A THEORETICAL MODEL OF TECHNICAL PROFESSIONALS IN WORK TEAMS

DISSERTATION

Presented to the Graduate Council of the University of North Texas in Partial Fulfillment of the Requirements

For the Degree of

DOCTOR OF PHILOSOPHY

By

Susan Tull Beyerlein, B.A., M.S.
Denton, Texas
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Research concerning technical professionals in team-based work environments is scarce. A two-stage study was conducted which examined role strain and its correlates among technical professional employees in team settings in 14 companies in the United States and Canada. A questionnaire was constructed based on the results of interviews with engineers and managers, and the analysis of pilot sample data. Five-hundred and forty-two technical professional employees in engineering, information systems and other professional specialties in companies undergoing organizational redesign completed the questionnaire.

Variables of interest included autonomy, career commitment, co-worker social support, general job satisfaction, job involvement, job-related tension, organizational commitment, role ambiguity, role conflict, role overload, turnover intent, and work locus of control. A theoretical confirmatory model was hypothesized and tested using structural equation modeling methods. Based on modification indices, a revised model was generated which produced moderately good fit indices.
Findings suggested that in organizations undergoing redesign to team-based structures, technical professional employees with internal locus of control are more committed and likely to stay, and they are perhaps more comfortable in the general chaotic states typically generated by redesign initiatives. Positive exchanges with co-workers seem to provide valuable information for dealing with role stressors and other sources of stress, and appear to positively influence the level of general job satisfaction among technical professionals.

In addition, role overload was found to be a positive predictor of job-related tension and role conflict, and appeared to have a negative influence on general job satisfaction. General job satisfaction related positively to career and organizational commitment, and negatively to turnover intent. General job satisfaction also appeared to moderate relationships that co-worker social support and role overload have with the commitment and turnover variables which suggests a complex model that requires managers to think in more systemic ways. In the future, isolated variables will be insufficient bases for decision making concerning the effective leadership of teams of technical professional employees.
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CHAPTER I

INTRODUCTION

Overview

Since the industrial revolution the design of organizations has slowly evolved toward larger, more complex, efficient, and humane work environments. Self-managing teams represent a form of work design that has recently emerged in United States organizations from the sociotechnical approach to organizational design (Cummings & Molloy, 1977; Trist & Bamforth, 1951) and work group effectiveness theory (Hackman, 1987). Work teams play a central role in what has alternately been described as a management transformation (Walton, 1985), paradigm shift (Ketchum, 1984), and corporate renaissance (Kanter, 1983). Illustrative of this management revolution, self-managing work teams contrast sharply with more traditional forms of management; their key feature is a high degree of self-determination by employees in the form of decision making power and self-control over group tasks and outcomes (Cummings, 1978; Hackman & Oldham, 1980).

To date, the primary thrust of research in this area has been in the form of field studies which were focused on the isolation of team development variables that influence team effectiveness, such as interpersonal processes, norms,
cohesion, and roles operating within the work group (see Miller & Monge, 1986, for a meta-analytic review of such studies). The literature on team-based work designs promises work environment improvements for team members; however, few studies have examined relevant person- and organizational-level variables within a multivariable framework.

In general, the move to self-directed work teams in the United States has been motivated by attempts to regain the country's competitive edge. Companies are often charged with making the change by corporate headquarters which are geographically and psychologically removed from the work site. This type of action may reflect a major incongruity that is passed down through the ranks, leaving managers with the formidable task of changing, at a root level, the political, cultural, and technical requirements of the organization, without the necessary skills, perspectives, tools, and so forth to bring about such massive changes.

In addition, traditional, old-style directives tend to negate the egalitarian spirit and values inherent in the proposed changes. What is evident instead is the appearance of new value systems and ways of working together in the myriad of planning documents produced by various operating levels in the organization (e.g., customer service initiatives, work group mission statements and operational procedures, interdisciplinary sales management team action
plans, etc.). However, these products often appear without the true commitment (or "buy in") of upper management and, thus, without the root cultural support necessary to support such initiatives in the long run. Therefore, it is imperative that those responsible for the implementation of major work redesign programs at all levels of an organization become aware of the personal and organizational processes of implementation, including underlying cultural assumptions, values, and operating procedures in order to ensure ultimate congruence with the professed content of such programs.

**Practical Basis for the Proposed Research**

It appears from conversations with practitioners in the field and a survey of the literature that many organizations in the transition phases of implementing self-directed work teams in a redesign fashion are operating in a somewhat schizophrenic fashion. That is, the operative (production) level is functioning in self-directed work teams, but upper management is still operating in traditional ways. And, it is midline managers (e.g., engineering and information systems managers) who experience the incongruency most strongly. This is because midline managers are faced with the daunting task of buffering two very different modes of operation, a common dilemma for mid-level managers.

Technical professional support personnel, on the other hand, face two additional severe problems. Traditionally,
as staff personnel, their lack of line authority has left them powerless to directly affect needed changes. Second, their professional training and technical expertise pose a special problem because they are not easily integrated into the self-managing environment. Professional training tends to prepare individuals for highly autonomous, rather than team-based positions. In addition, part of the professional socialization process entails development of loyalties to the profession (embodied in professional associations, codes of ethics, sanctions) outside the particular organization.

These personal and organizational constraints make technical professional support personnel a particularly interesting group for study. They appear to be operating in a sort of netherland contiguous to the operative and management levels; that is, they have institutionalized dealings with both. Yet they defy easy classification or movement into self-managing structures. Thus, they are likely to experience the clash of frames of reference more strongly than the other groups that are somewhat insulated through their day-to-day involvement in either the operative or management domains away from the boundary of change (Smith & Gemmill, 1991).

Those involved in the change process are faced with the problem of integrating these individuals into team-based systems. Interventions in the field have included moving technical professionals into existing operative teams,
forming separate professional teams by function that are available in an advisory capacity to floor operations (e.g., discrete teams of engineers, maintenance and material personnel, etc.), creating interdisciplinary lateral process teams which are product oriented but utilize technical professionals in a similar consultive fashion (e.g., product teams), and, as a last resort, transfer of personnel to other non-team-based areas of the operation at their request.

Technical professional personnel offer a unique window on the myriad of ideological and practical contradictions inherent in the shift to self-management. Therefore, the general focus of this study was to explore the perspectives of these individuals with the intent of gathering information which could be utilized to understand and improve the transition process for these individuals and entire organizations. A theoretical model of technical professionals in self-managing work teams was developed and tested as a way of codifying this information and making it potentially useful for future theory development and practical applications in the field.

**Theoretical Basis for the Proposed Research**

A successful, massive, work redesign program of this nature is potentially more powerful if securely grounded in a theoretical base. Tichy's (1983) three-part framework, i.e., technical, political, cultural, is a useful
ideological starting point. Technical change ideas are rooted in two historical research streams: (1) socio-technical systems design, which emanated from the Tavistock studies of the 1950s and 1960s, and (2) the quality-of-worklife studies of the 1960s and 1970s, the most recent and central theoretical perspective being Hackman and Oldham's (1980) ideas concerning work redesign. Cohen (1993) suggests that, from the sociotechnical theory perspective which focuses on self-regulation among technical and social factors in the work environment, self-managing work team effectiveness hinges on performance, quality, and productivity issues. Whereas, Cohen (1993) suggests that in using Hackman's (1980) Job Characteristics Theory, which is a motivation theory, as the primary lens, the chief effectiveness indicator is employee satisfaction (i.e., job, group, growth, and social). The point is that these differing theoretical perspectives yield very different hypotheses about what constitutes work team effectiveness.

Tichy's (1983) early mention of the political and cultural perspectives has gained momentum over the years. These perspectives have attained the status in organizational theory circles as the new organization design imperatives (Ott, 1989), following age, size, technology and environment. A central political issue of importance in self-managing work transitions is the autonomy/control paradox, and the concomitant issue, managers' fear of loss
of control. The related issue of empowerment involves dissemination or sharing of information that has traditionally been the private domain of the management ranks (e.g., cost information). This leads directly into the issue of trust ("can we trust operatives with proprietary information?"), as well as a rethinking of the value of the individual to the organization, the meaning of work, and cooperative effort. Participatory Action Research (Elden & Levin, 1991), which is discussed in greater detail in Chapter II, embodies the core ideals that are necessary for self-management to succeed.

The cultural perspective involves the management of meaning, a task which has traditionally been ascribed to upper management in the literature (e.g., Hambrick & Mason, 1984). The change to self-management necessarily involves a fundamental paradigm shift yielding a move from unilateral directives to what Shapiro and Carr (1991) call the negotiated interpretative stance, or collectively agreed-upon meanings. More specifically, the traditional, authoritarian, command and control style of management must be supplanted with egalitarian (Srivastava & Cooperrider, 1986), collaborative modes of relating and the implicit, underlying assumptions about individuals and work which support the shift (Theory Y was an early forerunner). It appears that a clash of paradigms also exists between the old style, new style, and professional
socialization/loyalties. These conflicting management styles and belief systems reflect the differing ontological realities of organization members (i.e., ways of being in the workplace and world) that are difficult to change. They index deeply held value systems, habits (behaviors), and beliefs about responsibility, loyalty, teamwork, and competence.

One process that has the potential for integrating the technical, political, and cultural perspectives is a focus on flexible learning styles. Particular illustrations from the literature include various theories of self-reflection (Mezirow, 1991), co-inquiry (Srivastava & Cooperrider, 1986), and co-generative learning (Elden & Levin, 1991). For example, self-reflection is operationalized at Xerox Corporation through the expectation of what is known as process documentation. Teams are expected to document their operations and reflect on mistakes in order to learn how to improve their processes. This is tied into the reward system in that employees are rewarded for improvement beyond target levels.

This emphasis of reflection on past actions, which illustrates Argyris’ (1982) double-loop learning idea, is congruent with Elden and Levin’s (1991) co-generative learning model which focuses on a collaborative learning process among local experts (e.g., individuals in the organization) and outside consultants, investigators, and so
forth. These authors remove the expert orientation assumed by outsiders or insiders (managers) in favor of an egalitarian endeavor where those in the problem field capitalize on internal wisdom (experience) to arrive at workable solutions to the organization’s problems. Thus, Elden and Levin level the power differential of traditional hierarchical systems in favor of a collaborative, problem-centered endeavor aimed at learning more effective ways of utilizing personal and organizational resources at hand (i.e., what employees already know about the system). The manager’s role in the successful transition becomes one of facilitator or guide rather than order giver.

This stance, harnessed organization-wide, can yield a shift from static, habitual, routine kinds of performance to a focus on self-regulating processes that promote interdependencies throughout the entire system and therefore enhance the viability of the organization as a whole. From this perspective, interchange is actively sought and promoted between organizational subsystems (i.e., operative work groups, staff units, and various levels of management). Related manifestations of this fundamental shift in perspective include both interdisciplinary team development and mandated accountability for results at all system levels. For example, George Wibben, Worldwide Manager of Customer Service Strategies for Xerox, as a "staffie," deliberately makes himself accountable for the same outcomes
for which his trainers are held responsible. He says that at Xerox, "being a good trainer" is no longer enough. All personnel are responsible for and evaluated on bottom line results such as customer satisfaction and the ratio of assets to expenses (G. Wibben, personal communication, July, 1991). Thus, at Xerox, as well as in other organizations, there appears to be the ethos operating that "we're all in this together," that is, an accepted sense of "system connectedness" which infuses the very fabric of the organization as expressed in performance expectations and reward contingencies.

Statement of the Problem

The implementation of self-managing work teams requires a radical change in job and organizational design, away from traditional work structures. Designing a plant around teams requires a shift in perspective for many managers and employees toward more extreme forms of socio-technical design. Although an increasing amount of evidence suggests that the shift pays off for both the employees and the company, technical professional employees are likely to resist the change because of a redefinition of their jobs and, therefore, their experience of being (i.e., ontology) in the organization.

This situation indexes a systems-wide problem, the underlying clash of paradigms between traditional management styles and the initiatives of participative frameworks such
as those proposed in the self-managing work team environment. Deeply held values and belief systems are manifested in the relationships among members of transitional and traditional organizations, particularly among members whose roles and performance expectations are ambiguous. Technical professional personnel tend to experience heightened role ambiguity because they are often not as well-insulated from the boundary of change as are individuals at the upper or lower levels of the organization (i.e., in either the strong team-based culture of the shop floor, or in managerial routines of traditional upper management circles).

Technical professionals, as well as midline managers, tend to operate closer to the ideological fray between conflicting paradigms that may exist and, in addition, bring a third perspective, elements of professional socialization. This is particularly evident in the case of engineers, who are trained to become members of the engineering profession, information systems personnel, and, perhaps to a lesser degree, to quality and purchasing personnel who identify with fields that are gradually taking on more of the characteristics of traditional professions. Thus, these groups can be construed as problematic to the organization involved in transition because they are not easily integrated into the team culture for various reasons. On the other hand, by virtue of the fact that they do not
assimilate easily, these individuals represent a rich resource for capturing the conflicting underlying belief systems within organizations. The fact that a model of technical professionals in teams does not exist in the literature provided the opportunity and focus for this study. Therefore, a complex set of multivariable interrelationships within a theoretical framework was proposed.

**Purpose of the Research**

The purpose of this research project was to develop and test a theoretical model of technical professionals in self-managing work teams using a number of constructs that have not been tested with this population. The overall aim was to begin to humbly fill a significant gap in the research literature focused on self-managing work teams. The rationale for the need to address technical professional perspectives in team settings is discussed in the following section.

**Significance of the Research**

Teams are rapidly spreading throughout organizations including professional groups. However, research on the role of technical professionals in team-based environments is scarce. In addition, while a well-developed body of literature exists on participation in organizations, theoretical models of the participation-satisfaction relationship are lacking in the self-managing work team
context. The bulk of small group research rests on the assumption that the group is a closed system (Sundstrom, DeMeuse, & Futrell, 1990). From a systems theory perspective (e.g., see Miller, 1978), this is an inaccurate assumption because all systems are viewed as subsystems of larger systems (in this case, the technical professional unit is an open subsystem embedded in the larger context of the organization).

Researchers are beginning to move away from the study of internal group processes to an emphasis on contextual factors within the larger system that influence group effectiveness (Sundstrom et. al., 1990). Mohrman, Cohen, and Mohrman (1992), in a recent study of several high technology companies, isolated five design features that contribute directly to organizational effectiveness: decision-making processes, measurable goals, human resource allocation, job identity, and pay for performance. Sundstrom, et al. (1990) identified autonomy as yet another contextual variable needing empirical verification. This variable is examined in this study.

Of particular importance in organizational redesign are the responses of technical professional employees to a team-based approach within the organization. For example, members of human resources management (personnel) departments are likely to find their jobs radically changed as work teams increasingly make decisions regarding employee
selection, compensation, and training, functions that have traditionally been part of their domain. Engineers and other specialists may suddenly find themselves dispersed throughout the organization as team members when they have been accustomed to working relatively independently. This type of arrangement may foster a myriad of intense reactions including feelings of insecurity, loss of autonomy or control, confusion, and resistance to change.

The study of technical professionals was important for a number of additional reasons. First, from a purely research perspective, a number of contextual variables were incorporated which have not been previously studied and which may influence the participation-satisfaction relationship. These variables were autonomy, social support, role conflict, role ambiguity, and role overload. Second, reactions and experiences of technical professional employees were examined rather than operative work teams, which have been the focus of most recent research in the area of participation in self-managing environments. Third, from a practical standpoint, because United States firms are having tremendous difficulty competing in the global marketplace, and self-managing work teams are increasingly being adopted in various industries as a means of improving organizational effectiveness, research that extends the knowledge of self-directed work structures is critical to future United States competitiveness. Fourth, it is the
investigator’s belief that only through change in individuals’ deeply held assumptions about the nature of work can organizations make positive changes in the marketplace. Thus, a complex set of variables were identified in order to produce a theoretical model of self-managing work teams from the perspective of technical professionals.

**Scope of the Research**

Because of the dearth of empirical research on self-managing work teams, in general, and technical professional personnel specifically, this study focused on the development of a theoretical model of technical professional personnel in self-managing work teams. A variety of industrial settings (e.g. computer, aerospace, electronics, petroleum refining, aluminum processing, and plastics), engaged in self-managing work teams, were available in which to examine pertinent variables. The variables of interest were: level of social support from co-workers, role conflict, role overload, role ambiguity, work locus of control, autonomy, job-related tension, job satisfaction, organizational commitment, career commitment, job involvement, and turnover intent.

**Definition of Terms**

The following definitions were germane to this investigation:
1. **Content analysis** is a methodological procedure for data analysis described as "any systematic reduction of flow of text, that is, recorded language, to a standard set of statistically manipulable symbols representing the presence, the intensity, or the frequency of some characteristics relevant to social science" (Markoff, Shapiro, & Weitman 1974, p. 5).

2. **Ontology** is "the science of being or reality; the branch of knowledge that investigates the nature, essential properties, and relations of being" (Webster’s New Collegiate Dictionary, 1949).

3. A **paradigm** is an example or pattern (Webster’s Third International Dictionary, 1961); "that which we look through rather than look at in viewing the world" (Kisiel, 1982, p. 95).

4. **Technical professional** refers to individuals working in staff positions in specialty areas that provide all or some of the characteristics of the professions, for example, membership in professional societies, professional certification, codes of ethics, advanced educational training and experience prior to entry into the profession or semi-profession. For the purposes of this study, the term technical professional applies to individuals in administration, customer service, development, engineering, facilities, finance, human resources, information systems, marketing, material,
operations, planning, purchasing, quality, real estate, sales, and technical writing and illustration.

**Summary of the Research Method**

A two-phase field study was conducted utilizing interviewing and survey techniques. Phase I involved a grounded theory approach to data gathering (Glaser & Strauss, 1967) for the express purpose of building a qualitative data base to be used in developing a tailored survey of technical professional employees in selected industry work sites. Grounded theory approaches focus on finding what's there rather than the usual positivist test of *a priori* hypotheses. This approach is useful when the literature in a particular subject area is not mature enough to support development of substantive hypotheses. In this phase of the study, the predominant qualitative method used was unstructured interviews. Twenty-five engineers and managers in various specialties were interviewed as a basis for survey development.

The research objective of Phase II was to establish linkages between the previously identified variables. A substantial body of literature exists to support the development of substantive hypotheses regarding some of the variables of interest (i.e., antecedents and consequences of role conflict and role ambiguity such as co-worker social support, autonomy, work locus of control, job-related tension, role overload, general job satisfaction, turnover
intent, career commitment, job involvement, and organizational commitment). Therefore, the development of a theoretical model was possible after an examination of the research literature.

A survey instrument was used to gather data from 542 technical professional employees in 14 companies in the United States and abroad. The sites represented the following industries (number of firms in parentheses): computers, office equipment (3); aerospace (3); electronics, electrical equipment (3); petroleum refining (1); scientific, photographic, and control equipment (1); plastics materials, synthetic resins (1); industrial gases (1); and aluminum processing (1).

Descriptive statistics and reliability coefficients are provided for each variable used in the study. The various scales (variables) used in the study were culled from established instruments in the research literature. Questions were also added included based upon qualitative data collected in Phase I of this study.

Pearson product-moment correlation coefficients were computed among the scales used as variables in the study. Latent variable measurement models were developed to establish validity and reliability of the constructs hypothesized to exist among the technical professionals in a self-managing work team environment. A structural model of the latent variables was then hypothesized to test the
direct and indirect affects using LISREL 8 (Jöreskog and Sörbom, 1993). This involved testing two structural models, a hypothesized model based on variables in the research literature, and a modified model derived from the structural equation model analysis.

Chapter Summary

The focus of this study was the development and testing of a theoretical model of self-managing work teams from the perspective of technical professionals in several industrial settings. The problem highlighted in this chapter, its significance, purpose, and scope, is further elaborated and best understood by examining the pertinent research literature. A survey of the literature relevant to this investigation is presented in Chapter II. In particular, the studies germane to the organizational and individual levels of inquiry, and several interpretive data gathering strategies that provide the value base for this study are examined.
CHAPTER II

LITERATURE REVIEW

Introduction

In this chapter a review of pertinent research literature is presented. The review begins with an exploration of broad systems issues that are organization-wide, such as (1) organization climate and culture, (2) paradigm shifts via second order change, (3) participative management, and (4) systems theory applications. In addition, the increasing influence of knowledge work on work redesign is discussed. In the next section of the chapter, issues at the individual level of analysis such as (1) the probable impact of professional socialization on employees’ adjustment in self-managing work environments, and (2) various antecedents and consequences of role conflict and role ambiguity are addressed. In the last section, three interpretative data-gathering strategies are examined which underpin parts of the study in terms of approach and value systems, that is, grounded theory, participative action research, and critical theory. Hypotheses are then formulated based upon interviews in Phase I, a pilot study, and this review of literature. Finally, a theoretical model of technical professionals in a self-managing work environment is presented.
Organizational Level

In the 1990s, individual behavior in organizations cannot be adequately addressed without examining the larger context in which employees operate. This is the mandate that organization scientists face in moving increasingly toward the realization of a global society in the twenty-first century. The present study is necessarily grounded in a number of systems issues that must be addressed. In any massive redesign program such as that proposed by self-management, organizational culture plays a critical role. The climate and culture of the organization undergoing redesign must necessarily be adaptive and therefore supportive of change. Change processes at the individual level are intricately tied into the predominant culture and involve what Levy and Merry (1986) call second-order change or paradigm shifts. Participative management strategies look at the process from the perspective of individual involvement; whereas, the systems theory framework and its applications (i.e., socio-technical systems design, the special needs of knowledge workers, and work redesign) examine multiple subsystems operating at various levels throughout the organization as well as the environment. Finally, in keeping with the mandate in the literature, this approach also takes into account situational (contextual) factors in the environment that affect the individual (e.g., autonomy, conflicting role directives, etc.). Thus, these
frameworks provide the underlying context for the examination of individual cognitive and affective responses within organizations undergoing massive redesign programs.

Organizational Climate and Culture

The formal study of organizational climate began with Lewin, Lippitt, and White's (1939) research on the creation of authoritarian, democratic, and laissez-faire social climates. The term climate is generally used to refer to interpersonal practices and includes both formal and informal policies and activities in the organization, particularly those that reward safety practices (Zohar, 1980) and innovation (Abbey & Dickson, 1983) among other things (Schneider & Reichers, 1983).

According to Schneider (1985, p. 595) climate research seems "to have died from acceptance"; whereas, studies of organizational culture are currently prominent in academia as well as business and industry. There is little overlap between the two traditions in the literature. Recent culture researchers have generally failed to reference earlier climate studies, and research methods are quite different. Whereas climate studies relied almost exclusively on survey methods (Schneider, 1975) grounded in the psychometric tradition, current culture researchers tend to favor qualitative and case study methods (Gregory, 1983).

Culture is considered to be a deeper construct than climate. Culture researchers attempt to understand the
norms and values that underpin an organization, and give rise to the particular activities and policies. As such, culture research seeks the invisible strata beneath the manifest policies and activities of the organization. The ultimate goal in culture studies is to get at the meanings that individuals attach to organizational policies and activities and the ways meaning is shared throughout the organization (Barley, 1983; Mitroff, 1983). In addition, Riley (1983) suggests that organizations have multiple cultures or subcultures, and Martin and Siehl (1983) have found evidence for countercultures as well.

