CEO Center for Effective Organizations

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DESIGNING WORK TEAMS

by

Susan Albers Mohrman

Designing organizations in which the work team is the focal performing unit began in earnest in production settings, where "new design plants" (Lawler, 1978) or "high commitment work systems" (Walton, 1985) emerged in the 1970's and are now widely used (Lawler, Mohrman and Ledford, 1993). These plants created teams that are responsible for a "whole" product or service and perform many of their own management and support functions (Cummings and Griggs, 1977; Goodman, Devadis and Hughson, 1988). The organizational context is designed (or redesigned) to support the team as the focal performing unit. The organization is flat, employees receive extensive training, management jobs are redefined, and all systems, including information, reward and decision making, are altered to support team effectiveness.

More recently, there has been a rapid expansion of the work team concept into the service and knowledge-processing components of organizations. Work teams are being employed in insurance processing units, sales and service offices, new product development projects, and information systems and human resources departments, to name a few. Organizations are striving to transport the concepts of teams, empowerment, self-management and self-containment from the factory floor to parts of the organization that employ quite different technologies.

The challenge of redesigning the service and information processing components of the organization is significant. The soundness of team design rests on an accurate analysis of the technology of the work system. Socio-technical analysis is one approach. The analysis is geared toward the joint optimization of the technical and social systems by designing teams with control over their boundaries, feedback about performance, and the ability to adjust their work processes to correct and improve performance (Pearce and Ravlin, 1987). Teams are designed to encompass the key interdependencies and the key variances (places where the production process is likely to get out of range) of the production process (Cummings, 1978; Pasmore and Sherwood, 1978). Different technologies pose different design challenges. To the extent that the technologies in the knowledge segments of organizations differ from production technologies, the notions embodied in the traditional team literature don't translate easily into these new contexts.

This chapter provides a framework for considering the design of workteams. It deals with teams that exist to perform the transformation processes of the organization. They turn inputs into the products or services that are the core mission of the organization, or they provide products and services for internal customers who make or perform the core organizational products or services. The chapter does not deal with the design of parallel teams such as improvement teams, task teams, and other special purpose teams that exist to improve the way the organization carries out its processes.

The premise underlying the paper is that a key element of work team effectiveness is the design of the team structure itself: what teams, for what purpose, and with what composition. Appropriate team design is not a trivial issue--it is extremely important for successful work performance improvement but not always easy to accomplish. There is no one recipe for effective teams--one size does not fit all. The chapter spells out a way to think through the issues of team design.

Teams for Routine Work

The prototypical work team that has been described in the literature as the "self-contained" or "self-managed" team (Cohen, 1993) has primarily been used in production settings, largely with technologies that are relatively routine, and where one of the major benefits of creating teams based on socio-technical analysis has been increasing the degree of stability and reliability in the technical processes. These teams are established when employees perform interrelated tasks and are required to interract with each other in order to produce a product or service (Goodman et al, 1988). The "ideal" form of these work teams is characterized by self-containment and self-management. These characteristics are supported by a number of design features that will be described below.

SELF-CONTAINMENT: Ideally, the team houses all the tasks required for the accomplishment of its mission to deliver a service or produce a product. This implies that team members possess the skills to perform all the tasks. Consequently the team's effectiveness depends minimally on the task accomplishment of people outside its bounds. Generally this is two implications.

First, tasks that have traditionally been performed by specialized <u>support services such as maintenance or quality assurance are moved into the team</u>, so that the team does not depend on services that emanate from a different organizational location that may not be attuned to the objectives and the performance requirements of the team. In cases where this is not possible for economic reasons, every effort is to make specialty services that are shared across teams accountable to the teams that are their customers.

Second, individuals in the teams are <u>cross trained</u> for purposes of flexibility, to make sure they can cover for one another, and to develop in each team member a broad understanding of the whole task. In fact, cross training is sometimes economically bounded, with individuals being rewarded for learning multiple skills only to the extent that multiple team members are actually required to perform the task. Cross-training particularly likely to be limited where certain tasks require a great deal of specialized expertise that would be very expensive to develop in all team members.

