

THE ROLE OF SENIOR MANAGEMENT AND TEAM LEADERS IN BUILDING COLLABORATIVE NEW PRODUCT TEAMS

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Abstract

Most high-technology firms expect cross-functional new product teams to accelerate product innovation, increase creativity, and cut costs. However, the mere formation of teams seldom produces such results. This article reports findings from a recent study of new product development processes in 10 high-technology firms and highlights the actions of senior management and team leaders that are associated with highly collaborative new product teamwork.

Introduction

Cross-functional teams have emerged as the structural mechanism of choice for managing new product decision-making and organizing its workflow in a large number of high-technology organizations (Ancona and Caldwell, 1990; Brown and Eisenhardt, 1995). Among other things, they promise higher levels of interfunctional cooperation and collaboration among participants and accelerated new product development cycle times (Donnellon, 1993 and 1996; Griffin and Hauser, 1996). Putting together people from multiple functional groups and holding them jointly responsible for product innovation is expected to create an open forum for information exchange, improve cooperation and coordination of activities as a result of the emerging shared understanding, and increase creativity and accelerate new product development (Ancona and Caldwell, 1990; Brown and Eisenhardt, 1995; Gupta and Wilemon, 1990; Kahn, 1996).

The interest in new product teams has come about because they improve cooperation and coordination among the participants in new product development including R&D, production, and marketing (Ancona and Caldwell, 1990 and 1992; Clark and Fujimoto, 1991; Gupta and Wilemon, 1990). The high level of cross-functional information exchange engendered by teams has helped firms reduce both perceptual and communication barriers among participants and mistakes and delays during new product processes (Clark and Fujimoto, 1991; Song and Parry, 1993). The formation of concurrent engineering and cross-functional teams as structural mechanisms for managing new product efforts makes both theoretical and practical sense, because they promise to intensify information exchange, increase creativity, and accelerate new product development. Our recent study of new product development processes in 10 high-technology medium to large industrial organizations shows, however, an enormous disparity between expectations and reality. Despite sound intents, many high-technology firms find that cross-functional teams do not deliver all that they promise. Many find their teams rife with finger pointing and turf battles that contribute to cost escalations and delays.

In this article, we attempt to answer the question: Why are all new product cross-functional teams (henceforth *teams*) not equally collaborative? In other words, why are some capable of cutting costs, taking risks, increasing creativity, and introducing products faster and cheaper, while others flounder and fail? Why are some teams infected with divergent agendas, blame setting, and non-cooperative behaviors of participants? While a myriad of factors related to participants, the organization, and the task environment can impact effective teamwork, this article traces those related to the actions of senior management and team leaders. In so doing, this article addresses the concerns of managers attempting to improve new product development processes and build collaboration in their new product teams.

Research Methodology

We studied new product development processes in 10 high-technology organizations, i.e., firms that engage a large number of engineers and technically qualified people, experience high amounts of product obsolescence, rely on product innovations for their survival and success, and invest significant efforts and resources in R&D and product design (Von Glinow and Mohrman, 1990).

The study was conducted in two phases. First, for a pilot test, we interviewed six managers responsible for new product development in four high-technology organizations and asked them to describe their processes and the key issues/problems they faced. From the analysis of the transcribed, tape-recorded interviews, we developed a list of managerially relevant research questions and derived an interview protocol to guide depth interviews during the second phase.

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In the second phase, we depth-interviewed 40 managers from 10 medium to large high-technology industrial firms located in the Northeast U.S. We focused on medium to large firms because we wanted to better understand the cross-functional interactions that occurred among participants in new product processes. Our pilot study showed that, in smaller firms, it was not unusual for a person to oversee multiple aspects of new product development (e.g., engineers who oversaw R&D and production and also visited and sold products to customers). This would prevent us from drawing meaningful insights about the breadth and complexity of interfunctional interactions that can occur during new product development processes.

