflict refers to "disagreements, differences, or incompatibilities between the members or their representatives of two or more groups." He suggests [p. 17] that "conflict between line and staff, production and marketing, and headquarters and field staffs are examples of this type of conflict." Although our model focuses on interactions *within* multifunctional teams, we still classify such conflicts as intergroup since the members of those teams represent different functional areas in which they spend most of their time. The multifunctional team serves as a temporary project structure. The distinction between intergroup and interpersonal conflict is important because, as Blake and Mouton [7] argue, when conflicts are interpersonal, an individual is free to react or change his or her position based on new data, while in intergroup conflicts, a person is restricted in his or her actions by rules and norms that regulate the behavior of members of his or her group or affiliation.

A number of theorists [22], [27], [55] have argued that emotional conflict tends to be dysfunctional and task conflict tends to be functional. Thus, we might be able to explain Ancona and Caldwell's finding of mixed consequences of functional diversity by showing how diversity leads to intergroup conflicts that are task-based and/or emotion-based.

Examples: We found several examples of intergroup task and emotional conflict in our interviews. One interviewee (Team C, Company 1) from manufacturing described a task-related conflict in which he wanted a certain "preferred" component in the product, but the designer insisted that it could not be used in the design because of space limitations. He then asked the designer, "Can't you change the drawing?" The designer soon realized that his space argument would not be sufficient to convince the manufacturing person to forgo the better component. If the designer did not find room for the component in the current design, the manufacturing person would press him to make a new design (i.e., redo the drawing), which would take a considerable amount of effort. Before long, the designer came up with a creative way to use the component without having to modify the design. Thus, their task-related conflict ultimately generated a better product.

Other conflicts were more emotional. An interviewee from Team B at Company 1 acted as a liaison between QA and hardware design. He reported that arguments between QA and hardware design were often "emotional and unproductive." For instance, if a person from one functional area drew a diagram, a person from the other area would erase it hastily without attempting to listen, saying it was incorrect. "Interfacing [between the functions] was torture. They bad-mouthed each other constantly."

In some cases, task conflicts remained relatively free of emotion. For example, a manufacturing worker on Team B at Company 1 reported that when design engineers were not receptive to manufacturers' suggestions for improving a particular design,

> There were some definite obstacles in working with the [designers]. We got along fine on a personal level; hallway conversations were cheerful and friendly. When it came to talking about the project, though, there were problems.

In other cases, there was spillover between task and emotional conflicts. One manufacturing interviewee (Team C, Company 1) described what began as a task-related conflict but later evolved into an emotional one. Manufacturing and design engineers could not agree on the appropriate testing procedure for a product. At a multifunctional meeting, manufacturing representatives argued that the test should push the product until it fails. Design representatives, however, felt that the product only needed to be tested within certain limits. The designers ultimately "knuckled under" because manufacturing refused to give their signature of approval unless the more rigorous tests were run. Not long after the meeting, a design engineer sent a letter to upper-level managers complaining that manufacturing was holding up the project with unnecessary testing. Years later, that designer was still not trusted by some of the manufacturing representatives, one of whom said, "He will do whatever he thinks is right to get his [own] job done, whether or not it's good for [the company] or anyone else."

B. Conflict-Inducing Psychological Processes

Theory: We propose that intergroup *task* conflicts occur primarily because functional diversity triggers *selective perception*, a process in which exposure to the goals, views, and traditions of a particular functional area or department inclines an individual from that area or department to attend only to certain information in a problem or task [8], [13]. Recapitulating Lawrence and Lorsch's [31] findings, Pfeffer [41, p. 72] argues,

> The fact that each of the different subunits obtains different information, which is relevant to its specific part of the task environment, tends to cause a parochialism in point of view, in which each participant sees the world through his subunit's perspective . . . Although differentiation clearly makes the task of integration more difficult, and is likely to lead to more potential conflict in the organization, the conclusions of [research by Lawrence and Lorsch [31]—i.e., that the most effective organizations were differentiated but also able to achieve effective integration] suggest that it is not necessarily wise to attempt to reduce the dissimilarities in perspectives and goal orientations among the different subunits.

