Chapter **Twelve**

Managing New Product Development Teams

Innovation Teams at the Walt Disney Company

The Walt Disney Company is probably the best-known entertainment company in the world. Founded in 1923 as a producer of animated films, it grew to become an entertainment conglomerate that includes theme parks, live action film production, television, publishing, retail, and more. In 2014, it earned over $48 billion in revenues and had 180,000 employees.[a] Despite the range of its businesses, most of them (with some notable exceptions) leverage the same key competitive advantage: the magical and wholesome stories and characters of its animated films.

The Making of an Animated Film

In the very early stages of generating and refining an idea for a movie, the development department assembles a small incubation team that includes a director, a writer, some artists, and some storyboard people.[b] This team draws storyboards that are edited together with dialogue and temporary music, creating "story reels." These story reels show the sequence of the movie and help the team craft and refine the story into one that will have visual and emotional appeal. They also help to reveal problems that have to be solved, which tend to be numerous in the early stages of production.[c]

Once approved for development, a typical movie enters production using computer-aided design (CAD) systems. Artists would create a model in a CAD system, which could then apply mathematical models to simulate lifelike textures, movement, and lighting.[d] This computing intensive phase was also managed by small autonomous teams, each focused on a particular specialty such as Tech Support, Renderfarm, and Post Production. Disney's Director of Systems, Jonathan Geibel, had noticed that when teams had seven or more participants, individual contribution would drop significantly, lowering the quality of the discussion. Geibel thus determined that teams should have only between two and six people, including one who would be designated as a *Team Lead*. Team Leads were chosen because of their technical expertise and their vision for the project. Their seniority played

little role—rather they were chosen based on how compelling their vision was, and how good management thought they would be in driving the progress of the team. The remaining employees were assigned as "primary" members to a particular team to which they would give most of their time and effort and might also serve as "secondary" members on other teams when those teams needed their help.[e]

Workspace and Collocation

Geibel was also concerned about how the physical structure of the workspace and proximity would influence team dynamics and productivity. After running several experiments involving the location of team members, he decided to reconfigure the entire division so that teams were collocated. He noted, "Collocating individuals allowed ideas to flow each day through ad hoc meetings. Individuals would often brainstorm, pause, and walk over to a whiteboard for further development rather than needing to arrange a specific time and space to meet. With high priority and chaotic work, physical proximity was key."[f] Geibel also believed that people tended to contribute less in formal conference rooms, so he created small casual meeting spaces that teams could meet in, that did not require advance scheduling.

In keeping with his belief that immediate and informal communication was key, Geibel himself gave up his office and moved to a desk without walls in the center of the Systems area. He would conduct frequent walkabouts, conferring with the teams so that if something was going on, he would know about it immediately.

Team Communication

To help foster communication and coordination between teams, teams were asked to create yearly roadmaps of their goals that were broadcast to everyone within the Systems group. A master calendar was also created on whiteboards in a main hallway that showed major milestones throughout the year. Teams put post-it notes on the calendar to show major events.[g]

The teams also used "dailies"—a practice from traditional film production that had been brought in when Disney acquired Pixar. In the "dailies," artists had to show their ongoing work to directors and peers. This informal audience could then provide direct feedback about both the creative and technical elements of the project. As Brad Bird, Oscar-winning director, described, "As individual animators, we all have different strengths and weaknesses, but if we can interconnect all our strengths, we are collectively the greatest animator on earth. . . . We're going to look at your scenes in front of everybody. Everyone will get humiliated and encouraged together. If there is a solution, I want everyone to hear the solution, so everyone adds it to their tool kit."[h] Initially, people were afraid to speak up, but after two months of seeing artists hear and benefit from the blunt suggestions of Bird and others, people began to feel safe enough to speak up.

Creating a Creative Culture

Teams were given considerable autonomy so long as their work got done. Teams could choose their own hours, attire, office arrangements, project management routines, meeting structure, and more. As described by Ed Catmull,

president of both Pixar and Walt Disney Animation Studios, "We believe the creative vision propelling each movie comes from one or two people and not from either corporate executives or a development department. Our philosophy is: You get creative people, you bet big on them, you give them enormous leeway and support, and you provide them with an environment in which they can get honest feedback from everyone."[i]

Initially, it was not always easy for the engineers to embrace this kind of autonomy—they tended to continue to ask permission about minor aspects of team organization. As Geibel noted, "We've built teams where technical leads don't have to ask for permission to change the way they are running their teams. . . . We're still working on people thinking that way spontaneously. The culture is ingrained in everybody because the average tenure is 15–40 years. If you've worked in a top-down organization for that long, it's going to take a while to adapt to a new culture where everyone is expected to challenge the status quo and where there's an expectation that critical thinking is happening at all levels."

Discussion Questions

1. Why does Disney keep its development teams small?
2. What are the pros and cons of the teams being so autonomous?
3. Is Disney's team approach mostly suited to creative projects, or would it work equally well in other kinds of industries?

[a] www.hoovers.com

[b] Catmull, E. "How Pixar fosters collective creativity," *Harvard Business Review* (2008), September: 65–72.

[c] Catmull, E. "How Pixar fosters collective creativity," *Harvard Business Review* (2008), September: 65–72.

[d] Edmondson, AC, Ager, DL, Harburg, E, and Bartlett, N. "Teaming at Disney Animation," *Harvard Business School* (2015), May 18.

[e] Edmondson, AC, Ager, DL, Harburg, E, and Bartlett, N. "Teaming at Disney Animation," *Harvard Business School* (2015), May 18.

