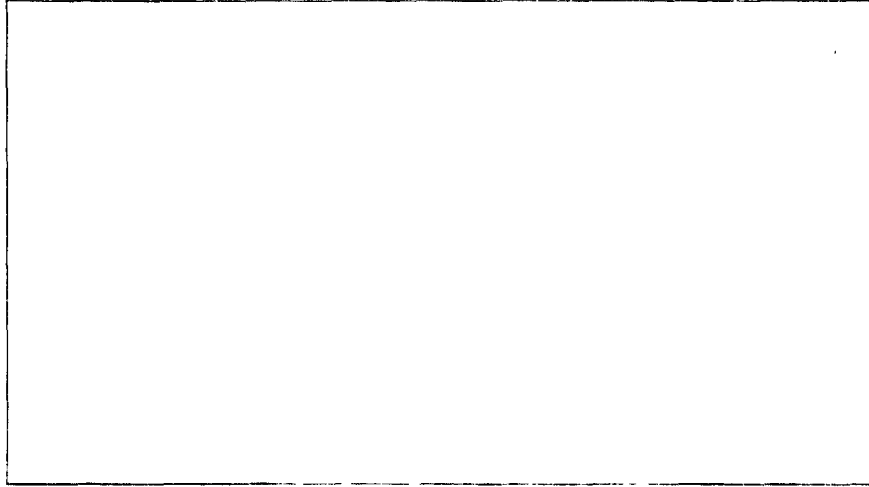


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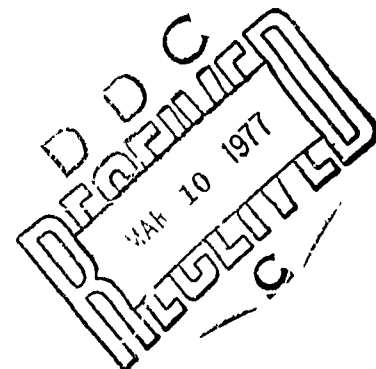
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THE DESIGN OF SELF-MANAGING

WORK GROUPS

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Technical Report No. 11
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Abstract

A model for the design and maintenance of self-managing work groups in organizations is proposed. The model emphasizes the importance of three design factors in constructing such groups: (a) the design of the group task, (b) the composition of the group, and (c) the structure of group norms about performance processes. The influence of these design factors on work group effectiveness is shown to be moderated by (a) the work technology with which the group must deal, and (b) the interpersonal relationships that develop among group members. Implications of the model are discussed, including issues regarding the management of work groups in organizations, and choices about when it is advantageous to design work to be done by interacting groups rather than by individuals.

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THE DESIGN OF SELF-MANAGING WORK GROUPS¹

J. Richard Hackman
Yale University

In a provocative article titled "Suppose we took groups seriously. . . ." Leavitt (1975) raises the possibility that it might be better to design and manage organizations using groups rather than individuals as the basic building blocks. Among the advantages Leavitt sees as possible from such an approach are the following:

--Groups seem to be good for people, in that they can provide members with important social satisfactions, support under stress, enriched opportunities for learning, and a wider range of activities than might be available to individuals.

--Groups can be good at finding problems, and at promoting innovation.

--Groups make better decisions than individuals on some kinds of tasks.

--Groups can be good tools for implementation in organizations, in that group decisions to which members are committed will be carried out willingly.

--Groups can control the behavior of individual members more effectively than often is possible using formal organizational controls.

--Groups can help fend off the negative consequences of large organizational size, by keeping communication lines short and hierarchies relatively flat.

Given possible benefits such as these, one could view work groups as a panacea for organizational problems which assuredly they are not. For one thing, groups can turn sour: they can enforce norms of low rather than high work effectiveness (Whyte, 1955); at times they make notoriously bad decisions.

(Janis, 1972); they can fall into patterns of destructive conflict with other groups (Alderfer, 1977); and sometimes they exploit and stress group members rather than aid in their growth and personal well-being (Hackman, 1976). Moreover, despite the increasing number of organizations that are designing work to be done by interacting groups, there are still major gaps in our understanding of the reasons why some such groups function effectively--and why others turn out to be a source of continual difficulty and dismay for both group members and organizational management. These gaps currently place severe limits on our ability to develop and utilize groups as fully as possible in carrying out the work of organizations.

This chapter is intended to further understanding of what is required to create self-managing work groups and to maintain them at high levels of effectiveness.² Toward this end, the chapter attempts to identify those factors that are most critical to the design of self-managing work groups--including how such groups should be staffed, how their tasks should be structured, what kinds of norms regarding internal performance processes should be encouraged, and so on. Although the chapter deals mainly with the design of self-managing work groups, attention also is given to questions about the management of such groups, and about the circumstances under which it is feasible and potentially advantageous to design work for groups rather than for individuals.

Existing Strands of Research and Theory

The notion of the "autonomous work group," developed by theorists and practitioners from the sociotechnical systems approach to organizational design, provides an excellent point of departure for thought about self-managing work groups. When autonomous work groups are formed, members of a small team (less than 20 members) are given major responsibility for planning and executing a whole and meaningful piece of work, and are encouraged to develop close ties

with one another in carrying out the work activities. The idea is that the group provides a setting in which the social (i.e., interpersonal) and the technical (i.e., task technology) aspects of the workplace can be integrated and support one another (Emery & Trist, 1969; Trist, Higgin, Murray & Pollock, 1963).

Specific arrangements in autonomous work groups (such as how the group task itself is designed, the composition of the work group, the nature of pay systems, and aspects of the organizational context) have varied from case to case in reported studies.³ In general, however, the following seem to be core attributes of effective autonomous work groups:

1. A "whole" task for the group--i.e., one in which the mission of the group is sufficiently identifiable and significant that members find the work of the group meaningful.
2. Workers who each have a number of the skills required for completion of the group task, thereby increasing the flexibility of the group in carrying out the task. When individuals do not have a robust repertoire of skills initially, procedures are developed to encourage cross-training among members.
3. Autonomy for the group to make decisions about methods for carrying out the work, scheduling various activities, assigning different individuals to different tasks, and (sometimes) deciding which individuals will be permitted to join the group as new members.
4. Compensation and feedback about performance based on the accomplishments of the group as a whole, rather than on the individual contributions of group members.

Published reports suggest that autonomous work groups are being used frequently and successfully as part of organizational change activities involving the redesign of work. Sociotechnical systems theory is incomplete, however,

in at least three respects that bear on the design and maintenance of interacting work groups in organizations.

First, the theory does not specify the attributes of group tasks that are required for creation of effective autonomous work groups. Simple prescriptions about providing groups with autonomy and creating "whole" tasks do not provide the kind of operational specificity that is needed to guide applications of the theory. Also, because key task attributes are not specified, it is not possible to devise measures of those attributes for use in theory guided diagnoses of work systems prior to change, in evaluations of the effects of changes on the work, or in tests of the conceptual adequacy of the theory itself.

Secondly, individual differences among people are not explicitly dealt with in the sociotechnical approach. While it is recognized that individuals are social beings, and that social relationships must be carefully attended to in the design or change of any work system, the theory does not deal with the fact that social needs vary in strength among people. Such differences may affect whether individuals seek out or resist opportunities to participate in an autonomous work group. Moreover, the theory fails to deal with other human needs that may be salient for individuals in organizations, some of which (e.g., needs for personal growth) appear to affect how people react to their work and their work groups.

Finally, the theory does not address the internal dynamics that occur among members of work groups, or offer guidance about how such groups could be designed to increase the chances that they will achieve internal health and effectiveness. The assumption, apparently, is that members of autonomous work groups will develop on their own satisfactory ways of working together, and that they will be able to adjust their internal dynamics appropriately in changing task or organizational circumstances. Given the substantial evidence

about ways that groups can go "sour," the validity of that assumption must be considered questionable.

