TEAM-BASED REDESIGN AS A LARGE-SCALE CHANGE *APPLYING THEORY TO THE IMPLEMENTATION OF INTEGRATED PRODUCT TEAMS*

Susan Page Hocevar and Walter E. Owen

The implementation of integrated product and process development through integrated product teams represents a large-scale organizational change. This article draws from existing theory and research related to both large-scale change and team-based organization design to identify critical issues that must be explicitly managed to achieve the desired optimal outcomes of IPPD and IPTs.

The words of Secretary of Defense William Perry (1995) were "I am directing a fundamental change," as he endorsed the implementation of integrated product and process development (IPPD) through integrated product teams (IPTs). This executive mandate recognizes the potential value of cross-functional integration of complex processes to reduce cycle time, improve quality, and reduce costs in acquiring goods and services required by the Department of Defense (DoD). Achieving these performance outcomes is required by both budgetary constraints and citizen mandate.

The language of "fundamental change" also reflects an appreciation of the challenge of effectively implementing the IPPD concept. This change requires attention to organizational level factors that include structure, culture, and decision processes; group level factors related to interpersonal dynamics, team building, and intergroup coordination; and individual factors of motivation, conflict management, and empowerment.

A substantial body of management research has found that organizations often do not meet the anticipated benefits of teams because implementation did not

reflect a comprehensive analysis of the requirements of designing a team-based organization. The purpose of this article is to draw from existing theory and research related to both large-scale change and team-based organization design to identify critical issues that must be explicitly managed to achieve the desired optimal outcomes of IPPD.

WHAT IS LARGE-SCALE CHANGE?

Through the 1980s there was evidence of an increasing demand on organizations to change on a large scale in order to gain or retain a competitive position. This impetus for change resulted largely from advancing technology, increasing global competition, and increasing professionalization of the workforce. There is also evidence of the pervasiveness of large-scale change in the popular management press articulations of "reengineering" (e.g., Hammer & Champy, 1993) and in the public sector initiatives for "reinventing government" (e.g., Gore, 1993). The premise of these change initiatives is that our traditional public and private organizations that have historically emphasized efficiency, predictability, and top-down control are no longer appropriate for the changing and competing requirements for organizational performance.

While there has been a substantial history of research and theory on organizational change in the management literature, the distinctive characteristics of "large-scale organization change" began to be explicitly discussed in the mid-1980s. Large-scale change redefines fundamental aspects of an organization including both design and process (Ledford, Mohrman, Mohrman, and Lawler, 1989). The comprehensive approach to large-scale change recognizes that organizations are complex open systems and thus requires that change must simultaneously address structure, technology, human resources, and tasks (e.g., Galbraith, 1989; Nadler, 1981). Change in design implies new ways in which work is divided and

Susan Page Hocevar received her Ph.D. degree in business administration from the University of Southern California. She is currently an assistant professor in the Department of Systems Management at the Naval Postgraduate School in Monterey, CA. She teaches courses in organization and management to military officers earning a graduate degree. Her research and publications are in the areas of organization change, high involvement organizations, reward systems, self-managed teams, organizational culture, and corporate social responsibility. Her current work is with an Office of Naval Research (ONR)-sponsored research effort in adaptive architectures for command and control.

Walter E. Owen is a student in the Doctorate in Public Administration (DPA) program with Golden Gate University in San Francisco, CA. He earned his M.S. in management from and is currently a Lecturer in the Department of Systems Management at the Naval Postgraduate School in Monterey, CA. He teaches courses in project management, acquisition and contracting related fields. He is also project manager of the Acquisition Management Distance Learning Program. His research areas are acquisition reform, systems theory, performance management, performance measurement and metrics. He is currently working with the Office of the Under Secretary of Defense for Acquisition and Technology with cycle time analysis of Major Defense Acquisition Programs (MDAP).

coordination and integration are achieved. It also requires that formal support systems such as information technology, financial, and human resource systems be realigned to fit the change in strategy and structure. Change in processes can include substantial modifications in communication, decision processes, and participation strategies. The process aspects incorporate informal mechanisms that provide flexibility to the more formal structural design aspects.

Another distinguishing feature of large-scale change is its scope. Such changes reach broadly across organizational work units and across multiple systems and processes. But breadth of change is not the only dimension of scope. Large-scale change also requires substantial depth that goes beyond change in structures and systems and addresses required changes in mission definition, strategy, culture, values, and behavioral norms. While the challenge of changing organizational structures is significant, changing the deeper values, beliefs, and norms is both difficult and necessary to accomplishment of the goals of large-scale change. It is possible for organizations to change reporting relationships, create teams, revise operational procedures and accountabilities, and still have day-to-day work being done largely in the "same old way." Fundamental change at the level of values, norms, and behaviors is essential to large-scale change.