Dougherty's recent research [16] shows how selective perceptions blossom into complex, internally articulated "thought worlds" and how difficult it is to integrate the thought worlds of R&D, marketing, and manufacturing in product development project teams.

While functional diversity may lead to beneficial task conflict through selective perception, it may also lead to disruptive *emotional conflict* via two other social psychological mechanisms—namely, *categorization* and *intergroup anxiety.*

Categorization, a cognitive process described by Taylor *et al.* [51], is the tendency of individuals to overestimate the similarity among members of their own group and to underestimate the similarity between people in their own group and people in other groups. We use categories or generalizations to deal with an overload of information, whether the information is about people or objects. When the information is about people, however, the categorization process facilitates polarization, with individuals favoring their own "ingroup" as superior and developing a hostile attitude toward members of the "outgroup." Ultimately, categorization may lead one group to stereotype the other, making distorted judgments about the personality traits and abilities of group's members.

In addition to the cognitive process of categorization, functional diversity may trigger a more directly emotive reaction that induces disruptive conflicts: *intergroup anxiety,* the discomfort or apprehension which individuals experience when interacting with members of different groups or subgroups [49]. Kramer [30] has suggested that the more heterogeneous a group is, the more intergroup anxiety its members will experience. The combination of categorization and intergroup anxiety leads to negative expectations that can be self-confirming, promoting emotional conflict.

Examples: The most vivid description of the process of selective perception on multifunctional teams was that of an interviewee (Team B, Company 1) who had spent seven years in manufacturing and five in hardware design. He reported, "In the lab, you are limited in the number of people you are exposed to. It's more cloistered. In manufacturing, you are exposed to more people." He further noted that, as a result, people from hardware design are "more cerebral. You try to take a longer range view. It's more reflective. Manufacturing is more aggressive—more people-oriented." Thus, he found that the different work environments of manufacturing and design representatives led them to have different perspectives on tasks.

Statements of other interviewees clearly linked such selective perception to task conflicts on teams. An R&D member (Company 3) reported that when his multifunctional team was in the initial stages of designing a product, he and other R&D engineers were accustomed to making many design changes rapidly. As a result, they thought it was less important to begin the project by interviewing customers to find out in detail what they wanted; R&D engineers assumed that once they had an initial design, they could show it to customers and subsequently modify it based on the customers' reactions. Team members from other functions, in contrast, felt that it was more critical to get detailed customer input as early as possible. Their experience had been that later changes to the design due to customer reactions had led to considerable disruption in "downstream" departments that had begun working with the original design in mind. In other words, different experiences led the team members to disagree about the importance of early customer interaction.

An incident (Team C, Company 1) we related earlier—our example of a task conflict that became emotional—also resulted from selective perception. When manufacturing and design employees could not agree on the appropriate testing procedure for a product, each team member was selectively perceiving the problem of determining a test procedure in terms of the traditions and goals of his or her functional area.

Our interviewees also provided examples of categorization and stereotyping among members of different functional areas. A manufacturing program manager (Team B, Company 1) reported that manufacturing people had traditionally labeled design as the "ivory tower," while design employees perceived those in manufacturing as less educated and less competent. Another interviewee (Team C, Company 1) from manufacturing, describing his organization's earlier history, said "Manufacturing engineers were the engineers that the lab [hardware design] had rejected. This perception was almost palpable: their opinions were frequently discounted." When management implemented a rotation program in which design engineers would work in manufacturing for a year or two, some design engineers left the company rather than make the temporary change. Rotation into manufacturing was considered "a tremendous blow," while rotation of manufacturing engineers into design was considered desirable. Design engineers also acknowledged that they saw manufacturing people as having lower status. Said one, "The best engineers are in R&D. So the role of R&D has not only been to design, but to drive the overall program. No other organization was trusted. . . . That kind of thing dies hard." A younger manufacturing representative (Team C) remarked that the perception of design as higher status than manufacturing may be deep-rooted: before ever entering the workforce, students in universities came to see product design jobs as more desirable than manufacturing engineering jobs.