Some additional design features result from to self-containing teams. These teams tend to consist largely of <u>dedicated</u> members, who do not have split priorities between the work of the team and other assignments. Furthermore, the entire team generally <u>reports as a unit</u> to a common manager. Consequently, team members are not responding to direction from multiple bosses. Both these features reinforce the integrity of the team as a performing unit, and enhance team members' abilities to focus on the team's mission.

SELF-MANAGEMENT: Self-containment means that the team contains within it all the tasks and roles necessary to accomplish its mission. Consequently, it can be the locus of most decisions relating to how it goes about its tasks. Management tasks that were traditionally performed by a hierarchical superior can now be performed within the team. If the team has clear goals that link it to the overall mission of the organization, and if the organization has mechanisms for holding the team accountable for its goal accomplishment, the team can perform its own day-to-day management functions. The new role of management is to ensure that the goal system and accountability system are in place, and to provide support to the team in the form of information, resources, training and development, and systems that are geared to support team functioning.

The prototypical self-managing team can manage three aspects of its functioning: its tasks, its boundaries, and its own performance. Each will be described below.

Task Management is the most fundamental aspect of self-management. A major benefit from the team structure is that teams can make decisions internally about how to apply their resources in the accomplishment of their tasks. Within constraints of the routinized and standardized aspects of the technology, the team also can determine its own performance strategies (i.e., the manner in which it goes about its tasks). These decisions are made right in the group that is performing the work, and can be responsive to the real-time requirements and issues that arise. Task self-management includes scheduling, integration of work between individuals, and responsibility for monitoring and improving the quality of the output.

Boundary Management refers to the team's managing its interfaces with the rest of the organization, and with its customers whether internal or external. If the team is truly self-contained, it relates to other teams in the organization that provide it with inputs or that it supplies with inputs. The boundary self-management tasks include making sure there are mutually agreed-to processes and standards that govern the interfaces, monitoring the effectiveness of the transactions that occur, problem-solving and improving the effectiveness of the interfaces, and dealing on-line with exceptions and required changes.

Performance Management refers to the team's role in managing its own performance as a collective entity, and the performance of the members that compose it. The team negotiates its objectives with the organization, manages the setting of objectives for its members, monitors and reviews its collective performance and that of its members, and finds ways to improve collective and individual performance. It may manage the way in which rewards are distributed internally within the team, and may have primary responsibility for dealing with performance problems.

Each of these self-management areas implies skills that have to be developed within the team. Furthermore, they support the notion of self-containment, in that tasks that used to be performed by external specialists (in this case, managers), are now performed within the team.

Self-containment and self-management reinforce one another. Self-management is made possible because the team contains the skills and is responsible for the tasks required to perform the whole task. Thus, it is not embodied in a complex web of interdependencies that results in the need to continually resolve tensions between the conflicting priority schemes of different units. To the extent that self-management is in place, self-containment is more complete--the team not only has all the skills and resources necessary to do the complete job, but it also has the skills, authority and responsibility to manage how it goes about doing it.

Work teams that approximate this ideal work team model clearly can more easily be embodied in work settings that house routine technologies. Here, programs and procedures for completing the work are well specified, uncertainty and exceptions are not pervasive, interdependencies can be described and routinized, and the cross training objectives are relatively readily accomplished because of less reliance on a diverse array of specialties.

The important distinction here is not between production and other kinds of work. Rather, it is between routine work that can be well specified, and non-routine work that involves a great deal of uncertainty,the handling of unique cases, and complex emergent interdependence between highly specialized contributors. As production processes become more automated, and flexible manufacturing capabilities are established, some argue that the remaining production workforce will increasingly be performing jobs that fall into the non-routine category. On the other hand, much service and support work can be characterized as production work; it involves routine, highly specified work such as back office paper processing. The next section examines some of the design issues encountered in creating work teams in non-routine settings.