[f] Edmondson, AC, Ager, DL, Harburg, E, and Bartlett, N. "Teaming at Disney Animation," *Harvard Business School* (2015), May 18.

[g] Edmondson, AC, Ager, DL, Harburg, E, and Bartlett, N. "Teaming at Disney Animation," *Harvard Business School* (2015), May 18.

[h] Rao, H, Sutton, R, and Webb, AP. "Innovation lessons from Pixar: An interview with Oscar-winning director Brad Bird," *McKinsey Quarterly,* April, 2008.

[i] Catmull, E. "How Pixar fosters collective creativity," *Harvard Business Review* (2008), September: 65–72.

OVERVIEW

New product development often requires activities that are the responsibility of different departments within the organization. To facilitate coordination and cooperation across division boundaries, many organizations create cross-functional new product development teams to lead and manage the development process for the project. There is considerable variation, however, in how teams are formed and managed. In this chapter, we will look at several factors that affect the new product development team's performance, including its size, composition, structure, administration, and leadership.

CONSTRUCTING NEW PRODUCT DEVELOPMENT TEAMS

In constructing new product development teams, the organization must consider how the team's size and composition will affect its mix of skills, its access to resources, and its effectiveness in providing communication and coordination across the divisions.

Team Size

New product development teams may range from a few members to hundreds of members. For example, the development team that created the IBM personal computer had 19 members, but the average team size for development projects at IBM is close to 200.[1] The Yahoo! Internet portal was developed by 13 software developers, split into several small teams of one to three members.[2] Though there is considerable research suggesting that individuals may be better off working alone during early ideation phases (see the Research Brief on "Why Brainstorming Teams Kill Breakthrough Innovation"), teams are often extremely valuable for refining and executing on those ideas. By combining the efforts and expertise of multiple individuals, groups can often outperform individuals on many problem-solving tasks, implying that the size of the development team might be related to its potential for success.[3]

Bigger, however, is not always better. Large teams can create more administrative costs and communication problems, leading to costly delays. Additionally, the larger the team, the harder it can be to foster a shared sense of identity among team members. Further, as the size of the team increases, the potential for **social loafing** also increases. Social loafing occurs when, as the size of the team increases, individuals perceive that they will not receive full credit (or blame) for their contribution to the group effort and so their effort and commitment decrease.[4] The average team size used by U.S. organizations is 11 members,[5] but there is considerable variance in the size of teams used by organizations, and each team may vary in size over the course of a new product development project.

social loafing
When an individual in a team does not exert the expected amount of effort and relies instead on the work of other team members.

Team Composition

A lack of communication among the marketing, R&D, and manufacturing functions of a company can be extremely detrimental to new product development. A lack of cross-functional communication can lead to a poor fit between product attributes and customer requirements. R&D cannot design products that fit customer requirements unless it receives *and* attends to input from marketing regarding those requirements. The manufacturing/R&D interface is also of critical importance because of manufacturing's role in determining two key attributes of a product—*quality* and *price*. By working closely with R&D, manufacturing can ensure that R&D designs products that are relatively easy to manufacture. Designing for ease of manufacturing can lower both unit costs and product defects, which translates into a lower final price and higher quality. Similarly, a lack of cross-functional communication between functions can lead to longer cycle times as a product iterates back and forth between different stages in the process.

One of the ways that firms address this problem is by building cross-functional product development teams.[6] **Cross-functional teams** include members drawn from more than one functional area, such as engineering, manufacturing, or marketing.[7] For instance, in Chrysler's "vehicle deployment platform teams," team members are drawn

cross-functional teams
Teams whose members are drawn from multiple functional areas in the firm such as R&D, marketing, manufacturing, distribution, and so on.

Research Brief Why Brainstorming Teams Kill Breakthrough Ideas[a]

Over a half a century ago, Alex Osborne wrote an influential book called *Applied Imagination* that opined, "the average person can think up twice as many ideas when working with a group than when working alone." Managers must have been convinced because brainstorming teams took off in popularity and are still used widely to this day. In fact, in business schools it is almost heretical to argue that teams are not more creative than individuals.

The only problem is that Osborne was wrong. Dozens of laboratory studies tried to confirm Osborne's arguments, but found the opposite: brainstorming groups produced fewer ideas, and ideas of less novelty, than the sum of the ideas created by the same number of individuals working alone.[b]

How could this be? Aren't ideas supposed to cross-fertilize, generating new and unusual hybrids?[c] It turns out group idea cross-fertilization is more likely to result in ideas that are mediocre compromises; more exciting ideas come from going solo. There are three main reasons that groups are less creative than individuals working on their own.

1. FEAR OF JUDGMENT

A series of studies by Professors Michael Diehl, Wolfgang Stroebe, Bernard Nijstad, Paul Pauhus, and others found that people self-censor many of their most creative ideas in group brainstorming sessions for fear of being judged negatively by others.[d] When the scientists told groups that their ideas would be judged by their peers, they came up with significantly fewer and less novel ideas than groups that were told they would be evaluated by anonymous judges.