Our interviews suggested that stereotypes existed between other functions as well. For example, a representative from QA (Company 3) asserted, "It's the old story: How can you tell a salesman is lying? His lips are moving. . . . You're never sure [the marketing representative] is telling the whole story, and you are not sure he knows what he's talking about." Conversely, as another QA interviewee reported, other functional areas have stereotypes about QA: "The QA person is always the one who brings the bad news."

Intergroup anxiety among members of multifunctional teams also contributed to emotional conflict. According to Wheelwright and Clark [57, p. 184], a major obstacle to integrated problem solving occurs when upstream (e.g., design) engineers are afraid to share information with downstream (e.g., process) engineers—when they "have an attitude of 'I won't give you anything now, because I know I'll have to change it later and I know that I will take the blame for it.'" An interviewee from manufacturing (Team C, Company 1) reported that initially his department was afraid that design engineers might select a solution that would not cost the design department much, but would greatly increase manufacturing costs. Designers, on the other hand, feared that manufacturing would "get in the way" if they got involved too early in the planning process.

In another case, a product development team (in Company 3) had started out with three members: one from sales and marketing, one from manufacturing, and one from R&D. Before long, the sales and marketing department insisted on having two representatives, a sales person and a marketing person. Fearing that sales and marketing would overwhelm other team members, the R&D department then decided it, too, wanted two representatives on the team.

C. Moderators of Link between Diversity and Conflict-Inducing Processes

Theory: The impact of functional diversity on the social psychological processes described above may be reduced or intensified by conditions internal and external to the team—i.e., "contextual" factors. Clearly, the moderating factors we describe in this paper are only a subset of the context variables that may influence the dynamics and effectiveness of a group or team. Gladstein's analysis of the context and effectiveness of groups [21], Mowday and Sutton's review of research linking groups and individuals to their organizational context [34], and Sundstrom, de Meuse, and Futrell's [50] model of team effectiveness describe numerous additional influences (e.g., organizational culture, group size, and supervisory behavior). However, the goal of parsimony led us to focus on those contextual variables that satisfy three criteria: First, we expect them to act as moderating variables—rather than merely control variables; second, organizational scholars have identified them as key influences on conflict in heterogeneous teams; and third, they are specifically relevant to product development teams.

At the *team level*, one significant moderating factor may be the team's *longevity*. When team members have worked together for a while, they should be less inclined to categorize and stereotype based on functional differences [39], and they should become more comfortable around each other, experiencing less intergroup anxiety. Moreover, selective perception should decrease as team members develop shared understandings of tasks [29]. As Wheelwright and Clark [57, p. 186] have noted,

> One of the most important barriers to respect and trust is a simple lack of understanding of the nature of the work, processes, and constraints under which functional counterparts operate. Experience can help to build this imperative understanding.

Thus, longevity should moderate the impact of functional diversity on all three cognitive and motivational processes in the model.

The second type of team-level moderating factor is *team-building*—organizational development interventions designed to bring about changes in the attitudes or behavior of group members [42]. Team-building differs from conflict resolution in that it can be proactive, rather than reactive: the team leader or team members may take steps to promote healthy interactions *before* any conflict occurs. For example, team meetings early in the project can be used to increase members' appreciation of functional differences and to enhance skills for dealing with those differences [43]. A project manager may be able to reduce key conflict antecedents by creating shifts in participants' attitudes or preferences [11]. One option is to create a forum—an off-site meeting perhaps—in which members openly discuss their stereotypes or preconceptions and develop norms to regulate team behavior [35].

Such techniques may moderate the impact of functional diversity on categorization and intergroup anxiety. An awareness of the tendency to categorize should enable members to diminish the likelihood that functional diversity will trigger this cognitive process. In a similar manner, as team building makes people from different functional areas more comfortable with each other, it should weaken the effect of functional diversity on intergroup anxiety.