Teams for Non-Routine Work

This section deals with the particular challenges faced when designing work teams in settings characterized by a high uncertainty, complex and changing interdependencies, dynamic requirements, and a high degree of specialization of work. New product development, systems development, and technical sales are examples of the kinds of settings that house this kind of work. In such settings it is hard to constitute stable teams, and to predict the interdependencies within and between teams, because the nature and duration of the projects they house can be highly varied and tend to unfold through time. It may not be possible to establish some of the attributes that characterize the prototypical work team described above.

Self-containment, for example, may not be possible given a complex array of interdependencies. Consider, for example, a project team that is designing an electronic system. The system consists of three integrated "boxes", two of which are composed of integrated software and hardware sub-systems. Traditionally, the organization that houses this project has broken work down into discipline specific packets that are then divided among the members of discipline based workgroups (see Figure 1.). The disciplines include software, electrical, mechanical, structural and systems engineering. Here, the word "workgroup" is being utilized to denote that they are not work teams, because the modus operandi has been for a manager of each workgroup to break the work down to individual assignments, and to take responsibility for integrating the total. Individual contributors are held individually responsible for their assigned work.

This program has 46 members, including a program manager and a discipline-based manager of each workgroup. Each of the disciplines that are required to develop the system constitutes one or more workgroups. A software workgroup develops the software for each of the two boxes that had integrated software. A Technical Support workgroup provides specialized quality and testing support for the entire project, and a systems integration workgroup monitors and directs the technical integration across the subsystems.

The double-sided arrows indicate the reciprocal interdependence between the groups, i.e., the places where work between the groups has to be coordinated on-line, because what members of one group design has repercussions for the work of members of the other group. Thus, these workgroups are far from self-contained, because they do not house all the tasks and skills required to produce a whole product; nor can they be given complete authority over task-related decision making, because decisions made within one workgroup have repercussions for all other workgroups. For example, a design decision made in an electrical engineering group may have design implications for the work of the software groups, the other electrical engineering group, and the mechanical and structural engineers. In fact, a technical analysis indicated that the people in these workgroups have as many or more technical transactions with people outside their workgroup as with people within. The Technical Support and Systems Integration groups, furthermore, provide services for every workgroup. Each of these services cuts across teams, and has to be integrated for the entire set of teams.

In this traditional design, managers provide technical supervision, and integrate work internally within the group and externally with other groups, as well as managing the performance of the workgroup members. An advantage of this design is that each workgroup is composed of one specialty and can be supervised by one manager. Because of the huge number of cross workgroup transactions, the managers are central to the boundary management process. Individual performers and even workgroups lack the broader perspective required to make system-wide trade-offs. Many cross-boundary decisions end up getting made by various assortments of managers thinking through the trade-offs involved in various courses of action, or even by escalating the decision to the program manager. Each workgroup is continually affected by decisions made externally.

The notion that the design challenge in knowledge work settings is to create forums (eg., teams) that include the stakeholders who are party to key deliberations (issues requiring ongoing resolution) underpins recent work applying socio-technical systems concepts to knowledge work settings (Pava, 1986; Pasmore, 1988). This company's decision to move to workteams required the program to embark on a technical analysis to determine the configuration of teams that most closely approximated self-containment, in order to be able to move as many decisions and task interdependencies as possible within teams and to decrease the number of decisions requiring cross-group and hierarchical decision making.

The task facing this program is to determine which transactions can be handled in a routine fashion (eg., by specifications, change orders, etc.) and which require on-line deliberation. As many as possible of the latter should be located within teams: the former can be handled by procedures that can efficiently integrate across teams. In the case of this program, there was no solution that provided complete self-containment. Figure 2 (Work team structure A) illustrates a design that combines hardware and software for the two component boxes where their integration is required. The assumption underpinning this design is that the key deliberations and task interdependence have to do with the fit and the functional trade-offs between hardware and software. This design raises an additional challenge for the organization because one manager can no longer perform the technical supervision for all team members in the teams that are composed of multiple specialties..

Figure 3 (Work team structure B) illustrates a design that combines all software into one team, and creates three hardware teams, each of which designs one of the component boxes. Multiple disciplines are housed within each of the three hardware teams. This design self-contains the creation of all software, and the hardware for each box. The assumption underlying this design is that key technical deliberations and task interdependencies are within the development of the overall software subsystem, and between the different disciplines designing the hardware for each box.