The firms we included in the study represented manufacturers of radar systems, emissions control equipment, electric and electronic components, medical diagnostic instruments, automobile transmission systems and components, electrical construction materials, jet engine cables and harnesses, single-package cooling units, locomotive brake systems, and high-technology specialty metals. Our sample firms fit our definition of medium to large high-technology firms (at least 450 employees) and met the following criteria: they were willing to participate in our study and allow us access to the participants in their new product initiatives, and they were located close enough that we could make multiple visits to their facilities.

In each firm, we sought the assistance of one or more senior executives to identify managers closely involved in new product development. We made sure to include at least one manager each from R&D, manufacturing, and marketing from each firm. Of the sampled managers, 90% had spent 10 years or more in the industry, while 70% had spent 10 years or more in their firms. Their average experience in the industry was 20 years. Our sample included functional heads ($n = 23$), middle managers representing their functional groups on the project ($n = 10$), heads of the business division ($n = 2$), leaders of the new product development teams ($n = 4$), and facilitator of teams ($n = 1$).

The interview protocol consisted of standard questions that would enable comparisons between interviewees and between companies. All questions were open-ended and encouraged interviewees to describe their unique circumstances and perspectives. The interviewees were asked to speak about the new product processes in which they were currently involved or the one in which they had been most recently involved. We asked managers to describe their new product development process, their role, interactions with other functional groups, and what they learned from participating in the process. The interviews, lasting between 90 and 120 minutes each, were tape recorded and transcribed, and their content was analyzed.

For the content analysis, we followed the guidelines of Miles and Huberman (1994), Bogdan and Biklen (1982), and Taylor and Bogdan (1984). We initially listened to and transcribed the interviews in order to attain a high level of familiarity with the responses from the entire cross-section of managers and to develop a holistic perspective from their collective voices. We coded each transcript to identify similarities and differences—first to isolate the patterns and themes within each transcript, and then to isolate the patterns and themes across multiple transcripts. While we coded, we made observations, wrote notes, and drew tentative hypotheses about the relationship between events (e.g., when X occurs, it seems that Y occurs as well). For instance, when we

began to see repeated references to trust between people and the freedom they felt to experiment with risky ideas, we drew a tentative hypothesis: higher levels of trust are associated with higher levels of creativity. To support these notions, we extracted and compiled evidence from the transcripts (i.e., precise quotes in the voices of managers).

Our data analysis was highly iterative. We repeatedly revisited the transcripts to check and verify our analysis and conclusions and compile supporting (or contrary) evidence. Eight of the 10 firms in our sample used cross-functional teams to manage new product development processes. All the cross-functional teams in our study were responsible for designing and developing a new product and preparing it for mass production. In all instances, teams were formed specifically for the new product project at hand and were expected to disband when the project was completed. Two firms did not employ teams and used a linear-sequential process for new product development. Each functional group worked on its part of the new product process in relative isolation and handed its output to the next functional group.

The findings we report in this article are drawn mainly from the eight firms that employed cross-functional teams. In particular, we draw on the insights gained by comparing and contrasting the two firms with highly collaborative teams that met and exceeded expectations with two teams that exhibited low levels of collaboration and failed to live up to their promise. Our notes and observations suggest that collaborative behaviors are learned behaviors, typified by four distinctive developmental milestones. In the rest of the article, we discuss the developmental process by which collaborative behaviors emerge, and then highlight the impact of specific actions taken by senior management and team leaders.

Milestones of Collaborative New Product Teams

We initially arranged the eight firms in our sample that used teamwork along a continuum of cross-functional cooperation, coordination, and collaboration. We found two firms with new product teams demonstrating notably high levels of collaboration and two other firms with new product teams demonstrating notably low levels of collaboration (the remaining four were scattered between these two polar ends). The high-collaboration teams in the sample also appeared to deliver somewhat dramatic results in terms of reduced costs, increased creativity, shortened time to market, and increased profitability.

When we looked closely at the nature of interfunctional and interpersonal linkages occurring in the firms with high-collaboration teams, we found that the high-collaboration team members had learned and developed distinctively new ways of thinking and acting, which meaningfully differentiated them from others. Four distinctive milestones, each of which lay the foundation for new learning and actions, characterized their learning and development.