Mossholder and Bedeian (1983) suggest that organizations cannot be described adequately by studying individuals as the unit of analysis. They believe that, in order to predict organizational behavior, researchers need macro level research methods. In addition, Alderfer (1987) found that at any level of analysis worth studying, the next larger unit in which the behavior is embedded also has impact. For example, an examination of individual behavior that affects an organization should include a look at the group functioning of these individuals as well. This seems to be consistent with systems theory approaches in general and, more specifically, with Sundstrom, DeMeuse, and Futrell's (1990) call for attention to the contextual variables within the organization and environment that influence organizational behavior.
Schein (1990) defines culture as:
(a) a pattern of basic assumptions, (b) invented, discovered, or developed by a given group, (c) as it learns to cope with its problems of external adaptation and internal integration, (d) that has worked well enough to be considered valid and, therefore (e) is to be taught to new members as the (f) correct way to perceive, think, and feel in relation to those problems. (p. 111)

According to Schein (1990), factors that affect the strength and internal consistency of an organizational culture include how stable the group is, the length of time together, the intensity of shared learning experiences, learning mechanisms such as positive reinforcement, and the clarity and strength of founding group members' assumptions. In addition, organizational culture serves to reduce anxiety for group members in much the same ways that defense mechanisms serve individuals. Once shared patterns of meaning are learned, individuals are able to predict events and thus to curb anxiety stemming from novel and therefore unpredictable situations.

According to Schein (1987), there are a number of underlying dimensions of culture which each group (organization) necessarily is faced with defining. These include (1) the organization's relationship to its environment, (2) the nature of human activity, (3) the
nature of reality and truth, (4) the nature of time, (5) the nature of human nature, (6) the nature of human relationships, and (7) homogeneity versus diversity. These fundamental ways of being in an organization (ontology) combine to form an organizational paradigm or world view.

For example, a truly self-managing organization most likely eschews allegiance to the traditional autocratic/paternalistic authority system in favor of a more collegial/participative model (i.e., Schein’s idea of the nature of human relationships) that encourages innovative thinking (Schein’s concepts of homogeneity versus diversity). Or, the nature of human activity may be dictated by a parent company’s unwillingness to yield control, resulting in a passive/fatalistic rather than proactive stance on the part of the subsidiary. If the industry itself is on the decline, as is the defense industry, this certainly has bearing on the organization’s relationship to its environment and other factors.

An understanding of organizational culture is important to the objectives of this study. If, by definition, the essence of organizational culture is the meanings that individuals attach to organizational phenomena, then levels of personal stress, organizational conflict, and tension, experienced among employees engaged in a redesign effort should index, in an indirect way, conflicting meanings or cultures.
Paradigm Shifts via Second-Order Change Processes

In the change literature, the terms planned or managed change refer to deliberate changes made in the organization when experts are involved. Planned change refers to the use of outsiders, such as organizational development consultants, whereas managed change involves organizational managers' planning and implementation efforts. According to Lippitt, Watson, and Westley (1958), unplanned change, such as a fortuitous event or accident, happens outside of the system experiencing the change, whereas planned change is initiated by those within for the express purpose of improving the system's functioning.

Levy and Merry (1986) note four aspects of planned change which express its intentional and actualized character:

1. Planned change involves a deliberate, purposeful, and explicit decision to engage in a program of change.
2. Planned change reflects a process of change.
3. Planned change involves external or internal expertise.
4. Planned change generally involves a strategy of collaboration and power sharing (power derived from knowledge, skills, and competencies) between expert and client system. (p. 4)

Thus, from this perspective, planned change operates on the expert model and the power differential that accompanies that perspective.
A distinction is also made in the literature between first-order and second-order change. Levy and Merry (1986) suggest that first-order change emanates from standard, developmental growth patterns that reflect incremental adjustments and minor improvements to system functioning, and leave the system's core intact. A large number of terms are used in the literature to describe first-order change. These include branch change (Lindbloom, 1959); executive change (Vickers, 1965), vertical change (deBono, 1971), evolutinal change (Greiner, 1971), linear quantitative changes (Putney, 1972), rational change (Grabow & Heskin, 1973), developmental change (Gerlach & Hines, 1973), homeostasis (Skibbins, 1974), first-order change (Watzlawick, Weakland, & Fisch, 1974), alpha change (Golembievsky, Billingsley, & Yaeger, 1976), transition (Hernes, 1976), and single-loop learning (Argyris & Schon, 1978). Related terms include incremental change (Kindler, 1979), momentum change (Miller & Friesen, 1980), normal change (Sheldon, 1980), growth (Carneiro, 1981), minor change (Ramaprasad, 1982), and change (Davis, 1982).

Second-order change (individual or organizational), however, reflects dramatic, discontinuous change. Levy and Merry (1986, p. 5) define second-order change, or organizational transformation, as "a multidimensional, multi-level, qualitative, discontinuous, radical organizational change involving a paradigm shift." Terms in
the literature that refer to second-order types of change include root change (Lindbloom, 1959), policy-making change (Vickers, 1965), lateral change (deBono, 1971), revolutionary change (Greiner, 1972), nonlinear qualitative changes (Putney, 1972), radical change (Grabow & Heskin, 1973; Skibbins, 1974), revolutionary change (Gerlach & Hines, 1973; Ramaprasad, 1982), second-order change (Watzlawick, Weakland, & Fisch, 1974), gamma change (Golembievsky, Billingsley, & Yaeger, 1976), transformation (Hernes, 1976), double-loop learning (Argyris & Schon, 1978), and transformational change (Kindler, 1979). Related terms include revolution change (Miller & Friesen, 1980), paradigm change (Sheldon, 1980), development (Carneiro, 1981), and transformation (Davis, 1982).

The change literature is important because in engineering a successful organizational redesign program, from a traditional to a self-managed environment, all support systems such as work processes and configurations, rewards and recognition, training, information flows, authority and power relations, must be modified in support of the change. In addition, and perhaps more importantly, the thinking in the organization around these issues must reflect and be supportive of the change, particularly the position of the redesign champion or upper-echelon person initiating the change. Massive, second-order change processes, as opposed to first-order change increments, must
occur for a successful redesign to take root and flourish. Kuhn's (1970) seminal work on paradigm shifts indexes this necessary process.

According to Kuhn (1970), a paradigm consists of four basic elements: (1) symbolic generalization, (2) metaphysical assumptions, (3) values, and (4) exemplars. Symbolic generalization refers to the way problems are defined and solved within the organization. Metaphysical assumptions are the unconscious assumptions or notions of reality held to be true by organizational members. Values reflect the basic priorities of the organization, the preferred courses of action, goals, and so forth. Exemplars are coherent world views that reflect consistency in chosen solutions. Burns and Nelson (1983) describe the organizational frame of reference using Kuhn's four-part definition. Related terms include shared meanings (Pfeffer, 1981), world-view (Starbuck, 1982), context (Davis, 1982), master scripts (Sproul, 1981), conceptual framework (Nicoll, 1984), and interpretative schemes (Bartunek, 1984). These concepts all take as their starting point the belief that organizational members decide what is important, right, or wrong in an organization based on their world views.

**Participative Management**

Much of the early literature on participative management presents global utopian models of participative organizations. The early seminal writings of Argyris
Likert (1961), and McGregor (1960) include discussions of the many advantages of such things as Theory Y management, System 4 management, and participative decision making. These writings possess some obvious strengths as well as weaknesses. On the positive side, they provide ideal models, or benchmarks, against which organizations can compare themselves. Second, they define in some detail what a participative organization should look like. Third, they provide arguments in favor of moving toward participative management: a current issue is the importance of responding to the rising educational level of the society (Lawler, 1985).

Early writers discuss the importance of the type of climate and employee/organization that should exist. They describe highly involved employees, a climate of trust, open communication, and participative decision making. However, they fail to provide information on the kinds of organization structures, reward systems, information systems, policies, and designs that are congruent with participative management.

Currently, the term participative management is considered to encompass a much broader spectrum of activity than that specified by membership in self-managing work teams. Gilberg (1988, p. 109) defines participative management as consisting of "those techniques and practices which increase employee involvement in areas which can
improve work practices, managerial decision making practices, and organizational performance standards."

According to Gilberg, some participative practices geared to improving work practices include self-pacing of work, independent or autonomous work teams, flextime, quality circles, and management by objectives. These techniques all aim toward getting the work done more efficiently. They also advocate moving control and decision making to the lowest possible level in the organization.

Practices aimed at improving decision making include situations where employees are involved in the decision making process. Examples are problem solving committees, consultation meetings, ombudsmen, attitude surveys, employee representation on policy making boards, and worker directors. Practices geared toward improving organizational performance include incentive pay systems, merit pay systems, profit sharing plans, and employee stock ownership plans.

The growing consensus among practitioners seems to be that a combination of participation programs is more effective than a single strategy. Researchers of the New York Stock Exchange, in 1982, surveyed human resource programs of corporations with more than two employees (Freund & Epstein, 1984). They found that firms with employee stock purchase, profit sharing, or gainsharing programs were significantly more likely to make use of
quality circles or other techniques for enhancing employee involvement in decision making than were firms without such programs. Employee involvement programs in many European countries (e.g., Norway), promote organizational involvement through political mandates whereby participative processes are explicitly incorporated in labor relations or collective bargaining agreements (Elden & Levin, 1991).

Lawler (1985) discusses how as a nation we are becoming more educated, and how this trend points to the need for a more participative style of management. He offers a number of arguments for this position. First, survey data support the view that better-educated workers are more concerned about having a say in work-place decisions, more interesting work, and a chance to develop their skills and abilities. In other words, education may cause individuals to have different expectations and preferences about their work. Second, there needs to be a good fit between management style and workers. Placing highly educated employees in traditionally managed work organizations or bureaucracies may increase their dissatisfaction, according to Lawler. In addition, organizations that provide training, tuition assistance programs, and other programs that encourage employees to develop their skills and knowledge may be creating a work force that is unsuited to the types of jobs they have to offer. Another argument is the increasingly turbulent environment in which most organizations operate,
and the fact that knowledge-based and technology-based work are increasing in the United States, whereas traditional manufacturing is decreasing. Lawler contends that the continuing move toward an information and service economy necessitates an increasingly educated work force. As Lawler (1985) states,

This argument rests on the assumption that in order to be more effective, organizations will have to move to more organic and participative management styles, which require decision making skills, self-management skills, and planning skills to be generally present in their work forces. They will have to do this because this management style fits the kind of work they do. (p. 8)

In other words, Lawler's belief is that as organizations and the environments in which they operate become increasingly more complex, participative management is rapidly becoming the only viable management strategy. However, many theorists hold that the change to participative work structures cannot be made successfully without a strong, deep-rooted commitment on the part of management to involve employees in all phases of the operation. As Russell (1988, p. 391) states, "an organization must have a real and deeply rooted commitment to increasing employees' involvement in both the governance and the financial fortunes of their firms."
The empirical literature on participation covers a wide variety of strategies in the workplace. Cotton, Vollrath, Froggatt, Lengnick-Hall, and Jennings (1988) who classified the empirical literature on participation, reduced different participation strategies in ninety-one studies into the following six general categories: (1) participation in work decisions, (2) consultative participation, (3) short-term participation, (4) informal participation, (5) employee ownership, and (6) representative participation. They examined the two most popular outcome variables, productivity and satisfaction, and aggregated the findings to provide summary percentages indexing overall positive or negative effects of participative decision making on performance and satisfaction. Their overall finding was that the effects of participative management vary by type; for example, employee ownership demonstrated positive effects on both performance and satisfaction, whereas short term participation generated no effects.

This literature, and particularly Lawler's (1985) work, has tremendous implications for the role of technical professionals in self-managing work environments. These individuals, along with management, often represent the most highly educated segment of an organization's work force. This fact, plus the continuing rapid change toward an information and service economy and shifting societal expectations in general, necessitate more participative
styles of management that take into account these changes. Increasing the options available to these individuals and others may make the difference in an organization's long-term effectiveness.

Sociotechnical System Design: A Systems Theory Perspective

The term sociotechnical system was coined by Trist (Trist & Bamforth, 1951) to express the fact that organizations comprise interrelated technical and social subsystems which must necessarily operate in concert, as well as in relation to the environment in which organizations are embedded. People comprise the social system and produce a product or service using a particular technology. The goal of a sociotechnical intervention is joint optimization (Emery, 1959), which holds that a social system is maximally effective only if each subsystem is designed to meet the demands of the other and the environment. Many organizational effectiveness techniques assume that technology is unchangeable and that it is the social system that must be changed. An example is job enrichment strategies that are based on the assumption that organizational effectiveness depends upon increasing employee motivation (e.g., Ford, 1969; Herzberg, 1968; Herzberg, Mausner, & Snyderman, 1959; Paul, Robertson, & Herzberg, 1969). In contrast, sociotechnical design assumes that both systems need to be evaluated when making design choices.
Pasmore, Francis, Haldeman, and Shani (1982) discuss the following characteristics of sociotechnical systems:

1. the social system, 2. the technical system, 3. an open systems perspective, 4. organizational choice, 5. controlling variances at their source, 6. boundary location, 7. support congruence, 8. quality of work life values, and 9. continual learning and evolution. The individuals who work in an organization and their relationships comprise the social system (Archer, 1975; Cherns & Wacker, 1976; Cummings & Srivastva, 1977; Emery, 1959; Emery, 1962; Pasmore, 1978; Pasmore, Srivastva & Sherwood, 1978; Taylor, 1975; Trist & Bamforth, 1951; Trist, Higgen, Murray, & Pollock, 1963). According to Pasmore et al. (1982, p. 1,183), the social system represents all that is human in an organization, including "the reasons that organizational members choose to work in the organization, their attitudes toward it, their expectations of it, patterns of supervisory-subordinate relationships, skill levels of employees, and the nature of the subgroups within the population."

The technical subsystem consists of procedures, techniques, tools, knowledge, skills, and mechanisms used by organizational members to fulfill the tasks of the organization (Cummings & Srivastva, 1977; DeHaan, 1976; Emery, 1959; Meissner, 1969; Trist & Bamforth, 1951; Trist et al., 1963; Woodward, 1958). The choice of technology
places constraints on the functioning of the entire social system by delimiting the range of behaviors required. The arrangement of the technology prescribes, to a large extent, the level of challenge, variety, feedback, decision-making, control and integration provided for organization members (Davis, 1979; Fullen, 1970). Traditionally, researchers have focused on organizations using physical technologies; however, a few have examined white collar and service-oriented organizations (e.g., Macy & Jones, 1976; Pasmore, Srivastva, & Sherwood, 1978; Taylor, 1977). Technology influences organizational productivity, placement of workers, and the motions and behavior necessary to operate the technology. Second-order effects include specific roles and relationships of operators and managers, attitudes about the organization, self-concepts that reflect how individuals are treated, and the overall relative adaptability of the organization.

The open systems perspective, a tenet of classical systems theory (von Bertalanffy, 1968), holds that organizations must interact with their environments in order to remain viable. They must not only take in needed resources (e.g., labor, capital, raw materials), but also remain adaptable to changing environmental conditions. The ability to respond to both expected and unexpected environmental contingencies is enhanced by building adaptable internal structures (Cummings & Srivastva, 1977;
Emery, 1959; Emery & Trist, 1965; Haberstroh, 1965). By definition, all parts of the organization are considered to be interrelated. Thus, the socio- and technical subsystems must be designed to adapt to each other as well as the wider environment.

The principle of organizational choice (equifinality in systems theory terminology) holds that there is more than one way to design effective organizations. A related concept is that many design decisions should be left in the hands of employees who work with the technology on a daily basis. This principle is referred to by Herbst (1974) as minimal critical specification. According to Pasmore et al. (1982, p. 1,186), this suggests that "the behavior of members of sociotechnical systems should not be bound by rules, regulations, and procedures except when absolutely necessary; rather, rules should evolve over time as people learn more about the technology and each other." This concept is consistent with Elden and Levin’s (1991) participatory action research which places decision making power in the hands of local experts, those centrally involved in the system.

Controlling variances at their source is a central principle of sociotechnical design advanced by Cherns (1976). According to Pasmore et al. (1982, p. 1,187), a variance is "any unprogrammed deviation from standards or procedures that is brought about by the state of materials
used, or the normal state of technical procedures."

Variances are considered critical when they affect either productivity or the quality of work life of employees. Workers must be given the training, information and autonomy necessary to detect and correct variances nearer to their source. This often necessitates an overhaul of traditional subsystems design so that workers are encouraged to conduct their own quality control, procurement, and maintenance functions. Information, which may have been reserved for management in the past, but is necessary to fulfill these tasks must also be made available.

Boundary location refers to the division of the work of an organization into tasks that are smaller and more easily coordinated and controlled. This is usually done on the basis of technology, territory, or time (Miller, 1959). Boundaries between subgroups and the environment often interfere with the communication and cooperation necessary to accomplish the organization's tasks. According to Pasmore et al. (1982), work groups that are able to control variances within their own boundaries enable supervisors to concentrate on boundary control activities.

Support congruence refers to consistency between the philosophy of sociotechnical work design and the means of selecting, training, promoting, rewarding, separating and assessing employees (Archer, 1975; Cherns, 1976; Emery & Thorsrud, 1969; Pasmore, 1978; Walton, 1972, Walton, 1978).
For example, as Pasmore et al. (1982, p. 1,188) state, "if the system is to function as a collection of interdependent autonomous work groups, individual rewards, externally imposed quality standards, and task-oriented management will interfere with the accomplishments of organizational goals."

In general, this principle suggests that management should develop an awareness of how their particular design choices affect their organization members, and strive to make them congruent with the organization's ideology.

According to Pasmore et al. (1982, p. 1,188), a higher quality of work life is expressed through sociotechnical design choices which create work that is "challenging, encourages learning, provides variety, offers social support and recognition, allows the accomplishment of whole tasks, permits self-direction, and provides feedback concerning performance" (Cherns, 1976; Emery, 1959; Pasmore, 1978; Poza & Markus, 1980; Trist, 1977; Trist, 1978; Walton, 1972; Walton, 1974). Proponents of the sociotechnical systems perspective argue that high productivity is contingent on design systems that take human needs into account in the design of work. The rising educational levels (Lawler, 1985), as well as growing dislike of traditional authority among younger generations make it increasingly important to consider human needs in the workplace. Hackman and Oldham's (1980) five Job Diagnostic Survey characteristics are consistent with quality of work life values (i.e., skill
variety, task significance, task identity, autonomy, and feedback). Other characteristics, indexed by Emery (1963), include optimum work cycle length, inclusion of tasks requiring skills that are respected, meaningfulness of task pattern, and meaningful contribution in terms of usefulness of final product to the consumer.

The final assumption of sociotechnical system design is based on the fact that sociotechnical systems are open systems and thereby dynamic rather than fixed for all time. Thus, to survive, these organizations need to remain adaptive through continued learning and growth. The assumption is that design elements need to be continually monitored and modified to fit evolving environmental contingencies.

Sociotechnical Theory and the Nature of Knowledge Work

The rapid pace of social and technological change in the latter half of the twentieth century has forced organizations to become more attuned to their external environments, and is evident in increased environmental scanning activity. Scanning for organizational survival involves apprehending, developing, and applying new knowledge rather than merely operating with what is known in an ostrich fashion. Environmental turbulence has forced organizations to become learning organizations in order to cope successfully with change. A number of researchers have studied aspects of knowledge acquisition, application, and
innovation for the purposes of organizational survival (e.g., Argyris & Schon, 1978; Roberts, 1987; Sims, Gioia & Associates, 1986; Von Glinow & Mohrman, 1990; Weick, 1979). Zuboff (1988) suggests that the key responsibility for managers in the next century will be the management of knowledge development and knowledge use.

Little research has been conducted on the design of organizations for effective knowledge management. The sociotechnical systems paradigm still exists as the predominant blueprint for routine work; however, researchers are currently struggling with the identification of the optimum design parameters for knowledge work. Purser and Pasmore (1992, pp. 40-41) define knowledge as "our collection of facts, models, concepts, ideas and intuition that shape our decisions," and define knowledge work as "any activity that helps to remove uncertainty from a relevant decision or course of action." Purser and Pasmore (1992) have reconceptualized some principles of sociotechnical systems design that seem more applicable to knowledge work settings than the classic principles discussed above. These are (1) dynamic synchronization, (2) multiphasing, (3) removing barriers to learning, and (4) quality of thinking life. These principles are discussed with the objective of shedding light on the different requirements knowledge work poses for organizations, as opposed to the
more routine work generally associated with manufacturing settings.

Joint optimization has been considered the cornerstone of sociotechnical systems theory since its inception in Britain in the early 1950s. However, a basic assumption of this principle is that the socio- and technical aspects of routine work are distinct, and each possess a unique set of requirements which must be matched in order to create highly productive and personally satisfying work systems (e.g., Cummings & Srivastva, 1977; Emery, 1959; Herbst, 1974). Knowledge work systems depend primarily on human knowledge and expertise rather than technology. The socio- and technical aspects of nonroutine work, such as an engineer's tasks, are considered to be reciprocal, highly interrelated processes, which makes it impossible to view them as completely separate subsystems. In addition, joint optimization is a homeostatic, equilibrium-driven paradigm which does not hold in turbulent times under permanent whitewater conditions (Vaill, 1984). Thus, Purser and Pasmore (1992) propose that the principle of dynamic synchronization is a superior concept for conceptualizing the requirements of the socio- and technical aspects of knowledge work. Similar to self-organizing systems, dynamic synchronization is grounded in the assumption that change is a ubiquitous element of organizations, and that "social and technical subsystems must continually learn and unlearn in
order to maintain a dynamic flexible balance between order and disorder" (Purser & Pasmore, 1992, p. 49).

Multiphasing replaces the multi-skilling principle in traditional autonomous work groups in which individuals are cross-trained and multiple skills are stored as excess capacity by the group for use in times of critical demand. Multi-skilling is viewed from this perspective as a means which allows the group to be self-organizing, and as a means of decreasing boredom while increasing work motivation, learning, growth, and self-esteem.

Because of the long training requirement for professional employees, cross-training or multi-skilling is not a viable option for non-routine work in knowledge work settings. Multiphasing is a design option that allows professionals to work in tandem and is a means to dynamic synchronization of highly technical and differentiated tasks under conditions of uncertainty (e.g., new product development).