The incompleteness of sociotechnical systems theory makes it difficult to translate from the general (and doubtless correct) tenets of the theory to either a set of testable propositions about the conditions under which autonomous work groups will and will not be effective, or to the specific action steps that should be taken to create and maintain such groups in different organizational settings. In particular, it appears necessary to flesh out the principles of sociotechnical systems design in the following three areas: (a) the characteristics of jobs and tasks that prompt effective work behavior, (b) individual differences among people that affect reactions to work and to work groups, and (c) internal social processes that occur among members of work groups.

In the pages to follow, research and theory that may be useful in this regard are reviewed. Then, in the following section, these research streams are integrated in an attempt to specify the ingredients that are most critical to the design and maintenance of effective self-managing work groups.

Job Characteristics Theory

An approach to the design of work for individuals that provides considerable specificity about the characteristics of tasks and jobs has been proposed by Hackman and Oldham (1976), based on earlier studies of task attributes by Turner and Lawrence (1965) and Hackman and Lawler (1971).

The theory, which is summarized in Figure 1, proposes that both work effectiveness and personal satisfaction are enhanced when all three of the following psychological conditions are present: (a) the work is experienced as personally meaningful, (b) the jobholder feels personally responsible for the work outcomes, and (c) the jobholder has knowledge of the results of the

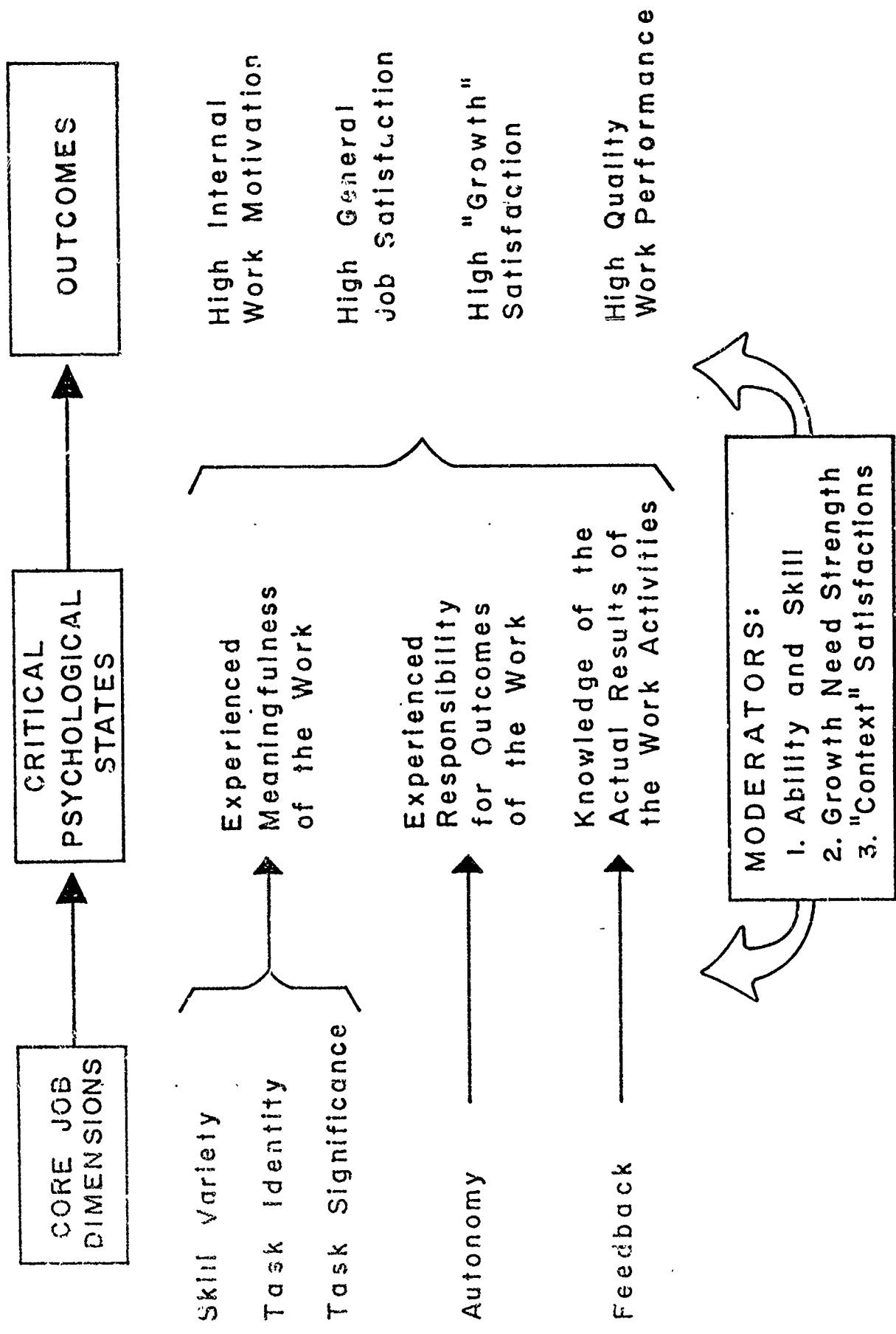


Figure 1. The Job Characteristics Theory of Work Motivation

work activities that have been carried out. Under such circumstances, a person feels an internal motivational "kick" when he or she does well, and experiences personal dismay when performance is poor--thereby creating an internal motivational impetus to perform as well as possible.

The theory also specifies the measurable characteristics of jobs that create the three psychological states described above. Knowledge of results is obtained through regular and trustworthy feedback from the job. Experienced responsibility is created when the job provides the employee with high autonomy to make decisions about planning and carrying out the work. And experienced meaningfulness is enhanced when any of three job characteristics are present: (a) skill variety, the degree to which the job requires use of a number of valued skills and abilities in carrying out the work; (b) task identity, the degree to which the job involves completion of a whole piece of work with a visible outcome; and (c) task significance, the degree to which the job has a substantial impact on the lives or work of other people.

It is possible to combine the five job characteristics into a single index that reflects the overall "motivating potential" of a job--i.e., the degree to which a job will prompt high internal work motivation on the part of job incumbents. This index, called the Motivating Potential Score (MPS) is computed as follows:⁴

$$\text{MPS} = \left[\frac{\text{Skill Variety} + \text{Task Identity} + \text{Task Significance}}{3} \right] \times \text{Autonomy} \times \text{Job Feedback}$$

Finally, job characteristics theory acknowledges that not all people will respond positively to a job that is high in motivating potential. Specifically, three individual difference moderators are specified and shown in Figure 1.

1. The task-relevant knowledge and skill of the job incumbent. Consider a

person working on a job high in MPS who does not have the skill required to perform the job successfully. Because of the motivating characteristics of the job, the person will care a great deal about doing well on it. And because the person does not have the skill needed to succeed, greater effort on the job will lead only to greater frustration at doing poorly. At some point, the person would be expected to cease trying to perform effectively, and either psychologically or behaviorally withdraw from the job.

2. The level of growth need strength of the job incumbent. Only if a person values personal growth and accomplishment to some degree would he or she be expected to respond with enthusiasm to the chance to work on a complex and challenging job, or to be personally motivated by the kinds of internal rewards that good performance on such a job can bring. In general, research evidence supports the proposition that growth need strength is one factor that determines who will--and who will not--respond positively to a job that is high in motivating potential (for a review of this literature, see Hackman, 1977).

3. The level of satisfaction with the work context experienced by the job incumbent. If an employee is chronically and seriously dissatisfied with aspects of the work context such as pay, job security, supervision, or relations with co-workers, then that person is unlikely to respond positively to the opportunities for personal development offered by a complex, challenging job (Oldham, Hackman & Pearce, 1976).