As Isaac Asimov, one of the most famous science fiction writers of all time (and also a biochemistry professor at Boston University) put it, "My feeling is that as far as creativity is concerned, isolation is required. . . . The presence of others can only inhibit this process, since creation is embarrassing. For every new good idea you have, there are a hundred, ten thousand foolish ones, which you naturally do not care to display."[e]

2. PRODUCTION BLOCKING

When people take turns to voice their ideas, those bringing up the rear may forget their ideas before having a chance to voice them. Worse still, the process of attending to another person's ideas redirects a listener's train of thought, essentially hijacking their own idea generation process. Scientists were able to demonstrate this by separating individuals into rooms where they would speak their ideas into a microphone when lights indicated it was their turn. In some of the rooms the individuals could hear the contributions of others, and in some they could not. This study resulted in big creativity losses: being required to wait to give ideas caused people to submit far fewer ideas, and even fewer ideas if they could hear the contributions of others.

Now imagine what happens when people do not have to take turns but instead volunteer ideas at will: the most outgoing people in the group will dominate the idea submission while the quieter people, or those more worried about social pressure, do not submit many (or any) of their ideas. Furthermore, if they do submit their ideas, they may submit only those ideas that build upon the ideas that were already contributed—a sure way to drive out novelty.

3. FEASIBILITY TRUMPS ORIGINALITY

Another series of studies by Professor Eric Rietzschel and colleagues shows that teams are not just bad for idea *generation*; they even impair idea *selection*.[f] If you let people work alone to generate ideas but then let the group select the best ideas to pursue, they will tend to make decisions that reduce novelty. Studies showed that when groups interactively ranked their "best" ideas, they chose ideas that were less original than the average of the ideas produced, and more feasible than the average of the ideas produced. In other words, people tended to weight "feasible" more highly than "original." If a brainstorming group is intended to elicit novel ideas, asking groups to select and submit their best ideas is not the way to achieve that outcome.

continued

concluded

THE BENEFITS OF SPENDING TIME ALONE

Solitude is extremely valuable for creativity; it affords a person the time to think and pursue those things they find intrinsically interesting. It can help them to develop their own beliefs about how the world works, and to develop a self-concept that is less structured by the opinions of others.[g]

Research on serial breakthrough innovators show that many spent significant time alone, investing heavily in self education.[h] Most were voracious readers—Elon Musk, for example, often read for 10 hours a day, and has his brother Kimbal recalled, "If it was the weekend he could go through two books in a day."[i] Elon Musk himself noted in a *Rolling Stone* interview, "I was raised by books. Books and then my parents."[j]

The preceding suggests that when managers want employees to come up with breakthroughs, they need to give them some time alone to ponder their craziest of ideas and follow their paths of association into unknown terrain. They should be urged to come up with ideas freely, without fear of judgment. They should be encouraged to commit their ideas to paper, and to flesh each of them out before exposing them to others. Managers can also follow Google and 3M's lead and give employees in creative roles a significant percentage of their time (e.g., 3M uses 15 percent of work hours) to pursue products of their own creation and choosing. Google's Gmail and Google News, 3M's Post-it Notes, and many other products, were developed this way.

A creative idea can be fragile—easily swept away by the momentum of a group conversation. Almost every team suffers from some degree of groupthink; individuals who are more outspoken or who have forceful personalities can dominate the conversation and the decision making. They can herd a team onto a particular trajectory without even intending to do so, or worse, they can bring everyone to a mediocre compromise. A little isolation and solitude can give other individuals a better chance to develop their breakthrough ideas. These individuals should have time to elaborate their ideas and engage in some initial planning and prototyping before their idea are subjected to review or moved into team development.

[a] Adapted from Schilling, M.A. Why brainstorming groups kill breakthrough ideas (and what to do instead). Inc., February 9, 2018.

[b] Diehl, M., and W. Stroebe, "Productivity Loss in Brainstorming Groups: Toward the Solution of a Riddle," *Journal of Personality and Social Psychology* 53 (1987): 497–509; Mullen, B., C. Johnson, and E. Salas, "Productivity Loss in Brainstorming Groups: A Meta-Analytic Integration," *Basic and Applied Social Psychology* 12, no. 1 (1991): 3–23; and Stroebe, W., B. A. Nijstad, and E. F. Rietzshel, "Productivity Loss in Brainstorming Groups: The Evolution of a Question," in *Advances in Experimental Social Psychology,* eds. M. P. Zanna, and J. M. Olson (San Diego, CA: Academic Press, 2010), 43: 157–203.

[c] Alton, L. 5 Strategies for team brainstorming to use in your next meeting. Inc., October 30, 2017.

[d] Diehl, M., and W. Stroebe, "Productivity Loss in Brainstorming Groups: Toward the Solution of a Riddle," *Journal of Personality and Social Psychology* 53 (1987): 497–509; Pauhus, P.B., M. T. Dzindolet, G. Poletes, and L. M. Camacho, "Perception of Performance in Group Brainstorming: The Illusion of Group Productivity," *Personality and Social Psychology Bulletin* 19 (1993): 78–89; and Mullen, B., C. Johnson, and E. Salas, "Productivity Loss in Brainstorming Groups: A Meta-Analytic Integration," *Basic and Applied Social Psychology* 12, no. 1 (1991): 3–23.

[e] Asimov, I., "Isaac Asimov Asks, 'How Do People Get New Ideas?'" *MIT Technology Review* (1959 essay, reproduced in October 20, 2014).

[f] Rietzschel, E. F., B. A. Nijstad, and W. Stroebe, "Productivity Is Not Enough: A Comparison of Interactive and Nominal Brainstorming Groups on Idea Generation and Selection," *Journal of Experimental Social Psychology* 42, no. 2 (2006): 244–51.

[g] Long, C. R., and J. R. Averill, "Solitude: An Exploration of Benefits of Being Alone," *Journal for the Theory of Social Behavior* 33 (2003): 21–44.