A third moderating variable at the team level is *task characteristics*. The literature on groups and conflict often mentions various task characteristics (e.g., task complexity, task interdependence, and task uncertainty) as contingencies [21], [53], [58]. When analyzing product development teams, one key task characteristic is the nature of the product being developed—i.e., whether from the company's point of view it is a more radical innovation or a more incremental refinement [4], [57]. If the innovation is radical, it represents a greater departure from established knowledge; since there is likely to be a need for more intensive cross-functional interaction, and since the knowledge required for problem-solving is apt to be less reliable, there will be more opportunity for functional differences to trigger categorization, intergroup anxiety, and selective perception. If, on the other hand, the product is only an incremental improvement of an earlier product, interactions among team members are likely to be less intensive, and the knowledge required for problem-solving tends to be more reliable. Thus, there will be less opportunity for team members' functional differences to trigger cognitive and motivational processes that induce conflict. Other task characteristics can also play a role, however. In particular, as firms attempt to accelerate time-to-market, the team can come under great time pressures, which can exacerbate the tendency for conflict-inducing processes such as anxiety. Indeed, resource scarcity in general can have this effect [30].

At the broader organizational level, one of the contextual influences on group dynamics/conflict that theorists mention most frequently is *goal orientation*. Different subunits often have goals that inherently conflict; for example, marketing may be interested in maximizing product variety to increase sales, while production is interested in minimizing product variety to restrict costs [41], [31]. In their study of the R&D production interface, Ginn and Rubenstein [20] found that the divergence of subunit goals was positively correlated with conflict which, in turn, was positively correlated with marketing and success variables. They also found that common superordinate goals were positively associated with success. On the one hand, superordinate goal congruence helps to keep team members focused on their joint task. On the other hand, functional goal divergence promotes beneficial task-related conflict.

The organization's *reward structure* has an even more pervasive effect on team processes than the goal structure because it has a symbolic, status-related component. Rewards may influence the relationship between functional diversity and

categorization as well as the relationship between functional diversity and selective perception. If performance appraisals, incentive plans, and compensation systems do not encourage teamwork, then individuals will be less inclined to think of themselves as members of the same team [56], and the tendency to categorize individuals as members of different functional areas will be greater. As Pasmore [38, p. 61] points out, "Differences in rewards reinforce the legitimacy of status, role, and class systems and may interfere with collaborative problem solving." Reward structure also shapes members' perceptions of what is important in a task. That is, group members are inclined to perceive that the most important task component is that for which they are rewarded (e.g., schedule vs. quality). To the extent that there are different bases for rewarding the various functional areas, there will be diverse perceptions of the task at hand.

The third organizational-level moderating factor in our model is the *physical proximity* of different functional areas. Being an effective multifunctional team member requires maintaining a delicate balance between proximity to one's own functional area and proximity to team members from other functional areas. Proximity to one's own functional area helps ensure access to specialized knowledge, which, when brought into the team's work through the selective perception process, leads to beneficial task conflict. But if team members remain based in their functional areas and if the physical distance between those areas is too great, the perceived differences among them become exaggerated; consequently, there is a greater tendency to categorize and stereotype [38], [50], [1], [19].

A final moderating factor at the organizational level is *technical expertise*. When organizations adopt the multifunctional team approach, they often discover that one or more of the participating functions lacks the technical expertise to contribute effectively to the new tasks thus created. Wheelwright and Clark [57] identify a range of capabilities that emerge as critical in multifunctional teams: first, the ability of upstream departments to develop "downstream-friendly" solutions, to reduce careless errors that disrupt downstream operations, and to resolve rapidly the problems posed by downstream groups; and second, the ability of downstream departments to forecast task requirements from upstream clues, to manage the risk associated with activities that begin with incomplete upstream information, and to cope with unexpected changes from upstream. Deficiencies in such technical expertise can clearly trigger conflict-inducing processes and exacerbate the risk of conflict once such processes are already operative.