Research tests of job characteristics theory (e.g., Hackman & Oldham, 1976; Evans, Kiggundu & House, 1976) have been generally supportive of theory-specified propositions. In addition, the theory has proven useful in guiding and evaluating organizational change programs involving work redesign, because it specifies (and facilitates measurement of) both job characteristics and individual differences among people, and shows how these two factors interact

in determining how people react to their jobs.

Yet, like the similar theory of Herzberg (Herzberg, Mausner & Snyderman, 1959; Herzberg, 1966), job characteristics theory is framed to apply exclusively to jobs that are done more-or-less independently by individuals. It offers no guidelines for the design of tasks to be done by interacting groups, nor does it address either the social needs of employees nor the social characteristics of jobs. And, because the theory is essentially a theory of individual work motivation, it offers no guidance in understanding how the interpersonal relationships that develop among members of an interacting work group influence the overall effectiveness of that group.

Individual Differences Theory and Practice

Not all jobs are well-suited to a given person, nor are all people well-suited for a given job. A great deal of research energy has been expended over the last several decades to generate theories of individual differences, and to devise strategies for measuring them so that good "matches" can be made between the capabilities of people and the requirements of their jobs.

These research efforts have led to some rather sophisticated technologies for assessing differences among people in their task-relevant knowledge and skill, and for assigning organization members to specific jobs for which they are fully qualified (Dunnette, 1966; Schneider, 1976). If an organization decides it wishes to identify the skill requirements of its jobs, and to develop measures for assessing individuals on those skills, the theory and technology needed to do so are available.

Less well-developed are measurement devices and placement strategies that deal with the interpersonal skills of individuals, and with the needs people have to obtain social satisfactions in the workplace. This gap in research knowledge is of consequence for the design and staffing of self-managing work

groups, because the social dynamics that occur in such groups may be as important as the task-relevant skills of individual group members in determining how well the work of the group gets done.

Moreover, very little is known about how the characteristics of individuals combine to influence the effectiveness of groups in which members work interdependently on a group task. Although there is a considerable social psychological literature on the consequences of homogeneity vs. heterogeneity of group membership (Haythorn, 1968; Hill, 1975; Schutz, 1958; Steiner, 1972), research on the topic has not yet proven useful in making decisions about the composition of interacting work teams in organizations. Indeed, it remains unclear exactly what characteristics of people are crucial (and what characteristics safely can be ignored) when interacting work teams are composed.

In sum, individual differences and their measurement are relatively advanced in a number of areas (particularly those having to do with the selection and placement of people based on measures of their knowledge and skill). Yet there presently is little understanding about some of the "softer" aspects of people (particularly those having to do with social skills, needs and relationships) that can be applied directly to the design and composition of self-managing work groups. In some applications of autonomous work groups, these problems are circumvented simply by asking existing groups to make decisions about membership in the group--including who is selected to join, and whose membership is terminated. The practice is intriguing and worthy of systematic evaluation--but it also highlights the absence of any measurement procedures that could be used a priori to predict the likely "fit" between individuals and their work groups.

Group Interaction Process

The role of the interaction process that takes place among group members in affecting performance outcomes is complex and, at present, unclear (Hackman & Morris, 1975). Yet within the considerable literature on the topic is a body of research and theory that may be particularly relevant to the design and maintenance of self-managing work groups--namely, studies of interventions that are explicitly designed to help work groups improve the task-appropriateness of their internal processes. Such interventions can be sorted into two categories: (a) structured techniques that specify in some detail how members optimally should proceed with work on the task, and (b) interpersonal techniques that are intended to improve the overall quality of inter-member relationships in the group, and thus indirectly enhance task effectiveness.

Structured techniques. A large number of techniques have been proposed to help groups improve their creativity, their problem-solving or decision-making capability, their ability to make accurate judgments and predictions, and so on (e.g., Delbecq, Van de Ven & Gustafson, 1975; Kepner & Tregoe, 1965; Maier, 1963; Osborn, 1957; Stein, 1975; Thelen, 1954; Varela, 1971). Some such techniques derive from research findings; others are based more on intuitive considerations. All are intended to provide strategies for proceeding with work in the group that will immediately aid group effectiveness. Many of these techniques have shown themselves to be very helpful to groups working on a specific type of task or problem. However, structured techniques that are useful for one kind of task tend not to be appropriate for other tasks, and little is known about precisely what task characteristics moderate their relative effectiveness. Moreover, structured approaches tend to ignore the interpersonal and emotional dynamics that take place in task-oriented groups, and for that reason they may not be helpful in achieving long-term

and general improvements in group performance capability.

Interpersonal techniques. This approach assumes that group effectiveness is strongly determined by the quality of the interpersonal relationships that develop among members, and that with training group members can increase their skills in working together competently (e.g., Argyris, 1962, 1965; Blake & Mouton, 1975; Kaplan, 1973). Change techniques, such as experiential laboratory training and team building with intact work groups, tend to focus directly on the relationships among group members, rather than on the interface between the group and its task. The goal is to help members gain the interpersonal skills required for competent interdependent work on the group task, and/or to help the group as a whole understand and change norms that may be constraining the behavior of group members (e.g., norms that minimize interpersonal openness about ideas, that inhibit individual and group risk-taking and experimentation, and so on). In general, research evidence suggests that interpersonal techniques can be quite powerful in changing the patterns of behavior that occur in groups during training, and in affecting member attitudes--but that task effectiveness is rarely enhanced (and often suffers) as a consequence (Deep, Bass & Vaughan, 1967; Hall & Williams, 1970; Hellebrandt & Stinson, 1971; Kaplan, 1973; Wagner, 1964). Apparently the link between the interpersonal competence of group members and the task effectiveness of the group as a whole is not so direct or straightforward as one might wish.

Overall, research on the effects of interventions that focus on the group interaction process suggests the following conclusions:

1. Such interventions do alter the behavior that members exhibit in the group, and do affect member attitudes about each other and about the group as a whole. This is true for both the structured and the interpersonal

intervention strategies.

2. There is, however, no general intervention that increases group effectiveness for all groups and tasks. By design, the structured techniques focus on particular types of tasks or problems, and appear not to be useful for other task types. And there is no evidence that groups trained in a given structured technique attempt to generalize that technique to new situations, or to incorporate the technique into the group's standard repertoire of performance strategies.

3. Therefore, it appears that interventions that focus on group interaction processes should not be relied upon as the sole or primary means for creating (or redesigning) work groups in organizations. Instead, such interventions might be better used to support and maintain a group that is already well-designed (i.e., that has a meaningful group task, that is staffed with an appropriate configuration of competent members, and that has norms that support interdependent task work). Process interventions, whether of the structured or the interpersonal variety, would be employed to aid the group in overcoming interpersonal and procedural rough spots, or to help members invent new ways of working together that could enhance the overall effectiveness of the group. Such interventions would be focused on aspects of the group process of particular salience for the kind of work being done by the group, as in the "process consultation" model of Schein (1969), but they would not be expected to compensate for major flaws in the design of the work or of the group.

Toward an Integrated Approach to the Design of Self-Managing Work Groups

Each of the strands of research, theory and practice reviewed in the previous section has something of importance to contribute to understanding about the design and maintenance of self-managing work groups in organizations.

Yet it is also the case that none of the approaches reviewed can provide the full theory and technology required for such purposes--even if knowledge about them were substantially more advanced than it is at present. Therefore, a more encompassing view, integrating the materials reviewed in the previous sections, seems called for.

A first approximation toward the development of such a view is presented in Figure 2. The key concepts in the framework shown there are the three "interim criteria" of group effectiveness. These are: (a) the level of effort members bring to bear on the task, (b) the amount of knowledge and skill available for task work, and (c) the appropriateness of the task performance strategies used by the group in performing the task.