In both work team designs, the systems integration group has been dispersed into the teams. The Technical Support group, on the other hand, has been maintained separately largely because as much of their work involved cross team transactions as within team transactions, and because the team consisted of three individuals with three different technical specialties. Each of the three would have had to belong to all teams.

As can be seen from the double-headed arrows, self-containment is not fully achieved in either design. Each design leaves some reciprocal interdependence between teams. In addition, in both designs the organization would have to create an overlay team of the systems integrators from each team, to address overall systems integration issues. Despite the difficulty of technical supervision posed by the inclusion of software and hardware in the same teams in Structure A, the program chose to go with it. The technical analysis indicated that the relationship between the software subsystems across the two boxes could be relatively easily handled by specifications and one-on-one meetings to address specific issues. The problems that had in the past held up development of similar systems had to do with the integration of hardware and software. The analysis indicated that design A required the least cross-boundary decision-making.

In this program, there was no way to create self-contained teams that create a "whole" product and are not highly interdependent. In a sense, the natural team is the program itself. It may be possible to think of the program as the team, and the others as sub-teams, but this does not resolve the coordination issue because the same integration issues exist across sub-teams. Thus, the best the designers can do is to maximize the self-containment of deliberations and task interdependence, and find ways to address deliberations and interdependence that cut across the resultant work teams.

Another way in which the work of this electronics firm makes it difficult to duplicate the prototypical self-contained team lies in the high degree of specialization in the firm. Key deliberations and task interdependence crossed disciplines, and consequently multi-discipline teams were generally indicated. Although an advantage provided by a team structure is an increasing familiarity across disciplines, substantial <u>cross training may not be an option</u> because of the large amount of formal education that underpins each discipline. Thus, these teams can provide increased ease of integration, but they offer less flexibility in resource utilization than is provided in the cross trained team. Software engineers and hardware engineers may work better because they gain more familiarity with each others' perspectives, but they will most likely not receive the training that would be required for them to trade off tasks.

Another issue illustrated in the above example by the quality, reliability and test engineers concerns both the cost effectiveness and the technical desirability of placing each needed specialty within a team. Many technical specialties may exist in small numbers and be shared across a number of organizational units. Key contributors may not be able to be dedicated to a team; consequently, teams and these contributors will have to deal with their conflicting priorities. A test engineer servicing five teams will have to juggle the priorities of all five. Other specialties may house work that inherently is performed across units. Quality, for instance, may largely be an issue of fit across the whole system, and thus may not be best performed within a team that is designing a sub-system. These specialties perform work that has profound implications for the work of each team, but that is not dedicated to the team, or perhaps not even located in the team.

Finally, the team design options faced by the electronics program illustrate another area in which the self-containment model may be more difficult to achieve: the ideal of the team reporting collectively into the organization. The issue is the technical desirability of having specialists managed by managers who are not familiar with their discipline, and the ability to define the role of the discipline managers so that technical excellence is assured at the same time that cross functional integration and the integrity of cross discipline teams is maintained. In some cases, dual reporting will be the solution. Some individuals, particularly those shared across teams, may maintain a discipline reporting relationship because they have multiple team affiliations. Others may be functionally managed because their discipline is so key to the organization's strategy that they are considered a core resource that has to be managed first and foremost for technical excellence. Thus, there are various issues that can erode the concept of collective team reporting.

Thus, a number of factors arising from the highly interdependent, non-routine, specialized, and dynamic nature of the work may detract from the integrity of the workteam as a self-contained performing unit. These factors increase the requirements for coordination across teams and different parts of the organization, and result in the work of the team being affected by ongoing deliberations that occur beyond the team. This reality has profound implications for the second key aspect that is sometimes presented as integral to the workteam notion: self-management.