First, for instance, collaborative teams had achieved high levels of at-stakeness (Liedtka, 1996). They were equally and highly committed to the collective intents of the team. They took ownership and personal responsibility for accomplishing team objectives, and they committed to changing their ways of thinking and doing in order to achieve new results. At-stake teams had either converted or eliminated skeptics. They also had no uninterested participants.

Second, collaborative teams had achieved high levels of transparency. Transparency refers to the high levels of awareness they professed about each other's agendas, orientations, interests, and objectives. Transparency signaled the development of a shared vision and the emergence of trust among participants. In transparent teams, there were no hidden or covert agendas, and few misunderstandings.

Third, high-collaboration teams had achieved high levels of mindfulness, i.e., they had begun to reflect in their actions the high levels of shared understanding they had reached. In mindful teams, members behaved as if they understood the breadth of concerns and orientations that existed. In mindful teams, every member could explain why other members (whether acting alone or as part of the team) did what they did and found it easy to support their actions.

Finally, we found that collaborative teams had achieved high levels of synergy. They had developed a team environment in which they trusted each other to the extent that they could engage in constructive conflict and push each other into developing solutions that stretched every participant's notion of what was doable and achievable. Synergistic teams produced, as a result of their intense interactions, results that far surpassed the simple sum of their capabilities (see Jassawalla and Sashittal, 1998 and 1999, for more on the developmental milestones).

Our findings about the developmental milestones in the process by which new product teams learn collaborative behaviors are similar to the model (forming, storming, norming, performing, and adjourning) presented by Tuckman (1965) and Tuckman and Jensen (1977) in several ways. Their model reflects the general pattern of small-group behavior over time. Our findings emerge from and are applicable to a much narrower context, i.e., one of new product-related cross-functional teams with representatives from R&D, marketing, production, and other functional groups in medium to large industrial organizations. Moreover, no one-to-one correspondence between our developmental milestones and their stages is implied. Unlike their stages, the developmental milestones we derive from the data refer specifically to the cross-fertilization of ideas, coordination of activities, development of trust, creativity and risk taking, i.e., issues focal in the development

of new products from new technologies in medium to large industrial organizations.

The teams in our sample are in various stages of learning and development. Two teams exhibit, however, notably high levels of collaboration. They have also achieved several outcomes desirable by a large segment of high-technology firms, including accelerated cycle times and increased creativity in the new product development process. In the following discussion, we focus on the specific actions taken by senior management and team leaders that foster collaborative behaviors in firms.

What Must Senior Management Do To Instill Collaboration in Teams?

We find that teams are social creatures, and a large number of intrinsic and extrinsic factors impact their effectiveness. This discussion focuses on the specific impact of senior management's actions on the collaborative behaviors of teams and recognizes that other factors can also impact team effectiveness. We know from the literature that, in order to foster effective teamwork, senior management must support the internal functioning of the project team (Gupta and Wilemon, 1990), maintain a balance between imposing its vision and respecting the autonomy of the project team (Brown and Eisenhardt, 1995; Cooper and Kleinschmidt, 1987), highlight the importance of new product development by attending the first team meeting and voicing confidence in the team (Ancona and Caldwell, 1992), and show interest and remain involved without controlling the process in ways that lessen participants' motivations (Cooper and Kleinschmidt, 1987; Clark and Fujimoto, 1991). Our findings largely mirror these notions in the literature and provide several new insights about the impact of senior management on collaborative behaviors in teams (Exhibit 1)

First, senior management's role in defining the collaborative organizational culture in which teams can function is clearly emphasized by our data. We find that R&D, production, marketing, and other functional group representatives thrown into teams find it difficult to learn collaborative behaviors if the organizational culture remains divisive, disintegrative, or fragmented. Attitudes and behaviors formed in functional-

Exhibit 1. The role of senior management in firms with high- and low-collaboration teams