The socio-technical systems principle of controlling variances at their source is a definition for production work which is replaced with removing barriers to learning in knowledge work settings. According to Purser and Pasmore (1992), in nonroutine work, variances are often hidden in the heads of knowledge workers rather than readily observable as conceptualized in traditional socio-technical systems theory designed for routine work. Variances can be
such things as "incorrect assumptions, mistakes, guesses, misinformation, misunderstandings, and trade-offs" (p. 53) which are often difficult to recognize, let alone control. As Purser and Pasmore (1992) state,

Knowledge development tasks are inherently unpredictable and novel, productivity levels of knowledge workers are ambiguous and difficult to measure, and organizational/product goals are frequently shifting or redefined. Moreover, determining the rate of progress toward an organizational goal is difficult to judge when the goal is technological innovation. Unexpected deviations in work may lead to the path of invention. Hence, it is difficult to assign meaning and differentiate what an out-of-norm event really is in knowledge work. (p. 54)

Barriers to learning in organizations are evident in the ways organizational members frame or interpret organizational phenomena. Researchers who study the perceptual processes that individuals in organizations use to interpret the environment and organizational problems (e.g., Bartunek & Moch, 1987; Bougon, Weick, & Binkhorst, 1977; Carroll, 1985; Dunn & Ginsberg, 1986; Kuhn, 1970; Schon, 1983; Senge, 1990; Shrivastava & Mitroff, 1984) suggest that the ways individuals conceptualize problems, including the quality of the information and scope of the
information search, delimit the quality of available solutions (e.g., Schwenk, 1988).

Barriers to thinking and learning in traditionally organized knowledge work organizations exist because the norms preclude questioning the underlying assumptions that gird the organization and promote status quo behavior. Van Lohuizer (1986) suggests that errors in knowledge work result from "preconceived ideas, premature conclusions, and a lighthearted attitude toward truth and sound rightful judgment." Babbie (1979) mentions errors in causal thinking, such as selective observation, overgeneralization, inaccurate observation, illogical reasoning, and deduced information. Tenkasi (1991) suggests that levels of anxiety in uncertain task environments can cause individuals to take a more simplified view of the situation than warranted.

Finally, Quality of Thinking Life initiatives follow in the spirit of Quality of Worklife programs initiated in the early 1970s, but reflect the rapid change occurring in global society and the need for organizations to remain flexible and adaptive. Most measures available today are derived from job and work design motivation theories, as is Hackman and Oldham's (1980) Job Diagnostic Survey, yet most knowledge workers find themselves already very high on the majority of criteria measured by these theories (i.e., Hackman and Oldham's Job Diagnostic Survey perceived job
characteristics including skill variety, task variety, task identity, autonomy, and feedback). Methods such as these were designed for production jobs and do not really capture the internal motivation of knowledge workers. Most knowledge workers (e.g., engineers, systems analysts) have been socialized through long years of training to be productive; thus, the problem facing organizations is less one of generating motivation and commitment than of reducing conditions that erode these personal commodities.

Research suggests that knowledge workers are driven by intrinsic rather than extrinsic rewards, and that financial rewards are poor motivators (e.g., Griggs & Manring, 1986; Miller, 1986; Resnick-West & Von Glinow, 1990; Von Glinow, 1988). Task conditions and intrinsic rewards that are applicable to knowledge work may differ from those that motivate traditional blue collar workers, including the opportunity to work with well-known professionals in the field, autonomy in decision-making, a productive atmosphere, participation in cutting-edge projects, and influencing national issues.

Improving the Quality of Thinking Life for knowledge workers requires understanding the design parameters and cognitive modes that promote creative problem solving and collaborative work styles, and the provision of intrinsic motivation for thinking about organizational issues in global, systemic ways. In the last section of this chapter
the participatory action research paradigm which underscores the need to utilize expertise at all levels in the organization in a collaborative mode to solve the organization's problems is examined.

**Self-Managing Work Teams**

The characteristics and philosophy behind traditional self-managing work teams in organizations are examined in this section. Most of the research to date has been developed for practitioners and is of a prescriptive nature. However, this section includes a discussion of representative empirical studies described in the literature.

Self-managing work teams represent a form of work design that has emerged from the sociotechnical systems approach to organization design. In manufacturing settings, the key feature is a high degree of self-determination by employees in the management of their daily tasks. This includes things like self-pacing, distribution of tasks, organization of breaks, participation in recruiting and training of new members. Traditional supervisory roles are often replaced by team members who rotate the role of facilitator. To achieve self-management, work is ideally organized so that (1) employees who perform tasks that are functionally interrelated are collectively responsible for the end product, (2) individuals must have a variety of skills so they can handle all (or at least a large portion)
of the group's tasks, and (3) feedback and evaluation are tailored to group rather than individual performance for maximum organizational effectiveness.

As mentioned in the previous section, these properties of work organization are specified by Hackman and Oldham (1980) in their job characteristics approach to job design which called for the following five elements: skill variety, task identity, task significance, autonomy, and feedback. A main distinction between the job characteristics model at the time it was developed and the self-managing work groups is that the former was specified for individual jobs rather than those in a group setting.

A causal set of assumptions serves as a rationale for the existence of self-managing work teams, the cornerstone being that this way of organizing work is intrinsically motivating. Intrinsic motivation involves such things as the opportunity to learn and grow, participate in decision making, and be recognized for one's efforts. Thus, the self-managing work environment is thought to be intrinsically motivating and, in general, to enhance employee satisfaction. Furthermore, increased employee satisfaction is thought to result in increased group performance and decreased labor turnover. The Hackman and Oldham (1980) job characteristics model posits this very set of causal relationships.
Research on the effectiveness of self-managing work groups is scarce. Wall, Kemp, Jackson, and Clegg (1986) suggest that very few of the findings are based on research designs that allow for causal inferences (i.e., they are not experimental designs), even though the assumptions that provide a rationale for self-management are causal in nature. In addition, many of the studies cited attempt to achieve changes in workers' attitudes and behaviors, but are of insufficient duration to adequately measure such changes.

The study by Wall et al. (1986) was an exception in that it was longitudinal. Their objective was to determine the effects of self-managing teams on employees' behaviors and attitudes. Specifically, their goal was to determine whether this type of work design enhances work motivation, job satisfaction, and group performance, as well as reduces labor turnover.

A candy manufacturing facility in the south of England was chosen for the study, which included an experimental group composed of self-managing teams and a control group managed in the conventional way. Individuals in another facility with traditional management practices were also surveyed. Wall et al. (1986) found that although self-managing work groups exhibited strong effects, the effects were generally restricted to workers' perceptions of workgroup autonomy and job satisfaction. They found that intrinsic job satisfaction showed an effect that persisted
over time, but that extrinsic job satisfaction was less enduring. Furthermore, the self-managing work groups had no clear effect on internal work motivation, organizational commitment, or mental health. These findings do not support the causal line that intrinsic work motivation leads to job satisfaction which, in turn, leads to increased performance and reduced turnover. Information on productivity in the Wall et al. study was mixed due to measurement problems.

A variety of pros and cons are associated with the implementation of self-managing work groups. They provide some identifiable economic benefits, not necessarily because groups enhance employees' motivation and effort per se, but due to the economic benefits of using groups themselves. For example, when decision making is pushed down to the shop floor, the need for supervision declines or vanishes, thereby decreasing indirect labor costs (Cohen, 1993). However, on the negative side, it costs more in terms of increased managerial time and effort. The existence of self-managing work groups may pose a threat to traditional midline managerial jobs because, typically, fewer levels of management are necessary. In addition, employees who have many skills can cause problems in union settings where there are clear boundaries around particular jobs and work practices. Finally, workers are generally resistant to change and to the problems associated with this common characteristic of human nature.
Obstacles to the implementation of self-managing work groups include the following four broad types:
(1) organizational, (2) situational, (3) subordinate, and (4) managerial. Organizational barriers include (1) a higher value being placed on tradition and maintenance of the status quo than on innovation; (2) an organizational philosophy which prefers uniformity, consistency, and control from the top rather than individual initiative and freedom at the field level; (3) a formal, bureaucratic authority structure which is rigidly adhered to; and (4) the lack of an organizational climate that is supportive of employee involvement and participation without fear of reprisals.

Situational barriers are related to an organization's environment. Certain tasks are accomplished best by an individual working alone, and other tasks are too technical to involve more than those with specialized expertise. This is often the dilemma of technical professional employees. Also, there are constraints imposed by time: for example, technical projects often require a two or three year cycle which includes a lot of overtime and spending less time at the regular job. Subordinate barriers exist when non-managerial employees resist participation. Some employees do not want the increased autonomy that is a characteristic of the self-managing work environment. Others may lack the knowledge or confidence to participate in decision making.
Union employees may fear changes in the way work is organized that would not be to their benefit.

Finally, the managerial obstacle is generally based on fear. Managers are afraid that participative forms of management such as that embodied in self-managing work groups will lead to loss of control over operations for which they are held accountable. They also fear that such a radical change may also reduce their maneuverability, result in decisions of poor quality, cause disruptive conflict, and take up too much of their time. The last item appears to be a legitimate complaint based on research studies. Most managers have not been adequately trained in participative management techniques, thus they face the time consuming process of learning the basics or risking improper implementation.

Summary

It has been said that organizational survival is the real motivation behind the move to work teams as a means of creating customer driven, lateral process work arrangements that draw on the expertise available at all levels of an organization and beyond (e.g., customers and other key stakeholders). The topics mentioned all interrelate in fundamental ways toward this end. Organizational culture issues, second-order change processes such as paradigm shifts, and sociotechnical applications such as consideration of the design parameters necessary to
facilitate knowledge work are intricately and reciprocally interdependent. Organizational redesign of this magnitude requires new patterns of thought regarding the nature of work, individuals in the work setting, and the increasingly chaotic landscape of global business. In effect, if organizations are to survive, multiple paradigm shifts must occur and gain strength within organizations, creating new cultural patterns that support these necessary ways of working.

**Individual Level**

The rationale for looking at cognitive as well as affective impacts on individuals is that the mix yields a more multidimensional picture of the stresses and strains facing technical professional employees operating in an ambiguous work setting. Professional socialization is addressed first because of the ways this type of training influences self-perception and behavior in organizations. Next, some antecedents and consequences of role conflict and role ambiguity are examined at the individual level of analysis. These include autonomy, co-worker social support, work locus of control, role overload, job-related tension (stress), general job satisfaction, organizational commitment, career commitment, job involvement, and turnover intent.
Professional Socialization

The nature of professions in light of their influence on a self-managing work environment is examined in this section. Although engineering has been considered a professional specialty for many years, other technical fields such as quality control and procurement have more recently moved toward greater professionalism.

Based on a review of the literature on professionalism, Kerr, Von Glinow, and Schriesheim (1977) listed six characteristics of professionals: (1) commitment to work and the profession; (2) autonomy; (3) expertise; (4) ethics; (5) identification with the profession; and (6) collegial maintenance of standards. Susman (1966, p. 184) suggests that "the core characteristics of a profession are: service orientation and a body of theoretical knowledge, with autonomy of the work group as a by-product of the two." He emphasizes the idea of altruism as opposed to selfish motivation, but also includes the society's role in defining needed services and according practitioners status, prestige and power (e.g., medical doctors).

The body of theoretical knowledge referred to by Susman (1966) is specialized knowledge that is generally acquired through a long educational training period, as in medicine and law; whereas lesser professions, such as teaching and social work, require a much shorter training period. Due to their service orientation and specialized knowledge, society
generally accords greater autonomy to professionals than other occupational members. As Greenwood (1957, p. 48) states, "the client's subordination to professional authority invests the professional with a monopoly of judgment. When an occupation strives toward professionalization, one of its aspirations is to acquire this monopoly." Codes of ethics are a natural outgrowth of this greater freedom and autonomy.

Other characteristics of professions include standards for ethics and training, criteria for admission into the profession, certification programs, governmental licensure and regulation (Goode, 1960; Sussman, 1966). A major responsibility of professional associations is to develop codes of ethics which set the standard for professional behavior. Associations are also charged with disciplining members who fail to meet these standards of behavior. The increasing widespread adoption of codes of ethics in industry suggests that this aspect of professionalization is becoming diffused beyond strictly professional associations into many United States corporations.

An illustration of this phenomenon is the various subfields of the production operations management field (e.g., quality control, inventory management and procurement) which are moving increasingly toward professionalism with the proliferation of various certification programs. Fearon, Ruch, and Weiters (1989)
discuss several such certification programs. For example, the American Production and Inventory Control Society has a series of tests which lead to the Certified in Production and Inventory Management designation. The designation can be earned by meeting certain educational and experiential requirements through the National Association of Purchasing Managers. Several designations are available through the American Society for Quality Control, such as Certified Quality Engineer, Certified Quality Technician, and Certified Reliability Engineer.

According to Mintzberg (1989), the professional organization is unique among contemporary organization forms in that it is egalitarian, it dispenses power among professionals directly, and provides employees with ample autonomy. Thus, professionals are able to work independently, limited only by standards of professional practice. This raises some unique problems that are not faced by more traditional units. First, professionals typically develop a professional loyalty that supersedes commitment to a particular organization. For example, professional psychologists view themselves as clinicians first, and employees of a particular clinic or psychiatric facility second. Second, emphasis on autonomy makes control of the work problematic. As Mintzberg (1989) states, there is no evident way to control the work, outside of that exercised by the profession itself, no
way to correct deficiencies that the professionals choose to overlook. What they tend to overlook are the problems of coordination, of discretion, and of innovation that arise in these configurations. (p. 189)

In practice, a common solution to this problem is to administer professional societies within an organization (e.g., engineering departments) with a close rein, more in line with traditional practices. In many organizations, engineers are supervised closely and, in the process, denied the autonomy of practice accorded the profession. This runs counter to the self-managing philosophy in general, and particularly violates characteristics of technical professional practice which has traditionally been fairly autonomous. It may be that engineers and others technical specialists view the move to self-management as a different variation of encroachment on their freedom. It is these kinds of issues that are examined in this study.

Role Strain

In two recent studies multivariate techniques were used to examine the impact of worker participation and role stressors on established outcomes in traditional organizational settings. One of the studies is Smith and Brannick's (1990) replication of Schuler's process model of employee participation in decision making and job satisfaction (Lee & Schuler, 1982; Schuler, 1980). In this
study a block recursive path analytic design was used to support Schuler’s original finding that role conflict and role ambiguity, as well as performance-outcome expectancy, appear to mediate the relationship between participation and satisfaction among social service caseworkers and clerical personnel. In a second study, by Schaubroeck, Cotton, and Jennings (1989), LISREL 6 (Jöreskog & Sörbom, 1984) was used to expand the Bedeian and Armenakis (1981) and Kemery, Bedeian, Mossholder, and Touliatos (1985) model of effects of role conflict and role ambiguity by including antecedent job conditions and the outcome variable, organizational commitment. This newer model clarifies the impact of role conflict and role ambiguity on organizational commitment as well as tension, intent to quit, and job satisfaction.

The model utilized in Phase II of the present study represents a constructive replication of an expanded model derived from the Schaubroeck et al. (1989) study. A major difference between the two studies is the nature of the work setting. The Schaubroeck et al. (1989) study was based on two samples collected from traditional, hierarchical-type structured organizations. The first sample consisted of responses from 249 blue- and white-collar employees of a civilian federal government manufacturing installation in the western United States. The second sample represented responses of 201 blue-collar employees of the maintenance division of a large university in the midwestern United
States. In contrast, the present study was conducted in team-based settings, specifically brownfield sites. "Brownfield" denotes a work site that is in the process of implementing self-managing work teams.

**Role Conflict and Role Ambiguity.** The theoretical aspects of role theory were first discussed by Parsons (1951) and Merton (1957). Gross, Mason, and McEachern (1958) defined and operationalized a number of role constructs including role conflict for a series of studies founded on role theory. However, it is Kahn, Wolfe, Quinn, Snoek, and Rosenthal (1964) who are generally given credit for introducing role concepts into organizational research in their book, *Organizational Stress: Studies in Role Conflict and Ambiguity*.

Gowler and Legge (1975) suggest that any social position or role comes with certain inborn rights and responsibilities which may have bearing on an individual's feelings, values, and behavior. A web of such expectations and relationships is known as a role set. According to role theory, managers are often faced with conflicting role sets. Stress occurs when they are prevented from fulfilling the responsibilities of one role set because of the demands or complexity of another. According to Gowler and Legge, three possible situations may arise: (1) conflict between different role sets, (2) conflict within a particular role set, and (3) ambiguity regarding role requirements.
Conflict between different role sets occurs when the duties of one role set prohibit fulfillment of duties in another. An example is the conflict many women face between work and home responsibilities. Conflict within a role set occurs when a manager is faced with a set of conflicting and mutually exclusive demands within his or her managerial role such as wanting to procure the highest quality raw materials and a commitment to cost containment. Finally, ambiguity regarding role requirements occurs when an employee is unclear as to what is expected of him or her. These situations are likely to result in declines in self-efficacy, perceived or actual performance, and job satisfaction (Gowler and Legge 1975).

More specifically, role ambiguity concerns lack of specific information regarding job responsibilities (Kahn et al., 1964). Role ambiguity develops when job responsibilities are not clearly defined. Role conflict is "the simultaneous occurrence of two or more sets of pressures such that compliance with one would make compliance with the other more difficult" (Bacharach, Bamberger, & Conley, 1990). Kahn et al. (1964) and Rizzo, House, and Lirtzman (1970) define role conflict as "the incompatibility of demands." Their definition has been used in many subsequent studies (e.g., Greene, 1978; Miles, 1976).
Classic studies of role ambiguity and conflict provide a theoretical direction that is still evident today. Kahn et al. (1964) found a relationship between job ambiguity, higher job-related tension, and lower job satisfaction. French and Caplan’s (1970) study of administrators, engineers, and scientists revealed associations between role ambiguity, feelings of job-related threats to individual well-being, and lower job satisfaction. Margolis, Kroes, and Quinn (1974), who examined a representative sample of 1,496 employees, found evidence of relationships between role ambiguity and symptoms of physical and mental ill health. Similarly, Kahn et al. found an inverse relationship between job-related tension and job satisfaction among employed men, as well as evidence that higher status among role senders tends to strengthen the relationship between role conflict and job dissatisfaction. Finally, Shirom, Eden, Silberwasser, and Kellerman (1973) found a relationship between role conflict and coronary heart disease among white-collar kibbutz members. Cooper and Marshall (1978) echo this finding that white collar and managerial employees are more likely than lower level employees to suffer negative effects from such role based stressors (also Cooper, 1982). These relationships have been confirmed in more recent studies (e.g., Keenan & Newton, 1984; Martin, 1984; Vredenburgh & Trinkaus, 1983).
Glowinkowski and Cooper (1987) also suggest that certain occupational groups may be at higher risk for conflict situations than others. Women with career and home responsibilities are the most often cited occupational group suffering from conflicting role demands (e.g. Davidson & Cooper, 1983). Glowinkowski and Nicholson (1984) conducted a study of British police inspectors who traditionally operate in the midline between officers on the street and senior police management. As expected, these officers experienced considerable role conflict between the conflicting realities and expectations of the two groups. Gowler and Legge (1975) further suggest that individuals undergoing promotions, the move to a new company, and/or internal organizational change programs (e.g., work redesign) tend to experience heightened role ambiguity.

King and King (1990) discuss some of the problems inherent in the role conflict and ambiguity constructs originally conceptualized by Kahn et al. (1964). Kahn et al., who were somewhat vague about the relationship between the two constructs, implied that there was perhaps some overlap in the definitions: for example, role demands that are incompatible (role conflict) may create uncertainty (role ambiguity), or role directions that are unclear (role ambiguity) may create inconsistent demands (role conflict). Kahn et al. also claimed that the two constructs emanate from the same causal origins, but are expected to occur
independently in the work environment. King and King (1990), who take issue with this point, have found no distinctive meaning or expression for either. As King and King (1990) state,

First, there is no singular meaning to either role conflict or role ambiguity. Each is either (and each is both) a characteristic of the environment (objective) or a characteristic of the individual (subjective). Moreover, role conflict and role ambiguity manifest themselves in a variety of forms. (p. 51)

Thus, Kahn et al. (1964) do not provide information or examples of when the two constructs tend to covary. Jackson and Schuler's (1985) meta-analytic findings suggest that concerning patterns of relationships between role conflict and ambiguity and other variables, there is indeed little difference. A review by Van Sell, Brief, and Schuler (1981) and meta-analyses by Jackson and Schuler (1985) and Fisher and Gittelson (1983) revealed that role conflict and ambiguity are related significantly to tension and anxiety, job dissatisfaction, lack of commitment and involvement, turnover intention, and, to a lesser extent, performance.

**Antecedents of Role Conflict and Role Ambiguity**

Antecedents of role conflict and role ambiguity are examined in this section. The particular variables examined
include autonomy, co-worker social support, role overload, and locus-of-control.

**Autonomy.** Researchers agree that autonomy is a variable that possesses both theoretical and applied significance (Langer, 1983; Spector, 1986). In traditional manufacturing situations, work processes are generally tightly structured (Cummings & Molloy, 1977), and worker discretion typically occupies a role subordinate to work efficiency (Manz & Angle, 1986). Thus, introduction of participative decision making mechanisms and self-directed teams has generally served to enhance employees' perceptions of personal control or autonomy (Spector, 1986). Indeed, worker autonomy has been substantially increased, compared to the industry norm, by the introduction of self-directed groups in a variety of settings such as coal mines (Trist, Susman, & Brown, 1977), a paint manufacturing plant (Poza & Markus, 1980), an automobile parts production plant (Manz & Sims, 1984), and a dog food plant (Walton, 1977). This trend is underscored by Hackman and Oldham (1976) who define autonomy as:

The extent to which individual employees can structure and control how and when they do their particular job tasks. Highly autonomous jobs allow incumbents to determine the order and pacing of job tasks, specify procedures for accomplishing those tasks, scheduling, coordination with other
employees and other conditions of work. Attempts to increase the scope of jobs in order to enhance performance and job satisfaction have generally increased autonomy along with other dimensions. (p. 1,006)

Thus, participation in various forms can be an effective means of increasing employee job satisfaction (Cummings, Molloy, & Glen, 1977; Lowin, 1968; Srivastava, 1983) and its correlates such as autonomy (Loher, Noe, Moeller, & Fitzgerald, 1985; Stone, 1987). Spector (1986, p. 1,015) summarizes the literature by stating, "it would be expected that increasing control for employees, to the extent that it impacts perceived control, would lend greater satisfaction, commitment, involvement, motivation, and performance, and lower physical and emotional distress, role stress, and withdrawal."

From a theoretical standpoint, participation in decision making is often treated as a conceptually distinct construct by researchers (Chung, 1977). However, Spector (1986) suggests that outcomes for participation in decision making and autonomy tend to be perceived by employees as identical, and to actually represent the same underlying construct of perceived control. Cummings and Molloy (1977), in their review of productivity improvement experiments within the quality of worklife perspective, found that autonomy was the variable most frequently changed of all
variables included in their study. Similarly, Loher et al. (1985), in their meta-analysis of the relationships between job characteristics and job satisfaction, found that autonomy was the job characteristic most highly correlated with job satisfaction. In the same vein, Mortimer (1985), who analyzed the responses to two national surveys prepared by the National Institute on Aging, concluded that work autonomy was the most important predictor of job satisfaction.