The organizing principle of the framework is the assumption that these three interim criteria, taken together, control a great deal of the variation in the overall effectiveness of any task-oriented group. That is, if one could simultaneously influence the effort, the knowledge and skill, and the performance strategies of a group, one would have substantial control over the task effectiveness of that group (Hackman & Morris, 1975).

If one views the three interim criteria as having a central role in determining work group effectiveness, then the following two questions emerge.

1. How can a work group be designed so that its standing on the interim criteria will be as high as possible? As is shown in Figure 2, three aspects of the design of a group seem particularly potent in affecting the interim criteria. These are: (a) the design of the group task, (b) the composition of the group, and (c) group norms about performance processes. As will be seen below, each of these design factors has an especially powerful impact on one of the three interim criteria, and each is potentially manipulable when a work group is created or redesigned.

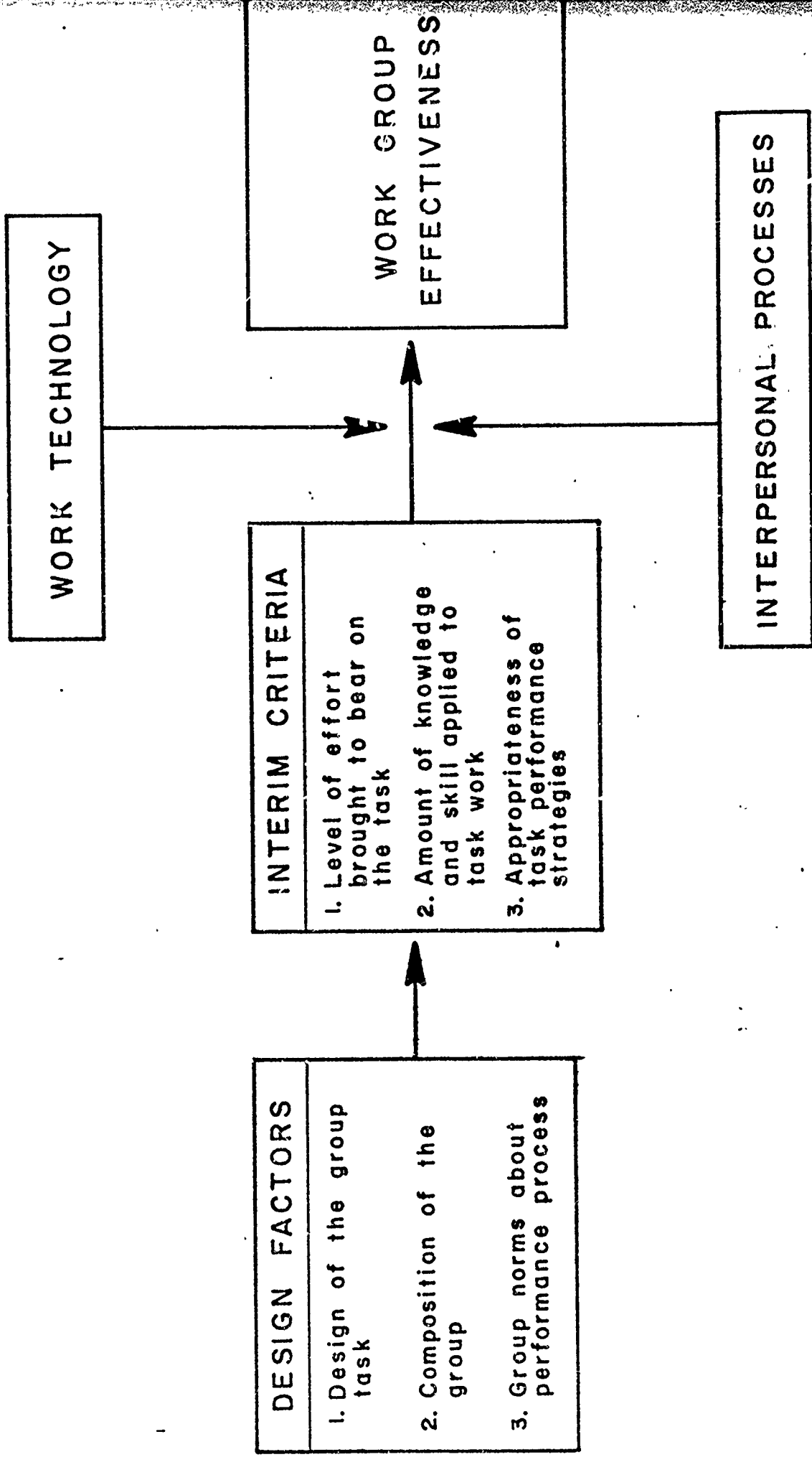


Figure 2. A Framework for Understanding the Determinants of Work Group Effectiveness

2. How is the standing of a group on the interim criteria translated into the overall level of effectiveness eventually achieved by that group? Two factors are shown in Figure 2 as moderating the relationship between the interim criteria and overall group effectiveness: (a) the technology with which the group deals in doing its work, which serves to weight the contribution of each of the interim criteria in determining group effectiveness; and (b) the interpersonal processes that occur among group members, which can result either in "slippage" (process losses) or in synergistic process gains as the group carries out its work.

With that general overview of the proposed framework, we turn now to a more detailed discussion of (a) the effects of work group design on the interim criteria, and (b) the factors that moderate the link between the interim criteria and overall group effectiveness.

Effects of the Design Factors

Task design: The design of the group task directly affects the level of effort group members apply to their work. When one reads discussions about the level of effort expended in work groups, comments invariably are made about the norms of the group—for example, norms that maintain production quotas, norms that encourage members to give their all for the group, and so on. The question, rarely answered, that emerges from such discussions is where such norms come from.

It is proposed here that in many cases group norms about effort derive from the nature of the group task. Consider, for example, a task that is structured so that it is very low in motivating potential. Members find work on the task to be boring, frustrating, and generally unpleasant. Over time, members may begin to share these reactions with one another, and eventually they may come to an implicit or explicit agreement that the best

way to minimize the unpleasant feelings they get from working on the task is simply not to work so hard--and a group norm enforcing low effort emerges. On the other hand, if the task is high in motivating potential, and members find the work exciting, fulfilling, or otherwise rewarding, these experiences also are likely to be shared with one another--and a group norm encouraging high effort may develop.

The implication, then, is that alteration of the design of the group task (which directly affects the personal consequences of hard work) may more powerfully influence the effort members expend working on the task than would direct attacks on group norms about productivity.⁵ To do the latter, in many cases, would be to address the outcropping of the problem rather than the problem itself.

How should group tasks be designed to increase the chances that members will choose to expend high effort in their work? As a start, the five core dimensions specified by the job characteristics theory of individual work motivation would seem useful (i.e., skill variety, task identity, task significance, autonomy, feedback). Although originally intended to be applied to jobs done by individuals, there is no reason why these dimensions could not be used to assess the motivational properties of group tasks as well. If group tasks were designed so that they were high on the five job characteristics, then an increase in the task motivation of group members would be expected--and, over time, group norms about productivity should change to become consistent with the increased motivation of individual group members.

It would be necessary, of course, to ensure that the job characteristics were defined (and measured) at the group rather than the individual level of analysis. That is, autonomy should be high for the group as a whole, feedback should be provided to the group and based on group (not individual) performance,

and so on. But such a translation of the job dimensions from the individual to the group level would seem to pose no major problems, either conceptually or operationally.

Even so, positive outcomes should come about only if individual group members identify with and feel personal commitment to the group as a whole (it is, after all, a group task). The five motivational job characteristics have little to offer toward the creation of such conditions. Instead, what seems required is that the task be designed so that members will be necessarily interdependent in their work, and so that they have ample opportunity to relate to one another about task- and group-related issues. Therefore, for tasks to be done by interacting groups, it would seem appropriate to supplement the motivationally-relevant job characteristics discussed above with the following two:

1. Task-required interdependence: the degree to which the task itself requires members to work with and rely upon one another for the task to be completed.