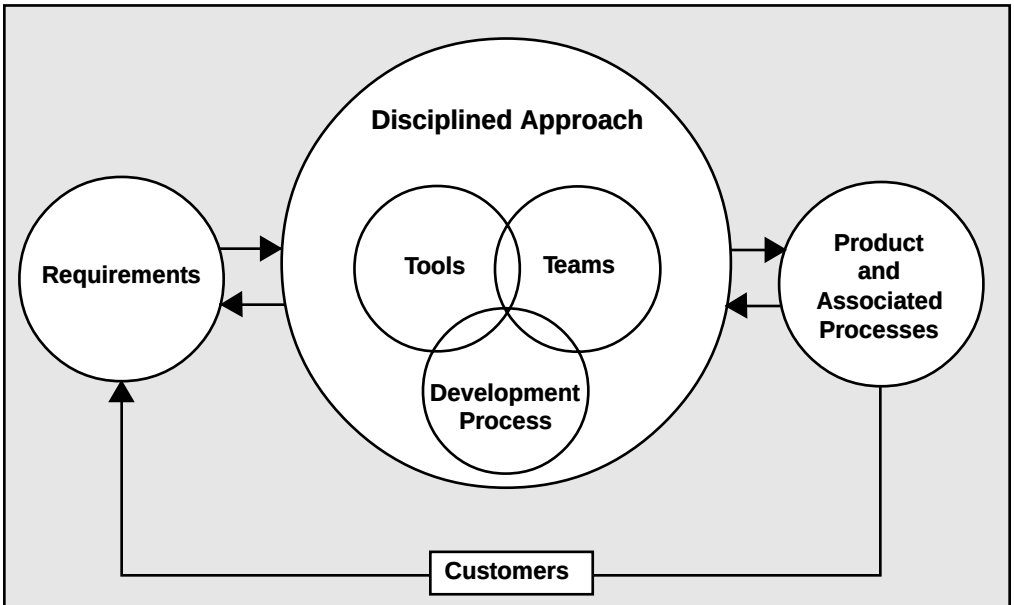
IPPD and IPT as Large-Scale Change

Here we assert that the adoption of a team-based organization for implementing IPPD (see Figure 1) meets the definition of large-scale change in the character of an organization's design, processes, and culture. This figure illustrates the open systems concept that is at the heart of large-scale change (Galbraith, 1989; Nadler, 1981). The IPPD process recognizes the comprehensive requirement to modify and align team structures, analytic and decision tools, and processes to achieve optimal performance as defined by customer criteria.

The implementation of team-based design is specifically illustrated by the Naval Aviation Systems Team (TEAM) Integrated Program Team Manual: Update (NAVAIR, 1996). This manual presents the structural realignment to IPTs within the Naval Air Systems Command (NAVAIR—the Competency Aligned Organization (CAO). The CAO defines the human resource and process capabilities of core competency areas to support program teams. It also defines the team leadership and membership responsibilities for functional competencies and program teams within the CAO structure. The manual also describes new process requirements that include the chartering of IPTs, operational processes, conflict management, personnel evaluations, communications, and financial management.

The F/A–18 Hornet Program Office is prototyping the conversion toward IPPD/IPT realignment with the Naval Aviation Systems Team. The F/A–18 Program Operating Guide (POG) (PMA–265, 1996) describes and outlines IPT implementation procedures. According to the POG:

> The two main tenets of our Naval Aviation System Team (TEAM) are that we are a competency-aligned organization and



Extracted from "DoD Guide to Integrated Product and Process Development"
Source: OUSD, A&T (1996, p. 1–3).

Figure 1. Generic IPPS Iterative Process

> that we accomplish work on teams. Over the past two years a tremendous amount of energy has been focused on the establishment and development of the competency side of the TEAM. Last year the Hornet Program was assigned the lead in focusing a similar level of intensity in implementing the IPT side of the CAO/IPT equation (PMA-265, 1996, p. i).

The assumption of this article is that in order for IPPD to be successful, the planning and implementation of IPTs must be treated as a large-scale change effort. Below we will expand the theoretical framework for analyzing the DoD implementation of the IPPD/IPT concept. DoD IPPD/IPT implementation guidelines and procedures within the TEAM and F/A–18 Hornet Program Team are used in this paper to specifically illustrate aspects of the theoretical propositions.

Team-Based Redesign: A Large-Scale Organizational Change

This section emphasizes the effective use of teams as a comprehensive organization design strategy. This emphasis is congruent with IPPD/IPT as a large-scale change initiative. Successful team-based redesign requires large-scale change. Restructuring an organization around teams and cross-functional processes reflects an approach to change that is significantly more comprehensive than change initiatives that focus solely on team building and group and interpersonal dynamics. In fact, while this latter emphasis has been

dominant in many organizations as they implement teams, the research finds that attention to organizational context has the most significant impact on overall team effectiveness (Cohen, 1994; Cohen, Ledford, and Spreitzer, 1996).