However, there are certain factors operating in organizations that may suppress these positive effects. For example, the reason for implementing self-directing teams in an organization may influence outcomes in an adverse way. Manz and Angle (1986) discuss a situation in which teams were implemented by management to clarify and enforce existing policies and procedures (i.e., promote organizational control) rather than to share governance responsibilities in the true spirit of self-direction. This raison'd-etre may be subtly evident in the leadership agendas of upper management. In addition, Manz and Angle suggest that perceptions of control are based on relative rather than absolute standards. Thus, individuals in an industry that historically operates in a very independent fashion, such as the insurance industry, may perceive the move to a team-based structure as a change from more to less autonomy rather than the opposite. Several psychological
theories support the view that an individual’s perception of control reflects personal experience (e.g., adaptation-level theory, Helson, 1959; social comparison theory, Festinger, 1954; and equity theory, Adams, 1965).

Whereas there is general theoretical agreement as to the practical and theoretical significance of autonomy, reviewers of job characteristics literature question the construct validity of two major measures, specifically the 

**Job Diagnostic Survey** by Hackman and Oldham (1976), and the 

**Job Characteristics Inventory** by Sims, Szilagyi and Keller (1976) (e.g., Aldag, Barr, & Brief, 1981; Cook, Hepworth, Wall, & Warr, 1981; Roberts & Glick, 1981). Breaugh (1985) claims that autonomy is defined and operationalized by Hackman and Oldham (1975) and Sims et al. (1976) in ways that confound two distinct job dimensions, autonomy and task independence/interdependence. Both sets of authors base their job characteristics models on Turner and Lawrence’s (1965) seminal work which clearly distinguishes between these concepts. According to Turner and Lawrence, autonomy is the amount of discretion or personal judgment a worker is expected to use in performing assigned work tasks. These authors hypothesize a separate variable, required interaction, to account for worker independence and interdependence. However, Hackman and Oldham (1975, p. 162) define autonomy as “the degree to which the job provides substantial freedom, independence, and discretion
to the individual in scheduling work and in determining the procedures used in carrying it out." Sims et al. (1976) do not specifically define autonomy, but their choice of items, which taps both worker discretion and worker independence, suggests that their concept of autonomy is similar to that of Hackman and Oldham.

Thus, Breaugh (1985) is concerned with the questionable construct validity of the Job Diagnostic Survey and the Job Characteristics Inventory scales. In addition, autonomy is operationalized by these authors as a global construct only when, in fact, Hackman and Oldham (1975), Sims et al. (1976) and Turner and Lawrence (1965) each discuss three types of specific autonomy, (1) work scheduling, (2) work procedures (methods), and (3) job performance criteria. Bailyn (1985) and Karasek (1979) both note the importance of examining these three aspects of autonomy. Similarly, other authors tend to subdivide the construct. Chung (1977) discusses autonomy as the degree to which individuals are able to participate in goal-setting activities, and to determine their own pace, work schedule, and work methods. DeCotiis and Koys (1980, p. 173) define the construct as "the perception of self-determination with respect to work procedures, goals, and priorities." Nicholson (1984, p. 178) also emphasizes three distinct types of autonomy, "the capacity to choose goals, the means for achieving these, [and] the time of means-ends relationships."
Chung (1977) suggests that managers are more likely to give employees control over work scheduling and work methods than work criteria simply because they are ultimately responsible for their employees' performance. However, studies of such innovative organizations as Hewlett-Packard document the importance of the autonomy of work criteria (Werssowetz and Beer 1982). Cummings and Molloy (1977), who reviewed a number of job enrichment studies, came to essentially the same conclusion. March and Simon (1958) suggest that organizations tend to dictate product specifications but to give employees latitude regarding particular work methods. Porter, Lawler, and Hackman (1975, p. 308), who examined the relative levels of scheduling, method, and criteria autonomy in various jobs, concluded that in vertically enlarged jobs, "workers are given authority and responsibility to make a maximum number of decisions about how they will do their work, and the pace they set, and, to a more limited extent, the goals they establish for their performance." Thus, from the literature it appears that workers tend to report lower levels of criteria than scheduling or method autonomy.

Breaugh (1985) developed an instrument which measures the work scheduling, work method, and work criteria aspects of autonomy (i.e., the Work Autonomy Scales). As part of the validation process, and based on an examination of prior literature, Breaugh predicted relationships between the
three scales and several correlates, supervisory satisfaction, participation in decision making, general job satisfaction, and role ambiguity (Breaugh, 1985; Hackman & Oldham, 1976; Langer, 1983; Spector, 1986). He also expected that the work autonomy scales would be negatively related to reports of role ambiguity (Hickson, 1966), because individuals with job autonomy experience more control over their work environments and should therefore be less dependent on others (e.g., supervisors) for information and direction. This is exactly what he found. Spector (1986) also detected an inverse relationship between global measures of work autonomy and perceptions of role ambiguity.

In addition, Breaugh gathered supplemental evidence by examining job descriptions for evidence of method, scheduling, or criteria autonomy. In particular he found that employees in the liaison engineering department of the firm studied had considerable method autonomy (i.e., latitude in how to solve problems that occurred) but relatively low levels of criteria autonomy. There was insufficient information in the job descriptions to evaluate the level of scheduling autonomy.

Both Bailyn (1985) and Schein (1987) make a case for examining differential aspects of autonomy in future studies. Bailyn’s distinction between autonomy and control over ends and means is similar to Breaugh’s (1985) distinction between method and criteria autonomy. Bailyn
(1985) also distinguished between strategic autonomy and operational autonomy. Strategic autonomy involves problem solving and goal setting, whereas operational autonomy is concerned with controlling the means of implementation (tactics). Based on two decades of research, Schein (1987) views autonomy along with technical/functional competence, as career anchors that, once developed, are very stable. He therefore suggests treating autonomy as an individual difference variable which should be taken into consideration when making hiring and placement decisions.

**Co-Worker Social Support.** The area of social support has traditionally been examined by researchers in the field of sociology, specifically those involved in social integration and isolation studies. However, research in the last decade has increasingly come from the health sciences and psychology. Two main issues under investigation during the last ten years are (1) whether there is a causal relationship between quality and quantity of social relationships, and (2) whether social relationships buffer psychological and physical health outcomes or constitute main effects (House, Umberson, & Landis, 1988).

The moderating or buffering hypothesis has been a topic of considerable debate in recent years. The main effects model holds that certain biopsychological processes, through which the health outcomes of social support are manifested, operate at all times; whereas, the buffering hypothesis
claims that these processes operate only when an individual is under stress (House et al., 1988). Some psychologists believe that the same mechanisms account for both buffering and main effects, and that they simply operate more intensively in the presence of stress. A rival hypothesis is that buffering and main effects are explained by qualitatively different mechanisms. In a third hypothesis, Hansson, Jones, and Carpenter (1984) suggest that it is the individual dispositional characteristics and skills that promote the ability to establish and maintain social relationships, rather than the nature of the particular social environment, that account for perceptions of social relationships.

Definitions of social support tend to focus on the availability of support, the resource aspect (Kessler & McLeod, 1985) or its perceived adequacy (e.g., Dunkel-Schetter & Wortman, 1982; Wortman & Lehman, 1983). Gore (1987) suggests that questions in research studies regarding the availability of social support focus on the existence of such relationships whereas the latter type tap one’s perceived level of satisfaction. Wills (1985) elaborates the construct by indexing different types of support, such as esteem, status, informational, instrumental, motivational support, and social companionship. Wills examines each type for its main effect and/or buffering properties. Similarly, Kaufmann and Beehr (1986) conceive of two differential
aspects of social support, emotional (caring and empathy) and tangible (tangible or instrumental assistance with stressors). Caplan et al. (1980) distinguish between supervisor and co-worker tangible, emotional, and extra-organizational support, and Ganster, Fusilier, and Mayes (1986) add family social support to existing supervisor and co-worker sources. Finally, social support is thought to protect individuals from the damaging effects of stress through its effects on coping processes and mediating cognitive appraisal (Lazarus & DeLongis, 1983; Lazarus & Folkman, 1984).

Jackson and Schuler (1985), in their meta-analysis and theoretical critique of role strain in occupational settings, found that supervisor and co-worker social support are directly related to role conflict, role ambiguity, stress relations, and job satisfaction (see Ganster, Fusilier, & Mayes, 1986). Social support correlates negatively with role ambiguity because it is viewed as increasing work-related communication and, thereby as reducing role ambiguity. In addition, there appears to be a inverse relationship between co-worker social support and role conflict because supportive behaviors in the workplace involve negotiating and reconciling differential peer role demands which tend to reduce role conflict (Jackson, 1983). Social support is also thought to reduce the effects of tension (stress) effects because it is an indicator of the
extent to which noxious work conditions are reduced by others (Fisher, 1985). Finally, social support correlates consistently with job satisfaction (Jackson & Schuler, 1985), which suggests that supportive behavior directly increases employees' positive experience in the workplace (Fisher, 1985).

**Role Overload.** French and Caplan (1973) define work overload as either quantitative (having too much to do) or qualitative (facing work that is too difficult). According to Shaw and Weekley (1985), quantitative role overload exists when individuals have more to do than they are able to accomplish in the time allotted (Beehr, Walsh, & Taber, 1976; Caplan, 1971; Rizzo, House, & Lirtzman, 1970). Kahn (1980) defines role overload as "the amount of pressure felt to do more work, the feeling of not being able to finish an ordinary day's work in one day, and the feeling that the quantity of work interferes with its quality." Qualitative role overload exists when each separate task is beyond an employee's ability level so that he or she is incapable of fulfilling the tasks, irrespective of the time available (Shaw & Weekley, 1985).

A number of classic studies (e.g., French & Caplan, 1972; Margolis, Kroes, & Quinn, 1974; Russek & Zohman, 1958) as well as more recent studies (e.g., Cooper, 1983; Cooper & Rodin, 1985) provide supportive evidence for relationships between role overload and negative psychological and health
effects. French and Caplan (1972) found a positive relationship between role overload and number of cigarettes smoked by managers. Russek and Zohman (1958) found a strong relationship between role overload and coronary heart disease. Margolis, Kroes, and Quinn (1974) found that role overload correlated significantly with lowered self-esteem, low work motivation, and regressive drinking behavior. Cooper and Rodin (1985) who examined a representative sample of British tax inspectors, found that quantitative and qualitative role overload was related to high levels of depression and anxiety. Finally, French and Caplan (1972) suggest that quantitative and qualitative role overload have been associated with the following nine psychological and physiological health effects: job tension (stress), job dissatisfaction, lower self-esteem, embarrassment, feelings of job-related threat to individual well-being, increased smoking, skin resistance, higher cholesterol levels, and increased heart rate.

Locus of Control. Locus of control is a personality variable (Jackson & Schuler, 1985) that has been found to be significantly associated with role stress (Organ & Greene, 1974a; Organ & Greene, 1974b; Sims, Szilagyi & Keller, 1976). Spector (1988, p. 335) defines locus of control as "a generalized expectancy that rewards, reinforcements, or outcomes in life are controlled either by one's own actions (internally) or by other forces (externally)." External
control generally refers to such factors as luck, fate, chance, and powerful others (Archer, 1979). Rewards of interest to employees in work settings include promotions, salary increases, favorable working conditions, and opportunities for career advancement (Spector, 1988).

Jackson and Schuler (1985), in their meta-analysis and theoretical critique of role strain in occupational settings, suggest that there are two hypotheses in the literature regarding the relationship of locus of control to role conflict and role ambiguity. First, locus of control is thought to determine perceived ambiguity and conflict (Organ & Greene, 1974a; Organ & Greene, 1974b; Sims et al., 1976; Vredenburgh & Trinkaus, 1983). Low average correlations between locus of control and both role ambiguity ($r = .29$) and role conflict ($r = .27$) support this hypothesis. The positive correlations suggest a relationship between external locus of control and these role states. However, the literature does not possess adequate conceptual justifications for such claims. Second, locus of control is thought to mediate employees' perceptions of role conflict and role ambiguity. The moderator (buffering) hypothesis appears to be the more popular of the two hypotheses; however, the evidence is less supportive (Abdel-Halim, 1980; Batlis, 1980; Keenan & McBain, 1979; Sims et al., 1976). The moderator hypothesis suggests that internals manifest weaker correlations between
role conflict and ambiguity and various negative outcome states such as tension and job dissatisfaction, than do externals. As with the prior hypothesis, there is little conceptual justification in the literature for the psychological processes engaged in by individuals that account for such findings. A third hypothesis, which has not been explored empirically because of the dearth of longitudinal and causal research designs, is the possibility that an external locus of control may result from an employee’s exposure over a long period of time to role expectations that are conflicting or ambiguous.

Outcomes of Role Conflict and Role Ambiguity

Literature on outcomes of role conflict and role ambiguity is examined in this section. Specifically, the variables covered include job-related tension (stress), general job satisfaction, organizational commitment and its related indicators, career commitment and job involvement, and, finally, turnover intent.

Job-related Tension (Job Stress). The seminal work on organizational stress was a non-experimental study of American workers conducted in the early 1960s by Kahn et al. (1964). Using survey methods they estimated that more than a third of the employees in a national sample were experiencing some sort of occupational stress. According to Greenhaus and Parasuraman (1987, p. 38), and consistent with recent investigations (e.g., Beehr & Bhagat, 1985; Schuler,
1980), "stress denotes the psychological state experienced by the individual when faced with demands, constraints, and/or opportunities that have important but uncertain outcomes."

Stressors are events or environmental contingencies that have the potential to produce stress symptoms known as strains in the individual. Outcomes are the consequences of stress states (e.g., turnover, absenteeism, job dissatisfaction, physical and mental ill health) that influence occupational and non-work environments. Finally, models of stress have identified chronic stressors that appear to be pervasive in occupational domains (see, Brief, Schuler, & Van Sell, 1981; Cooper & Marshall, 1976). General stressor categories include (1) organizational roles, (2) job characteristics, (3) interpersonal relationships, (4) organizational structure, (5) career development, and (6) physical environment (Greenhaus & Parasuraman, 1987). Specific chronic stressors related to the present study subsumed in these categories include role conflict, role ambiguity, and quantitative and qualitative role overload. In addition, researchers have identified various psychological strains that relate to chronic work stressors such as tension, job dissatisfaction, depression, boredom, alienation, self-esteem, and psychological fatigue. The first two strains are incorporated in the present study.
In the organizational commitment literature, stress is described as a correlate of organizational commitment because it is thought to result from reactions to perceptions of the work environment, which makes it difficult to establish antecedent causal conditions. Research suggests that stress causally precedes organizational commitment; however, there is little research that explains how organizational commitment increases stress in the workplace (Mathieu & Zajac, 1990). According to Mathieu and Zajac, role stress from conflicting role demands is thought to decrease organizational commitment. Conversely, evidence suggests that highly committed employees may experience increased stress due to work/nonwork conflicts (such as wanting to work longer hours and be with the family). Results of the meta-analysis by Mathieu and Zajac yielded an average corrected correlation between stress and organizational commitment of $r_t = -.330$.

**Job Satisfaction.** As an attitude, job satisfaction is considered to be an affective response of an individual to particular aspects of the job, such as pay, supervision, coworkers, promotion, and the work itself. Churchill, Ford, and Walker (1974, p. 255) define the parameters of the job satisfaction construct as, "all characteristics of the job itself and the work environment which [industrial] salesmen find rewarding, fulfilling, and satisfying, or frustrating and unsatisfying." Locke (1976, p. 1,300) defines the
construct as "a pleasurable emotional state resulting from the appraisal of one's job or job experience." The construct has been divided into intrinsic and extrinsic components for purposes of study (e.g., Porter & Lawler, 1968). In studies of salespersons, researchers have examined the salesperson's affective reaction to various facets of the work situation such as pay and promotion opportunities, the nature of the work itself, supervisors, and co-workers (Churchill, Ford, & Walker, 1974; Smith, Kendall, & Hulin, 1969). Many researchers have examined the effects of these job facets on the construct separately, whereas others have studied job satisfaction in a global way (e.g., Bagozzi, 1980a; Bagozzi, 1980b; Hackman & Oldham, 1975; Pearson, Barker, & Elliott, 1957). More than 30 constructs have been studied empirically as antecedents or consequences of job satisfaction. Those related to the present study and included in the discussion are organizational commitment, turnover intent, and job involvement.

While measures of job performance were not included in the present study because of unavailability, it is perhaps worthwhile to examine the relationship of job satisfaction to performance because of the inclusion of both variables in the well known participation-satisfaction-performance equation. There is extensive literature on the question of whether job satisfaction is a causal antecedent of
performance or vice versa (e.g., Bagozzi, 1980a; Schwab & Cummings, 1970). Empirical evidence suggests that performance causally precedes job satisfaction (e.g., Bagozzi, 1980a; Sheridan & Slocum, 1975; Wanous, 1974), although contradictory evidence suggests that the relationship is spurious and is due to common antecedent variables (e.g., Behrman & Perreault, 1984; Dubinsky & Hartley, 1986). Conceptual models often place performance at the far right of the equation as a consequence of the participation-satisfaction relationship (e.g. Sundstrom et al., 1990). Moving performance further back in the equation (e.g., participation-performance-satisfaction) may thus have practical implications for managers regarding work redesign issues.

Organizational Commitment. The construct organizational commitment has been linked as an antecedent and consequent variable in numerous studies in the last fifteen years. As an antecedent variable, it has been isolated as a predictor of withdrawal behaviors such as absenteeism, lateness, turnover, as well as performance and other behaviors. Correlates such as career commitment, job involvement, stress, and job satisfaction have been linked empirically with organizational commitment. As a consequent variable, it has been linked to personal characteristics, role states, job characteristics, group/leader relations, and organizational characteristics (Mathieu & Zajac, 1990).
A number of definitions, types, foci, and measures of the construct have gained attention. However the common theme seems to be that organizational commitment "is considered to be a bond or linking of the individual to the organization" (Mathieu & Zajac, 1990, p. 171). Attitudinal organizational commitment, which is the most popular type under study, is defined by Mowday, Porter, and Steers (1982) as follows:

The relative strength of an individual's identification with and involvement in a particular organization. Conceptually, it can be characterized by at least three factors: a) a strong belief in and acceptance of the organizational goals and values; b) a willingness to exert considerable effort on behalf of the organization; and c) a strong desire to maintain membership in the organization. (p. 27)

Among the foci of work commitment discussed by Morrow (1983) are (1) job (e.g., job involvement); (2) values (e.g., the Protestant work ethic); (3) union; and (4) career. Similarly, Reichers (1985) posits a multiple constituency approach to organizational commitment research.

Meyer and Allen (1984) distinguish between two types of organizational commitment and have developed measurement scales for each. The first, labeled affective commitment is viewed as a feeling or attitudinal response. The individual identifies positively with the organization and is thus
committed to remaining with the organization in order to achieve its goals. The second type, labeled continuance commitment, is considered a behavioral construct that involves maintaining employment because the costs of leaving are perceived by the employee as prohibitive, as opposed to staying because of positive (affective) ties to the organization.

McGee and Ford (1987), who examined the psychometric properties of the scales developed by Meyer and Allen (1984), concluded that the affective commitment scale was unidimensional and possessed acceptable internal consistency. However, the continuance commitment scale reflects two separate dimensions: (1) commitment based on the presence of few alternative employment options, and (2) commitment stemming from expected high personal sacrifices if the respondent leaves the organization. McGee and Ford found a significant positive relationship between affective commitment and the continuance commitment dimension reflecting few employment alternatives, and a significant inverse relationship between affective commitment and the continuance commitment dimension associated with high personal sacrifice. Both scales were used in the pilot test but were replaced in the current study with items from the work of Blau (1988) and Landau and Hammer (1986).
Recent meta-analyses on the validity of Hackman and Oldham's (1976) job characteristic model support Steers' (1977) proposition that higher organizational commitment is likely tied to job enrichment (Fried & Ferris, 1987; Loher et al., 1985; Spector, 1985). Job characteristics are considered antecedents of organizational commitment in the literature along with role states, personal characteristics, organizational characteristics, and group/leader relations. Mathieu and Zajac's (1990) meta-analysis of the antecedents, correlates, and consequences of organizational commitment yielded a small positive correlation (the mean weighted correlation corrected for attenuation) between autonomy and organizational commitment ($r_t = .083$).

There has been little theory development around how role states relate to organizational commitment. It is suggested that role states derive from perceptions of the work environment and yield particular affective responses. It may be that role states influence organizational commitment levels directly or are mediated by affective responses such as job satisfaction and stress. There is, however, sufficient evidence to suggest inverse relationships between role states and organizational commitment. Results of the meta-analysis by Mathieu and Zajac (1990) yielded the following negative correlations between the three role states: role conflict ($r_t = -.271$), role ambiguity ($r_t = -.218$), and role overload ($r_t = -.206$).
Career Commitment and Job Involvement. Career (or occupational) commitment and job involvement are considered correlates of organizational commitment, along with job satisfaction, because they represent affective responses to the work environment and because it is difficult to identify causal antecedents of affective responses (Mathieu & Zajac, 1990). Morrow (1983, p. 488) defines job involvement as "the degree to which a person is identified psychologically with his [or her] work." Whereas organizational commitment involves an individual's attachment to an organization, job involvement describes the person's attachment to his or her job. According to Mathieu and Zajac, one would expect the two constructs to be correlated in organizations that provide employees with jobs they desire. The results of the meta-analysis by Mathieu and Zajac yielded a correlation between the two constructs of \( r = .432 \).

Morrow (1983) describes occupational (career) commitment as an individual's commitment to his or her career, occupation, or profession. Whereas, job involvement focuses on an individual's attachment to his or her job, career commitment focuses on the individual's attachment to his or her profession or occupational group. The results of the meta-analysis by Mathieu and Zajac (1990) yielded a correlation between career commitment and organizational commitment of \( r = .420 \). Career commitment and organizational commitment are thought to be quite compatible
and to develop over time (Aranya & Ferris, 1983; Aranya & Jacobson, 1975).

Blau (1988), who tested the discriminant validity of career commitment, job involvement, and organizational commitment, found that the three constructs can be reliably measured as distinct from one another. He found significant relationships ($p < .01$) between career commitment and the other two constructs. The shared variance between career commitment and job involvement was approximately nine percent and approximately eleven percent between career commitment and organizational commitment which suggests little redundancy between the constructs. Morrow (1983) suggests that work referents such as career commitment, organizational commitment, and job involvement are independent constructs, and that moderate correlations up to $r = .30$ may be due to method variance.

The Job Satisfaction-Organizational Commitment Relationship. The empirical evidence in support of the job satisfaction-organizational commitment relationship is equivocal. Mathieu and Zajac (1990), in their review and meta-analysis of organizational commitment, consider job satisfaction to be an affective response to facets in the work environment and, thus, a correlate of organizational commitment rather than a causal antecedent. Prior researchers have assumed that job satisfaction is a precursor of organizational commitment (e.g., Bluedorn,
1982; Koch & Steers, 1978; Steers, 1977). Porter, Steers, Mowday, and Boulian (1974) argue that satisfaction takes less time to develop than commitment, and that satisfaction is less stable than commitment.