2. Opportunities for social interaction: the degree to which the task is structured so that members are in social proximity to one another, under conditions that facilitate inter-member communication about the work and how it is being done.

Both of these dimensions should enhance inter-member communication around matters having to do with task accomplishment, and (if the group task also is high in inherent motivating potential), should facilitate the development of shared high motivation and commitment to the group and its performance goals.

It should be emphasized, however, that high motivation in response to a well-designed task will come about for groups, just as for individuals, only if the group is composed of people who collectively have sufficient knowledge

and skill to complete the task successfully. If not, the same kind of frustration and withdrawal observed for individuals with insufficient task-relevant skill will be observed for a group. A basketball team is a good case in point: by all standards the task of a basketball team is well designed (i.e., it is high on four of the five motivational job characteristics: skill variety, task identity, autonomy, and feedback; it also is high on the two interpersonal dimensions proposed above: task-required interdependence and opportunities for social interaction). And if a basketball team is skilled enough to be competitive with its opponents on the court and to play together competently, then motivation invariably is high. But if a team loses almost all of its games because of a lack of skill, then psychological (and sometimes behavioral) withdrawal of team members is a common outcome.

Group composition: The composition of a group directly affects the amount of knowledge and skill that can be applied to task work. Presumably when a self-managing work group is formed in an organization, an attempt will be made to staff it with individuals who collectively have sufficient knowledge and skill to perform the group task well. And, given the relatively sophisticated technologies available for assessing the skill requirements of jobs and the capabilities of people, this strategy seems to represent a relatively straightforward way of affecting the level of knowledge and skill available to the group for work on the task.

There are, however, two complicating factors that may compromise the success of attempts to compose a group with a workable "mix" of task-relevant skills. The first factor has to do with the heterogeneity of skills in the group. On the one hand, if the skills of members are too homogeneous, some of the special advantages of designing work for teams are lost--e.g., the

special expertise of different individuals for different parts of the task, and the opportunity for individuals in the group to learn new skills from their co-workers. Yet it also is true that too much skill heterogeneity can impair group effectiveness, because insufficient "common ground" among members makes communication difficult and/or provides less-than-needed interchangeability among members. Even when the heterogeneity of member skills is at about the right level problems can develop, particularly around the reluctance of members to share with one another their own specific and "special" skills. Often individuals in a work group have a vested interest in keeping to themselves special expertise they have developed, for in that expertise lies their own distinctiveness and status.

A second complicating factor derives from the fact that an effective self-managing work group requires members to have (and to use) interpersonal as well as task-relevant skills in carrying out the work of the group. As Argyris (1965; 1969) and others have shown, such skills are not well-practiced by most individuals in organizations, nor are they easily learned (Argyris & Schon, 1974). Yet if the group task is challenging and requires real interdependence among members, interpersonal skills are needed simply to bring the task skills of members effectively to bear on the work of the group. This issue may become especially salient on those occasions (not infrequent among managerial groups) when the work group is composed of representatives of other groups that may have a conflictful or competitive relationship with one another.

In sum, the technology is readily available for placing individuals in a group so that sufficient talent is present for the work of the group to be carried out; it is, however, far from a simple undertaking to compose a group so that the talents of individual members form a compatible mix. Nor,

unfortunately, is the problem of creating a good mix of individuals in a group one for which behavioral science research currently provides much guidance.

Group norms: The norms of a group regarding performance processes directly affect the task appropriateness of the performance strategies used by the group. Performance strategy refers to the choices group members make about how they will go about performing the task (Hackman & Morris, 1975). For example, a group might decide to focus its energies on checking and re-checking for errors, in the interest of a high quality product (and at the expense of quantity of production); or members might choose to free-associate about ideas for proceeding with a new task, rather than starting to work immediately on it.

Strategy choices can be very important in determining how well a group performs (e.g., Davis, 1973; Hackman, Brousseau & Weiss, 1976; Maier, 1963; Shiflett, 1972; Shure, Rogers, Larsen & Tassone, 1962; Stone, 1971). What specific strategies will work best for a given task, however, depends very heavily on the particular requirements of that task.

And there lies the rub. Research evidence suggests that group members rarely engage in spontaneous tests of the task-appropriateness of their performance strategies--even when they are told that it is to their advantage to do so, or when the strategies presently in use are demonstrably dysfunctional for task effectiveness (Hackman & Morris, 1975; Janis, 1972; Shure et al., 1962; Weick, 1969). Instead, group task performance strategies tend to be well-codified as norms of the group: members typically share a set of expectations about the "proper" way to carry out the work, routinely behave in accord with those expectations, and enforce to some degree adherence to them.

Such norms have the advantage of short-cutting the need to explicitly manage and coordinate group member behavior on a continuous basis: everyone

knows how things should be done, and everyone does them that way with minimum fuss and bother. Because little time must be spent in moment-by-moment behavior management activities, more time becomes available for actual task work, and the effectiveness of the group should be enhanced. This advantage accrues to a group, however, only if the norms that guide the use of task performance strategies are fully task-appropriate. If existing norms about strategy are dysfunctional for effectiveness, then performance will suffer unless the norms are changed, despite their time-saving advantages.

Norms about strategy (in contrast to those that may emerge about the level of effort to be expended on the task) should be relatively amenable to change, since they are more likely to be present out of "habit" than as a reflection of some more basic structural feature of the group task or the organizational environment. Yet, because such norms are rarely examined or tested by the group, it probably is necessary for the impetus for change of norms about strategy initially to come from outside the group.

One option for the creation or re-formulation of group norms about performance processes is for an outside agent to independently diagnose the requirements of the group task, and then to generate a strategy for the group that is objectively more task-appropriate than the one currently in use (i.e., as in the approach to improving group effectiveness through the use of structured intervention techniques, discussed earlier). The problem is that such an intervention would not be likely to help group members increase their own capability to consider and re-formulate their performance processes when effectiveness is poor, or when task demands change.

Therefore, it appears more appropriate to involve group members themselves in interventions that are intended to improve the task-appropriateness of group performance strategies. Such an approach would be consistent with the aspiration

that members of self-managing work groups become adept at handling their own task and social processes insofar as possible, and that opportunities be made available for members of such groups to enhance their skills at process management.

One type of intervention that is consistent with this approach involves an outside diagnosis of existing group norms, followed by feedback of the diagnostic results to group members in a way that encourages them to take responsibility for designing and implementing any changes in norms about strategy that seem to be called for. Useful in this regard is the Return Potential Model developed by Jackson (1965). This model allows for direct measurement of the distribution of potential approval (and disapproval) group members feel for various behaviors that might be exhibited in a given situation. The special value of this Return Potential Model as a diagnostic device derives in large part from the quantitative indices that can be generated to describe the properties of specific group norms (for examples, see Hackman, 1976 and Jackson, 1965). These measures can be of considerable help to members in understanding existing group norms, and can serve as a basis for subsequent decisions about whether (and how) members wish to change them.

Diagnostic data about group norms also can be generated using other devices, including direct observation of behavior in the group by a consultant. Whatever the data collection technique, the idea simply is to provide group members with systematic and verifiable information describing existing group norms about performance processes. Group members will then have a concrete basis for planning how those norms might be altered to make them more appropriate to the task of the group. And the result of such planning, in many cases, will be newly-formulated performance strategies, strategies that are more task-appropriate than those that were in use prior to the group's review

of its norms about performance processes (see, for example, Hackman, Brousseau & Weiss, 1976).