Role of senior management in firms with:	
High-collaboration teams	Low-collaboration teams
Carefully select team leaders with: <ul style="list-style-type: none"> • cross-functional experience • interpersonal skills • belief in the power of teamwork 	Appoint the R&D representative on the cross-functional team to be the leader
Decentralize decision-making to the team	Micromanage every stage of new product development
Provide team with access to information and resources they need to act independently	Permit R&D to continue controlling access to resources and information
Encourage teams to take risks and experiment with creative ideas	Discourage risk-taking and emphasize adherence to the pre-determined checklist

hierarchical organizations with compartmentalized departments often get in the way of teamwork, because teams cannot *entirely* insulate their members from the influences of their macro-environment. Unless the organizational culture and norms established and reinforced by senior management support openness, information exchange, and trust building, it is overly optimistic to expect transparency and mindfulness to emerge within teams.

Second, the attitudes of senior management, which project the centrality of new product initiatives to the firm's mission, appear to make a decisive difference. The actions taken by senior management when new product processes take high priority are worth noting. For instance, in the firms with high-collaboration teams, we find that the senior managers carefully select team leaders who possess cross-functional experiences and the capacity to develop an independent, self-directed team. They ensure that the selected leader owes allegiance to the co-creative intent of the team, rather than to any particular functional group. Selection of a team leader free of functional affiliations also appears to send powerful signals about the equality of all participants in the new product process and functions to build at-stakeness among participants. A new product team leader, describing the rigorous, thoughtful process by which he was selected, explains:

It's clear that this [new product development] is a fairly major investment of resources, it's highly risky, and involves a lot of complex interactions. So the organization goes to work and says, "who is the best qualified person to meet the requirements of the position [of team leader]?" ... our VP ... is responsible [and coordinates the selection of the team leader]. But the key players who would be involved [in the selection are] ... business managers for both our North American business and our European business. They would review the [team leader] candidates, and ultimately my boss' boss—the General Manager of this division, would have to buy-off on me as a candidate.

Third, the ability of senior management to select leaders not just for their technical skills but also for their human interaction skills appears critical for engendering high levels of transparency and mindfulness in teams. When team members become aware of the broad selection criteria, it fosters a belief in the notion that the soft skills—i.e., information sharing, trust building, acting mindfully—are the hard skills of new product processes and shapes the beliefs that human and psycho-social issues are as important as technical issues in the new product task environment.

Conversely, we find that team leaders in low-collaboration teams are invariably appointed by the dominant functional group (mostly R&D), because of the technical skills they possess. The responses of the appointed leaders belie their beliefs in the notion that team members are senior-management-imposed burdens to be tolerated and consulted when necessary. Team members, in turn, view appointed leaders as yet another signal of their perceived inadequacy. They therefore withhold cooperation and fail to function as voting citizens in the team. For instance, production and marketing representatives in R&D-led teams fail to commit personally or emotionally to the team development and hesitate to discuss their specific concerns and agendas. At-stakeness and transparency fail to take root because of the implied pecking order among participants imposed by the senior management.

Fourth, senior management's unyielding attempts to decentralize decision-making and to delegate responsibility of new product-related decision-making to the teams appear to make a decisive difference in their learning and development. Senior management's attempts to ensure that teams have access to the necessary information and resources and that they can function independently appear to encourage members to seek creative solutions, take risks, and commit to bold initiatives. By creating resource and information independence, senior management appears to absolve team leaders from building political coalitions and jockeying for resources using political means. A selected team leader, expressing his satisfaction with the autonomy he and his team enjoy, explains:

I actually report to the Operations Management Team [which comprises] the CEO and the officers of the company. I actually report to the governing body of our corporation, which is a nice position to be in because I'm truly empowered to do what I need to do and only need to keep them advised of what I'm doing. And I usually get 100% support for everything I ask for. So it works out well. We found here at our company that to truly empower a team you have to give them some authority and responsibility and cut 'em loose. So that's what they've done.