A contrary position is that organizational commitment causally precedes job satisfaction (e.g., Bateman & Strasser, 1984; Williams & Hazer, 1986). In addition, there is adequate empirical support to suggest that satisfaction and commitment correlate positively with one another (e.g., Bluedorn, 1982; Clegg, 1983; Dougherty, Bluedorn, & Keon, 1985). Mathieu and Zajac (1990) suggest that further theoretical work regarding such causal models needs to be done and that confirmatory modeling techniques are a useful aid in the establishment of such theoretical models.

**Turnover Intent.** Turnover intent is generally viewed as the last in a sequence of withdrawal cognitions, along with thinking of quitting and intent to search for a new job (e.g., Mobley, Horner, & Hollingsworth, 1978). It is defined as "a conscious and deliberate willfulness to leave the organization" (Tett & Meyer 1993, p. 262). Turnover intent is distinguished from turnover, which represents an individual's actual termination with a given company. There is strong empirical support for negative relationships between satisfaction and turnover intent, and between commitment and turnover intent (e.g., Arnold & Feldman, 1982; Bluedorn, 1982; Hollenbeck & Williams, 1986).
Tett and Meyer (1993) discuss three models of the antecedents of turnover intent that include the job satisfaction and organizational commitment constructs. First, the *satisfaction-to-commitment mediation model* suggests that job satisfaction has only an indirect effect on turnover intent, and suggests that it is important to ascertain the factors that facilitate organizational commitment among employees. Second, the *commitment-to-satisfaction mediation model* suggests that commitment to the organization results in positive feelings about the job, suggesting that changes in commitment have only indirect effects on turnover intent (e.g., Bateman & Strasser, 1984; Dossett & Suszko, 1989). However, there is also empirical evidence that contradicts this perspective (e.g., Curry, Wakefield, Price, & Mueller, 1986; Meyer & Allen, 1988).

Third, the *independent-effects model* posits that job satisfaction and organizational commitment are distinct constructs (e.g., Dougherty, Bluedorn, & Keon, 1985), and that while related, they contribute independently to the turnover process. As mentioned previously, prior research has established the positive correlational nature of the two constructs; however, the possibility of a solid causal link is still debated. Farkas and Tetrick (1989) suggest that there may be reciprocal influences between the two constructs which can be captured through structural equation modeling procedures. The independent-effects model calls
for an examination of how the two constructs interact to influence turnover intent and actual turnover.

Summary

The following antecedents and consequences of role conflict and role ambiguity, have been examined in this section: autonomy, co-worker social support, work locus of control, role overload, job-related tension, general job satisfaction, organizational commitment, career commitment, job involvement, and turnover intent. The findings reported in the literature reviewed have obvious implications for employees involved in major organizational redesign efforts, such as the transition to self-managing work team structures. Virtually no empirically-based literature exists which tests these relationships with technical professional employees.

An additional issue concerns employees' lack of a history of reinforcement in some areas that would lead them to have specific expectations about outcomes. Although, according to Spector (1982, p. 495), individuals with an internal locus of control "seem to prefer participative supervision, they demonstrate initiative, and they tend to take personal action on the job," there is still the problem of tremendous ambiguity regarding systemic issues such as the changing reward structure, work methods, and manager/operative relations. Issues of particular importance in the self-managing work setting are methods of
new standard setting, individual recognition and status in the organization, general disruption of manufacturing methods, personal adjustment problems, expertise, interpersonal tension (Street, 1990), and lack of managerial support for the redesign, and fear of job and/or status loss. Redesign of incentive systems (e.g., pay for knowledge and group-based standards) is a particularly salient, current issue that has tremendous implications for professionals and has an impact on job satisfaction, organization commitment and other attitudes. Several qualitative data gathering frameworks that manifest a congruent value base and lend philosophical support to a thoughtful examination of the issues facing professionals in team-based organizations today are examined in the following section.

**Interpretative Data Gathering Strategies**

Grounded theory (Glaser & Strauss, 1967) is the theoretical basis for Phase I of this study. Participatory action research (Elden & Levin, 1991), and critical theory (Deetz & Kersten, 1983) are strongly anchored in a respect for the knowledge, wisdom, and needs of individuals in the social field studied and thus help illuminate the value base of this study.

**Grounded Theory**

Glaser and Strauss' (1967) concept of grounded theory involves the generation of theory from the data, in contrast
to logico-deductive methods based on apriori assumptions. According to Glaser and Strauss (1967, p. 3), the rationale behind the grounded theory approach is that it provides "theory that is suited to its supposed uses." Glaser and Strauss (1967) describe the purposes of sociological theory as follows:

1. to enable prediction and explanation of behavior;
2. to be useful in theoretical advance in sociology;
3. to be usable in practical applications--prediction and explanation should be able to give the practitioner understanding and some control in situations;
4. to provide a perspective on behavior--a stance to be taken toward data; and
5. to guide and provide a style for research on particular areas of behavior. (p. 3)

Thus, theory becomes a means of handling data and provides ways of conceptualizing for the purposes of describing and explaining behavior. In order to fulfill these purposes, theory must necessarily fit the situation being investigated. As Glaser and Strauss (1967, p. 3) further state, "the theory should provide clear enough categories and hypotheses so that crucial ones can be verified in present and future research; they must be clear enough to be readily operationalized in quantitative studies when these are appropriate." The best way to insure fit, according to Glaser and Strauss, is the induction or systematic discovery of the theory from the data. In
addition, not only do most hypotheses and concepts emerge from the data, but their relation to the data is refined during the course of the research endeavor. Thus, the grounded theory investigation represents an ongoing process of clarification rather than a testing of *apriori* models that are not necessarily data-based.

**Participatory Action Research**

According to Whyte (1991), participatory action research (PAR) is not a new strategy for advancing research and practice. It evolved from three lines of intellectual thought: (1) applied social research methods, (2) participative decision making involving individuals of low organizational or community status, and (3) sociotechnical systems theory applied to organizational behavior.

Whyte (1991) suggests that the most common form of applied social research is what is known as the expert model, the framework underpinning most organizational development interventions. Using this framework, an organization calls in a so-called "expert" (e.g., organizational consultant) to diagnose a particular problem and recommend solutions. This type of intervention typically ends with the consultant providing organizational decisions makers with the facts and possible action alternatives.
This framework has limited value when organizations are facing massive change programs (e.g., merger activity, work redesign such as to the move to self-managing work teams, etc.). According to Whyte (1991, p. 9) major change initiatives require "a hands-on set of relationships with the social researcher." Among other things, this involves consulting with key informants in the organization about project goals and how to interpret findings. Thus, these particularly knowledgeable individuals become active partners in the research process, thus embodying the egalitarian values which underpin the participatory action research perspective.

Participation in decision-making by individuals of low status in an organization further emphasizes this democratic value system. This type of participation is currently manifested among members of self-managing work teams in organizations. Finally, the sociotechnical systems approach, discussed in detail in a prior section, is based on the notion that in order to understand behavior in organizations, there must be an integration of social and technical factors. However, the participatory action research perspective takes the study of these elements one step further. It suggests that rather than use individuals as simply passive informants, social researchers should include these individuals as active participants in a collaborative spirit of inquiry.
Whyte (1991) suggests that research and action are not incompatible. As he states,

Science is not achieved by distancing oneself from the world; as generations of scientists know, the greatest conceptual and methodological challenges come from engagement with the world. The scientific standards that must be met to conduct a successful PAR project are daunting. And yet, . . . it is possible to pursue both truth and solutions to concrete problems simultaneously. Indeed, we are led to wonder about the mystification that permits some of our colleagues to believe that research and action are incompatible. (p. 21)

**Critical Theory**

Critical theory, as a sociological perspective, concerns the gap that exists between human needs and the actualization of those needs. European in origin, the theory owes its intellectual roots to three lines of thought: the hermeneutic theory of understanding, Marxian social theory, and Freudian discursive intervention. Critical theory combines the historical Marxist focus on the forces of power, domination, and production, the hermeneutical interest in meaning, and the Freudian interest in the distorted communication patterns of the neurotic and psychotic to arrive at an organizational analogue, the neurosis of society. Critical theory is ultimately
political. It seeks to intervene in social processes that benefit some individuals to the exclusion of others. According to Deetz and Kersten (1983, p. 151), its goal is an emancipatory one, "namely the examination of all forms of domination for the sake of opening up the decision-making process to all relevant interests." As Deetz and Kersten (1983) state,

Domination takes place whenever one group has privileged access to the means of production and expression. Domination may thus take place through working relationships, standard social practices, access to information, ownership, or uncritically accepted beliefs and values. Domination has a distorting effect on systems of production and communication. Some forms of domination lead to a consensus in society or in an organization that is not representative of the interests of any existing groups. (p. 151)

This has relevance for organizations involved in the transition to self-management because the distortion of domination must be given up forever in favor of a truly egalitarian ethos. According to Deetz and Kersten (1983, p. 154), this is precisely the aim of critical theory—"emancipatory interests [that] reflect concerns for conditions that promote human development, reflexiveness, and autonomy."
As with the systems theory approach, critical theory places the organization in its wider social context. Organizations are more than simply producers of goods, services, and profits. They play a central role in the total development of society and must be thoroughly examined from this perspective. They are contexts for the production of human artifacts, and are therefore the loam of meaning systems that are of crucial historical value. As Deetz and Kersten (1983) state,

Organizations that only allow for their participants to labor and acquire economic well-being degrade people as well as the intrinsic value of the work experience. The work place that does not allow for participation in the decision-making process can adversely affect participation in other social and political processes. Societies cannot proclaim their belief in a set of values that are ignored and denied by the organization within them. (p. 154)

Ultimately, critical theory suggests that insight is useful to the extent that it is able to emancipate and enlighten (Habermas, 1973). The ultimate role of knowledge is to make individuals aware of the conditions under which they exist (and work). Once awareness is achieved through knowledge, then individuals possess the freedom to change the conditions and their places in the scheme of things.
To achieve this goal, investigators must look beyond the professed value systems, norms, and goals of an organization to the wider context (i.e., underlying assumptions and beliefs, community or extraorganizational context, etc.). As Deetz and Kersten (1983) state,

The utility of knowledge does not lie in the extent to which it increases organizational control nor does it lie in the extent to which it can make organizational behavior appear rational to its members. Rather, critical research is important because it contributes to unveiling the purposive irrationality in organizational behavior. (p. 155)

Finally, Deetz and Kersten (1983, p. 155) discuss the types of questions that critical researchers should ask. These include, "Whose interests are being served by these goals? What role do they play in creating and maintaining structures of power and domination? What are the conditions that would allow for a more consensual determination of goals?"

In conclusion, whereas critical theory may assume a sort of sleuthing role as its mode of operation, it is strongly anchored in the values of equality, collaboration, and emancipation as is participatory action theory. Finally, grounded theory represents the more generic, inductive investigative method for uncovering realities in the social field, and, as such, is applicable to both.
Hypotheses

A set of hypotheses were formulated for technical professional employees based upon the pilot data analysis results (see Appendix A), interviews conducted in Phase I of the study (see Appendix B), and a review of literature. The hypotheses are stated according to which variables have a direct effect upon others. The sign and direction of each coefficient is therefore important to test and interpret in a theoretical model.

The variable work locus of control was directly related to role conflict, role ambiguity, and career commitment. A negative, significant relationship is expected between locus of control and career commitment, with a positive significant relationship between the other two variables. Therefore, the following two hypotheses are stated:

H1A: As work locus of control increases, role conflict and role ambiguity should increase significantly.

H1B: As work locus of control increases, career commitment should decrease significantly.

Autonomy was related to general job satisfaction, organizational commitment, job involvement, job related tension, turnover intent, role ambiguity, role conflict, and role overload. Basically, if autonomy increases then job satisfaction, organizational commitment, job involvement, and role conflict increase. Role overload covaries positively with autonomy. Also, when autonomy increases
then job-related tension, turnover intent, and role ambiguity decrease. In this instance, negative, significant coefficients are expected. Four separate hypotheses are formulated to address these direct effects as follows:

H2A: As autonomy increases, general job satisfaction and role conflict should increase significantly.

H2B: As autonomy increases, job-related tension and role ambiguity should decrease significantly.

H2C: As autonomy increases, organizational commitment and job involvement should increase significantly.

H2D: As autonomy increases, turnover intent should decrease significantly.

Three separate hypotheses were also formulated which related work method, work scheduling, and work criteria autonomy directly to role ambiguity. Since role ambiguity was hypothesized to decrease when these variables increased, a negative, but significant coefficient is expected. The hypotheses are:

H3A: As work method autonomy increases, role ambiguity should decrease significantly.

H3B: As work scheduling autonomy increases, role ambiguity should decrease significantly.

H3C: As work criteria autonomy increases, role ambiguity should decrease significantly.
Co-worker social support was found to be directly related to role ambiguity, role conflict, job-related tension, and general job satisfaction. Since role ambiguity, role conflict, and job-related tension were hypothesized to decrease, but general job satisfaction and organizational commitment to increase, the following three hypotheses were stated:

H4A: As co-worker social support increases, general job satisfaction should increase significantly.

H4B: As co-worker social support increases, role ambiguity, role conflict, and job-related tension should decrease significantly.

H4C: As co-worker social support increases, organizational commitment should increase significantly.

Role overload was directly related to job-related tension, role ambiguity, role conflict, and general job satisfaction in the research literature. If role overload increases then job-related tension, role ambiguity, and role conflict increase, and conversely, if role overload increases then general job satisfaction should decrease. This led to two separate hypotheses as follows:

H5A: As role overload increases, job-related tension, role ambiguity, and role conflict should increase significantly.

H5B: As role overload increases, general job satisfaction should decrease significantly.
According to the review of literature, role ambiguity was related to job-related tension, job satisfaction, organizational commitment, job involvement, and turnover intent. If role ambiguity increases, then turnover intent should increase; a positive coefficient indicating a significant direct effect is expected. Job related tension should positively covary with role ambiguity. Alternatively, if role ambiguity increases, then organizational commitment and job involvement should decrease; a negative coefficient indicating a significant direct effect is expected. Job satisfaction should negatively covary with role ambiguity. Therefore two hypotheses were formulated as follows:

H6A: As role ambiguity increases, turnover intent should increase significantly.

H6B: As role ambiguity increases, organizational commitment and job involvement should decrease significantly.

Role conflict was related to job-related tension, general job satisfaction, organizational commitment, job involvement, role ambiguity, and turnover intent. If role conflict increases, turnover intent should increase (a direct effect); a positive significant coefficient is expected. Job-related tension and role ambiguity should covary positively with role conflict. In contrast, if role conflict increases, then organizational commitment and job
involvement should decrease; a negative, significant coefficient is expected. General job satisfaction should covary negatively with role conflict. Consequently, the following two hypotheses were stated:

H7A: As role conflict increases, turnover intent should increase significantly.

H7B: As role conflict increases, organizational commitment and job involvement should decrease significantly.

Job related tension was negatively related to career commitment in the research literature, negatively covaried with general job satisfaction, but positively covaried with role ambiguity. Therefore, the following hypothesis was developed:

H8: As job-related tension increases, career commitment should decrease significantly.

General job satisfaction has a reciprocal relationship with turnover intent. It was previously noted that general job satisfaction also has a reciprocal relationship with organizational commitment. Regarding turnover intent, the following hypothesis was stated:

H9: As general job satisfaction increases, turnover intent should decrease significantly, and as turnover intent increases, then general job satisfaction should increase significantly.
Organizational commitment was found to be related to turnover intent, career commitment, and general job satisfaction. Turnover intent negatively covaries with organizational commitment whereas career commitment positively covaries with organizational commitment. A positive reciprocal relationship exists between general job satisfaction and organizational commitment (2 paths). A hypothesis was formulated based upon the nature of this reciprocal relationship.

H10: As organizational commitment increases, general job satisfaction should increase significantly, and as general job satisfaction increases, then organizational commitment should increase significantly.

In the research literature career commitment is related to general job satisfaction, turnover intent, job involvement, and organizational commitment. However, as previously noted, controversy still exists as to whether this constitutes a mediation model or an independent-effects model. Therefore, for purposes of theoretical model development, career commitment is considered to covary with these variables. Basically, career commitment and turnover intent should have a negative covarying relationship. Career commitment should positively covary with general job satisfaction, job involvement, and organizational commitment. Consequently, no direct effect hypotheses are stated.
Job involvement was found to relate to turnover intent and general job satisfaction. Job involvement and turnover intent negatively covary whereas job involvement and general job satisfaction positively covary. The research literature indicates that these variables are correlates, rather than directly related to each other. Therefore, no direct effect hypotheses are warranted.

The Theoretical Model

Recently, Schaubroeck, Cotton, and Jennings (1989) used structural equation modeling to expand the Bedeian and Armenakis (1981) and Kemery et al. (1985) model of the effects of role conflict and role ambiguity by including antecedent job conditions and the outcome variable, organizational commitment. The model clarified the impact of role conflict and role ambiguity on organizational commitment, tension, turnover intent, and job satisfaction. Their original model was tested with a sample consisting of 249 blue- and white-collar employees of a civilian federal government manufacturing installation. The model was modified to improve fit and then cross-validated with a second sample representing 201 blue-collar employees of the maintenance division of a large university.

The use of a structural equation modeling approach to test a theoretical model has been useful in examining these kinds of complex variable interrelationships. Instead of testing each hypothesis in a separate analysis, all
variables and their direct effects are tested in a theoretical model. Figure 1 presents the hypothesized theoretical model based upon the Phase I, the pilot study, and the research literature. It specifically indicates the aforementioned hypothesized direct effects among antecedent, mediating, and outcome variables.

The latent variables identified and used to test the theoretical model were defined by sets of items included in the survey instrument during Phase II (see Appendix C). Work locus of control, autonomy, work method autonomy, work scheduling autonomy, work criteria autonomy, co-worker social support, and role overload were treated as antecedent exogenous (independent) latent variables. Role ambiguity, role conflict, job related tension, and general job satisfaction were treated initially as mediating latent variables (indirect effects). They were also used to indicate direct effects on the following outcome latent variables: career commitment, organizational commitment, job involvement, and turnover intent. Latent variables in these types of models will typically be independent variables in one level of analysis, but become dependent variables in subsequent analyses within the same model. This model does reflect reciprocal relationships between general job satisfaction with organizational commitment and turnover intent, respectively, which is reported in the research literature. Specific hypotheses were generated
Fig. 1. Hypothesized Theoretical Model
related to the direct effects of these latent variables included in the model. Negative coefficients are indicated in Figure 1 for several direct effects. For the antecedent variables, work locus of control has a negative coefficient to career commitment; autonomy has negative coefficients to role ambiquity, job related tension, and turnover intent; work method, work scheduling, and work criteria autonomy have negative coefficients to role ambiquity; co-worker social support has negative coefficients to role ambiquity, role conflict, and job related tension; and role overload has a negative coefficient to general job satisfaction.

The mediating variables also had negative direct effect coefficients to the latent outcome variables: role ambiquity to organizational commitment and job involvement; role conflict to organizational commitment and job involvement; job related tension to career commitment; and general job satisfaction to turnover intent. The outcome variables indicated two reciprocal relationships. General job satisfaction has a positive reciprocal relationship with organizational commitment and a negative reciprocal relationship with turnover intent. All other paths indicate positive coefficients between latent variables indicating direct effect relationships.

Chapter Summary

This chapter began with a discussion of organization-wide systems issues including organization climate and
culture, paradigm shifts, participative management, and systems theory applications. The increasing influence of knowledge work on work design was then discussed as were professional socialization, various antecedents and consequences of role conflict and role ambiguity, and three interpretative data gathering strategies.

The research literature, Phase I data, and the pilot study formed the basis for deriving specific direct effect hypotheses between antecedant, mediating, and outcome latent variables. Prior research which investigated some of these variable interrelationships using a structural equation modeling approach was then cited. Finally, a hypothesized theoretical model was developed.

In Chapter III, the methodology used to test the hypothesized theoretical model is examined. General topics covered include procedures used in Phases I and II of the present study, variables and instruments used to measure them, and the preparation of feedback reports for participating companies, power of the test, and the methods of analysis.
CHAPTER III

METHOD

Introduction

This qualitative-quantitative study represented a field-based approach to the investigation of complex multivariable interrelationships. Selected technical professional employees in various facilities in the defense industry were interviewed to generate data for use in the construction of a tailored survey instrument. Scale items were chosen from the literature to augment scales which measured certain variables discussed in the pilot study (see Appendix A).

The steps involved in interviewing (Phase I) and the administration of the survey (Phase II) are outlined in the following sections. This is followed by a discussion of the variables included in this study and the instruments used to measure them. A discussion of feedback report preparation follows. The methods used to test the hypothesized model and the power of the test are also discussed.

Phase I: Qualitative Data Gathering

The main objective of Phase I was to isolate issues facing technical professionals in team settings as preliminary groundwork for survey construction. A related conceptual objective was to gather information regarding
these individuals' reactions to the implementation of self-managing teams in their organizations.

Subjects

Interviews with 25 engineers and managers in various functional areas were conducted at three defense industry electronic manufacturing sites in a large southwestern metropolitan area over several months during the spring of 1992. Twenty-four of the 25 individuals provided biodata information with an average age of 38.4 years. Ninety-six percent of the 24 individuals were male. Sixty-three percent held bachelors degrees, 29% held master's degrees, and 4% held doctoral degrees. Individuals were employed in the following functional areas: manufacturing, operations, purchasing, inventory control, quality/reliability, training, finance, management information systems, management, assembly, maintenance, and various engineering specialties (process, design, quality, product, and equipment). The average number of subordinates supervised by these individuals was 16. The average number of years in the industry was 12, with an average of 6.6 years in their current profession. The interviewees had been with their current organization for an average of 9.6 years. Their self-managing work team had been operating for an average of 1.5 years, and they had been members of their team for the same duration. Table 1 follows.
Table 1

Demographics of 25 Interviewees

<table>
<thead>
<tr>
<th>Control Variable</th>
<th>Mean Value</th>
<th>Response Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>38.4</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(male)</td>
<td></td>
<td>96.0%</td>
</tr>
<tr>
<td>(female)</td>
<td></td>
<td>4.0%</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(bachelors degree)</td>
<td></td>
<td>63.0%</td>
</tr>
<tr>
<td>(masters degree)</td>
<td></td>
<td>29.0%</td>
</tr>
<tr>
<td>(doctoral degree)</td>
<td></td>
<td>4.0%</td>
</tr>
<tr>
<td>No. of Subordinates</td>
<td>16.0</td>
<td></td>
</tr>
<tr>
<td>Years in industry</td>
<td>12.0</td>
<td></td>
</tr>
<tr>
<td>Years in profession</td>
<td>6.6</td>
<td></td>
</tr>
<tr>
<td>Tenure with co. (yrs.)</td>
<td>9.6</td>
<td></td>
</tr>
<tr>
<td>SMWT life (yrs.)</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>Member of SMWT (yrs.)</td>
<td>1.5</td>
<td></td>
</tr>
</tbody>
</table>

Apparatus

Initial materials for Phase I of the project included an informed consent form which briefly described the nature of the project, and a biodata sheet which requested specific demographic information (Appendix B). A list of interview questions was prepared for use by the interviewers but was
not made available to the interviewees. Each interviewer came prepared with the set of interview questions, note paper, and ample informed consent and debriefing forms.