Summary. Three design factors have been proposed as useful points of intervention for facilitating the work effectiveness of self-managing work groups. The design factors were viewed as differentially potent in affecting three interim criteria of work effectiveness. Specifically, as shown in Figure 3:

1. The level of effort members bring to bear on the group task is affected primarily by the design of the group task itself.
2. The amount of knowledge and skill available for task work is affected primarily by the composition of the group.
3. The task-appropriateness of the performance strategies used by the group in carrying out its work is affected primarily by group norms about performance processes.

The off-diagonal cells in Figure 3 are not vacant. Performance strategies, for example, may also be affected by cues in the group task, or by the composition of the group (through the predispositions about strategy brought by different members); similar effects can be imagined for effort and for knowledge and skill. The point is simply that the most potent influences of the design factors on the interim criteria--and therefore the most useful points of intervention--are those indicated by the shaded diagonal cells in the figure.

Moderators of Group Effectiveness

As shown in Figure 2, the link between the interim and the final criteria of group effectiveness is moderated by two factors: the work technology with which the group deals, and the interpersonal processes that take place in the group.

INTERIM CRITERIA

	Effort	Knowledge and Skill	Performance Strategies
Group Task Design	/		
Group Composition		/	
Group Norms			/

DESIGN FACTORS

Figure 3. Points of Intervention for Improving Work Group Effectiveness: Relationships between the Design Factors and the Interim Criteria

Work technology. By technology is meant "the complex of physical objects and technical operations (both manual and machine) regularly employed in turning out the goods and services" of an organization (Blauner, 1964, p. 6). The technology with which a work group deals affects the salience of the three interim criteria in determining overall group effectiveness. That is, for some technologies, most of the variation in overall group effectiveness is determined by the level of effort the group applies to the task. A straight-forward group assembly task in industry, where the pace of the work is controlled by the group itself, is an example of such a technology. In that case, effort is of high salience in determining group effectiveness, because overall group effectiveness covaries substantially with the amount of effort expended by the group.

For other technologies, of course, other interim criteria are more salient in affecting overall performance. The point can be stated more systematically as follows:

$$\text{Overall Group Effectiveness} = S_1 \begin{bmatrix} \text{Level of} \\ \text{Effort} \end{bmatrix} + S_2 \begin{bmatrix} \text{Amount of} \\ \text{Knowledge} \\ \text{and Skill} \end{bmatrix} + S_3 \begin{bmatrix} \text{Appropriateness of} \\ \text{Task Performance} \\ \text{Strategies} \end{bmatrix}$$

where S_1 , S_2 and S_3 are the technologically-determined saliences of the three interim criteria.

How, then, does the technology enhance or depress the salience of the interim criteria? While systematic research and theory on the question has not yet been done, one possible answer is that salience is determined by the degree to which the technology constrains the variation of each of the interim criteria, as follows:

$S_1 = 1$ - degree of technological constraint on effort

$S_2 = 1$ - degree of technological constraint on performance strategy

$S_3 = 1$ - degree of technological constraint on knowledge and skill.

Thus, if one of the interim criteria is totally constrained by technological factors, it cannot be salient in determining group effectiveness for the work being done. The interim criterion, in such circumstances, is under the control of the technology rather than the group. So long as the technology remains relatively constant, variance in the interim criterion will be severely restricted, which means that it cannot have much causal impact on overall group effectiveness. On the other hand, if the technology places no constraint whatever on one of the interim criteria, it can have a substantial effect on how well the group performs its task. And when all three interim criteria are generally unconstrained by the technology, which is the case for many types of group work in organizations, all will have salience in affecting how well the group does.

A first cut at identifying the measurable features of technology that constrain each of the interim criteria follows:

1. The salience of effort is constrained by the degree to which work inputs are technologically controlled. When work is machine-paced, for example, the work group is in a reactive stance, and the relationship between effort and performance effectiveness is severely restricted--because the group is unable to exert control of its output by working especially hard. When, on the other hand, the technology is such that a group can work proactively at whatever pace it chooses (e.g., in group production where materials and equipment are available and sufficient) then effort will be a highly salient determinant of overall group effectiveness.

2. The salience of strategy is constrained by the degree to which performance processes are technologically determined. When, for example, work procedures are fully programmed, the relationship between performance strategy and group effectiveness will be restricted--because the group has little or no

control about the strategies used in work on the task. On the other hand, when the work is unprogrammed there is a great deal of "room" for the group to alter its performance strategies, and strategy will be a salient determiner of group effectiveness.

3. The salience of knowledge and skill is constrained by the degree to which performance operations are simple and predictable, versus complex and unpredictable. When task performance requires routine use of skills that are well-learned in the general population, then knowledge and skill will be highly constrained as a determiner of group effectiveness. But when the technology requires sophisticated or complex skills to be used on unpredictable occasions, then knowledge and skill will be unconstrained and of high salience in determining how well the group performs.

Some technologies are unconstrained for all three of the interim criteria. A group charged with development of a marketing plan for a new product is in such a position: the place of work is at the discretion of the group, task performance procedures are unprogrammed, and the work requires complex skills to deal with considerable uncertainty and unpredictability in the environment. For other technologies, all of the interim criteria may be constrained. For a group working on a mechanized assembly line, for example, task inputs are machine-paced, assembly procedures are completely programmed, and the performance operations are both simple and highly predictable. In such a situation, the fact that there is a work "group" is of little meaning or importance, because no matter how the group is designed it can do little to increase its own work effectiveness.

Most technologies will not have such clear-cut constraints as those described above, and instead will be relatively constrained on some interim criteria and relatively unconstrained on others. Consider, for example, the

technology involved in the work done by a team of surgeons. There is little constraint regarding the use of knowledge and skill by work group members, and a moderate amount of constraint on strategy (some, but not all, procedures are specified) and on effort (some, but not all, task inputs drive from the nature of the surgical problem that is being dealt with and the responses of the patient as the operation progresses). In this case, all three interim criteria are salient--but one more than the other two. And, following the logic of Figure 2, one would wish to attend most carefully to the composition of the surgical team (because composition as a design factor strongly affects the most salient interim criterion--knowledge and skill).

In summary, it has been proposed that the nature of the work being done by a group--the work technology--affects which of the interim criteria are most salient or important in influencing the overall effectiveness of a work group. This suggests that there is no single approach to the design of a self-managing work group that will be generally appropriate for groups that deal with different work technologies. Instead, the design factors that serve as points of intervention for creating or redesigning a work group will be differentially useful, depending on the nature of the technology with which the group must deal.

Interpersonal processes. The second moderator of work group effectiveness shown in Figure 2 has to do with the kinds of interpersonal processes that take place in a work group. It was argued earlier that much of the variation in how well a work group performs is controlled by how well that group is designed, specifically in terms of its task, composition, and norms about performance strategy. Within a given design, however, the interpersonal processes that take place among group members can either impair or enhance

group effectiveness.

Group effectiveness is impaired when the interaction among members creates process losses--i.e., group members relate to one another in ways that lead to inefficiencies or errors in their task behavior. Effectiveness is enhanced when the interaction leads to a process gain--i.e., a synergistic effect, in which the interaction among members leads to levels of efficiency or effectiveness that exceed what would be obtained by summing the inputs of individual group members.

The nature of the process losses likely to be encountered by a group, and the special opportunities of a group to generate process gains, depend largely on the kind of work being done. Listed below are some of the process losses and process gains that are likely to be of particular significance for each of the three interim criteria discussed in this chapter (cf. Hackman & Morris, 1975).

1. When effort is salient:

Process Loss: Members fail to coordinate their efforts in applying them to the task, resulting in a "coordination decrement" (Steiner, 1972).

Process Gain: Members develop strong commitment to each other and to the group that increases the amount of effort they are willing to expend in task work.