Task self-management within a team is constrained to the extent that it cannot routinize its interface with other parts of the organization, is on-line reciprocally interdependent with other groups, and is both party to and subject to decisions that involve trade-offs between many different perspectives beyond the team. No matter what the ideal of empowerment and self-management, the reality is that the team does not have control over decisions that go beyond its scope. The organization must find ways to resolve issues between teams and at the whole system level. The decision making forums that are set up for this purpose must contain the requisite variety of viewpoints to address the needs of the various performing units whose work must fit together. An example is the overlay systems integration team in the electronics program we have been considering. The task of the organization is to develop forums in which these broader decisions can be made with participation and representation of the viewpoints of the teams. Participative through they might be, these inter-team and system-wide decisions constrain each team, and have implications for how each team goes about its work. In some cases the decisions made may mean that a particular team cannot optimize its performance vis-a-vis its own goals, because a trade-off is made to enhance performance of the larger system.

High degrees of specialization make task self-management a greater challenge. Because different specialties have different languages and frameworks, the integration task will be more time consuming and involve complex trade-offs between perspectives. It may be especially difficult when functional management maintains an active link to the specialists within teams, a condition that is highly likely because technical excellence and technical learning are fundamental to organizational success and because teams may not house the skills necessary for technical leadership of their own specialists. The organizational design task is to define discipline management's role as providing services to the team--i.e., to foster discipline development and monitor discipline excellence in a manner that supports the ability of the team to manage its task accomplishment. The same service mandate needs to be built into the accountability system of all shared specialized services. The technical services group in the electronics program is responsible for developing approaches and conducting certain technical analyses that assess the technical effectiveness of the products of the teams. Their service mandate is to provide these technical services in a manner that takes into account the needs of the team and enhances team effectiveness: i.e., to treat the teams as customers.

Boundary Management by the team is obviously a very large challenge when the team is embedded in complex on-line interdependence beyond its boundary. Interface relationships cannot be routinized, as in a less complex model where its major interfaces are with units that supply it with inputs or with units that receive its output. The software engineers in both teams in workteam structure A, for example, have to continually interact to ensure that their pieces fit together to create an integrated system. One is not the customer of the other. Here, the team can establish a variety of linking mechanisms (Galbraith, 1993) that range from less formal approaches such as face-to-face communication between individuals or special liaison roles to more formal solutions such as cross team linking positions, such as the systems integration engineer positions in the electronics firm. Hierarchical mechanisms for the resolution of issues that cannot be resolved laterally because of conflicting priorities may have to be established. Manager roles or higher level cross functional teams may be required to perform this function, such as the management team in the electronics program.

The team's role in its own Performance Management is also affected in the non-routine settings being discussed here. High degrees of specialization, for example, mean that part of the management of an individual 's performance may have to come from outside the team. The team may not have the resources for technical supervision, including goal setting, feedback and development planning that pertains to technical competence. This supervision will have to occur in a manner that supports team performance goals rather than working at cross purposes. In addition, if individuals are not fully dedicated to teams, there will have to be mechanisms for the team to be involved in the negotiation of priorities across projects and assignments.

Because of the high degrees of interdependence between teams and the dynamic nature of the work that is done, management will have to manage the performance of teams in a manner that aligns their objectives with dynamic system requirements and with each other. Cross-team interaction will be required for the establishment of mutually supportive goals. The three teams in workteam design A will have to interact to establish coordinated goals, so that they are responsive to each other's priorities. Mechanisms for inter-team feedback and input into performance evaluation will also be needed to supplement the team's internal performance management practices and the hierarchical evaluation of teams.

In summary, the nature of the technology may preclude the design of teams that fully fit the mold of the "Self-Contained, Self-Managing" team that has been described in the literature. Complex technical interdependence and uncertainties may seriously erode the self-containment ideal; consequently, the team may not have control over many of the decisions that impact its work and how it goes about producing its product or delivering its service. This means that the team is constrained by decisions beyond its bounds, and that the constraints cannot always be specified in advance. The additional design task posed by these conditions is to create mechanisms for making these more inclusive decisions. These mechanisms may be lateral (eg., cross team) or hierarchical (at the larger unit level). They may involve the creation of specialized roles, such as a management team or formal integrator positions. Or, they may be representative cross-team teams. The design challenge facing such organizations is to create a team structure that maximizes within-team deliberations, and minimizes complex and expensive cross-team deliberations. The next section provides some guidelines for organizations moving to a team structure.