Procedure

At the initial contact, and after introductions, interviewees were informed that the interview (including filling out forms) would take about one hour. Informed consent forms which describe briefly the nature of the study and participant rights, were distributed. After signing the form which represents voluntary participation, participants were given the biodata form to complete. Once both forms were completed, the interview commenced. The interviews were transcribed and analyzed for significant themes. This information was then used to tailor the selection of scales for the survey administered in Phase II of the project (see Appendix B for a copy of the interview report prepared for the interviewees).

Phase II: Survey Construction and Administration

Construction of the questionnaire was based on an analysis of the interviews with 25 engineers and managers and pilot testing of selected items. A two-page letter describing the project and including informed consent information about the voluntary nature of the survey (Phase II) and respondent confidentiality was attached to each survey (see Appendix C). The informed consent letter did not require a signature (completing the survey implied
voluntary participation). A copy of the survey is also included in Appendix C. Questions for the survey were then selected from nationally recognized, published instruments which have demonstrated validity and reliability and have been adapted for a variety of research uses. Items were chosen to represent issues revealed in the analysis of the interviews.

Subjects

The subjects for this study were 542 technical professional employees representing 117 different work groups and 14 companies within the United States and abroad. Seven cases were dropped from the data analysis because of missing data leaving a sample of N = 535. Most were traditional sites engaged in redesign. Twelve of the companies surveyed are publicly traded United States companies; one includes participants from a foreign subsidiary, one is a privately held United States firm, and one is under foreign ownership. The companies represent the following industries (number of firms in parentheses): computers, office equipment (three); aerospace (three); electronics, electrical equipment (three); petroleum refining (one); scientific, photographic, and control equipment (one); plastics materials, synthetic resins (one); industrial gases (one); aluminum processing (one). Ten of the participating companies (or their parent companies in some cases) were listed on the 1993 Fortune 500 list, and
nine of these were included on the Fortune 150 list for the same year (1992 rankings). Specialties surveyed included but were not limited to, administration, customer service, development, engineering, facilities, finance, human resources, information systems, marketing, material, operations, planning, purchasing, quality, real estate, sales, and technical writing and illustration.

Seventy percent of the subjects of this study were male; the mean age was 35.9. Twenty-two percent of the respondents held masters or doctoral degrees and the remainder held either bachelor's or associate degrees. Respondents had been with their current company an average of 7.5 years, and in their present position an average of 2.8 years. Eighty-eight percent worked the day shift and 25% indicated that they supervised at least one individual. The average reported work week was 45 hours.

The respondents indicated that they had been a member of their current team for an average of 1.3 years, and that their team had been in existence about 1.7 years. While 33% reported that they were a full-time member of one team, 9% indicated that they were loaned out to a variety of teams. Almost 27% of the respondents reported that they operated from a home team, in addition to being loaned out to others as needed. Another 26% chose not to answer this question (see Table 2).
Table 2

Demographics of 542 Survey Respondents

<table>
<thead>
<tr>
<th>Control Variable</th>
<th>Mean Value</th>
<th>Response Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>35.9</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(male)</td>
<td></td>
<td>70.0%</td>
</tr>
<tr>
<td>(female)</td>
<td></td>
<td>30.0%</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(bachelor’s or associate degrees)</td>
<td></td>
<td>78.0%</td>
</tr>
<tr>
<td>(master’s or doctoral degrees)</td>
<td></td>
<td>22.0%</td>
</tr>
<tr>
<td>Supervise one or more workers</td>
<td></td>
<td>25.0%</td>
</tr>
<tr>
<td>Years in present job</td>
<td></td>
<td>2.8</td>
</tr>
<tr>
<td>Tenure with co. (yrs.)</td>
<td></td>
<td>7.5</td>
</tr>
<tr>
<td>Work the day shift</td>
<td></td>
<td>88.0%</td>
</tr>
<tr>
<td>SMWT life (yrs.)</td>
<td></td>
<td>1.7</td>
</tr>
<tr>
<td>Member of SMWT (yrs.)</td>
<td></td>
<td>1.3</td>
</tr>
<tr>
<td>Team assignments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(full-time with one team)</td>
<td></td>
<td>33.0%</td>
</tr>
<tr>
<td>(loaned to a variety of teams)</td>
<td></td>
<td>9.0%</td>
</tr>
<tr>
<td>(home team and loaned as needed)</td>
<td></td>
<td>27.0%</td>
</tr>
<tr>
<td>Industries represented in 117 work groups: (number of companies in parentheses)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computers, office equipment (3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aerospace (3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electronics, electrical equipment (3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Petroleum refining (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientific, photographic, control equipment (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics materials, synthetic resins (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial gases (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aluminum processing (1)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Sample

The sample used in this study was a targeted sample. Approximately 12 months were spent contacting companies to interest key contact personnel in the project. Packets of information including a copy of the survey, an attached informed consent letter requesting participation by technical professional employees, benefits to be derived from participating, and models underpinning the study were sent to over 50 companies in the fall of 1992. Numerous telephone calls were made and materials were faxed to sites around the country. Fourteen companies eventually agreed to participate in exchange for detailed feedback concerning their work team and company results.

Variables Included in the Survey

The variables included in the model and survey based on the results of the pilot analyses and the survey of the relevant literature are described in this section. Several additional variables were added based on the qualitative analyses from Phase I. Definitions are based on generally accepted meanings from the literature. However, because of the vastness of the literature, some definitions reflect operational constructions used in particular instruments chosen for this study.

Autonomy is "the extent to which individual employees can structure and control how and when they do their particular job tasks" (Hackman & Oldham, 1976).
Career commitment is "one’s attitude toward one’s profession or vocation" (Blau, 1988).

Co-worker social support represents the extent to which support is available (Kessler & McLeod, 1985), or is perceived adequate (e.g., Dunkel-Schetter & Wortman, 1982; Wortman & Lehman, 1983).

General job satisfaction is a positive attitudinal disposition towards one’s job. "Employees on enriched jobs...express relatively high general satisfaction, as measured by questions such as, ‘Generally speaking, how satisfied are you with your job?’ and ‘How frequently do you think of quitting this job?’" (Hackman & Oldham, 1980).

Job involvement is "the degree to which the individual identifies with a job, that is, the importance of the job to one’s self image" (Blau, 1988).

Job-related tension (stress) "denotes the psychological state experienced by the individual when faced with demands, constraints, and/or opportunities that have important but uncertain outcomes" (Greenhaus & Parasuraman, 1987).

Locus of control is "a generalized expectancy that rewards, reinforcements, or outcomes in life are controlled by either one’s own actions (internally) or by other forces (externally)" (Spector, 1988).

Organizational commitment represents "the individual’s identification with a particular organization and its goals" (Blau, 1988).
Role ambiguity concerns the lack of specific information regarding job responsibilities (Kahn et al., 1964).

Role conflict is "the incompatibility of demands" (Kahn et al., 1964; Rizzo, House, & Lirtzman, 1970); "The simultaneous occurrence of two or more sets of pressures such that compliance with one would make compliance with the other more difficult" (Bacharach, Bamberger, & Conley, 1990).

Role overload is the extent to which an individual has too much to do (quantitative), or faces work that is too difficult (qualitative) (French & Caplan, 1972)--has too much work to do in the time available (Beehr, Walsh, & Taber, 1976).

Turnover intent is an attitudinal disposition which represents an employee’s seriousness about quitting his or her current job (Landau & Hammer, 1986).

Work criteria autonomy is "the degree to which workers have the ability to modify or choose the criteria for evaluating their performance" (Breaugh, 1985)

Work method autonomy is "the degree of discretion/choice individuals have regarding the procedures/methods they utilize in going about their work" (Breaugh, 1985).
Work scheduling autonomy is "the extent to which workers feel they can control the scheduling/sequencing/timing of their work activities" (Breaugh, 1985).

Instruments

A number of instruments used in the pilot analysis were changed in order to improve internal reliabilities and to minimize the possibility of method bias. The scale items from the pilot study that were retained and used in the present study to define variables without change were: co-worker social support, role ambiguity, and role conflict. These items are from the research of Caplan et al. (1980). Reliabilities from the pilot study for these scales (variables) were, respectively, $\alpha = .78$, $\alpha = .83$, $\alpha = .75$.

The general satisfaction scale (Hackman & Oldham, 1980) used in the pilot study was modified to include three additional scale items by these authors (i.e., "I frequently think of quitting this job;" "Most people on this job are very satisfied with the job;" and "People on this job often think of quitting."). In addition, one growth satisfaction item used in the pilot version was dropped from the present scale: "The amount of personal growth and development I get in doing my job." The reliability coefficient from the pilot study for this scale was $\alpha = .83$.

Instruments for the remainder of the scales were replaced from those used in the pilot study for various reasons (see Appendix C for a complete list of items used in
the present study). Hackman and Oldham's (1980) autonomy scale was replaced with three items from the *Job Characteristics Inventory* autonomy scale (Sims, Szilagyi, & Keller, 1976) because of their stronger internal reliability. "The freedom to do pretty much what I want on my job," was measured on a 5-point Likert type scale from 1 = a minimum amount to 5 = a maximum amount. The last two items which were measured on a 5-point Likert-type scale ranging from 1 = very little to 5 = very much, were "How much are you left on your own to do your own work?" and "To what extent are you able to act independently of your supervisor in performing your job function?" The reliability coefficient for the unedited scale tested on a sample of N = 215 professionals is α = .84, and tested on a sample of N = 110 technical employees is α = .85.

The one role overload item was replaced with three items by Beehr, Walsh and Taber (1976). The reliability for this scale from the literature is α = .56. Job-related tension (stress) was measured using a three-item scale by House and Rizzo (1972) with a Kuder-Richardson internal reliability coefficient of .83 for the original seven-item scale. A fourth item addressing health effects of work stress was added to the questionnaire although it was not retained in the present analysis because of a poor item-total correlation. The affective commitment scale was replaced with three, three-item scales by Blau (1988) which
measure career commitment, job involvement, and organizational commitment. The reliabilities for these scales from the literature were not available.

Three more-specific measures of autonomy by Breaugh (1985) augmented Sims et al.’s (1976) *Job Characteristics Inventory* autonomy measure, that is, work method autonomy, work scheduling autonomy, and work criteria autonomy. The test-retest reliabilities for these scales from the literature are, respectively, $r_{tt} = .76$, $r_{tt} = .71$, $r_{tt} = .65$. The continuance commitment scale was replaced with a three-item turnover scale by Landau and Hammer (1986). The reliability for this scale from the literature is $\alpha = .77$.

Work locus of control was measured with three items from Spector (1988). In the present study, a high score indicates external locus of control (externality); conversely, a low score indicates internal locus of control (internality). The internal reliability coefficient for a sample of 101 mental health agency employees (counselors, nurses, and support personnel) was $\alpha = .85$. A second sample comprised of $N = 496$ municipal managers yielded a coefficient $\alpha = .85$.

**Apparatus**

Materials included the questionnaire and a two-page informed consent letter attached which explained the voluntary and confidential nature of the project. The contact personnel at most of the research sites distributed
the surveys with the informed consent letter attached. However, one large site (n = 238) unfortunately only included the first page of the letter to prospective participants, thus depriving these individuals of information regarding their rights in the study. The surveys had been returned and were being prepared for data entry when it became evident that the second page of the letter had not been included. One possible explanation for the omission of the second page of the letter is that this particular firm did not want its employees to know that they had a choice about participating in the study.

Procedure

Questionnaires were distributed to 542 technical professional employees by contact personnel within the particular work sites. Because distribution was handled internally, there was no way of knowing how many surveys were distributed and, thus, the percentage of nonresponse. The surveys were returned by mail in most cases, although two contact individuals hand delivered the completed questionnaires from their sites. Upon receipt, the questionnaires were logged in and assigned a nine-digit code number which indexed the company, subject number, version of the questionnaire, group, and survey administration year. The questionnaires were then coded for data entry and delivered to the data entry office in the university computing center where they were keyed. Written comments
were also given identification numbers, duplicated, and typed. These were then analyzed and written in narrative form.

Feedback Reports

The months of March through July, 1993, were spent preparing 23 separate feedback reports for participating companies, plus an overall summary report aggregating the results of all 14 participating companies. In order to protect participants' confidentiality, a minimum of eight participants from a particular work group or company were required to prepare a tailored feedback report. This criterion was communicated to companies in promotional materials from the onset of the project.

Each customized feedback report took approximately 25 to 30 hours to assemble. Once the data were received in electronic file form from the data entry office, they were analyzed using an SPSS program designed for the data. Printouts for each company or workgroup were then transcribed by hand onto worksheets. These worksheets were used to enter the data into a spreadsheet program designed expressly for the purpose of presenting the questionnaire results in the reports. A total of six individuals worked on various aspects of the reports. The investigator served as the project manager/coordinator of the project. This involved providing resources for these individuals and serving as the final quality control station. The
investigator did all of the coding of the questionnaires, statistical analyses, assembly of reports, mailings, and was the primary contact with company representatives involved in the project. The investigator also assisted project members in solving the various problems they encountered on a day-to-day basis with their various tasks.

Each customized feedback report was 45 to 50 pages long and contained the following sections: Executive Summary, Overview of the Survey Project, How to Read and Use This Report, Analysis of Write-In Comments, Scales Included in the Questionnaire, and Spreadsheet/Item Percentages. Two copies of each report were mailed to the contact person in each participating company. A typical mailing included two copies of the report, a cover letter, and a dummy billing for my records (no charge to participants). The packages were sent by certified return receipt mail in order to track potential problems at the receiving end because the material was confidential. By early July, 1993, all participating companies were mailed copies of the overall summary report by regular mail. In addition, because an error in reporting one of the scales was discovered after the reports were mailed to participating companies, reports were corrected and reprinted for several companies.

A feedback debriefing session was held on the University of North Texas campus in July, 1993, to provide a forum for discussing the overall survey results with
representatives from participating companies. An additional
general information session for reporting results of the
survey program was held on the University of North Texas
campus in March 1994 for interested corporate
representatives. In addition, follow-up information
regarding interpretation of the data was provided to one of
the participating companies at their request.

**Power of the $\chi^2$ Test**

The power of the test or the probability of correctly
rejecting a false (null) hypothesis (Kachigan, 1986) is
equal to $1 - B$. According to Cohen and Cohen (1983) one of
the parameters of any test of a null hypothesis is sample
size: as $n$ increases, power increases. With a sample of
$N = 535$, adequate power was not of particular concern,
however, a power analysis was conducted in order to lend
further support to the strength of the findings.

An evaluation of the power function of the $\chi^2$ statistic
involves the non-central chi-square distribution. Haynam,
Govindarajulu, and Leone (1970) state that the distribution
involves three parameters: (1) the non-centrality parameter
denoted by $\lambda$; (2) the degrees of freedom denoted by $\nu$; and
(3) the power or cumulative probability denoted by $1 - B$.
Power is derived by computing the non-centrality parameter,$\lambda$ and degrees of freedom $\nu$ for the particular test. The
desired $\alpha$ level is chosen and the three parameters are then
located in a power of the chi-square test table which
represents the cumulative non-central chi-square distribution.

Power was computed at a .001 α level for four structural models: (1) the initial structural model: mediating variables predicted by antecedent variables (referenced in Table 9); (2) the modified structural model: mediating variables predicted by antecedent variables (referenced in Table 9); (3) the initial structural model: outcome variables predicted by antecedent and mediating variables (referenced in Table 10); and (4) the modified structural model: outcome variables predicted by antecedent and mediating variables (referenced in Table 10). In test (1) \( \lambda = 431.85, v = 522; \alpha = .001, 1 - B = .9863 \). Test (2) yielded the following statistical parameters: \( \lambda = 419.33, v = 531; \alpha = .001, 1 - B = .9863 \). The results of test (3) were as follows: \( \lambda = 475.43, v = 525; \alpha = .001, 1 - B = .9863 \). The results of test (4) were: \( \lambda = 396.27, v = 530; \alpha = .001, 1 - B = .9863 \). These power levels are arrived at using the largest degrees of freedom interval on the table (\( v = 100 \)). Interpolation was not conducted to account for the larger actual sample size because the power level for all tests was considered adequate.

Method of Analysis

Descriptive statistics were computed for each demographic variable, subscale total, and whole scale total,
where appropriate. Pearson product-moment correlations were then computed among the variables.

Estimation of the coefficients in the theoretical model was accomplished using the LISREL 8 program (Jöreskog and Sörbom 1993). The coefficients are presented as standardized beta weights. Because LISREL uses a simultaneous, maximum-likelihood, estimation procedure, all coefficients in a specified model are estimated as a whole; changing the model by adding or deleting a path or variable changes the model and results in some alteration of the coefficients. If the sample size is sufficiently large, multiple items rather than total subscale scores can be used for each construct. As a result, the model can be treated as a latent variable problem, rather than as a path analytic problem.

In addition to estimating the coefficients, LISREL 8 provides indices of fit for the model overall. The chi-square ($\chi^2$) value provided by the LISREL program indicates the difference between the observed covariance matrix and a matrix based on calculations using the estimated coefficients from the specified model. The null hypothesis states that the matrix from the observed data does not differ from the computed matrix. A low chi-square value with a high probability level suggests that the differences between the two matrices are minimal, implying that the
specified model used to compute the matrix does a good job of capturing the relationships among the observed variables.

Additional indices of goodness-of-fit include the goodness-of-fit index, root mean square residual, and the adjusted goodness-of-fit index. The goodness-of-fit index is an index of overall variation explained by the model. The root mean square residual reflects the degree of unexplained variation across the individual parameter estimates. Jöreskog and Sörbom (1984) note that the residuals should be small in comparison to the magnitudes of the coefficients. Others suggest that the root mean square residual should be less than 0.05. Finally, the adjusted goodness-of-fit index is an index of overall variation explained by the model, adjusted for sample size.

Chapter Summary

The methodological procedures used in Phases I and II of the present study have been examined in Chapter III. This has been followed by a discussion of the variables and instruments included in this study. Also discussed were report preparation, the power of the $\chi^2$ test, and the methods used to test the hypothesized model. The statistical findings of the present study are presented in Chapter IV.
Chapter IV

RESULTS

This chapter includes the descriptive statistics for those indicator variables selected to represent the antecedent, mediating, and outcome variables. Next, the results of a confirmatory analysis is presented to indicate the extent to which the sets of latent variables were defined (measurement model). Then the antecedent variables as independent latent variable predictors of the mediating dependent latent variables, and certain antecedent and mediating variables as predictors of the outcome latent variables are presented (structural models). Finally, the reciprocal relationships between job satisfaction and turnover intent, and job satisfaction and organization commitment are reported. These structural relationships form the basis for the hypotheses in this study.

**Descriptive Statistics**

Twenty-one items were selected to identify seven antecedent variables (see Appendix C). Their intercorrelations, means and standard deviations are presented in Table 3. These items were selected after a careful search of the literature, a pilot study, and interviews in Phase I. Items four to six were numerically scaled from one to five. The remaining indicator variables
### Table 3

**Antecedent Indicator Variable Descriptive Statistics (N=535)**

<table>
<thead>
<tr>
<th></th>
<th>V1</th>
<th>V2</th>
<th>V3</th>
<th>V4</th>
<th>V5</th>
<th>V6</th>
<th>V7</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>V1</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V2</td>
<td>.57</td>
<td>1.00</td>
<td></td>
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</tr>
<tr>
<td>V3</td>
<td>.49</td>
<td>.63</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V4</td>
<td>-.23</td>
<td>-.25</td>
<td>-.24</td>
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<td></td>
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<tr>
<td>V5</td>
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<tr>
<td>V6</td>
<td>-.25</td>
<td>-.24</td>
<td>-.24</td>
<td>.41</td>
<td>.50</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V7</td>
<td>-.22</td>
<td>-.24</td>
<td>-.24</td>
<td>.41</td>
<td>.41</td>
<td>.43</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V8</td>
<td>-.20</td>
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\[ \Sigma_{cv} = .10, \ p < .01. \]
were numerically scaled from one to seven. It is interesting to note that because of the large sample (N = 535), most of the correlation coefficients met or exceeded the critical value, $r_{cv} = .10$, with the exception of two role overload items, V20 and V21. The highest correlations were between the work method autonomy items V7 and V8 ($r = .87$); V7 and V9 ($r = .87$); and V8 and V9 ($r = .91$).

Means for the 18 indicator variables scaled on a seven-point scale ranged from 2.26 to 5.96, and standard deviations ranged from 1.11 to 1.81. Means for the three indicator variables scaled on a five point scale (i.e., V4, V5, V6) ranged from 3.10 to 4.13, and standard deviations ranged from .83 to 1.14.

Table 4 indicates the intercorrelations, means and standard deviations of 14 items that were selected to identify four mediating latent variables. These indicator variables were scaled from 1 to 7 (see Appendix C). All but nine of the correlation coefficients achieved statistical significance ($r_{cv} = .10$). The highest correlation was between the role conflict items, V26 and V27 ($r = .81$). The means ranged from 2.41 to 5.90. Standard deviations were between 1.06 and 2.12.

Table 5 indicates the intercorrelations, means and standard deviations of 12 items that were selected to measure four outcome latent variables. These items were also scaled from 1 to 7 (see Appendix C) and carefully
### Table 4

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**Mean** 4.01 3.77 5.56 5.48 5.90 4.95 5.02

**SD** 1.95 2.12 1.44 1.84 1.06 1.40 1.66

**Note.** The mediating indicator variables were scaled from 1 to 7; $\rho_{cv} = .10$, $p < .01$. 
### Table 5

**Outcome Indicator Variable Descriptive Statistics (N = 535)**

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<tr>
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<td>0.28</td>
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</tr>
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<td>0.28</td>
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<tr>
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<td>0.16</td>
</tr>
<tr>
<td>V45</td>
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<td>-0.35</td>
<td>-0.38</td>
<td>-0.32</td>
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<td>-0.43</td>
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<th></th>
<th>M</th>
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<td>2.01</td>
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<tr>
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<td>1.36</td>
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<td>1.21</td>
</tr>
<tr>
<td></td>
<td>5.07</td>
<td>1.53</td>
</tr>
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</table>

(Table Continues)
Table 5

Outcome Indicator Variable Descriptive Statistics (N = 535)

<table>
<thead>
<tr>
<th></th>
<th>V42</th>
<th>V43</th>
<th>V44</th>
<th>V45</th>
<th>V46</th>
<th>V47</th>
</tr>
</thead>
<tbody>
<tr>
<td>V36</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>V37</td>
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<td>V38</td>
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<td>V41</td>
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<td>V45</td>
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<td>-.17</td>
<td>-.10</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V46</td>
<td>-.13</td>
<td>-.19</td>
<td>-.10</td>
<td>.74</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>V47</td>
<td>-.08</td>
<td>-.13</td>
<td>-.02</td>
<td>.63</td>
<td>.75</td>
<td>1.00</td>
</tr>
</tbody>
</table>

| M  | 3.41| 3.28| 3.06| 2.60| 2.14| 1.84|
| SD | 1.98| 1.83| 1.94| 1.88| 1.62| 1.53|

Note. The outcome indicator variables were scaled from 1 to 7; \( r_{cv} = .10, \ p < .01. \)
selected based upon a literature review, pilot study, and interviews in Phase I, as previously discussed. All but three of the correlation coefficients achieved statistical significance ($r_{cv} = .10$). The highest correlation was between the turnover intent items, V46 and V47 ($r = .75$). The means ranged from 1.84 to 6.17, and the standard deviations were between 1.21 and 2.01.