The large-scale change literature would argue for expanding the definition of organizational context to include not only system support such as information and training but also organizational culture and processes such as rewards and inter-team integration. In the sections to follow, three defining characteristics of large-scale change are used to present the current research and theory on team-based organization design and the implications to IPT effectiveness. The three domains of change we address are structure, process, and culture (Figure 2). Changes in structure require analysis of tasks and interdependencies and a determination of appropriate integration mechanisms; changes in processes address redefinition of roles and aligning support systems (e.g., information, performance management); and changes in culture are manifest in behavioral norms and informal reward systems.

Structure	Process	Culture
• **Task Analysis** – Nonroutine task interdependence • **Composition** – Below 20 members – Self contained • **Team Integration** – Strategy – Liaison roles – Overlapping – Integrative management teams	• **Control Systems** – Clear objectives – Measurement – Reward systems – Self management • **Performance Management** – Team evaluations – Informal feedback: multiple perspectives – Appropriate input to formal ratings – Peer input • **Clear Charter** – Member roles – Team vs. work group • **Leadership** – Leader vs. manager – Shared leadership	• **Empowerment** – Impact – Competence – Meaningfulness – Choice • **Managerial Norms** – Openness – Cooperation – Trust – Delegation – Informal reward – Resource support

Figure 2. Team-Based Design as Large-Scale Change: Considerations for Implementation

Structural Changes in Team-Based Design

Teams provide a mechanism to increase flexibility of performance in the context of increasing environmental turbulence. This flexibility is achieved due to the improved cross-functional coordination and decision making; the dedication to process improvement; and the improved motivation derived from the job enrichment offered by work that is organized around teams. However, such teams should not be seen as the panacea for all requirements for coordination, flexibility, and increased motivation. In fact, the implementation of IPPD is product and process dependent and must be tailored to a particular organization's needs and requirements (OUSD, A&T, 1996).

> "Identifiable bottlenecks in decision making due to conflicting functional perspectives often signal work domains where team structure is appropriate."

Teams represent a high-cost organization design strategy and the decision of whether and how to structure teams should be informed by three types of analysis (Mohrman, Cohen, and Mohrman, 1995). First, processes must be analyzed to determine which sets of activities have to be integrated with each other to provide increased value to the customer. Second, it should be determined if teams are the appropriate coordination mechanism. Teams are appropriate for coordination of nonroutine interdependencies. However, if cross-functional interdependencies are standard and predictable, teams are not necessary to achieve integration. Finally, explicit analysis of decision processes can provide important guidance as to where teams should be established.

The F/A–18 program illustrates the use of IPTs to address cross-functional coordination requirements as defined by specific business or product lines. The F/A–18 POG describes the program team structure as follows (PMA- 265, 1996, p. 3):

> The F/A–18 Program Team is structured along the line of product-focused, multidisciplinary Integrated Program Teams (IPTs). There are three major (Level I) IPTs in our program, reflecting our three prime business areas...Each of these IPTs consists of product-focused teams known as Integrated Product Teams.

These IPTs represent teams that bring together cross-functional tasks with high interdependence toward a common product (e.g., radar, propulsion, engine design).

Task Interdependence as Determinant for Team-Based Structure

Teams provide optimal structural value if they are strategically positioned where there is substantial nonroutine task interdependence and at critical decision points that have historically slowed cycle time. Identifiable bottlenecks in decision making due to conflicting functional perspectives often signal work domains where team structure is appropriate. The team provides a mechanism to develop common goals and a shared agreement as to the problem or process for resolution.

An analysis of task interdependence should be done to assure that organizations do not over-use teams. A surface examination of the TEAM CAO structural design

offers a possible example. Teams seem to pervade the CAO concept at NAVAIR. This could mean that teams are being used in situations where routine interdependencies, or even low interdependence, would suggest this is an excessively high cost structure. Another possible indicator of the overuse of teams is when personnel report that they are serving on a large number of teams, and spend more time in meetings than they do pursuing their primary task. Declining fiscal resources indicate the need to review team structures and limit their use to tasks and processes having nonroutine interdependencies or historically predictable decision bottlenecks.

Team Composition

Once it has been determined that teams are an appropriate and necessary approach to resolving interdependencies and specific cross-functional decision domains, teams must be constituted. Katzenbach and Smith (1993a, p. 45) define a team as a "small group of people with complementary skills who are committed to a common purpose, performance goals, and approach for which they hold themselves mutually accountable." Their research findings also argue for keeping team size below 20 members.

Mohrman et al. (1995) also suggest that teams be as self-contained as possible. In other words, team structure should be designed so that there is minimal interdependence between teams, to maximize their ability to operate independent of other teams. The failure to include this design criterion constrains teams in both their speed and flexibility due to the need to communicate, coordinate, and make decisions jointly with other teams. However, this is often very difficult to achieve in knowledge work such as that done by IPTs. The inevitable interdependence among teams requires deliberate mechanisms for integration.