[h] Schilling, M.A., *Quirky: The Remarkable Story of the Traits, Foibles, and Genius of Breakthrough Innovators Who Changed the World* (New York: Public Affairs, 2018).

[i] Vance, A., *Elon Musk: Tesla, SpaceX, and the Quest for a Fantastic Future* (New York: Harper Collins, 2015).

[j] Strauss, N., "Elon Musk: The Architect of Tomorrow," Rolling Stone (November 15, 2017).

from design, engineering, purchasing, manufacturing, product planning, finance, and marketing. Firms around the world rely heavily on cross-functional teams for their new product development efforts. In 2000, 77 percent of U.S. firms, 67 percent of European

Teams that are composed of people from diverse backgrounds have several advantages over teams that are drawn from only one or a few functional areas.[9] A greater variety of specialists provides a broader knowledge base and increases the cross-fertilization of ideas.[10] Having specialists from different areas also allows the project to draw on a wider mix of information sources in the environment through scanning activities (for richer detail on this, see the accompanying Research Brief on boundary-spanning activities).[11] Functional experts often actively read journals and are involved in associations that directly affect their trade. These activities can lead to the creation and improvement of innovative ideas, as well as provide solutions to product development problems.[12] By combining members of different functional areas into one project team, a wide variety of information sources can be ensured.

A number of arguments also support other types of diversity. Individuals who enter the organization at different times (organizational tenure diversity) are likely to have different contacts outside of the team, enabling the team to draw from a wider mix of resources. Teams that incorporate cultural diversity should show better problem solving by incorporating multiple viewpoints, and teams composed of members who are diverse in terms of education, gender, or age can help ensure a variety of viewpoints are considered and external resources are tapped.[13] Studies have demonstrated that demographic diversity in teams can increase innovative outcomes and overall performance.[14]

Diversity of team members, however, can also raise coordination and communication costs. Individuals tend to interact more frequently and more intensely with other individuals whom they perceive as being similar to them on one or more dimensions.[15] This phenomenon is known as **homophily**. Research on homophily suggests that individuals prefer to communicate with others they perceive as similar to them because it is easier and more comfortable to communicate with those who have similar dialects, mental models, and belief systems.[16] The perception of similarity can also be self-reinforcing—as individuals interact with frequency and intensity, they can develop a common dialect, greater trust, and greater familiarity with the knowledge each possesses. The common dialect, trust, and familiarity, in turn, make the individuals both more willing and more able to exchange information effectively in future interactions. When individuals perceive others as being very different from them, they may be less willing to interact frequently or intensely, and it may be more difficult for them to develop a shared understanding. Heterogeneous teams often have greater difficulty integrating objectives and views, leading to conflict and lower group cohesion.[17] Research has also indicated, however, that the communication and coordination differences between heterogeneous or homogeneous teams diminish if the groups maintain long-term contact. Presumably, through extensive interaction, heterogeneous teams learn to manage their group processes better.[18]

homophily
The tendency for individuals to like other people whom they perceive as being similar to themselves.

In sum, heterogeneous teams should possess more information, on average, than homogeneous groups. The heterogeneity of a team can also increase the creativity and variance in decision making, leading to more innovative outcomes and higher overall performance.[19] However, to realize this potential performance advantage, heterogeneous teams may require long-term contact and incentives to foster communication and cooperation.

The ability of team members to communicate and cooperate effectively is also

Research Brief Boundary-Spanning Activities in New Product Development Teams

To be successful, new product development teams must be able to manage relationships with groups that are beyond the team's boundaries. Teams need to be able to collect information and resources both within and outside of their organizations, and they also need to represent the team to other groups in the organization to ensure that the team continues to receive support and that team members are not overloaded with non-team-related activities.[a] The most successful new product development teams have gatekeepers who provide important links to the environment.[b]

Deborah Ancona and David Caldwell conducted a study to explore the full range of boundary-spanning activities in which teams engage and to identify which of these activities enhanced team performance. They interviewed 38 experienced product development team managers and collected data from 45 product development teams in five high-technology companies in the computer, analytic instruments, and photographic equipment industries. Ancona and Caldwell found that teams engaged in three primary types of boundary-spanning activity:

1. *Ambassador activities*—These activities were directed at representing the team to others and protecting the team from interference. For example, an ambassador might convince other individuals in the organization that the team's activities are important.
2. *Task coordination activities*—These activities emphasized coordinating and negotiating the team's activities with other groups. For instance, task coordination activities might include negotiating delivery deadlines with other divisions of the firm or obtaining feedback about the team's performance.
3. *Scouting activities*—These activities were directed at scanning for ideas and information that might be useful to the team, enhancing its knowledge base. For example, scouting activities could include collecting data about what competitors were doing on similar projects or finding technical information that might be useful in the development project.

Ancona and Caldwell found that boundary-spanning activities affected the performance of the new product development team, and their impact depended on the timing of the activities. In particular, they found that scouting and ambassador activities were more beneficial if conducted early in the development project cycle, while task coordination activities were beneficial throughout the life of the team.[c]

[a] D. B. Ancona and D. F. Caldwell, "Making Teamwork Work: Boundary Management in Product Development Teams," in *Managing Strategic Innovation and Change*, eds. M. L. Tushman and P. Anderson (New York: Oxford University Press, 1997), pp. 433–42.