**Measurement Models**

A determination of whether the items selected defined the latent variables of interest was established by conducting a confirmatory factor analysis on each set of items for each set of latent variables. Table 6 presents the results of a confirmatory factor analysis of the 21 items for each of seven antecedent latent variables. Results indicated that each latent variable had a significant amount of variance explained and the scale reliabilities were high. Role overload and autonomy were not as well defined as the other latent antecedent variables.

The factor loadings were all above .70 and ranged from .71 to .97. Scale reliabilities using the Cronbach alpha procedure ranged from a low of .63 (role overload) to a high of .96 (work method autonomy). The percent variance explained for each latent variable was computed for each antecedent latent variable by summing the squared factor loadings and dividing by the number of factor loadings.
Table 6

Confirmatory Factor Analysis of Antecedent Latent Variables

<table>
<thead>
<tr>
<th>Latent Variable</th>
<th>Factor Loading</th>
<th>Scale Reliability</th>
<th>Percent Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work Locus of Control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V1</td>
<td>.81</td>
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<tr>
<td>V2</td>
<td>.88</td>
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<tr>
<td>V3</td>
<td>.84</td>
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<td></td>
</tr>
<tr>
<td>Autonomy</td>
<td></td>
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<tr>
<td>V4</td>
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<td>V5</td>
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<tr>
<td>Work Method</td>
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<td>Autonomy</td>
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<td>V7</td>
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<td>V8</td>
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<td>V9</td>
<td>.97</td>
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<td></td>
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<tr>
<td>Work Scheduling</td>
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</tr>
<tr>
<td>Autonomy</td>
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<tr>
<td>V10</td>
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<td></td>
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<tr>
<td>V11</td>
<td>.90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V12</td>
<td>.90</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>V14</td>
<td>.90</td>
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<td></td>
</tr>
<tr>
<td>V15</td>
<td>.66</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Co-Worker Social</td>
<td></td>
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</tr>
<tr>
<td>Support</td>
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<td></td>
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<tr>
<td>V16</td>
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</tr>
<tr>
<td>V17</td>
<td>.90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V18</td>
<td>.76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Role Overload</td>
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<td></td>
</tr>
<tr>
<td>V19</td>
<td>.79</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V20</td>
<td>.78</td>
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</tr>
<tr>
<td>V21</td>
<td>.71</td>
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</tr>
</tbody>
</table>
Percent variance ranged from .58 (role overload) to .93 (work method autonomy).

Table 7 presents the results of a confirmatory factor analysis of the 14 items for each of the four mediating latent variables. Results indicated that each latent variable had a significant amount of variance explained and the scale reliabilities were high. General job satisfaction was not as well defined as the other three mediating latent variables.

The factor loadings were all above .70 with the exception of one general job satisfaction item (V33). Factor loadings ranged from .66 to .93. Scale reliabilities using the Cronbach alpha procedure were all equal to or above .80 and ranged from .80 (general job satisfaction) to .88 (role conflict). The percent variance explained for each latent variable was again computed for each mediating latent variable by summing the squared factor loadings and dividing by the number of factor loadings. Percent variance ranged from .56 (general job satisfaction) to .80 (role conflict).

Table 8 presents the results of a confirmatory factor analysis of the 12 items that were selected to define four outcome latent variables. Organizational commitment was not as well defined as the other outcome latent variables. Results indicated well defined latent variables with high scale reliabilities.
Table 7
Confirmatory Factor Analysis of Mediating Latent Variables

<table>
<thead>
<tr>
<th>Latent Variable</th>
<th>Factor Loading</th>
<th>Scale Reliability</th>
<th>Percent Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>(N = 535)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Role Ambiguity</td>
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<tr>
<td>V22</td>
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<td>.75</td>
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<td>V23</td>
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<td></td>
</tr>
<tr>
<td>V24</td>
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<td></td>
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<tr>
<td>Role Conflict</td>
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<td>.88</td>
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<tr>
<td>V25</td>
<td>.85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V26</td>
<td>.93</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V27</td>
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</tr>
<tr>
<td>Job-related Tension</td>
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<td>V28</td>
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<td>V29</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>V30</td>
<td>.86</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Job Satisfaction</td>
<td></td>
<td></td>
<td>.80</td>
</tr>
<tr>
<td>V31</td>
<td>.82</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V32</td>
<td>.79</td>
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<td></td>
</tr>
<tr>
<td>V33</td>
<td>.66</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V34</td>
<td>.73</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V35</td>
<td>.74</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. The percent variance explained for each latent variable is determined by summing the squared factor loadings and dividing by the number of factor loadings.

The factor loadings were all above .70 and ranged from .74 to .90. Scale reliabilities using the Cronbach alpha procedure were all equal to or above .76 and ranged from .76 (organizational commitment) to .87 (turnover intent). The
Table 8

Confirmatory Factor Analysis of Outcome Latent Variables

<table>
<thead>
<tr>
<th>Latent Variable (N = 535)</th>
<th>Factor Loading</th>
<th>Scale Reliability</th>
<th>Percent Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Career Commitment</td>
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<td>.72</td>
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<tr>
<td>V36</td>
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</tr>
<tr>
<td>V37</td>
<td>.88</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V38</td>
<td>.86</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organizational Commitment</td>
<td></td>
<td>.76</td>
<td>.69</td>
</tr>
<tr>
<td>V39</td>
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<td>V40</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>V41</td>
<td>.87</td>
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<td></td>
</tr>
<tr>
<td>Job Involvement</td>
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<td>.74</td>
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<tr>
<td>V42</td>
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<tr>
<td>V44</td>
<td>.79</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turnover Intent</td>
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<td>.81</td>
</tr>
<tr>
<td>V45</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>V46</td>
<td>.93</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V47</td>
<td>.88</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. The percent variance explained for each latent variable is determined by summing the squared factor loadings and dividing by the number of factor loadings. Percent variance explained for each latent variable was again computed for each outcome latent variable by summing the squared factor loadings and dividing by the number of factor loadings. Percent variance ranged from .69 (organizational commitment) to .81 (turnover intent).
The antecedent, mediating, and outcome latent variables are therefore well defined by the items selected, that is, valid, and have high scale reliability. This is important to confirm before establishing any structural relationships between the sets of latent variables.

**Structural Models**

Two sets of initial and modified structural models were developed. The first pair involved mediating latent variables predicted by antecedent variables. The second pair consisted of outcome variables predicted by antecedent and mediating variables. The initial models were based on hypothesized relationships, whereas the modified models consisted of those paths that were significant in the initial models and some additional added paths that reached statistical significance. All paths that were nonsignificant in the initial models were dropped from the modified models.

**Initial Model**

Table 9 provides the results of a linear structural relationship analysis (LISREL 8) wherein the antecedent independent latent variables predicted mediating dependent latent variables. This analysis was specifically tailored to answer certain research questions posed in Hypotheses one through five. The specific hypotheses for testing the direct effects between these latent variables were:
Table 9

Structural Model: Mediating Latent Variables Predicted by Antecedent Variables (N = 535)

<table>
<thead>
<tr>
<th>Dependent Latent Variable</th>
<th>Initial Model</th>
<th>Modified Model</th>
</tr>
</thead>
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<td>SE$_b$</td>
</tr>
<tr>
<td><strong>Ambiguity</strong></td>
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<td></td>
</tr>
<tr>
<td>H1A Locus</td>
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<td>0.06</td>
</tr>
<tr>
<td>H2B Autonomy</td>
<td>-0.07</td>
<td>0.10</td>
</tr>
<tr>
<td>H3A WMethod</td>
<td>0.01</td>
<td>0.07</td>
</tr>
<tr>
<td>H3B Schedule</td>
<td>-0.03</td>
<td>0.08</td>
</tr>
<tr>
<td>H3C Criteria</td>
<td>0.04</td>
<td>0.08</td>
</tr>
<tr>
<td>H4B Cowork</td>
<td>-0.49</td>
<td>0.07</td>
</tr>
<tr>
<td>H5A Overload</td>
<td>0.05</td>
<td>0.07</td>
</tr>
<tr>
<td><strong>Conflict</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H1A Locus</td>
<td>0.04</td>
<td>0.06</td>
</tr>
<tr>
<td>H2A Autonomy</td>
<td>0.14</td>
<td>0.07</td>
</tr>
<tr>
<td>H4B Cowork</td>
<td>-0.11</td>
<td>0.06</td>
</tr>
<tr>
<td>H5A Overload</td>
<td>0.40</td>
<td>0.06</td>
</tr>
<tr>
<td><strong>Tension</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H2B Autonomy</td>
<td>0.09</td>
<td>0.07</td>
</tr>
<tr>
<td>H4B Cowork</td>
<td>-0.20</td>
<td>0.06</td>
</tr>
<tr>
<td>H5A Overload</td>
<td>0.69</td>
<td>0.10</td>
</tr>
<tr>
<td><strong>JobSat</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H2A Autonomy</td>
<td>0.07</td>
<td>0.06</td>
</tr>
<tr>
<td>H4A Cowork</td>
<td>0.41</td>
<td>0.07</td>
</tr>
<tr>
<td>H5B Overload</td>
<td>-0.32</td>
<td>0.08</td>
</tr>
</tbody>
</table>

$\chi^2_1 = 953.85 \ (p = 0.0, \ df = 522); \ AGFI = .88$;

$\chi^2_2 = 950.33 \ (p = 0.0, \ df = 531); \ AGFI = .88$;

$\chi^2_{null} = 77,937.83, \ df = 595$;

* $t < 2.0 = $ nonsignificant path in model.
H1A: As work locus of control increases, role conflict and role ambiguity should increase significantly.

H2A: As autonomy increases, general job satisfaction and role conflict should increase significantly.

H2B: As autonomy increases, job-related tension and role ambiguity should decrease significantly.

H3A: As work method autonomy increases, role ambiguity should decrease significantly.

H3B: As work scheduling autonomy increases, role ambiguity should decrease significantly.

H3C: As work criteria autonomy increases, role ambiguity should decrease significantly.

H4A: As co-worker social support increases, general job satisfaction should increase significantly.

H4B: As co-worker social support increases, role ambiguity, role conflict, and job-related tension should decrease significantly.

H5A: As role overload increases, job-related tension, role ambiguity, and role conflict should increase significantly.

H5B: As role overload increases, general job satisfaction should decrease significantly.

Consistent with research hypothesis H1A, work locus of control significantly predicts role ambiguity in the hypothesized direction (positive relationship). The t values for the relationship between work locus of control
and role ambiguity in the initial and modified models were 2.58 and 3.13, respectively. However, role conflict, while in the hypothesized direction, is not significantly predicted by work locus of control. Therefore, hypothesis H1A was only partially supported.

Research hypothesis H2A was not supported, that is, autonomy does not significantly predict general job satisfaction or role conflict although both relationships were in the hypothesized direction (positive relationship). Hypothesis H2B was also not supported. Autonomy does not significantly predict job-related tension, and in fact, this relationship yielded a positive rather than a negative sign. Autonomy also did not significantly predict role ambiguity although this relationship was in the hypothesized direction (negative relationship).

Hypothesis H3A was not supported. Work method autonomy did not significantly predict role ambiguity and, in fact, the relationship was positive rather than negative. H3B was not supported. Work scheduling autonomy did not significantly predict role ambiguity although the relationship was in the hypothesized direction (negative relationship). Finally, Hypothesis H3C was not supported. Work criteria autonomy did not significantly predict role ambiguity, and again the relationship was a positive rather than negative one.
Research hypothesis H4A was supported. Co-worker social support significantly predicts general job satisfaction in the hypothesized direction (positive relationship). The $t$ values for this relationship in the initial and modified models were 6.16 and 6.11, respectively.

Hypothesis H4B was partially supported. Co-worker social support significantly predicts role ambiguity and job-related tension. Both relationships were in the hypothesized direction (negative relationships). The $t$ values for the inverse relationship between co-worker social support and role ambiguity in the initial and modified models were -6.90 and -8.40, respectively. The $t$ values for the inverse relationship between co-worker social support and job-related tension in the initial and modified models were -3.21 and -2.60, respectively. However, co-worker social support did not significantly predict role conflict although the relationship was in the hypothesized direction (negative relationship).

Hypothesis H5A was partially supported. Role overload significantly predicts job-related tension and role conflict. Both relationships are in the hypothesized direction (positive relationship). The $t$ values for the positive relationship between role overload and job-related tension in the initial and modified models were 6.63 and 7.07, respectively. The $t$ values for the positive
relationship between role overload and role conflict in the
initial and modified models were 5.11 and 6.98,
respectively. However, role overload did not significantly
predict role ambiguity although this relationship was also
in the hypothesized direction (positive relationship).

Hypothesis H5B was supported. Role overload
significantly predicts general job satisfaction in the
hypothesized direction (negative relationship). The $t$
values for the inverse relationship between role overload
and general job satisfaction in the initial and modified
models were -4.30 and -4.76, respectively.

The variance accounted for by the dependent latent
variables was relatively stable across the initial and
modified models. For example, role ambiguity yielded an
$R^2 = .36$ in the initial model, and an $R^2 = .32$ in the
modified model suggesting a slight drop in the variance
accounted for. Similarly, role conflict yielded an $R^2 = .19$
and $R^2 = .18$ in the initial and modified models,
respectively. The variance accounted for by job-related
tension across the two models was $R^2 = .59$ and $R^2 = .58$,
respectively. General job satisfaction yielded an $R^2 = .45$
in the initial model, and an $R^2 = .40$ in the modified model,
suggesting perhaps a more significant drop in variance
accounted for by the two models. Finally, the adjusted
goodness-of-fit indices remained identical across the two
models, that is, adjusted goodness-of-fit $= .88$ for both the initial and the modified models.

**Modified Model**

A modified model was created by dropping all nonsignificant paths from the initial model. The relationships of the mediating variables to the outcome latent variables are identified in Table 10. These pertain to research questions posed in Hypotheses one, two, four, and six through eight which are as follows:

- **H1B**: As work locus of control increases, career commitment should decrease significantly.
- **H2C**: As autonomy increases, organizational commitment and job involvement should increase significantly.
- **H2D**: As autonomy increases, turnover intent should decrease significantly.
- **H4C**: As co-worker social support increases, organizational commitment should increase significantly.
- **H6A**: As role ambiguity increases, turnover intent should increase significantly.
- **H6B**: As role ambiguity increases, organizational commitment and job involvement should decrease significantly.
- **H7A**: As role conflict increases, turnover intent should increase significantly.
- **H7B**: As role conflict increases, organizational
Table 10

Structural Model: Outcome Latent Variables Predicted
by Antecedent and Mediating Variables (N = 535)

<table>
<thead>
<tr>
<th>Dependent Latent Variable</th>
<th>Initial Model</th>
<th></th>
<th></th>
<th>Modified Model</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b</td>
<td>SE&lt;sub&gt;b&lt;/sub&gt;</td>
<td>t</td>
<td>b</td>
<td>SE&lt;sub&gt;b&lt;/sub&gt;</td>
<td>t</td>
</tr>
<tr>
<td><strong>Career</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(R^2 = .25)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H1B Locus</td>
<td>-.15</td>
<td>.05</td>
<td>-2.84</td>
<td>-.12</td>
<td>.06</td>
<td>-2.07</td>
</tr>
<tr>
<td>H8 Tension</td>
<td>-.32</td>
<td>.06</td>
<td>-5.07</td>
<td>-.19</td>
<td>.07</td>
<td>-2.91</td>
</tr>
<tr>
<td>JobSat (added)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JobInvol (added)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Organ</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(R^2 = .52)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H6B Ambig</td>
<td>-.03</td>
<td>.04</td>
<td>-.66*</td>
<td>-.03</td>
<td>.04</td>
<td>-.66*</td>
</tr>
<tr>
<td>H2C Autonomy</td>
<td>.08</td>
<td>.07</td>
<td>1.21*</td>
<td>.08</td>
<td>.07</td>
<td>1.21*</td>
</tr>
<tr>
<td>H7B Conflict</td>
<td>.01</td>
<td>.03</td>
<td>.16*</td>
<td>.01</td>
<td>.03</td>
<td>.16*</td>
</tr>
<tr>
<td>H10 JobSat</td>
<td>.48</td>
<td>.08</td>
<td>6.28</td>
<td>.49</td>
<td>.06</td>
<td>8.90</td>
</tr>
<tr>
<td>H4C Cowork</td>
<td>.06</td>
<td>.04</td>
<td>1.33*</td>
<td>.06</td>
<td>.04</td>
<td>1.33*</td>
</tr>
<tr>
<td>Locus (added)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>JobInvol</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(R^2 = .02)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H2C Autonomy</td>
<td>.17</td>
<td>.14</td>
<td>1.18*</td>
<td>.17</td>
<td>.14</td>
<td>1.18*</td>
</tr>
<tr>
<td>H6B Ambig</td>
<td>.07</td>
<td>.03</td>
<td>.84*</td>
<td>.07</td>
<td>.03</td>
<td>.84*</td>
</tr>
<tr>
<td>H7B Conflict</td>
<td>.10</td>
<td>.07</td>
<td>1.50*</td>
<td>.10</td>
<td>.07</td>
<td>1.50*</td>
</tr>
<tr>
<td>Organ (added)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Turnover</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(R^2 = .68)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H2D Autonomy</td>
<td>-.01</td>
<td>.09</td>
<td>-.09*</td>
<td>-.01</td>
<td>.09</td>
<td>-.09*</td>
</tr>
<tr>
<td>H6A Ambig</td>
<td>.06</td>
<td>.06</td>
<td>.91*</td>
<td>.06</td>
<td>.06</td>
<td>.91*</td>
</tr>
<tr>
<td>H7A Conflict</td>
<td>.03</td>
<td>.04</td>
<td>.81*</td>
<td>.03</td>
<td>.04</td>
<td>.81*</td>
</tr>
<tr>
<td>H9 JobSat</td>
<td>-1.02</td>
<td>.11</td>
<td>-9.38</td>
<td>-1.10</td>
<td>.07</td>
<td>-15.27</td>
</tr>
<tr>
<td>Locus (added)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[ \chi^2 = 1000 \ (p = 0.0, \ df = 525); \ AGFI = .87; \]
\[ \chi^2 = 926 \ (p = 0.0, \ df = 530); \ AFGI = .88; \]
\[ \chi^2 \text{NULL} = 39320, \ df = 595; \]

* t < 2.0 = nonsignificant paths in model.
commitment and job involvement should decrease significantly.

H8: As job-related tension increases, career commitment should decrease significantly.

Consistent with research hypothesis H1B, work locus of control significantly predicts career commitment in the hypothesized direction (negative relationship). Therefore, hypothesis H1B was supported. The t values for the relationship between work locus of control and career commitment in the initial and modified models were -2.84 and -2.07, respectively. Research hypothesis H2C was not supported, that is, autonomy does not significantly predict organizational commitment or job involvement although both relationships were in the hypothesized direction (positive relationship). Hypothesis H2D was not supported. Autonomy does not significantly predict turnover intent although the relationship was in the negative hypothesized direction.

Hypothesis H4C was not supported. Co-worker social support does not significantly predict organizational commitment although the relationship was in the hypothesized direction (positive relationship). Hypothesis H6A was not supported. Role ambiguity does not significantly predict turnover intent although the relationship was in the hypothesized direction (positive relationship).

Hypothesis H6B was not supported. Role ambiguity does not significantly predict organizational commitment although
the relationship was in the hypothesized direction (negative relationship). Role ambiguity did also not significantly predict job involvement. In this case, the relationship was a positive rather than negative one.

Hypothesis H7A was not supported. Role conflict does not significantly predict turnover intent although the relationship was in the hypothesized positive direction. Hypothesis H7B was not supported. Role conflict does not significantly predict organizational commitment or job involvement. Both relationships were in the positive rather than negative direction.

Hypothesis H8 was supported. Job-related tension significantly predicts career commitment in the hypothesized direction (negative relationship). The \( t \) values for the inverse relationship between job-related tension and career commitment in the initial and modified models were -5.07 and -2.91, respectively.

The variance accounted for by the dependent latent variables tended to improve moderately across the initial and modified models. For example, career commitment yielded an \( R^2 = .25 \) in the initial model, and an \( R^2 = .46 \) in the modified model which suggests a substantial increase in the variance accounted for. Organizational commitment yielded an \( E^2 = .52 \) and \( R^2 = .56 \) in the initial and modified models, respectively. The variance accounted for by job involvement across the two models was \( E^2 = .02 \) and \( R^2 = .05 \),
respectively. Turnover intent yielded an $R^2 = .68$ in the initial model, and an $R^2 = .77$ in the modified model, which suggests a moderate increase in the variance accounted for by the two models. Finally, the adjusted goodness-of-fit indices improved slightly between the two models, that is, $AGFI = .87$ for the initial model, and .88 for the modified model.

**Reciprocal Relationships**

Table 11 identifies the reciprocal relationship between job satisfaction and turnover intent as depicted in Figure 1. Hypothesis 9 is as follows:

**H9:** As general job satisfaction increases, turnover intent should decrease significantly, and as turnover intent increases, general job satisfaction should increase significantly.

Hypothesis H9 was partially supported. Table 11 suggests that general job satisfaction is significantly predicted by co-worker social support and role overload although not turnover intent. However, turnover intent is significantly predicted by general job satisfaction and work locus of control. Thus, as general job satisfaction increases, turnover intent decreases significantly, as predicted. The $t$ values for the inverse relationship between general job satisfaction and turnover intent in the initial and modified models were $-9.38$ and $-15.27$, respectively. However, there is no evidence to suggest
Table 11

Reciprocal Relationship: Job Satisfaction and Turnover Intent

<table>
<thead>
<tr>
<th>Latent Variable</th>
<th>b</th>
<th>SEb</th>
<th>t</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job Satisfaction</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turnover</td>
<td>-.18</td>
<td>.15</td>
<td>-1.16*</td>
<td>.49</td>
</tr>
<tr>
<td>Cowork</td>
<td>.34</td>
<td>.05</td>
<td>6.28</td>
<td></td>
</tr>
<tr>
<td>Overload</td>
<td>-.22</td>
<td>.06</td>
<td>-3.67</td>
<td></td>
</tr>
<tr>
<td>Turnover</td>
<td></td>
<td></td>
<td></td>
<td>.75</td>
</tr>
<tr>
<td>JobSat</td>
<td>-.78</td>
<td>.16</td>
<td>-4.99</td>
<td></td>
</tr>
<tr>
<td>Locus</td>
<td>.14</td>
<td>.04</td>
<td>4.09</td>
<td></td>
</tr>
</tbody>
</table>

* t < 2.0 = non-significant path in reciprocal model.

that as turnover intent increases, general job satisfaction increases significantly.