Team Integration

Strategic integration is one important mechanism that aligns teams in a program to a commonly shared definition of mission and goals. While such an integrated strategy is basic to defining the necessary structure to support that strategy, it also has process implications. Shapiro (1992) argues that in developing a "unified holistic strategy" all functional components contribute. Through this participative process, roles and expectations are negotiated and clarified, and resource implications are addressed. Thus, the strategy formulation process itself represents the underlying core values of cross-functional integration.

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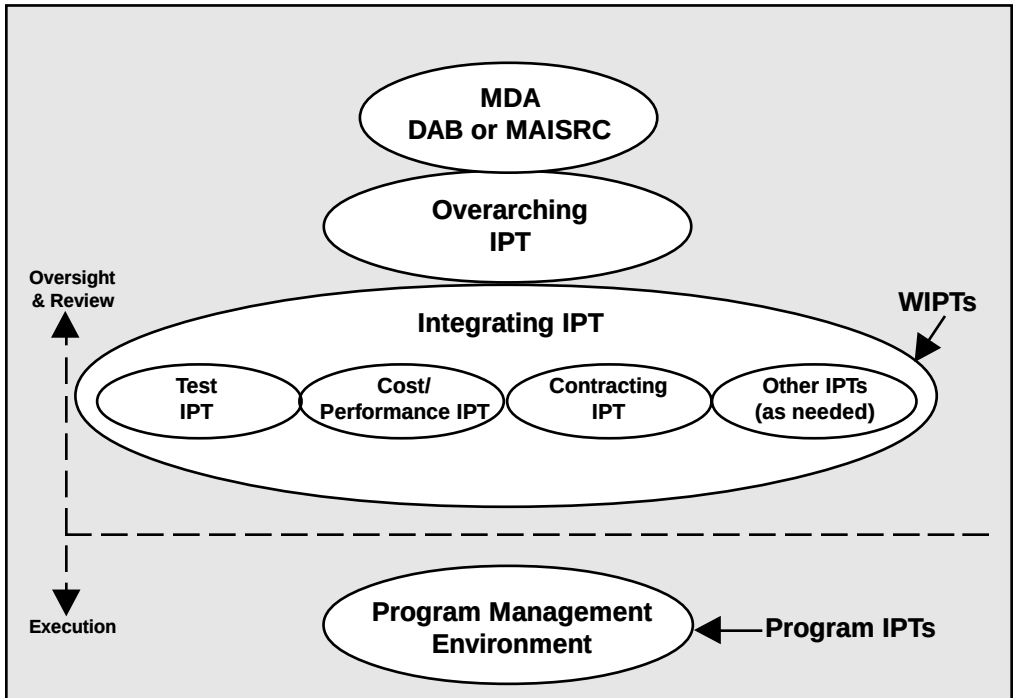
An integrative strategy is a mechanism appropriate to any system. However, other mechanisms for integration across teams should be part of the planning of a team-based structure. Appropriate mechanisms might include liaison roles, overlapping team membership, cross-team integration teams, management teams for vertical integration, and process improvement teams (Mohrman et al., 1995). Effective management across team boundaries (i.e., recognizing internal customers) becomes itself a team responsibility. In fact, there is research that shows that the most successful teams are those that effectively manage

interteam relations (Ancona and Caldwell, 1992).

A dominant mode of integration used in DoD acquisition is that of management level teams for vertical integration (see Figure 3). DoD guidance requires that each program have an oversight structure that consists of at least three layers above the program level IPTs (OUSD, A&T, 1996). These include Overarching IPTs (OIPT), Working Level IPTs (WIPT), and Integrating IPTs. Concern regarding the over-reliance on vertical integration is voiced by the CNA study observation that there is a potential risk that the IPT process may become too bureaucratized and top-heavy "with its overarching IPTs, integrating IPTs, and working-level IPTs...actually slowing down and hindering progress rather than facilitating it" (DiTrapani & Geithner, 1996, p. 46). Supporting the CNA study's concern, Galbraith (1995) argues that teams reduce the need for information processing when they are structured and empowered to operate relatively independently. A team-based design that nests teams in a hierarchy of management (or management teams) will significantly diminish the potential beneficial outcomes of expedited decision processes. This is not to suggest that there is no need for hierarchy. But each level of management should have clearly defined product, process, or



Extracted rom "Rules of the Road, A Guide for Leading Successful Integrated Product Teams"
Source: OUSD, A&T with ASD, C3I (1995, p. 4).

Figure 3. IPT Structure Oversight and Review

service responsibilities with comparable criteria for performance, measures, and rewards as outlined for operational level work teams (i.e., program IPTs).