[b] M. L. Tushman, "Special Boundary Roles in the Innovation Process," *Administrative Science Quarterly* 22 (1977), pp. 587–605; and E. B. Roberts and A. R. Fusfeld, "Staffing the Innovative Technology-Base Organization," *Sloan Management Review* 22, no. 3 (1981), pp. 19–34.

[c] D. B. Ancona and D. F. Caldwell, "Bridging the Boundary: External Activity and Performance in Organizational Teams," *Administrative Science Quarterly* 37 (1992), pp. 634–65.

Kichuk and Willi Wiesner explored whether five personality factors (conscientiousness, extroversion, neuroticism, agreeableness, and openness to experience) influenced the likelihood of success in new product development teams. Kichuk and Wiesner found that the personality characteristics that enhanced the success of a new product development team were high extroversion, high agreeableness, and low neuroticism.[20]

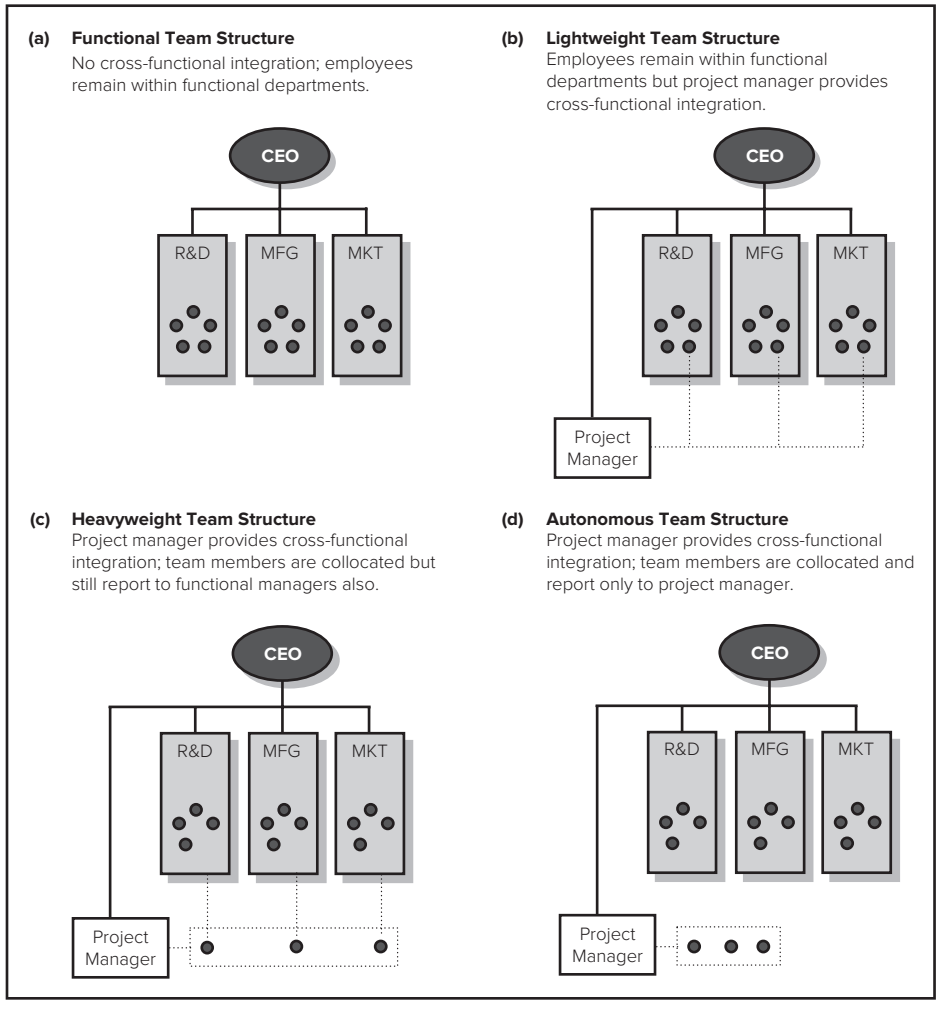
THE STRUCTURE OF NEW PRODUCT DEVELOPMENT TEAMS

Teams can be structured in a number of ways. One well-known typology classifies teams into four types: functional, lightweight, heavyweight, and autonomous.[21] Figure 12.1 depicts each of these types graphically.

Functional Teams

In functional teams, members remain in their functional departments (e.g., R&D, marketing, manufacturing, etc.), and report to their regular functional manager (see Figure 12.1, panel a); however, they may meet periodically to discuss the project. Such teams are usually temporary, and individuals may spend less than 10 percent of their time working on team-related activities. Functional teams also typically do not have a project manager or dedicated liaison personnel. While this team structure is straightforward to implement because it requires little (if any) deviation from the

FIGURE 12.1
Types of Development Teams



firm's normal operations, this structure provides little opportunity for cross-functional coordination.[22] Further, since individuals are still evaluated and rewarded almost exclusively based on their functional performance, the team members may have little commitment to the development project. Functional teams are more likely to be appropriate for derivative projects that primarily affect only a single function of the firm.

Lightweight Teams

In lightweight teams, members still reside in their functional departments, and functional supervisors retain authority over evaluation and rewards (see Figure 12.1, panel b). Like functional teams, lightweight teams are typically temporary, and members spend the majority of their time on their normal functional responsibilities (up to 25 percent of their time might be spent on team-related activities). However, lightweight teams have a project manager and dedicated liaison personnel who facilitate communication and coordination among functions. Managers of lightweight teams are normally junior or middle management employees, who are not able to exert significant influence or authority over team members. As a result of these factors, lightweight teams offer a small improvement in team coordination and likelihood of success over functional teams. Such a team structure might be appropriate for derivative projects where high levels of coordination and communication are not required.