Fifth, senior management's tolerance for mistakes and failures appears critical to the emergence of risk-taking and creative behaviors within teams. The tolerance for failure appears to create an environment in which members are less afraid to engage in constructive conflict and to dramatically intensify the cross-fertilization of ideas—the distinctive precursors to the emergence of synergistic interactions among members. By contrast, the attempts of senior management in low-collaboration firms to micro-manage the new product process appears to produce inadvertent and often negative results. For instance, we find low levels of collaboration in teams when senior management expects strict adherence to prespecified checklists and demands frequent status reports. A manufacturing manager participating in the new product team, describing how R&D dominates meetings and demands status reports, notes:

And these [senior management] meetings are supposed to bring up any issues or problems. Doesn't really work very well. The meetings I find are a lot of [the R&D] management and they want to gloss over things, they don't really want to hear any detail. They don't really look closely enough at each of the projects. They just hit at major topics here and there. They basically just want to hear that everything's going good because their guys are the project [team leaders]. They [the meetings] are supposed to help communication, but I don't think they do. I think the fights start there.

The information exchange and human interaction within teams, therefore, are unduly focused on pleasing senior management and not on the new product process. Moreover, the members exhibit notably low levels of commitment to the team goals and notably high levels of resentment.

What Must Team Leaders Do To Instill Collaboration in Teams?

We know from the literature that effective team leaders gain the support of senior management for team decisions (Cooper and

Kleinschmidt, 1994), focus their energies on the internal functioning of the team (Ancona and Caldwell, 1992; Barczak and Wilemon, 1992), facilitate equal involvement of key functions and high levels of communication between team members (Ancona and Caldwell, 1992), and mobilize resources for the team and shield members from the bureaucratic forces of the larger organization that attempt to control resources and resist change (Ancona and Caldwell, 1992; Barczak and Wilemon, 1992). Our data highlight several additional team leader actions that help in the cognitive, emotional, and behavioral development of team members (Exhibit 2).

First, effective team leaders appear highly aware that old habits, rivalries, and issues must give way to new thinking and behaviors. They demonstrate awareness of the complex cognitive, emotional, and behavioral transformation that must occur before true collaboration is achieved. They begin by holding frequent, formal team meetings and creating the climate in which team members interact, develop rapport, build trust, engage in high-intensity information exchange, and share their divergent agendas in open forums. These actions contribute to the development of transparency and mindfulness among team members. Effective leaders ensure that all team members develop an integrated perspective into the new product process. A team leader, describing the importance of integrating multiple functional perspectives, notes:

They [different functional groups] tend to have different orientations. And that's very easy for manufacturing to say: "marketing or commercial people, all you do is give away the store, you never deal with any specifics, you come back and tell me everything I need to do and none of it is what I can do." The commercial people say the manufacturing people are always so narrow and limited in their ability. And in the meantime they'll point a finger at the technical [R&D] guys and say "you don't care at all about the customer, you just want to do something technically brilliant." And manufacturing looks at technology and says, "look what you

did to me. You never engineer this thing far enough along so I can do it." So, a big piece of my job is to help define common ground. And it involves giving and coming towards each other. It's a natural dynamic because of their respective areas. If you don't work at it, it won't happen.

Effective team leaders maintain a schedule of regular team meetings. As deadlines draw near, they increase the frequency of meetings and emphasize the need for high levels of connectedness among participants. For instance, one team leader has given each member a two-way radio to enable real-time connectedness among participants, regardless of their physical location in the sprawling facility. These actions help team members develop high levels of transparency and mindfulness and create conditions that favor synergistic interactions.

Second, effective leaders collocate the members in a way that compels them to come to grips with a shared physical environment. The collocation, coupled with regularly scheduled meetings, helps members develop a shared vision and, more than any other action, promotes at-stakeness and transparency. A team leader, explaining to an interviewer why collocating team members accelerates new product development, contends:

First thing you gotta do is to try not to move it [the new technology] between functions. To try to create a team so that function is not the first thing that comes to your mind. "I'm an engineer" is not the first thing that comes to your mind. The first thing that should come to mind is "I'm part of the team trying to develop this product."

Q: How do you get that mindset?