Process Changes in Team-based Design

Following the open systems model of organizations, structural redesign is only one component that is involved in the large-scale change to a team-based organization. Roles and processes must also be changed to match the requirements of teams rather than individual work. This section discusses the role and task expectations of teams as a whole and team leaders in particular, as well as the changing role of the management hierarchy. In addition, process systems that must be redesigned to support a team-based structure are introduced. The processes referred to here are not the work processes that define the structural determination, but are the support processes that include the information systems, resource allocation systems, performance management systems, decision systems, financial management systems, and training and development systems (Galbraith, 1995).

Control Systems

Shonk (1992) specifies that the responsibility of teams includes measuring, monitoring, and evaluating their own work. To accomplish this, teams must have a clear charter of objectives and expectations, measurement criteria, and information systems to support the gathering and monitoring of team performance. One important measurement criteria is fiscal performance; shifting financial responsibility to programs and teams is an important mechanism for aligning responsibility and authority. In addition, as long as "poor performing teams" are subsidized with either human or fiscal resources, there is a significant disincentive for teams to work hard to reduce costs or personnel requirements. Thus, the reward system, as always, must link rewards with performance. What is different now is the importance of measuring performance at the team as well as the individual level. Both the TEAM CAO (NAVAIR, 1996) and F/A–18 POG (PMA–265, 1996) reference the importance of linking team and individual performance to rewards. Specifically, in commenting on the Ten Guiding Principles of Acquisition Reform, the F/A–18 POG describes the need to delegate authority and reward results as part of "empowering people to lead/manage...not to avoid risk" (PMA-265, 1996, p. 45).

> "What is different now is the importance of measuring performance at the team as well as the individual level."

The discussion above illustrates several ways in which organizational control systems must change to be appropriately aligned with a team-based structure. Lawler (1996) states that increasing team-level involvement is an effective source of control that decreases the need for bureaucratic control mechanisms. Control systems that previously supported a functionally defined hierarchy will be inappropriate for measuring and monitoring empowered IPTs comprising members from multiple functions. This has implications for the changing role of the management hierarchy of team-based organizations. The traditional role of

management hierarchy in bureaucratic organizations is to monitor performance and approve (or make) decisions. In a team-based structure that emphasizes the empowerment of teams, higher level managers or management teams now have a new role to establish direction (defining goals and domains of empowerment), develop competence, and provide needed resources (e.g., funding, information, personnel).

Performance Management Processes

Another important management role is in the performance management process. With a team-based organization, traditional performance management process responsibilities must be re-evaluated and the appropriate roles of team members, functional manager, and project/program manager must be defined. Because of legal requirements, contracting personnel must have appraisals signed by an appropriately warranted contracting officer. To meet this requirement, IPT members may have two managers (functional and program) giving both informal feedback and formal ratings of performance. This model of dual input for performance feedback recognizes the value of both the expert-functional perspective as well as the program perspective.

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Finally, the performance management system should consider the potential role team members play in developing capabilities and providing both formal and informal feedback on the performance of their peers. Katzenbach and Smith (1993a) define teams as being collectively responsible for outcomes. As such, there is among effective teams a motivation to cooperate, support, and teach that makes team peers potentially strong resources in the organization's performance management process.

The F/A–18 Team encourages informal team-peer evaluations. The F/A–18 POG offers a sample survey form that can be used by team members to evaluate their peers and the team as a whole. This type of evaluation is designed by the team as a tool for achieving specific team performance objectives. As part of the discussions on team-peer evaluations, the POG states, "These evaluations will be separate from annual personnel appraisals, and can be administered informally every few months. The team can use whatever method best fits its needs, which involves members evaluating the effectiveness of their peers within the team" (PMA-265, 1996, p. 42). A formal team member performance evaluation form is also used as input to the formal appraisal prepared by the functional and program managers.

Naval Air Systems Team (NAVAIR, 1996) recognizes the importance of multiple perspectives on performance in the design of the CAO. IPT members get feedback from multiple stakeholder groups (e.g., related teams, customers, team peers, managers). However, formal performance evaluation remains the responsibility of the program manager with input from the team member's functional manager. A question to be considered is whether this formal appraisal process adequately captures the broader sources of performance

perspective. Research on high-performing teams indicates that performance assessments should go beyond the traditional technical contribution and include contribution to team process and team effectiveness (e.g., Katzenbach and Smith, 1993a; Mohrman et al., 1995). Team members have a unique perspective on this domain of performance.

Establishing a Clear Charter: Team Versus Work Group

The role that IPTs play given the new strategic determination and team-based structure must also be defined. Katzenbach and Smith (1993a, 1993b) make an important distinction between teams and work groups. What distinguishes a "team" from a "group" is the mutual responsibility of members for the total team product. In work groups, members have individual responsibilities that may require shared information and coordination of tasks, but the work products are largely individual. In contrast, teams have both individual and mutual accountability and generate primarily collective work products.