Heavyweight Teams

In heavyweight teams, members are removed from their functional departments so that they may be *collocated* with the project manager (see Figure 12.1, panel c). Project managers of heavyweight teams are typically senior managers who outrank functional managers, and have significant authority to command resources, and evaluate and reward team members.[23] The core group of team members in the heavyweight team is often dedicated full-time to the project. This combination of factors helps ensure that the team has strong cross-functional coordination and communication, and that team members are significantly committed to the development project. However, heavyweight teams are still often temporary; thus, the long-term career development of individual members continues to rest with their functional managers rather than the project manager. This type of team structure offers a significant improvement in communication and coordination over functional teams, and it is typically considered appropriate for platform projects.

Autonomous Teams

In autonomous teams, members are removed from their functional departments and dedicated full-time (and often permanently) to the development team (see Figure 12.1, panel d). Team members are collocated with the project manager, who is a very senior person in the organization. The project manager of an autonomous team is given full control over resources contributed from different functional departments, and the project manager has exclusive authority over the evaluation and reward of team members. Autonomous teams often do not conform to the operating procedures of the rest of the organization; instead they are permitted to create their own policies, procedures, and reward systems.[24] Autonomous teams are also held fully accountable for the success of the project; in many ways, autonomous teams act like independent divisions of the firm. Autonomous teams typically excel at rapid and efficient new product development, particularly when such development requires breaking away from the

organization's existing technologies and routines. Thus, autonomous teams are typically considered to be appropriate for breakthrough projects and some major platform projects. They can be the birthplace of new business units.[25] However, the independence of the autonomous teams can cause them to underutilize the resources of the parent organization. Furthermore, autonomous teams are often hard to fold back into the organization if the project is completed or terminated. Many autonomous teams thus go on to become separate divisions of the firm, or may even be spun off of the firm as a subsidiary.

Figure 12.2 summarizes key dimensions across which the four teams vary, including a number of points that have not yet been dealt with in the text. The potential for conflict between the functions and the team, particularly the project manager, rises with the move from functional teams to autonomous teams. The independence of heavyweight and autonomous teams may prompt them to pursue goals that run counter to the interests of the functions. Senior managers should keep such conflict in check.

FIGURE 12.2
Summary of Characteristics of Team Types

Characteristics	Functional Team	Lightweight Team	Heavyweight Team	Autonomous Team
Project manager	None	Junior or middle manager	Senior manager	Senior manager
Power of project manager	NA	Low	High	Very high
Time spent on team activities	Up to 10%	Up to 25%	100%	100%
Location of team members	Functions	Functions	Collocated with project manager	Collocated with project manager
Length of commitment to team	Temporary	Temporary	Long-term but ultimately temporary	Permanent
Evaluation of team members	Functional heads	Functional heads	Project manager and functional heads	Project manager
Potential for conflict between team and functions	Low	Low	Moderate	High
Degree of cross-functional integration	Low	Moderate	High	High
Degree of fit with existing organizational practices	High	High	Moderate	Moderate-low
Appropriate for:	Some derivative projects	Derivative projects	Platform projects/ breakthrough projects	Platform projects/ breakthrough projects

THE MANAGEMENT OF NEW PRODUCT DEVELOPMENT TEAMS

For a new product development team to be effective, its leadership and administrative policies should be matched to the team's structure and needs.

Team Leadership

The team leader is responsible for directing the team's activities, maintaining the team's alignment with project goals, and serving as a communicator between the team and senior management. In heavyweight and autonomous teams, the team leader may also be the person who is primarily responsible for the evaluation, compensation, and promotion of individual team members. Effective team leaders are often much more directly related to the team's success than senior management or project champions. This may be because team leaders interact much more frequently with the team and more directly influence the team's behavior.[26]

As described in the team type and structure section above, different types of teams have different leadership needs. For instance, while lightweight teams might have a junior or middle-management leader who provides basic coordination between the functional groups, heavyweight and autonomous teams require senior managers with significant experience and organizational influence. In heavyweight and autonomous teams, the project manager must be someone who can lead and evaluate the team members, champion the development project both within the team and to the wider organization, and act as a translator between the various functions.[27] In particular, project managers in heavyweight and autonomous teams must have high status within the organization, act as a concept champion for the team within the organization, be good at conflict resolution, have multilingual skills (i.e., they must be able to talk the language of marketing, engineering, and manufacturing), and be able to exert influence upon the engineering, manufacturing, and marketing functions.[28] Other things being equal, teams whose project managers are deficient in one or more of these dimensions will have a lower probability of success.[29]

Team Administration

To ensure that members have a clear focus and commitment to the development project, many organizations now have heavyweight and autonomous teams develop a project charter and contract book. The *project charter* encapsulates the project's mission and articulates exact and measurable goals for the project. It might include a vision statement for the project (e.g., "Dell laptops will be the market standard for performance and value") and a background statement for why this project is important for the organization. The charter may describe who is on the team, the length of time members will spend on the team, and the percentage of their time that will be spent on team activities.[30] It may also stipulate the team's budget, its reporting timeline, and the key success criteria of the project (e.g., meeting a particular time-to-market goal, exceeding customer satisfaction criteria established for the project, capturing a target amount of market share within a defined period of time, etc.). Establishing an explicit set of goals for the project helps ensure that the team members have a common understanding of the project's overall purpose and priorities. Goals also help to structure the new product development process and can facilitate cooperation by keeping team members oriented toward a common outcome.[31]