Examples: Our interviews revealed cases of many of these moderating factors. One example of team-building effort we found in our interviews was the development of "ground rules" for behavior. A project leader on Team C at Company 1 explained that at the start of a project, he held a meeting to set the ground rules for behavior, such as "no subversive sabotage" and "never assume the answer for others"; he noted that in the past, design engineers had often just assumed "this is the way manufacturing wants it" without actually knowing whether that was the case. Another interviewee who worked closely with Team C organized a series of full-day off-site workshops in which design and manufacturing engineers discussed how their interaction should work. Perhaps as a result of this team building effort, other interviewees from the team reported that most conflicts were creative and that they generally no longer perceived any stereotypes.

Team C also presented an example of goal differences that increased the tendency for selective perception. The interviewee working closely with the team reported that design engineers did not perceive that it was critical to use a particular vendor (that is, they thought any vendor was acceptable) because of "an inherent difference between what manufacturing was sent off to do and what the lab was sent off to do." The lab (design) objective was to reduce time-to-market, while manufacturing's goal was to "ship in volume and not deviate from their processes."

Several interviewees saw the organization's reward structure as an influential factor. Informants from Team A suggested that performance appraisal of team members was not tied strongly enough to their work on the team, even though most of the people on the team's project were spending the majority of their time on it. Only occasionally did functional managers solicit input from team leaders when making their performance evaluations.

The contextual factor that our informants most frequently mentioned was proximity. At Company 2, a design (product) engineer observed that communication was seriously impaired even when design and manufacturing were only a five-minute car ride away. Similarly, at Company 1, a manufacturing engineer from Team C said that lack of proximity had been a barrier to the interactions and the development of positive attitudes between design and manufacturing people. When manufacturing and design engineers were in different buildings, they were less sensitive to each other's problems. Then, once design and manufacturing employees were co-located, there was less differentiation. As he put it, "We started to insist that lab people come down and put boxes together, so they'd see what it's like to cut their hands on sharp edges. . . . Now, more and more often, manufacturing is getting designs that look just fine." Co-location—and the resulting increase in the design engineers' understanding of the manufacturing perspective—not only improved the quality of designs, it gave manufacturing employees more credibility in the eyes of design engineers.

A second manufacturing engineer on the same team reported that since the design and manufacturing engineers were co-located, he interacted much more freely with the design engineers than previously. He even became friendly with some of them off the job, and they went water-skiing together. This social interaction outside the office facilitated his interaction with them at work.

Expertise as a moderating variable emerged in several interviews. At several multifunctional meetings at Company 2, manufacturing representatives were asked to review a design early in the development process. They did and gave the design their approval, but when the design reached the manufacturing stage, there were producibility problems with it. When this happened several times in successive projects, design (product) engineers became frustrated and annoyed, losing respect for

the manufacturing representatives. Further interviews suggested that this expertise gap encouraged stereotyping and intergroup rivalry. According to one design engineer, the representatives "did not take their job seriously," did not take enough time to review a design, and did not have enough contact with the plant. Manufacturing representatives were perceived as nuisances. Said another designer we interviewed,

> One manufacturing representative kept bringing up the same issue over and over again without helping solve the issue. There has been a lot of hesitancy to invite such individuals to meetings. These kinds of issues detract from the credibility of manufacturing engineers.

III. Discussion

Through a synthesis of organizational behavior and social psychology literature, supplemented by field work, we have developed a model highlighting some key determinants of the nature and degree of intergroup conflict in multifunctional product development teams. To recapitulate the model in general terms, functional diversity triggers a set of cognitive and motivational processes (selective perception, categorization, and intergroup anxiety) whose intensity depends on certain contextual factors. The cognitive and motivational processes then induce task and emotional intergroup conflict. The amount of task conflict depends on the extent to which selective perception occurs, and the amount of emotional conflict depends on the extent to which categorization and intergroup anxiety occur.

A. Directions for Future Research

The development of this initial model opens several avenues for future research. A first and obvious step is to conduct more intensive case study research to transform this preliminary model into grounded theory. A systematic analysis of data gathered through prolonged field research will help identify discrepancies between those variables that are relevant according to the literature and those that are relevant in a field setting. Then, once the model is well-grounded in field data, the next step is to conduct a large-scale, quantitative study to test it. Such a study should include measures of other kinds of diversity (e.g., heterogeneity with respect to age, company tenure, education, race, and gender) in addition to functional diversity. While we expect similar processes to intervene between these variables and consequences such as performance and turnover, we expect that these processes will occur to different degrees, depending on the particular diversity variable under consideration. We also expect that certain contextual factors (e.g., goal orientations and the physical proximity of functional areas) that moderate the relationship between functional diversity and conflict-inducing processes will not necessarily be moderators for other types of diversity. A large-scale study that includes a variety of diversity measures will allow us to determine whether this is the case.