The clear distinction between teams and work groups is that each has unique expectations for individual roles and group processes. Teams require higher levels of coordination among members with a consequent requirement for shared problem solving and decision making. Work groups require fewer meetings, and the focus of meetings is largely information sharing. Because the work of teams is highly interdependent, more consensus building is required and more conflict is to be expected. Similarly, the information required for work groups more heavily emphasizes individual-level tasks and outcomes while teams need both individual- and team-level information for self-monitoring. Finally, each is likely to have different approaches to leadership. In working groups, there is typically a strong, designated leader, while in teams, there are often shared leadership roles among team members.

Team Leadership: Leaders Versus Managers

The shift to teams also requires new definitions of roles. The role of leader/manager changes from supervisor to facilitator and resource provider. This change goes hand in hand with the development of teams' self-management capabilities. Mohrman et al. (1995) also argue for an important distinction between the role of "leader" and the role of "manager." They state that the leadership role may be to act as a liaison (either vertically or horizontally) with other teams; to contribute within the team by coordinating task management or workload issues; or to facilitate group problem solving, conflict resolution, or decision making processes. Katzenbach and Smith (1993a) support this definition. They state that team leadership:

> "What distinguishes a "team" from a "group" is the mutual responsibility of members for the total team product."

- keeps the team focus on purpose and goals;
- builds commitment and confidence;
- strengthens the mix and level of team skills;

- creates opportunities for others; and
- does "real work" that contributes to the team product.

These roles can be filled by a single, designated individual, but they can also be deliberately shared as a mechanism for developing self-management skills as part of the strategy of empowerment.

It is important to note that these authors argue it is not necessary for the individuals filling these leadership roles to have hierarchic authority over team members. In contrast, the team "manager" position is hierarchically defined (Mohrman et al., 1995). The responsibilities of the team manager are the major administrative functions including formal reporting authority, performance evaluation, and fiscal authority. A team manager is also responsible for supporting successful team leadership. This includes clarifying the performance criteria for leadership tasks, providing necessary training (in both functional and team leadership competencies), assessing performance, and providing appropriate rewards for team members filling leadership roles.

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The need for a hierarchically defined team manager is defined by both the work requirements of the team and the leadership capabilities of the team members. If the work of a team requires significant liaison work with upper-level integrating teams or negotiating authority for interactions with contractor organizations, a team manager with positional authority may be required. However, the need for a team manager should be re-evaluated as team members develop greater leadership competence in both intrateam processes and interteam communication and negotiation.

Both the F/A–18 POG and the NAVAIR TEAM manuals describe team leader roles and responsibilities. It is important for each organization to prioritize these roles and responsibilities and then use the theoretical framework above as a reference to make distinctions between leader and manager functions. For example, the F/A–18 POG emphasizes the role of team leader by stating, "The word that best captures the attitude and perspective the PMA asks the Level I IPT leads to embrace is 'coach'" (PMA–265, 1996, p. 7). While this term suggests something different from the traditional managerial role, the list of task responsibilities presented in the POG are primarily administrative (e.g., management of cost, schedule and performance; establishment of performance objectives; direction of programmatic tasking). These responsibilities reflect the traditional supervisory role of a manager and, as such, may be in conflict with the role of coach to facilitate and develop team leadership capabilities. The research on effective teams supports the importance of clarifying the expectations for differing roles of leader, coach, and manager.

Cultural Change in a Team-Based Design

As noted above, a characteristic of high-performing teams is the development of the self-management capabilities of team

members. Achieving this requires change not only in decision making procedures and information flow, but also a change in the often deeply held values about the traditional role and status of management and labor. Thus, as noted by Secretary of Defense Perry in the opening words of this paper, accomplishing the objectives of IPPD requires cultural as well as structural change.

EMPOWERMENT

The empowerment of IPTs is the litmus test of fully achieving the depth of change envisioned for IPPD concept. It is important to state that empowerment does not mean complete autonomy. Decision authority is defined in terms of both the horizontal and vertical interdependence among tasks and teams. Thus, the domain of influence and decision authority must be specifically defined in establishing an IPT's charter, and this will vary with the task requirements of the team.

There is an increasing body of theory and research on empowerment (e.g., Conger and Kanungo, 1988; Thomas and Velthouse, 1990) suggesting factors that can significantly enhance the success of an organization in empowering its workforce. For example, Thomas and Velthouse (1990) propose four dimensions of empowerment, each determined by varying aspects of task and organizational context: impact, competence, meaningfulness, and choice. Each of these dimensions has implications for managerial action and changes in organizational context to support team empowerment. Impact results when individuals or teams see their work making a difference in the accomplishment of team or organizational objectives. When teams make decision recommendations that disappear into a bureaucratic black hole, their sense of impact, and thus empowerment, is diminished. Feedback mechanisms and ongoing measures of performance at the individual, team, and organizational level support the impact component of empowerment. Competence results when team members receive needed coaching, training, or other development in areas of both technical expertise and team skills. Meaningfulness derives from understanding the role of the individual's or team's task to a larger valued purpose. Teams that know how their work relates to the work of others in the larger system and appreciate the importance of their work will have not only an enhanced sense of meaningfulness, but a clearer understanding of process interdependencies. Finally, "choice" is the dimension that is often narrowly taken as the definition of empowerment. Decision autonomy, as noted above, is a necessary component of empowerment, but is dependent on the competence of team members and the interdependencies of team tasks.