Once the team charter is established, core team members and senior managers must negotiate a *contract book*. The contract book defines in detail the basic plan to achieve the goal laid out in the project charter. Typically, the contract book will estimate the resources required, the development time schedule, and the results that will be achieved. The contract book provides a tool for monitoring and evaluating the team's performance in meeting objectives by providing a set of performance benchmarks and deadlines to which the team's performance can be compared. More important, however, the contract book is an important mechanism for establishing team commitment to the project and a sense of ownership over the project. After negotiation and acceptance of this contract, all parties often sign the contract book as an indication of their intention to honor the plan and achieve the results. Team members who sign the contract book typically feel a greater sense of duty to work toward the project's goals. Furthermore, signing the contract book can give team members a sense of ownership over the project and empowerment to make decisions about the project. This ownership and empowerment can help team members identify with a project's outcome and can encourage them to exert extra effort to ensure its success.[32]

Managing Virtual Teams

virtual teams Teams in which members may be a great distance from each other, but are still able to collaborate intensively via advanced information technologies such as videoconferencing, groupware, and e-mail or Internet chat programs.

Recent advances in information technology have enabled companies to make greater use of virtual teams. **Virtual teams** are teams in which members may be a great distance from each other, but are still able to collaborate intensively via advanced information technologies such as videoconferencing, groupware, and e-mail or Internet chat programs. Virtual teaming can enable individuals with unique skills to work on a project, regardless of their location. By meeting virtually, individuals who live at great distances can collaborate without incurring travel costs or disruption to their lives.[33] This is especially valuable for a company whose operations are highly global. For example, SAP Aktiengesellschaft is headquartered in Walldorf, Germany, but has large R&D centers in India, China, Israel, and the United States. Each location has deep expertise in particular areas but lacks functional breadth due to specialization. SAP's managers choose employees from different locations to assemble virtual teams that optimally integrate the expertise needed for a given project.[34] Similarly, when IBM began deploying more of its products globally, it increased its use of virtual teams. About one-third of IBM's employees will participate in virtual teams at some point in their career. When IBM needs to staff a project, it gives a list of the needed skills to the human resource division, which identifies an appropriate pool of people. If the skills and talent of the people are more important than their ability to meet face-to-face, a virtual team is formed.[35]

Virtual teams pose a distinct set of management challenges, however. As described earlier in the chapter, much of the work on the structure of new product development teams has emphasized the importance of collocation. Collocation facilitates communication and collaboration by giving team members opportunities for rich face-to-face communication and informal interaction.[36] Proximity and frequent interaction help teams to develop shared norms and a dialect for communicating about the project. Virtual teams, by contrast, must often rely on communication channels that are much

Research Brief Virtual International R&D Teams

Gassman and von Zedtwitz build on the transnational corporation model discussed in Chapter Ten by examining how such firms coordinate their international innovation efforts via virtual teams. As in some of the arguments made in Chapter Ten about loosely coupled R&D activities, virtual international R&D teams may jointly work on a single development project, utilizing information technologies (rather than geographical proximity) to achieve coordination. However, while information technology decreases the need to collocate R&D activities, it does not readily solve problems related to building trust and transferring tacit knowledge. The type of innovation project being undertaken and the type of knowledge that must be shared should influence the degree to which firms rely on decentralized, virtual coordination processes.

Gassman and von Zedtwitz studied 37 technology-intensive multinationals and identified four patterns of teams: (1) decentralized self-coordination, (2) system integrator as coordinator, (3) core team as system architect, and (4) centralized venture team. In the *decentralized self-coordinating* teams, there was no single source of power or authority over the teams. Teams communicated primarily through telephone, the Internet, shared databases, and groupware. Coordination was relatively weak and relied largely on a strong corporate culture. Decentralized self-coordination was more likely to arise if there were well-developed standard interfaces between components being developed in different locales; thus, it tended to be suited to modular innovation as opposed to architectural innovation (see Chapter Three).

In teams with a *system integrator as R&D coordinator*, a single individual or office takes responsibility for helping different divisions coordinate. The system integrator helps to build a common understanding of the project among each of the divisions, translates knowledge from one division to another, and tracks progress and contributions. While the overall project is decentralized, the system integrator enables some centralized coordination.