Design Choices: Trade-Offs and Guidelines

When designing work settings composed of work teams as performing units, it is wise to keep the ideal of the "self-contained, self-managed" work team in mind. There is evidence that these teams can achieve high levels of effectiveness if properly designed (Cohen, 1993). But the ideal is not always possible. In fact, most settings will find that their technology lies somewhere along a continuum from routine to highly complex, uncertain and dynamic. Most organizations will have to stop short of the ideal model. But that does not mean that they will not benefit by creating a design that establishes teams that fit the ideal as much as possible.

Fully self-contained work teams will not always be possible. Nevertheless, it may be desirable to work towards that goal. If the teams are properly designed and if interfaces are standardized as much as possible, most organizations can increase the extent to which task decisions are in the scope of each team and are made within the team, the team is actively involved in managing its boundaries, and the team is an active participant in managing its own performance. Additional formal decision making mechanisms may be required to provide cross team integration, and hierarchical mechanisms will be required to resolve issues that cannot be resolved laterally.

There is no cookie cutter solution. The design will have to be tailored to each organization's requirements and the integration challenges it faces. However, the benefits of the use of workteams will increase to the extent that the ideal model can be achieved. If a decision has been made to move to workteams, it is important to keep that intent in mind. All design decisions involve a trade-off: ease of technical supervision is traded-off against ease of cross functional integration, hierarchical control is traded-off for self-management, and so forth. Thus, in designing team structures, it is important to keep the following guidelines in mind:

1. Self-contain as much as is technically and economically possible.

2. Move as much self-management as makes sense into the team, given the developmental stage of the team, and consistent with the needs to integrate the efforts of the team with the rest of the organization.

3. Substitute lateral integration mechanisms for hierarchical ones wherever possible.

4. Flatten the organization where possible.

5. Where it is not possible to fully self-contain or to move substantial self-management into teams, develop integrative mechanisms that are as consistent as possible with the workteam notion: ie., give teams a voice in decisions that impact them.

6. Assess the transaction costs of lateral coordination, and provide hierarchical mechanisms where the cost of lateral coordination outweighs its benefits.

7. Maintain a clear management responsibility for managing the overall performance of the organization and its teams, and for creating a context in which teams can more fully manage themselves and lateral integration can more readily occur.

Finally, it is important to note that workteams are not the solution for all organizations. The interdependence may be so complex that lateral integration must occur higher in the organization, and the line workforce may best be functionally managed. Conversely, the work may not be interdependent: it may be performed by individual contributors who do not need to interact with one another to perform a complete task. In the latter case, creating the extra transactions required to be a team may simply add cost without a performance benefit. Thus, the primary assessment to be made by any organization contemplating a workteam model is whether it will benefit from such a model.

Summary

This chapter argues that the workteam model that was initially developed and utilized in production settings and has been popularly referred to as "Self-contained, Self-Managing Teams" may not be fully implementable or desirable in all organizations. Organizations performing non-routine, dynamic, highly uncertain work where there is a complex web of interdependence may be unable to fully self-contain the work within teams. The paper further argues that this inability to self-contain the work limits the amount of self-management that can be vested in the team.

This limitation does not necessarily mean that a workteam design will not benefit the performance of the organization. However, it means that the organization will make a series of trade-offs in designing its team structure. It will have to design mechanisms that facilitate cross team and system-wide decision making. One challenge will be to do so in a manner that supports team functioning. A second challenge is to do so in a manner that doesn't drown the organization in complex transactions that offset the advantage derived from the teams.

An argument is made that workteam structures are not always appropriate, and that organizations should base their transition to teams on an analysis of their technology as well as the performance requirements they face, rather than initiate a transition because work teams are fashionable and other companies are using them with positive results. This is truly an area that requires local analysis and tailored design approaches.

References

Cohen, S.G., "Designing Effective Self-Managing Work Teams". In M. Beyerlein (Ed.) *Advances in Interdisciplinary Studies of Work Teams, Volume 1, Series on Self-Managed Work Teams.* (in press), Greenwich, CT: JAI Press.