> "A significant indicator of the depth of large-scale change is evident in behavioral norms such as openness of communication, cooperation, trust, delegation, and informal rewards."

MANAGERIAL VALUES: MODELING NEW BEHAVIORAL NORMS

A significant indicator of the depth of large-scale change is evident in behavioral norms such as openness of communication, cooperation, trust, delegation, and informal rewards. Organizational values are deeply embedded, and themselves unobservable, but these

values are demonstrated by the daily behaviors of personnel. Many organizations aspire or pay lip service to empowering the workforce and do not address the multiple organizational factors that must change to support empowerment. A lack of modeling is demonstrated in many organizations when senior managers direct middle managers to "empower" their subordinate teams, but they don't, in turn, empower the middle management teams. Treating empowerment as a superficial change ultimately leads to employee distrust and cynicism with the consequent outcomes in poor performance.

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A key part of Secretary of Defense Perry's mandate for change through the transformation to the IPPD/IPT concept is the necessity for empowerment. The language of empowerment is prevalent throughout the DoD acquisition documented guidance for IPPD/IPT implementation. But as the research and theory argue, achieving empowered teams requires much more than proclaiming them to be "empowered." Successfully accomplishing empowerment as a deeply rooted change in values and behaviors is determined by:

- the modeling of empowerment by senior managers;
- the formal and informal reward systemæredefined career paths and "what 'pays off' around here"; and
- the adequacy of resource support that can come in the form of training (for both technical and teaming skills), information, and appropriate team decision authority.

Teams that are told they are empowered but not given the necessary training, information, performance feedback, and decision authority will not be successful. Unfortunately, this failure is sometimes attributed to the teams, when in fact the failure is due to limitations of the organization's context or managerial support.

Some Recent Findings on IPPD/IPT Effectiveness

Two recent research reports (Engel, 1997; DiTrapani & Geithner, 1996) present evidence that IPTs are accomplishing some of the desired objectives of reduced decision cycle time, improved quality, and increased satisfaction. Both reports also reinforce many of the theoretically derived propositions outlined in the previous discussion of team-based design as a large-scale change. While several of their findings represent aspects of team implementation that fit more than one category, we use the same categories of structure, process, and culture to present the salient results.

Structural Change

The study of IPTs conducted by the Center for Naval Analysis (CNA) (DiTrapani & Geithner, 1996) included a sample of 11 private contracting organizations, 18 government projects, and more than 80 interviews with program managers. There were several structural design

findings reported. First, the authors state that it is not necessary to convert entire organizations to IPTs. While the authors do not quantify the extent to which an overuse of teams existed in their research sample, the recommendation reinforces the discussion of appropriate analysis of task interdependency and predictability (Mohrman et al., 1995) to structurally determine when teams are appropriate. The CNA study provides further confirmation of the theory in stating that IPTs "are not appropriate for urgent, minor, or routine matters" (DiTrapani & Geithner, 1996, p. 2).

Engel (1997) describes the results of a 1996 study conducted by the Defense Systems Management College (DSMC) that found that 18 of 26 Defense Acquisition Boards (DAB) did not need to convene because there were no unresolved issues; and programs were ready for issuance of the Acquisition Decision Memorandum. In other words, these 18 programs had effectively resolved conflicts that might previously have required upper-level intervention. The elimination of a formal DAB suggests not only that these teams were highly competent, but that they had also been delegated appropriate autonomy to address issues without having to defer to higher levels of authority. The implication is that the Overarching IPT-Working IPT (OIPT-WIPT) structure can allow working-level teams to monitor and evaluate their own work (following Shonk, 1992) and has the flexibility to forego vertical decision approval processes (following Mohrman et al., 1995) when the requirement for integration and coordination at senior levels of the hierarchy is unnecessary.

A problem identified by the DSMC study as reported by Engel relates to team size. One feature of what Katzenbach and Smith (1993a, 1993b) refer to as "high-performing teams" is the appropriate mix of competencies for the task. However, they argue this must be balanced with the need to limit the size of the team for effective decision making. Their recommendation is that teams should be no larger than 20 members. The CNA study findings suggest that team size should be limited to 15 members for effective problem solving and decision making (DiTrapani & Geithner, 1996).

The research cited by Engel (1997) suggests formulating the appropriate team composition often leads to teams that are too large for effective decision processing. Because team composition is defined by the task requirements, an obvious solution to cumbersome team size is to subdivide the task. Inevitably, this creates the need for coordination between two sub-task teams; however, meeting the need for coordination may be more readily addressed than managing effective decision processes with large teams.

"Because team composition is defined by the task requirements, an obvious solution to cumbersome team size is to subdivide the task."