B. Implications for Management

This paper has focused on the antecedents of intergroup conflict because the consequences of intergroup conflict and tools for conflict resolution have received more attention in organizational behavior literature. In order to evaluate a conflict situation and decide which resolution technique will be most constructive, it is important to understand the sources of the conflict. As Barclay [6, p. 145] points out, "Conflict can have constructive or destructive outcomes, depending on its management, and an emphasis on managing conflict requires a discriminating understanding of its causes." If the conflict is one that stems from selective perception, then a collaborative problem-solving approach should be feasible, and avoidance and smoothing, which might conceal important issues, may be inappropriate. If the task conflict is getting out of hand and becoming emotional, it may be necessary to reinforce the salience of superordinate goals. If, on the other hand, the cause of the conflict is categorization or intergroup anxiety, then avoidance or smoothing may be more appropriate in the short-run, while behavioral change techniques may be appropriate in the long-run.

In addition to helping managers react to conflict in the most optimal manner, the proposed model could also help managers specify conditions under which they may need to be more proactive. When the group has high longevity, for example, the situation might warrant appointing a devil's advocate [17], [26] or bringing in outsiders to promote more task conflict. Alternatively, when the team is more susceptible to emotional conflict (i.e., when functional areas are not co-located, when the organization's reward system does not encourage teamwork, when the product represents a more radical innovation, and when the team is in the earlier stages of its existence), the situation may call for team-building activities that promote trust. Both theory and practice require that we clarify the processes that lead from diversity to conflict.

References

[1] T. J. Allen, *Managing the Flow of Technology*. Cambridge MA: MIT Press, 1977.

[2] D. G. Ancona and D. F. Caldwell, "Improving the performance of new product teams," *Res. Tech. Management*, vol. 33, pp. 25–29, (Mar.-Apr. 1990.

[3] D. G. Ancona and D. F. Caldwell, "Beyond boundary spanning: Managing external dependence in product development teams," *J. High Tech. Management Res.*, vol. 1, pp. 119–135, 1990.

[4] D. G. Ancona and D. F. Caldwell, "Demography and design: Predictors of new product team performance," *Organization Sci.*, vol. 3, pp. 321–341, Aug. 1992.

[5] K. A. Bantel and S. E. Jackson, "Top management innovations in banking: Does the composition of the top team make a difference?" *Strategic Management J.*, vol. 10, pp. 107–124, 1989.

[6] D. W. Barclay, "Interdepartmental conflict in organizational buying: The impact of the organizational context," *J. Marketing Res.*, vol. 27, pp. 145–159, May 1991.

[7] R. R. Blake and J. S. Mouton, *Solving Costly Organizational Conflicts*. San Francisco: Jossey-Bass, 1984.

[8] H. J. Brightman, "Better decision making for better business," *Business*, pp. 28–34, Apr.-June, 1988.

[9] L. D. Brown, *Managing Conflict at Organizational Interfaces*. Reading, MA: Addison-Wesley, 1983.

[10] M. Chan, "Intergroup conflict and conflict management in the R&D divisions of four aerospace companies," *IEEE Trans. Eng. Management*, vol. 36, pp. 95–104, May 1989.

[11] J. A. Conger and R. N. Kanungo, *Charismatic Leadership: The Elusive Factor in Organizational Effectiveness*. San Francisco: Jossey-Bass Publishers, 1988.

[12] M. Connerton, R. B. Freeman, and J. L. Medoff, "Productivity and industrial relations: The case of U.S. Bituminous Coal," unpublished manuscript, Harvard Univ., 1979.