Cummings, T.G. "Self-Regulating Work Groups: A Socio-Technical Synthesis." *Academy of Management Review.* 1978, 3, 625-633.

Cummings, T.G., and Griggs, W.H. "Workers' Reactions to Autonomous Work Group Conditioning for Functioning, Differential Effects, and Individual Differences." *Organization and Administrative Sciences,* 1977, 7, 87-100.

Galbraith, J.R. *Competing with Flexible Lateral Organizations.* Reading, Mass.: Addison-Wesley, 1994.

Goodman, P.S., Devadas, R. and Hughson, T.L. "Groups and Productivity: Analyzing the Effectiveness of Self-Managing Teams." In J.P. Campbell, R.J. Campbell, & Associates (Eds.), *Productivity in Organizations.* San Francisco: Jossey-Bass, 1988.

Lawler, E.E. "The New Plant Revolution." *Organizational Dynamics,* 1987, 6 (3), 2-12.

Lawler, E.E., Mohrman, S.A., and Ledford, G.E., *Employee Involvement and Total Quality Management.* San Francisco: Jossey-Bass, 1992.

Pasmore, W.A. *Designing Effective Organizations: The Sociotechnical Systems Perspective.* New York: John Wiley. 1988.

Pasmore, W. and Sherwood, J. *Sociotechnical Systems: A Sourcebook.* San Diego: University Associates, 1978.

Pava, C. "Redesigning Sociotechnical Systems Design: Concepts and Methods for the 1990's". *Journal of Applied Behavioral Science.* 1986, 22(3), 201-222.

Pearce, J.A., and Ravlin, E.C., "The Design and Activation of Self-Regulating Work Groups." *Human Relations,* 1987, 40(11), 751-781.

Walton, R.E. "From Control to Commitment in the Workplace." *Harvard Business Review,* 1985, 63(2), 76-84.

Figure 1
Sample Electronics Program
Traditional Workgroup Structure
(Reciprocal Interdependence Indicated by ⟷)