Process Change

Engel (1997) also presents results of the DSMC study that indicate OIPT-WIPT processes that need improvement. In particular, the need is cited for education and training directed toward the processes of IPPD and IPT implementation. This further reinforces that proposition that team-based design requires new processes such

as information exchange, decision making, and career development; successful implementation requires that personnel receive training related to these new processes.

The clarification of role responsibilities and decision processes is supported by the CNA report (DiTrapani & Geithner, 1996) that identifies an ongoing need to assure that team members are empowered to act on behalf of the functional organization they represent. This report recommends that a clear charter be established specifying the authority domain of teams and team members. Such a charter provides clear decision process parameters. Ideally, the chartering process involves team members and managers from both higher level teams and functional competencies in a dialogue to negotiate "boundaries" of empowerment. The dialogue itself represents an important behavioral manifestation of the underlying values change required in the effective implementation of team-based organizations (Larkin & Larkin, 1996).

"Ideally, the chartering process involves team members and managers from both higher level teams and functional competencies in a dialogue to negotiate "boundaries" of empowerment"

Finally, the CNA study reports successful teams have one leader, or at most co-leaders. This finding challenges the suggestion of Mohrman et al. (1995) that teams can effectively utilize multiple leaders in complementary roles. It is important to note that the CNA study did not distinguish between leadership and management roles. It is possible that the study finding reflects the administrative and structural necessity for single point of contact within teams that is in line with the recommendation that there should be a single team manager with positional authority and administrative responsibility (Mohrman et al., 1995).

Cultural Change

Another aspect of IPT implementation that DSMC reports as needing improvement is WIPT empowerment (Engel, 1997). Engel's elaboration suggests that functional managers are not delegating adequate decision authority to WIPT members. He describes the necessity for functional managers to adopt a new role that includes defining the limits of empowerment for functional representatives to teams, developing the team members' necessary skills, and allowing delegated decision authority. Engel thus supports Mohrman et al.'s (1995) definition of the changing role of functional manager to one that emphasizes resource provision over direct supervision. Functional managers are responsible for providing program and project managers with fully capable personnel, with capability defined in terms of both functional competence and decision authority.

It is important to note that the DSMC study focused only on OIPTs and WIPTs. The findings suggest that while senior managers espouse empowerment, the next level of managers (serving on OIPTs and WIPTs) don't perceive themselves to be adequately empowered. Research suggests that when mid-level managers perceive they are limited in decision autonomy, they will limit the autonomy they delegate to their subordinates. In other words, constraints on the empowerment

of WIPT members will likely have consequences for the empowerment of program-level IPTs. The DSMC study seems to offer reinforcement of Katzenbach and Smith's (1993b) finding that senior management teams have the most difficulty in meeting the goals of a team-based organization.

CONCLUSION

The Department of Defense has undertaken a large-scale change effort with the implementation of IPPD and IPTs. The purpose of this paper was to highlight research and theory related to large-scale change and team-based organization design as a type of "benchmarking." The research findings and theoretical models provide guidance for organizations to monitor the effectiveness of IPPD processes and IPT performance, and diagnose needed modifications for improved outcomes.

Here we identify specific areas that need management attention within the three domains of structure, processes, and culture (See Figure 2). Three recommendations related to structure are, in sum:

- First, to minimize the potential for over-use of teams, a critical analysis of tasks and processes should be done and teams used only in situations of high or nonroutine interdependence.
- Second, team size should be limited for effective decision making and problem solving.
- Finally, research shows that high-performing teams are those that effectively manage interteam relations. Structural mechanisms that encourage lateral (rather than hierarchical) integration will optimize expedient information processing and reduce the unnecessary "oversight" that can occur when coordination between teams depends on going up the chain of command.

Team-based organization design also has specific process management requirements. The use of measurement to monitor and improve performance can be argued for all organizations. But in team-based organizations, performance must be measured at both the team and individual levels. Rewards must also be linked to quality performance at both the team and organizational level. Performance management processes such as performance appraisals must acknowledge the dual perspective of both the project manager and the functional manager, and they can be further enhanced by team (or peer) and customer input. Finally, the leadership roles and management functions necessary for team effectiveness must be distinctly defined. While management responsibilities may be appropriately assigned to a single individual, it may be appropriate for teams to share leadership responsibilities. Distributed leadership is at the heart of the culture change inherent in effective team-based organizations with empowered teams. But success requires more than adopting the values of participative management. Teams must be given the necessary training, information, performance

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feedback, and decision authority for self-leadership.

From the perspective of large-scale change, it is important to acknowledge that the changes under way are significant and involve not only structural design but processes, fundamental values, and organizational culture. There is substantial support from research and theory for the potential benefits of the strategic aims of IPPD and IPTs. To achieve those aims, the concepts of large-scale change and team-based design provide the foundation for theory testing that is central to continuous improvement and organizational learning.

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