[13] D. C. Dearborn and H. A. Simon, "Selective perception: A note on the department identifications of executives," *Sociometry*, pp. 140–144, June 1958.
[14] C. H. Deutsch, "Teamwork or tug of war?" *New York Times*, Aug. 26, 1990.
[15] M. Deutsch, "A theoretical perspective on conflict and conflict and conflict resolution," in *Conflict Management and Problem Solving*, D. J. D. Sandole and I. Sandole-Staroste, eds. New York: New York Univ. Press, 1987.
[16] D. Dougherty, "Interpretive barriers to successful product innovation in large firms," *Organization Sci.*, vol. 3, pp. 179–202, May 1992.
[17] K. M. Eisenhardt and L. J. Bourgeois III, "Conflict and strategic choice: How top management teams disagree," working paper, Stanford Univ., 1993.
[18] K. M. Eisenhardt and C. B. Schoonhoven, "Organizational growth: Linking founding team strategy, environment, and growth among U.S. semiconductor ventures, 1978–1988," *Admin. Sci. Quarterly*, vol. 35, pp. 504–529, 1990.
[19] J. Galbraith, *Designing Complex Organizations*. Reading, MA: Addison-Wesley, 1973.
[20] M. E. Ginn and A. H. Rubenstein, "The R&D production interface: A case study of new product commercialization," *J. Product Innovation Management*, vol. 3, pp. 158–170, 1986.
[21] D. L. Gladstein, "Groups in context: A model of task group effectiveness," *Admin. Sci. Quarterly*, vol. 29, pp. 499–517, 1984.
[22] H. Guetzkow and J. Gyr, "An analysis of conflict in decision-making groups," *Human Relations*, vol. 7, pp. 367–381, 1954.
[23] R. H. Hayes, S. C. Wheelwright, and K. B. Clark, *Dynamic Manufacturing*. New York Free Press, 1988.
[24] L. R. Hoffman and N. R. F. Maier, "Quality and acceptance of problem solutions by members of homogeneous and heterogeneous groups," *J. Abnormal and Social Psychol.*, vol. 62, pp. 401–407, 1961.
[25] S. E. Jackson, J. F. Brett, V. I. Sessa, D. M. Cooper, J. A. Julin, and K. Peyronnin, "Some differences make a difference: Individual dissimilarity and group heterogeneity as correlates of recruitment, promotions, and turnover," *J. Appl. Psychol.*, vol. 76, pp. 675–689, 1991.
[26] I. L. Janis, *Groupthink*. Boston: Houghton Mifflin, 1982.
[27] K. A. Jehn, "The impact of intragroup conflict on group effectiveness," working paper, 1991.
[28] J. W. Julian and F. A. Perry, "Cooperation contrasted with intra-group and inter-group competition," *Sociometry*, vol. 30, pp. 79–90, 1967.
[29] R. Katz, "The effects of group longevity on project communication and performance," *Admin. Sci. Quarterly*, vol. 27, pp. 81–104, 1982.
[30] R. M. Kramer, "The more the merrier? Social psychological aspects of multi-party negotiations in organizations," in *Research on Negotiations in Organizations*, R. Lewicki, M. Bazerman, and B. Sheppard, eds. Greenwich, CT: JAI Press, 1989.
[31] P. R. Lawrence and J. W. Lorsch, *Organization and Environment*. Boston: Graduate School of Business Administration, Harvard Univ., 1967.
[32] B. E. McCain, C. A. O'Reilly III, and J. Pfeffer, "The effects of departmental demography on turnover: The case of a university," *Admin. Sci. Quarterly*, vol. 26, pp. 626–641, 1983.
[33] R. H. Moos and J. C. Speisman, "Group compatibility and productivity," *J. Abnorm. Soc. Psychol.*, vol. 65, pp. 190–196, 1962.
[34] R. T. Mowday and R. I. Sutton, "Organizational behavior: Linking individuals and groups to organizational contexts." *Ann. Rev. Psychol.*, vol. 44, pp. 195–229, 1993.