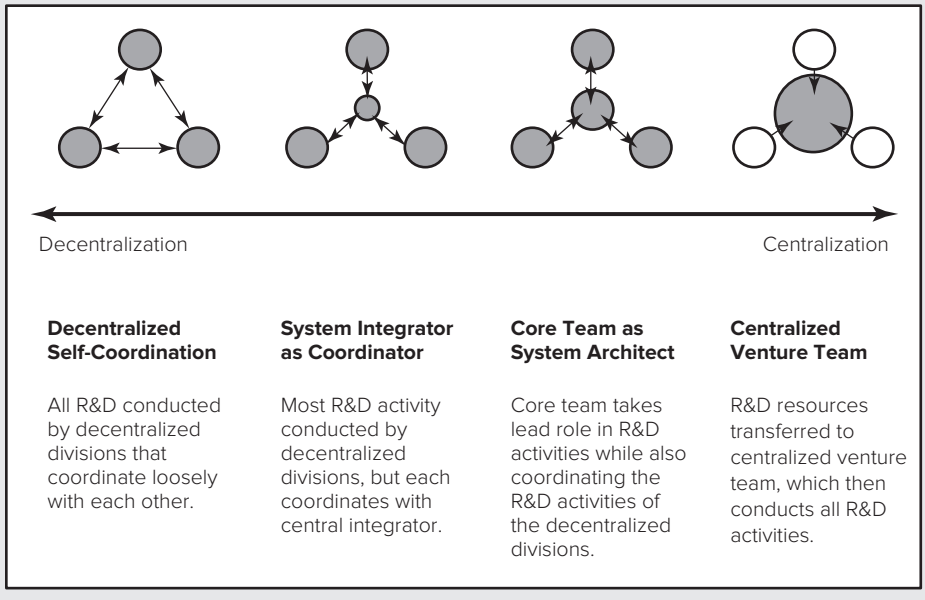
In the *core team as system architect* model, a core team of key decision makers from all of the decentralized R&D groups meets regularly to coordinate the otherwise decentralized groups. The core team often includes a strong project manager, leaders from each of the decentralized groups, and occasionally external customers or consultants. The core team constructs the overall architecture of the development project and maintains its coherence throughout its development. Because the core team has more direct authority over the individual divisions than the system integrator described above, the core team is better able to resolve conflict and enforce standards across the divisions. Because core teams can provide a significant level of integration across the divisions, core teams are often able to conduct architectural innovation. In the *centralized venture team,* R&D personnel and resources are relocated to one central location to enable maximum integration and coordination. The team is likely to have a very powerful senior project manager with significant authority to allocate resources and define the responsibilities of individual team members. Gassman and von Zedtwitz describe two examples of centralized venture teams—Asea Brown's "High Impact Projects" and Sharp's "Golden Badge" projects. Because of their high expense, such teams are likely to be used only for strategic innovations of the utmost importance.

Gassman and von Zedtwitz's model is summarized in Figure 12.3. Overall, Gassman and von Zedtwitz argue that innovations that are radical, are architectural, or require the intensive transfer of complex or tacit knowledge will require greater centralization. Innovations that are incremental, are modular, and do not require the frequent transfer of complex or tacit knowledge can be more decentralized.

continued

concluded

FIGURE 12.3
Gassman and von Zedtwitz's Typology of International Virtual Teams



Source: Adapted from O. Gassman and M. von Zedtwitz, "Trends and Determinants of Managing Virtual R&D Teams," *R&D Management* 33, no. 3 (2003): 243–62.

and dialects and may suffer from greater conflict. They may also have trouble negotiating multiple time zones, which can lead to frustration.[37]

In the forming of virtual teams, it is important to select personnel who are both comfortable with the technologies being used to facilitate collaboration and who have strong interpersonal skills.[38] Team members must be able to work independently and have a strong work ethic. Since distance makes it easy for team members to deflect opportunities for interaction, it is important to choose individuals who tend to seek interaction rather than avoid it. It is important that members of the team establish standards for how quickly they will respond to messages, and how often they will be available for synchronous communications (communications where the involved parties must participate at the same time, such as telephone calls, videoconferencing, and instant messaging).[39] Furthermore, because many of the opportunities for informal interaction may be lost in a virtual environment, more types of interaction may have to be incorporated into the ground rules of the team.[40] For example, the team leader might schedule daily or weekly unstructured "chat" times where team members are required to participate in a group conference call or online conference to share ideas that may not be uncovered in the team's more formal interactions.

Virtual teams also face challenges in developing trust, resolving conflict, and exchanging tacit knowledge, as discussed in the accompanying Research Brief about virtual international R&D teams.

Summary of Chapter

1. Bringing multiple people together into a team enables multiple bases of expertise to be collectively directed toward problem solving; thus, teams are powerful mechanisms for problem solving. However, if teams become too big, administrative costs and communication problems can become significant.
2. Diversity of team members ensures that the team can draw on different perspectives and bases of expertise. In particular, functional diversity is often sought in new product development teams. Cross-functional teams enable design, manufacturing, and marketing objectives to be integrated in the new product development process.
3. Diversity of team members ensures that the individuals in the team not only possess different knowledge or viewpoints, but also have different sources of extra-team resources upon which to draw through boundary-spanning activities.
4. Diversity can also make it more difficult for teams to develop a common understanding of the new product development project and can result in lower group cohesion. Teams may need long-term contact and incentives for cooperation to overcome these challenges.
5. The way in which a team is structured (collocation, permanence, supervisory relationships, etc.) significantly influences how team members interact and the likely outcomes of a development project. Different types of teams are appropriate for different types of development projects.
6. Attributes of the team leader (seniority, authority, multilingual skills) must match the team type for teams to be most effective.
7. Many firms have teams develop and sign a project charter and contract book to ensure that all team members have a common understanding of the project's goals and possess a sense of ownership and commitment to the project's success.
8. When a company wishes to form a team with individuals who have unique skills but live great distances from each other, it might opt to form a virtual team. Virtual teams use information technologies to achieve communication and coordination. Virtual teams face a distinct set of challenges in promoting participation, cooperation, and trust. As a result, they require special consideration of the selection of team members and the team administration processes.

Discussion Questions

1. What are the trade-offs in choosing a team's size and level of diversity?
2. How can managers ensure that a team reaps the advantages of diversity while not being thwarted by some of the challenges team diversity raises?
3. Identify an example of a development project, and what type of team you believe they used. Do you think this was the appropriate type of team given the nature of the project?
4. What are some advantages and disadvantages of collocation? For what types of projects are virtual teams inappropriate?

Suggested Further Reading

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