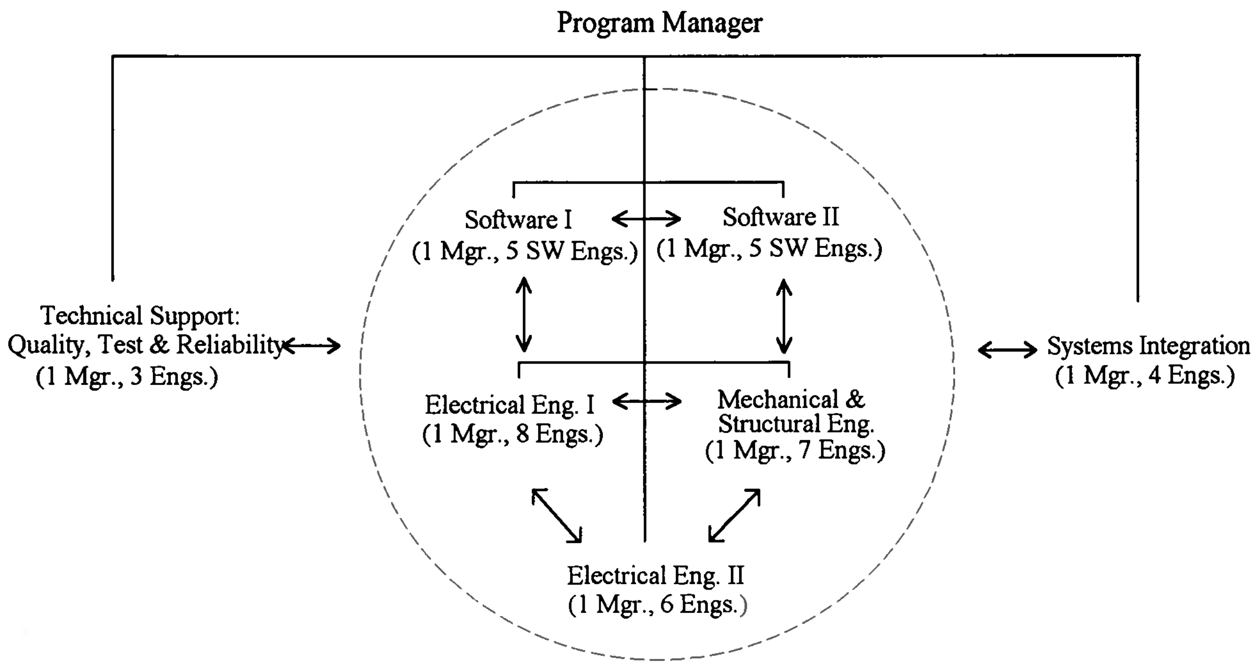
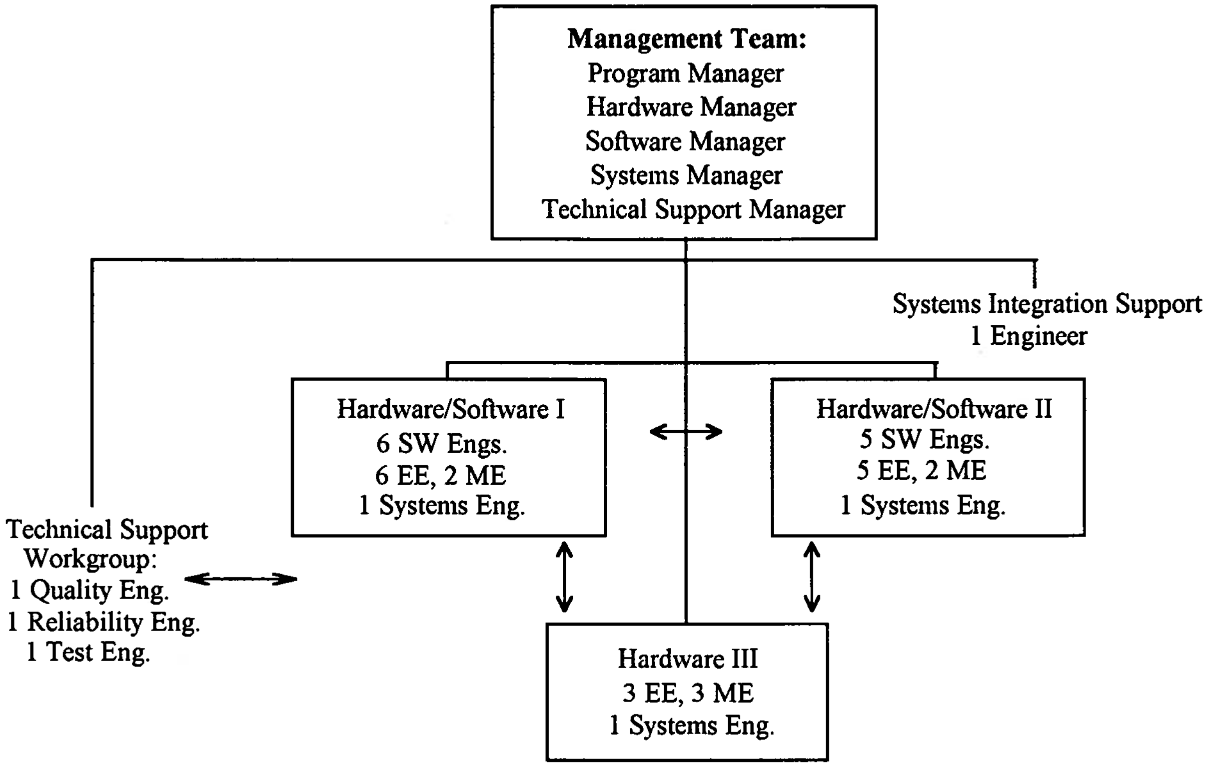


Figure 2
Workteam Structure A
(Reciprocal Interdependence Indicated by ⟷)



There will also be a Systems Integration Team that includes all four Systems Engineers.

Figure 3
Workteam Structure B
(Reciprocal Interdependence Indicated by ⟷)