[35] N. Oliver and J. Langford, "Safety in team building: The contracting process," *Industrial & Commercial Training*, vol. 19, 1987.
[36] C. A. O'Reilly III, D. F. Caldwell, and W. P. Barnett, "Work group demography, social integration, and turnover," *Admin. Sci. Quarterly*, vol. 34, pp. 21–37, 1989.
[37] C. A. O'Reilly III and S. Flatt, "Executive team demography, organizational innovation, and firm performance," working paper, University of California, Berkeley, 1989.
[38] W. A. Pasmore, *Designing Effective Organizations: The Sociotechnical Systems Perspective*. New York: Wiley, 1988.
[39] L. H. Pelled, "Work Group Diversity and its Consequences: The Role of Substantive and Affective Conflict," Ph.D. dissertation, Stanford Univ., 1993.
[40] D. C. Pelz and F. M. Andrews, "Organizational atmosphere, motivation, and research contribution," *Amer. Behav. Scientist*, vol. 6, pp. 43–47, Dec. 1962.
[41] J. Pfeffer, *Power in Organizations*. Marshfield, MA: Pitman Publishing, 1981.
[42] M. A. Rahim, *Managing Conflict in Organizations*. New York: Praeger Publishers, 1986.
[43] C. A. Rideout and S. A. Richardson, "A teambuilding model: Appreciating differences using the Myers-Briggs type indicator with development theory," *J. Counseling and Development*, vol. 67, pp. 529–533.
[44] M. E. Roloff, "Communication and conflict," in *Handbook of Communication Science*, C. R. Berger and S. H. Chaffee, eds. Newbury Park, CA: Sage, 1987.
[45] R. S. Ross, *Small Groups in Organizational Settings*. Englewood Cliffs, NJ: Prentice Hall, 1989.
[46] J. B. Roure and R. H. Keeley, "Predictors of success in new technology based ventures," *J. Bus. Venturing*, 1989.
[47] S. M. Schmidt and T. A. Kochan, "Conflict: Toward conceptual clarity," *Admin. Sci. Quarterly*, vol. 17, pp. 359–370, 1972.
[48] M. Shaw, *Group dynamics: The psychology of small group behavior*. New York: McGraw- Hill, 1981.
[49] W. G. Stephan and C. W. Stephan, "Intergroup anxiety," *J. Social Issues*, vol. 41, pp. 157–175, 1985.
[50] E. Sundstrom, K. P. de Meuse, and D. Futrell, "Work teams: Applications and effectiveness." *Amer. Psychologist*, vol. 15, pp. 120–133, 1990.
[51] S. E. Taylor, S. T. Fiske, N. L. Etcoff, and A. J. Ruderman, "Categorical and contextual bases of person memory and stereotyping," *J. Personality and Social Psychology*, vol. 36, pp. 778–793, 1978.
[52] D. Tjosvold, "Implications of controversy research for management," *J. Management*, vol. 11, no. 3, pp. 21–37, 1985.
[53] M. L. Tushman, "Special boundary roles in the innovation process," *Admin. Sci. Quarterly*, 22, pp. 587–605, 1977.
[54] W. G. Wagner, J. Pfeffer, and C. A. O'Reilly III, "Organizational demography and turnover in top-management groups," *Admin. Sci. Quarterly*, vol. 29, pp. 74–92, 1984.
[55] V. D. Wall and L. L. Nolan, "Perceptions of inequity, satisfaction, and conflict in task-oriented groups," *Human Relations*, vol. 39, pp. 1033–1052, 1986.
[56] R. E. Walton and J. M. Dutton, "The management of interdepartmental conflict: A model and review," *Admin. Sci. Quarterly*, vol. 14, pp. 73–84, 1969.
[57] S. C. Wheelwright and K. B. Clark, *Revolutionizing Product Development: Quantum Leaps in Speed, Efficiency, and Quality*. New York: Free Press, 1992.
[58] M. N. Zald, "Power balance and staff conflict in correctional institutions," *Admin. Sci. Quarterly*, pp. 2–49, June 1962.

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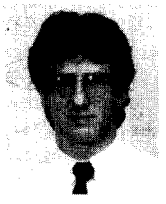

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