2. When knowledge and skill are salient:

Process Loss: The group imperfectly assesses and weights the inputs of members who have differential task-relevant talent.

Process Gain: Members share uniquely-held knowledge and skill, and cooperate to gain new learnings--thereby increasing the total pool of talent available to the group.

3. When performance strategy is salient:

Process Loss: Members imperfectly assess task requirements, and implement task-inappropriate strategies.

Process Gain: Members invent new or creative ways of proceeding with work on the task.

The implication, then, is that interventions intended to help self-managing work groups improve their internal processes might usefully be focused on the potential process losses and gains that are of special salience for the kind of work the group is performing. Indeed, an intervention focused on a non-salient aspect of the group process might do more harm than good, in that it could direct the attention and energy of group members away from issues of particular importance for their task and toward phenomena that in fact could have little impact on the eventual effectiveness of the group. It would be inappropriate, for example, to intervene to help members become more competent at sharing their special skills with one another (a not uncommon type of process intervention) if effort (rather than knowledge and skill) were the sole salient interim criterion for the technology being dealt with by the group.

Conclusion

The conception of self-managing work groups presented in the preceding pages is both less complex and more complex than other treatments of work group behavior and effectiveness. It is less complex, in that it focuses on a relatively small number of focal variables, each of which is assumed to control considerable variation in overall group effectiveness, and each of which is potentially open to planned change. It is more complex, in that neither the design factors nor the variables proposed as moderators have direct effects on group performance outcomes that are constant for all circumstances.

The present conception is consistent with a diagnosis-based approach to the design and maintenance of self-managing work groups. This approach would begin with assessment of the imperatives of the work technology, to identify the interim criteria that are most salient for the group being dealt with. Then would follow exploration of the usefulness of the three design factors in improving the standing of the group on the salient interim criteria. And

finally the interpersonal processes of the group would be assessed, with special attention given to identifying process losses likely to be experienced, and to opportunities that might be present for the group to achieve process gains as members work together on the group task.

The particular action steps called for on the basis of diagnostic exploration will, of course, vary from group to group and from technology to technology. The point is that there is no single best way to design a self-managing work group, nor a single type of process intervention that will be helpful to all such groups. Instead, the design factors and the process interventions that are likely to be of the greatest help to a given group depend upon the interim criteria that are most salient for the work being done by that group.

Managing Work Groups in Organizations

The material presented above has focused exclusively on the design of self-managing work groups, and on the maintenance of effective internal group processes. Yet it must be emphasized that work groups do not operate in an organizational vacuum: how such groups are managed, and the nature of the organizational context within which they function can have important implications for their long-term viability and task effectiveness--even if their internal design is excellent. In this section, we briefly review some of the major factors external to the group itself that can affect how self-managing work groups develop and function.

Reward and Control Systems

In almost every case in which self-managing work groups have been successfully created in organizations, pay systems have been arranged so that members are paid contingent upon the performance of the group as a whole, rather than in terms of the relative level of performance of individual employees. A group-based compensation arrangement increases the chances

that internal cooperation and cohesiveness will improve as members work together to obtain the group-level rewards. Moreover, dysfunctional group interaction that grows from the fear (or the fact) of pay inequities among members can be reduced when compensation is tied directly to the output of the group as a whole (Lawler, 1977).⁶

The same line of reasoning applies to performance objectives that are set for self-managing work groups, and to organizational feedback and control systems that are used to monitor achievement of such objectives. In general, when a group accepts a moderately difficult performance objective, and has available to it feedback regarding its progress toward achieving that objective, group performance will be enhanced (Zander, 1971). Yet if such external motivational devices are instituted for a group that has a poor internal design, then there may be little improvement in overall group effectiveness--or even a performance backlash. The reason is that the external incentives to good performance may be neutralized by motivational disincentives or process difficulties that arise from a faulty design of the group itself. So once again the conclusion is that first priority must be given to the design of the work group--with external rewards, objectives, and control systems serving a supportive role. By themselves, such external devices probably cannot compensate for a group design that is inherently inappropriate for the kind of work being done.

Managerial Roles

It is clear that self-managing work groups must be provided with substantial autonomy in carrying out the group task and in managing internal group processes if such groups are to be task-effective and internally healthy over the long term. Just as "pseudo-participation" in organizations may be worse than no participation at all, so it is that autonomous work groups should not be formed

unless there is reasonable assurance that the result will not be a potentially-frustrating state of "pseudo-autonomy." This, of course, requires careful attention to issues of management and supervision, to ensure that managers are both willing and able to provide the group with sufficient real autonomy to carry out the work assigned to it (cf. Gulowen 1972).

Moreover, what the manager does on the job after self-managing work groups have been formed may become problematic. No longer does the manager have on-going responsibility for the work behavior and productivity of individual employees, and it is not unusual for a manager in such circumstances to feel that his or her own status has been compromised, and that the meaningfulness of the managerial job has been stripped away.

One possibility for dealing with this problem is for the manager to move from managing what goes on within the boundaries of a group to helping the group manage those boundaries themselves. Thus, the manager would assist the group in liaison with other groups, and serve as the advocate of the group with higher management--leaving to the group itself routine decision-making about the work and the management of work crises. Moreover, the manager might become something of a process consultant to the group, helping members meld themselves into an internally healthy and task-effective team.

The role is not an easy one, however, and such activities may require skills that are not familiar to or well-practiced by the manager. Moreover, there is inherent conflict in a managerial role that requires the occupant to exercise real authority in managing a group and simultaneously to serve as a process consultant to it. For these reasons, it would seem essential to give special attention to both the role and the person of the first-line manager when self-managing work groups are created, and especially to provide managers with the opportunity to learn new managerial skills that they will

need in their new leadership roles.

The Structure and Climate of the Organizational Context

When designed according to the principles suggested in this chapter, a self-managing work group will be inherently "organic" (as opposed to "mechanistic") in character. If the organizational context surrounding such groups also is organic, then self-managing work groups should find nurturance and support in the environment: flexibility among units would be valued, authority would be located relatively low in the organization and at the site where decisions are made and work is done, and rules and procedures would be viewed as less important than doing what needs to be done to complete organizational tasks successfully. In a mechanistic system, on the other hand, a self-managing work group might repeatedly run afoul of organization policies, procedures, and values. With decision-making and planning the clear prerogative of management, and consistency and regularity highly valued, predictions about the future of even a well-designed self-managing work group would not be optimistic. Instead, it would be expected that the group would have a relatively short and troubled life--or that the group would become congruent with the surrounding system, and survive by becoming as rigid and as mechanistic as that system.

One specific aspect of the organizational context that has special relevance for self-managing work groups is the nature of the relationships among work groups in the organization. There are two schools of thought on the matter. One is that healthy competition among groups should be encouraged, because competition increases the motivation of group members to perform well. The other is that the risk of dysfunctional consequences from competition is too great to tolerate--and that instead organizations should be structured so that work groups are interdependent with one another. While this strategy should lead to better communication between and coordination among groups, it

runs the risk that the boundaries of individual groups (perhaps especially newer or weaker ones) will become excessively permeable, with a resultant loss in the internal integrity of the separate groups.

Clearly more research on inter-group relations and on boundary maintenance of self-managing work groups is needed. At present, perhaps all that can be said with confidence is that the strength of group boundaries--and the way relationships are managed across boundaries--will have important effects on what happens both within the separate groups, and in the larger organization (cf.. Alderfer, 1977).

Individual vs. Group Work Design: Which When?

The choice between designing work for individuals or for groups is complex, and in many cases depends on factors idiosyncratic to a given situation. In general, however, a group-based design seems indicated when one or more of the following conditions is present.

1. When the product, service, or technology is such that meaningful individual work is not realistically possible (e.g., when a large piece of heavy equipment is being produced). It often is possible, in this instance for a group to take autonomous responsibility for an entire product or service--while the best possible job design for individuals would involve only small segments of the work. In such cases, the motivating potential of even the best-possible individual job would be constrained to a relatively low level.