A: The first thing you gotta do is to physically collocate these guys away from the functional groups and managers. Our functional managers and functional folks are located on the second floor of this building. This team is locked away in a room on the first floor, all collocated, and the more you can do that the better off you are. Because that gets them away from mother telling them what to do and gets them out on their own where they have to think about what to do for

Exhibit 2. The role of team leaders in firms with high- and low-collaboration teams

Role of team leaders of:	
High-collaboration teams	Low-collaboration teams
Hold regular team meetings and foster high levels of information sharing and communication between members	Rarely hold team meetings and consult individual members when information is needed from them
Collocate team members to increase shared understanding of the team's goals and strategies	Keep team members in separate locations to ensure fulfillment of R&D's agenda
Handpick team members and spend time developing their interpersonal and team process skills	Show no concern for the interpersonal skills of team members and ignore team building
Network with key people outside the team to ensure access to information and resources needed for new product development	Network mainly with R&D department head to ensure the fulfillment of R&D's agenda

themselves. The second thing that really works is to do what we've done which is once you get them into that room you intermix them. Don't let all the manufacturing guys clump together in one corner of the room and the engineering folks in another corner of the room. Get 'em in that same room sitting side by side and back to back.

Third, effective team leaders define themselves as coaches and facilitators (versus directors). They help develop the team's vision, scout for talent, and handpick team members because of the diverse skills they can bring to the team. An R&D manager who assists the selected team leader in choosing design engineers to include on the new product team explains:

We tried to get the best people we could and we really strive to get people that ... it's always been my philosophy to strive to get people, maybe that aren't necessarily the experts in their field, but who are willing to work with one another, they're dedicated, they're hardworking. I'll take ten of those type of people against ... no offense meant, but say ten Ph.D. people with no practical experience and are very smart but you run into a lot of personality conflicts. ... I really strove to get the best possible people that I felt could work well together in this particular environment.

Fourth, effective team leaders spend inordinate energies and resources developing the interpersonal and technical skills of the carefully chosen team members. This emphasis on interpersonal skills as a selection criterion increases the team's potential for achieving mindfulness and synergy. While less-effective leaders attempt to mold team member behaviors to conform to the team, more effective leaders appear to emphasize the talents of each individual, so as to expand the repertoire of the team's talents. They arrange off-site team-building retreats and focus on building cohesion and trust. They ensure that members are comfortable enough to discuss their divergent agendas without fear of censure and feel secure enough to take risks and commit to creative ways of solving problems. Effective team leaders view constructive conflict as an opportunity to discuss the undiscussable and to broaden every participant's belief about what is doable. These actions greatly enhance the team's ability to engage in synergistic interactions.

Fifth, effective team leaders devote considerable energies to communicating outside the team. They build a network with key people across the organization and create an environment in which the rest of the organization understands its interdependent relationship with the team. In low-collaboration teams, we find team leaders focused mostly on implementing the agenda of the functional group they represent, on protecting departmental turf, and on gaining compliance from participants. While they articulate in clear terms the changes that ought to occur within their teams, they appear to take few definitive actions to foster these changes. It is important to note that effective team leaders ensure that all agenda items concerning the team are discussed as a team, i.e., the discussion with all participants is viewed as the only legitimate forum for decision-making. These acts go a long way in building collaborative behaviors within teams. Less-effective leaders, on the other hand, often strike performance-related deals with specific members without discussing specific issues with the rest of the team.

Concluding Remarks

Collaborative behaviors rarely emerge in teams unless senior management and team leaders take specific steps to create an environment of trust, creativity, and collaboration. Effective senior management and effective team leaders build collaboration and accelerate new product development processes principally because they understand the complex developmental process by which collaborative behaviors are learned by participants. They understand that transforming linear new product development processes—where each functional group makes its part of the new product decision and hands its output over the wall to the next group—into organic processes is essential for harvesting the innate talents and creativity of people. Hence, they focus their energies on developing an organizational and team culture in which people can discard their old ways and adopt new ways of thinking and doing.

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