2. When the technology or physical work setting is such that high interdependence among workers is essential (cf., the concept of "technically required cooperation" proposed by Meissner, 1969). For example, Susman (1970) has suggested that one effect of increased automation (especially in continuous process production) is to increase interdependence among workers. The creation

of autonomous work groups under such circumstances would seem to be a rather natural extension of the imperatives of the technology itself.

3. When individuals have high social need strength--and the enrichment of individual jobs would run significant risk of breaking up existing and satisfying groups of workers. In such cases (assuming technological and other considerations are appropriate) designing work for teams would capitalize on the needs of employees, whereas individual-oriented job enrichment might require that employees give up important social satisfactions to obtain a better job. Some people might be reluctant to make such an exchange (Reif & Luthans, 1972). There is, however, some risk present when members of self-managing work groups are all high in social needs, especially when these individuals also are relatively low in growth need strength. In such a case, there is a possibility that individuals will use the group primarily as a setting to obtain social satisfactions. Even if the task were very high in inherent motivating potential, such individuals might find the group itself so much more involving than the task that productivity would suffer.

4. When the overall motivating potential of employees' jobs would be expected to be considerably higher if arranged as a group task rather than as a set of individual tasks. Probably in most cases the motivating potential of a job would increase if the job were designed as a group task, simply because a larger piece of work is possible for a group than for an individual. This should not, however, automatically tilt the decision toward group work design, because of the difficult interpersonal factors that must be attended to in effectively designing work for interacting groups. When the expected benefits are commensurate with the costs and risks of implementation, then a group design would be called for--but only then.

On the other hand, there are a number of circumstances that seem to call

for work to be designed to be done by individuals, working more-or-less independently on motivationally well-constructed tasks. These include:

1. When individuals have high needs for personal growth and development, but relatively weak needs for meaningful social relationships at work--or, as is sometimes the case, a strong antipathy for working in groups. Such individuals would find it difficult to generate the considerable energy required to develop an effectively-functioning group, because the personal benefits of group membership would not be sufficiently great.

2. When there are strong prospects that high and dysfunctional conflict will emerge either within or between work groups. As noted earlier, within-group conflict sometimes develops when there are marked differences in skills held by individual employees--especially when those skill differences are correlated with demographic factors such as age, race or sex. Between-group conflict often develops when groups are at different levels of status in the organization, are in competition for resources or for rewards, and/or are organizationally positioned so that complete and undistorted communication from group to group is difficult. Because such conflict can be destructive both to task effectiveness and to the people involved--and because working through conflict can be very demanding of time and energy on the part of all parties involved--self-managing work groups should be created with considerable caution when the seeds of destructive intra- or inter-group conflict are evident beforehand.

3. When there is no natural interdependence among the people who would be members of the work group. If individuals are considered a "group" only because they perform the same function, or report to the same manager, then the prospects of developing a meaningful self-managing work group may be slim (e.g., a number of telephone installers who operate their own trucks,

coordinating only with a central dispatcher, or a group of flight attendants who travel so much that they see each other and their supervisor infrequently). There would seem to be no task-based reason for forming work teams in such circumstances, and enrichment of individual jobs (or formation of inter-departmental teams of people who do work in close physical and temporal proximity) would be the better alternative.

4. When the behavioral science sophistication of those charged with carrying out the design (or redesign) of the work is not high, and/or when the managerial competence of those who supervise the work is low. As indicated above, designing work for groups is demanding--not only of energy and commitment, but also of behavioral science sophistication and managerial skill. If such talent is not readily available in the work setting, it might be advisable to opt for individual task design--which, although not a routine undertaking, is at least less likely to stretch the competence of managers and consultants quite as far. While some "stretching" is of course necessary for people to increase existing skills and learn new skills, such learning is unlikely to take place if the difference between present competence and project-required competence is too great.

Perhaps of special importance in this regard is the degree to which use of self-managing groups to carry out the work of an organization is consistent with the organizational values and philosophy of top management. The device of the self-managing work group moves control of the work being done downwards in the organization--a move that is sometimes at odds with the views of top management about how organizations should function. In such cases, it may not be advisable to proceed with the creation of work groups unless and until top management can understand the full implications of such groups for organizations functioning--and can accept that the creation of self-managing work

groups may lead to significant changes in how control is exercised within the organization.

Conclusion

What has been attempted in this chapter is a relatively general treatment of factors that influence the effectiveness of self-managing work groups. The emphasis has been on a small number of variables and intervention strategies, each of which has been viewed as controlling considerable variance in work group effectiveness. The position taken in the chapter does not deny that idiosyncratic design issues and interpersonal problems may arise in groups that have special or unique tasks--such as the development of a highly creative advertisement, the establishment of organization-wide policy by a group of top managers, or the conduct of research by an interdisciplinary scientific team. Because such groups may have unusual task and interpersonal problems, they may require design features or process interventions that are specifically focused on those problems--and that extend beyond the general kinds of design and process variables considered in this chapter. It is maintained, nonetheless, that even such special types of groups, if they are to perform well, must meet the basic criteria for effective group design and interpersonal process that have been proposed here.

Overall, there is much to be said in favor of the creation of self-managing work groups in organizations. They can be motivationally advantageous, and it is a truism that more task-relevant resources are brought to the work by a group than by an individual performing the same task. Yet the material reviewed in this paper suggests that the device of the self-managing work group is far from a panacea for the solution of organizational problems. In the first place, such teams are not always technologically or motivationally appropriate, and attempting to create them by force in an environment where

they do not really fit is a sure route to organizational difficulties. Moreover, it is usually very difficult to create and maintain such groups-- more difficult, for example, than individual job enrichment, which itself has been shown to be a more substantial undertaking than often is suspected (Hackman, 1975).

So the message of this paper favors rather conservative use of self-managing work teams in organizations, despite their high overt attractiveness, at least until such time as more and better research on the determinants of what happens within such groups becomes available--and until better understanding is generated about how most effectively to install and maintain them.

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FOOTNOTES

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2. For present purposes a work group is considered effective if it meets the following criteria: (a) group task performance meets or exceeds acceptable levels of quantity and quality; (b) the group experience serves more to satisfy than to frustrate the personal needs of group members; and (c) the social processes used in carrying out the work maintain or enhance the capability of members to work interdependently on subsequent group tasks.
3. See, for example, Bucklow, 1966; Davis, 1966, p. 44; Davis & Trist, 1974; Gulowsen, 1972, pp. 375-378; Trist et al., 1963, Ch. 9. An informative and succinct statement of the principles of sociotechnical design on which such applications are based is provided by Cherns (1976).
4. Scores on the job characteristics can be obtained using the Job Diagnostic Survey (Hackman & Oldham, 1975), an instrument designed specifically to measure the concepts in job characteristics theory. The JDS scores for each characteristic range from 1 to 7; therefore, the MPS of a job can range from 1 to 343.
5. It also is true, of course, that the level of effort a group expends in carrying out its work is affected by the relationships among group members, and by aspects of the organizational environment (such as the

reward system, performance objectives that the group may have accepted, supervisory expectations, and so on). But the focus here is on factors intrinsic to the design of the work group that influence the standing of a group on the interim criteria of effectiveness; the role of interpersonal and extrinsic factors, including managerial behavior and reward systems, will be addressed later in the chapter.

6. It should be recognized, however, that a group-based reward system does not necessarily solve all problems of pay equity among group members--especially for groups whose members were differentially skilled and differentially paid at the time the group was formed. In such cases it may be necessary both to tie overall rewards to the performance of the group as a whole, and to help the group devise an equitable internal means for distributing those rewards among members.