Table 12 identifies the reciprocal relationship between job satisfaction and organizational commitment as depicted in Figure 1. Hypothesis 10 is as follows:

H10: As organizational commitment increases, general job satisfaction should increase significantly, and as general job satisfaction increases, organizational commitment should increase significantly.

Table 12 suggests that general job satisfaction is significantly predicted by co-worker social support and role overload. In addition, organizational commitment is
Table 12

Reciprocal Relationship: Job Satisfaction and Organizational Commitment

<table>
<thead>
<tr>
<th>Latent Variable</th>
<th>b</th>
<th>SE_b</th>
<th>t</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job Satisfaction</td>
<td>.38</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organization</td>
<td>.01</td>
<td>.12</td>
<td>.10*</td>
<td></td>
</tr>
<tr>
<td>Cowork</td>
<td>.41</td>
<td>.06</td>
<td>6.72</td>
<td></td>
</tr>
<tr>
<td>Overload</td>
<td>-.29</td>
<td>.07</td>
<td>-4.38</td>
<td></td>
</tr>
<tr>
<td>Organizational Commitment</td>
<td>.54</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JobSat</td>
<td>.66</td>
<td>.12</td>
<td>5.60</td>
<td></td>
</tr>
<tr>
<td>Locus</td>
<td>-.20</td>
<td>.05</td>
<td>-4.19</td>
<td></td>
</tr>
</tbody>
</table>

* t < 2.0 = non-significant path in reciprocal model.

significantly predicted by general job satisfaction and work locus of control. There is evidence to suggest that as general job satisfaction increases, organizational commitment increases significantly. The t values for the positive relationship between general job satisfaction and organizational commitment in the initial and modified models were 6.28 and 8.90, respectively. However, there is no evidence to suggest that as organizational commitment increases, general job satisfaction increases. The significant paths that resulted from the modified models in Tables 9-12 permit a reformulation of the theoretical model depicted in Figure 1.
Latent Variable Covariances

Fifteen covarying relationships were expected based on studies in the literature which indicated that certain variables should covary positively or negatively. The majority of these relationships yielded the expected sign but did not reach statistical significance which would have enabled them to stay in the modified model.

Table 13 identifies each relationship and compares the coefficients in the initial and modified models. The covariance matrices that provided the coefficients for the initial and modified structural models involving mediating variables predicted by antecedent variables are included in Appendix C. The covariance matrices for the initial and modified structural models involving outcome variables predicted by select antecedent and mediating variables are also included in Appendix C (Tables 16-19). These tables provide empirical information about the actual sign and strength of the each relationship based on the present sample.

Eleven of the 15 covarying relationships were in the expected direction in the initial model. Three of the four coefficients were close to zero and thus are considered negligible. All relationships in the modified model except for the role overload-autonomy relationship were in the expected direction, however only the career commitment-job involvement relationship attained statistical significance.
<table>
<thead>
<tr>
<th></th>
<th>Initial Model</th>
<th>Modified Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Job-related tension should positively covary with role ambiguity.</td>
<td>.32</td>
</tr>
<tr>
<td>2</td>
<td>General job satisfaction should negatively covary with role ambiguity.</td>
<td>-.54</td>
</tr>
<tr>
<td>3</td>
<td>Job-related tension should positively covary with role conflict.</td>
<td>.34</td>
</tr>
<tr>
<td>4</td>
<td>Role ambiguity should positively covary with role conflict.</td>
<td>.22</td>
</tr>
<tr>
<td>5</td>
<td>General job satisfaction should negatively covary with role conflict.</td>
<td>-.14</td>
</tr>
<tr>
<td>6</td>
<td>Role overload should positively covary with autonomy.</td>
<td>-.42*</td>
</tr>
<tr>
<td>7</td>
<td>Turnover intent should negatively covary with organizational commitment.</td>
<td>-.42</td>
</tr>
<tr>
<td>8</td>
<td>Career commitment should positively covary with organizational commitment.</td>
<td>.11</td>
</tr>
<tr>
<td>9</td>
<td>Job-related tension should negatively covary with general job satisfaction.</td>
<td>-.46</td>
</tr>
<tr>
<td>10</td>
<td>Job involvement should negatively covary with turnover intent.</td>
<td>.02*</td>
</tr>
<tr>
<td>11</td>
<td>Job involvement should positively covary with general job satisfaction.</td>
<td>-.01*</td>
</tr>
</tbody>
</table>

(Table Continues)
### Table 13

**Latent Variable Covarying Relationships**

<table>
<thead>
<tr>
<th>Model</th>
<th>Career commitment should negatively covary with turnover intent.</th>
<th>Career commitment should positively covary with general job satisfaction.</th>
<th>Career commitment should positively covary with job involvement.</th>
<th>Career commitment should positively covary with organizational commitment.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(12)</td>
<td>Initial Model: -.21</td>
<td>Modified Model: -.97</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Modified Model: -.97</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(13)</td>
<td>Initial Model: .19</td>
<td>Modified Model: .81</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(14)</td>
<td>Initial Model: -.01*</td>
<td>Modified Model: .46</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(15)</td>
<td>Initial Model: .11</td>
<td>Modified Model: .46</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. Coefficients are from Tables 16-19 in Appendix C. An * indicates the sign was opposite from that expected.*

which enabled it to remain in the modified model. Figure 2 represents the final model of technical professionals in work teams.

**Chapter Summary**

Descriptive statistics of the indicator variables, results of confirmatory analyses, structural modeling, two reciprocal relationships, and latent variable covariances
Fig. 2. Final Theoretical Model of Technical Professionals in Work Teams.
have been presented in Chapter IV. Chapter V examines these results with the objective of lending meaning and understanding to these findings. Specifically, Figure 1, the original hypothetical model, and Figure 2, the final modified model are compared. Paths that were dropped and added are discussed with the idea of capturing the discrepancies between the two models. The various research hypotheses are examined in light of these findings to ascertain how well the final theoretical model reflects the studies cited in the literature. Chapter V concludes with a discussion of implications and ideas for future research.
CHAPTER V

DISCUSSION

Chapter V begins with an examination of the various research hypotheses in light of the data and previous research findings in the literature. This is followed by a discussion of the structural models and involves a comparison of the original hypothesized theoretical model (Figure 1) and the final theoretical model (Figure 2). A discussion of the differences between the two models includes the paths that were added to the final theoretical model. The chapter concludes with a discussion of implications, limitations and key assumptions, and ideas for future research.

Hypotheses

A discussion is offered of empirical support for several of the relationships hypothesized in the present study. Also included are relevant empirical studies from the literature which support these findings and possible reasons for lack of empirical support for various research hypotheses. In addition, several rival hypotheses are examined which contributed to the design of the modified model.

Hypothesis 1A states that as work locus of control increases, role conflict and role ambiguity should increase
significantly. While in the hypothesized direction, there was no significant empirical evidence to support the hypothesis that as work locus of control increases, role conflict increases. However, the significant positive correlation between work locus of control and role ambiguity suggests a relationship between external locus of control and role ambiguity (Organ & Greene, 1974a; Organ & Greene, 1974b; Sims et al., 1976; Vredenburgh & Trinkaus, 1983).

External locus of control is the generalized expectancy that rewards and outcomes in life are controlled by outside forces rather than one's own actions. The present relationship among technical professional employees suggests that as the generalized expectancy that rewards occur outside one's control gets stronger, role ambiguity increases. An "external" defines self and situation based more on external than internal cues. As an organization goes through redesign, external cues change. An "internal" would probably tend to be less affected by that and have stability based on unchanging internal cues.

Hypothesis 1B states that as work locus of control increases, career commitment should decrease significantly. The results yielded a significant negative coefficient between work locus of control and career commitment, as predicted. As locus scores increase, individuals become more external in orientation, and that is related to a decrease in career commitment. The belief that significant
outcomes and rewards are controlled by outside forces does not seem to lend itself to developing personal career goals and undergoing the years of training needed to meet those objectives. Externals, in general, tend to experience life in fatalistic terms, yielding all perceptions of control over situations with statements such as, "it was meant to be," "it was God's will," etc. In contrast, the development and maintenance of a career takes long years, focused action, and single minded commitment toward goal attainment with the belief that achievement is possible. These two cognitive frames seem somewhat mutually exclusive in that if the individual feels the outcomes are beyond his or her control, it is unlikely he or she will persevere toward goal attainment over long periods.

Hypothesis 2A states that as autonomy increases, general job satisfaction and role conflict should increase significantly. While in the hypothesized positive direction, neither relationship reached the significance criterion established for this study (i.e., t < 2.0), although the autonomy-role conflict relationship met the standard 95% cutoff (i.e., 1.96). The literature supports the positive relationship between autonomy (defined as increased participation leading to a perception of perceived control) and general job satisfaction (e.g., Cummings, Molloy, & Glen, 1977; Loher, Noe, Moeller, & Fitzgerald, 1985; Lowin, 1968; Mortimer, 1985; Spector, 1986;
Srivastava, 1983; Stone, 1986). Autonomy is probably the hallmark characteristic of the professions: the opportunity to work autonomously is highly valued and respected. For professionals, increased self-determination is a core value. "Give me an assignment and leave me alone to do it my way" has expanded to include, "thanks for allowing me to help create the assignment list."

The positive relationship between autonomy and role conflict is also supported in the literature (e.g., Glowinkowski & Nicholson, 1984). For example, engineers who move from technical to managerial tracks may find themselves with conflicting role demands as their level of autonomy increases. That is, by virtue of their dual roles, they are caught between loyalties to fellow technical personnel, and larger managerial initiatives. This situation illustrates the "netherland" experienced by technical professional employees discussed in Chapter I. Technical professional support personnel (often midline managers) are often not as well insulated from the boundary of change as are shop floor production workers and upper level managers. They tend to be part of the level of the organization charged with "making it happen," that is, whatever the organizational change initiative (work teams, TQM, ISO 9000, etc.). With increased autonomy comes increased responsibilities, and in many cases, conflicting responsibilities. Autonomy means more job facets and more interactions with employees in
other roles, hence more conflict in general. With more responsibilities, it is more likely some will conflict.

Hypothesis 2B states that as autonomy increases, job-related tension and role ambiguity should decrease significantly. Again, neither relationship reached statistical significance. The relationship between autonomy and job-related tension curiously yielded a positive rather than negative coefficient. The inverse relationship between autonomy and job-related tension is supported in the literature concerning perceived control and its effect on various outcome states (Spector, 1986). As mentioned previously, among technical professionals, perceived control (autonomy) is a highly valued commodity, that is, central to identification with the profession. The literature states that as these individuals garner and maintain autonomy over work-related matters, their tension (stress) tends to diminish because of the increased perception of control. That job-related tension would have a positive relationship with autonomy can be explained by increased stress effects due to the increasing responsibility associated with autonomy.

The relationship between autonomy and role ambiguity was negative, as predicted, although not statistically significant. This relationship is supported in the literature (Breaugh, 1985; Hickson, 1966; Spector, 1986). As perceived control increases among technical professional
employees, lack of clarity about job responsibilities would tend to decrease. As previously mentioned, autonomy is a highly valued commodity among professional employees, that is, being able to work with a minimum of supervision, the freedom to set one's own priorities, ways of getting the work done, the latitude to set one's own schedules, and so forth. To be a professional is to have this freedom of action which is considered the job characteristic most highly correlated with job satisfaction (Loher et al., 1985; Mortimer, 1985), as well as better access to information about the job. Whereas, role ambiguity seems to emanate from within the larger organization, beyond one's control, it indexes a situation where the individual is unclear about what is expected of him or her, a situation where job responsibilities are not clearly defined. Thus, as one gains the ability to self-direct, the lack of clarity about job responsibilities would tend to decrease.

Hypothesis 2C states that as autonomy increases, organizational commitment and job involvement should increase significantly. While in the hypothesized direction, neither relationship was statistically significant. The lack of support for a positive autonomy-organizational commitment relationship may be explained by the relatively low internal reliability of the autonomy scale which suggests that item-total correlations are not consistent. This is ironic as the scale was chosen over the
Job Diagnostic Survey items used in the pilot analysis because of stronger reliabilities. However, it is important to remember that the measures used in the present study were generally validated in traditional work sites with production workers rather than with technical professionals in organizations undergoing massive redesigns to more participative work arrangements.

Again, there was insufficient support in the present study for a positive relationship between autonomy and job involvement. Considered an affective response to the work situation, it is difficult to identify the causal antecedents of job involvement (Mathieu & Zajac, 1990). However, as a correlate of organizational commitment, job involvement has been linked to the Hackman and Oldham (1980) job characteristics such as autonomy (Mathieu & Zajac, 1990). It is clear that autonomy is a key desired job characteristic for professional employees. Professionals tend to strongly identify psychologically with their work which is the definition of job involvement (Morrow, 1983). This linkage suggests that as technical professionals gain and maintain autonomy, their psychological identification with their work increases. Increased autonomy means more responsibility for more facets of the work. There may be a loose point-to-point correspondence between the number of facets one is responsible for and the resulting sense of
involvement in the job. This may be particularly true for individuals engaged in professions such as engineering.

The engineering profession has had the status of a true profession in the business community for many years, and is known for training new entrants to function in highly autonomous ways. Information systems is another area that has traditionally relied on independent work but is gradually experimenting with work teams. Again, software engineers have the reputation in the popular press for preferring to work independently (autonomously), as well as choosing their computer screens over human contact (job involvement). These caricatures, while built on kernels of truth, are beginning to give way as engineering and information systems units increasingly move toward team structures.

Hypothesis 2D states that as autonomy increases, turnover intent should decrease significantly. While in the hypothesized direction, the relationship was not statistically significant. The literature tends to treat autonomy as a correlate of participation, linking autonomy with the mediating variable, general job satisfaction, and related to reduced withdrawal behaviors (Loher, Noe, Moeller, & Fitzgerald, 1985; Spector, 1986; Stone, 1986). It may be that among technical professionals, there is truly an indirect effect with general job satisfaction mediating the relationship between autonomy and turnover intent.
Also, as mentioned previously, the poor reliability of the autonomy scale may partially account for the lack of a direct significant relationship between the two variables.

Hypothesis 3A states that as work method autonomy increases, role ambiguity should decrease significantly. Results yielded a positive rather than negative relationship which was not statistically significant. Thus, this study yields insufficient empirical evidence to support the hypothesis that as work method autonomy increases, role ambiguity decreases. A negative relationship is supported in the literature (e.g., Breaugh, 1985; Hickson, 1966; Spector, 1986). Being given the authority and responsibility to decide how the work will be accomplished is in line with the professional’s value set. As mentioned previously, autonomy is a central aspect of the professional’s identity. Having this freedom, as opposed to being dependent on others for directives of this nature, leads to increased perceived control and resulting increased role clarity (reduced role ambiguity). The technical professional employee is less dependent on others for information and direction and more self-reliant which tends to reduce ambiguity around role expectations.

The fact that the sign was reversed (positive rather than negative) is perhaps curious except that, again, this particular autonomy measure essentially drops out of the analysis (see Figure 2), possibly due to poor internal
reliability with the current sample. In addition, the high intercorrelations reported between the three work method autonomy items suggest a possible problem with multicollinearity which would tend to impact the strength of the relationships in the model-building process.

Hypothesis 3B states that as work scheduling autonomy increases, role ambiguity should decrease significantly. The present study yields insufficient empirical evidence to support this hypothesis although the relationship was in the hypothesized negative direction. The literature supports an inverse relationship between work scheduling autonomy and role ambiguity (e.g., Breaugh, 1985; Hickson, 1966; Spector, 1986). The fact that this relationship did not reach statistical significance may reflect technical professional employees' perceived moderate degree of control over scheduling rather than the issue of role ambiguity.

Hypothesis 3C states that as work criteria autonomy increases, role ambiguity should decrease significantly. Results yielded a positive rather than negative relationship which was not statistically significant. Whereas, Spector (1986) found support for an inverse relationship between global measures of work autonomy and perceptions of role ambiguity, Breaugh (1985) found relatively low levels of work criteria autonomy among employees of a liaison engineering department. It may be that most employees, and technical professional employees in particular, have little
input into the criteria chosen to evaluate their performance. The positive direction of this relationship suggests that when, in fact, employees do have the opportunity to choose evaluation criteria, their input is interpreted by them as in addition to their managers’ stated or unstated criteria, thus obfuscating task responsibilities rather than clarifying them.

Hypothesis 4A states that as co-worker social support increases, general job satisfaction should increase significantly. Hypothesis 4A was supported. There is empirical support for this relationship in the literature, for example, results of the meta-analysis by Jackson and Schuler (1985), as well as work by Fisher (1985), and Ganster et al. (1986). Supportive behavior is thought to directly increase employees’ positive experience in the workplace. Technical professional employees’ positive view of teamwork tends to support this relationship.

Hypothesis 4B states that as co-worker social support increases, role ambiguity, role conflict, and job-related tension should decrease significantly. Hypothesis 4B was partially supported. The results yielded a significant negative coefficient between co-worker social support and role ambiguity, and between co-worker social support and job-related tension, as predicted. However, the relationship between co-worker social support and role
conflict, while in the hypothesized negative direction, did not reach statistical significance.

The inverse relationship between co-worker social support and job-related tension is supported in the literature (Fisher, 1985). Supportive communication is thought to reduce noxious work conditions leading to job-related tension. Social support means co-workers provide resources, including information, that help the employee cope with job demands so that stress is reduced. Evidence from the write-in comments from the open-ended questions in the questionnaire suggests that technical professional employees, contrary to the stereotype of the lone worker, prefer the supportive communication of the team setting.

The literature also supports the relationship between co-worker social support and role ambiguity (Jackson & Schuler, 1985). Social support is thought to increase work-related communication which, in turn, reduces role ambiguity. Write-in comments support the finding that social support is helpful in improving communication, decision making, and problem solving. Comments such as, "sharing of ideas, responsibilities, problems, solutions," "more shared knowledge and experience," "improved interpersonal relations," "better communication," "improves flow of information," and "a much nicer and more supportive environment" lend qualitative support for the idea that
increased work-related communication, in general, reduces role ambiguity.

The inverse relationship between co-worker social support and role conflict did not reach statistical significance although there is ample empirical support for this relationship in the literature (e.g., Jackson, 1983). Again, the work-related communication thesis is applicable here, that work-related communication reduces role strain such as role conflict. Co-worker supportive behaviors in the workplace involve negotiating differential role demands, thus reducing role conflict. Among technical professional employees, the write-in comments listed in the previous hypothesis support this idea, that supportive communication helps the technical professional employee negotiate the day-to-day vagaries of the workplace.

Hypothesis 4C states that as co-worker social support increases, organizational commitment should increase significantly. This relationship, while in the hypothesized direction, did not reach statistical significance. Social support correlates consistently with job satisfaction (Jackson & Schuler, 1985) which is considered a correlate of organizational commitment (Mathieu & Zajac, 1990).

Supportive communication is known to reduce noxious stimuli in the workplace thereby increasing employees' positive affective response to the work environment. While the relationship between job satisfaction and organizational
commitment is still equivocal, all three constructs seem to move in the same direction. It may be that job satisfaction mediates the relationship between co-worker social support and organizational commitment. This remains to be tested. While the technical professional stereotype says these individuals are not social in orientation, much of the rewards (e.g., pay) literature argues that social needs are fairly basic. High co-worker social support means those needs are being met. In addition, co-workers are perceived as resources including sources of information that aid an employee's performance, thus the workplace is positively perceived and valued.

Hypothesis 5A states that as role overload increases, job-related tension, role ambiguity, and role conflict should increase significantly. Hypothesis 5A was partially supported. The results yielded a significant positive coefficient between role overload and job-related tension, and between role overload and role conflict, as predicted. However, the relationship between role overload and role ambiguity, while in the hypothesized positive direction, did not reach statistical significance.

The positive relationship between role overload and job-related tension is supported in the literature by the classic work of Caplan et al. (1980). Other traditional studies provide empirical evidence in support of role overload and various negative psychological and health
effects evocative of tension states (e.g., Cooper, 1983; Cooper & Rodin, 1985; Margolis, Kroes, & Quinn, 1974; Russek & Zohman, 1958).

In addition, analysis of the open-ended question related to stress yielded 227 responses (42% of 537 total responses) which indexed workload, scheduling, and/or deadlines as primary sources of stress (job-related tension), all topics related to role overload. This suggests that technical professional employees tend to see workload and tension as tightly related, and that the general state of "too much to do in too little time" tends to be related to stress effects.

The positive relationship between role overload and role conflict was also supported. Among technical professional employees, it may be that as job requirements increase with downsizing and internal reorganizations, conflicting role demands increase, as well. This may be particularly true as organizations experiment with moving technical professional employees into a variety of work team arrangements. For example, if an engineer is the member of a "home" team, but also expected to work as needed on several project teams, it would seem that conflicting role demands would be a likely outcome. Finally, this study provided no empirical support for the hypothesis that as role overload increases, role ambiguity increases.
The present study treats role overload as an antecedent of role ambiguity. The scale reliability for the role overload measure was below the generally acceptable standard of .70, and may have bearing on the lack of statistical significance. Also, one role overload item, V20, correlated significantly with only one variable outside the role overload set suggesting it was a weak item. While excessive work demands could result in less available time to receive information about job responsibilities, this relationship is not borne out statistically in the current study.

Hypothesis 5B states that as role overload increases, general job satisfaction should decrease significantly. This relationship was strongly supported in the present study. There is support in the classic literature for this relationship (e.g., French & Caplan, 1972). Quantitative and qualitative role overload tend to be associated with increased job dissatisfaction as well as a number of other psychological (affective) and physiological health effects.

Hypothesis 6A states that as role ambiguity increases, turnover intent should increase significantly. This relationship, while in the hypothesized positive direction, did not reach statistical significance. There is support for this hypothesis in the traditional literature, for example, a review by Van Sell, Brief, and Schuler (1981), and meta-analyses by Jackson and Schuler (1985), and Fisher and Gitelson (1983). Among technical professional
employees, this relationship suggests that lack of role clarity is so distressful as to cause employees to have a strong desire to leave the organization. This may shed light on the importance of professional identity among the technical professional sector: knowing what is expected on the job is apparently so important that individuals contemplate leaving when role ambiguity is high, as in many organizational redesign situations. It is no longer the job they signed on for, so there is a perceived lack of fit which results in motivation to look for that ideal job elsewhere rather than change themselves to improve fit.

Hypothesis 6B states that as role ambiguity increases, organizational commitment and job involvement should decrease significantly. The relationship between role ambiguity and organizational commitment, while in the hypothesized negative direction, did not reach statistical significance. An inverse relationship between role ambiguity and organizational commitment is consistent with the literature, for example, a review by Van Sell, Brief, and Schuler (1981), and results of meta-analyses by Jackson and Schuler (1985), Fisher and Gitelson (1983), and Mathieu and Zajac (1990). Professionals, in general, tend to be loyal to the profession beyond the particular employing organization. This behavior is also increasing, in general, in the 1990s as companies continue to downsize. Loyalty to the employing organization has been replaced, out of
necessity, with a focus on one’s own career path. Thus, when there is increased lack of clarity around job responsibilities in organizations undergoing redesign, professionals tend to experience reduced commitment to the particular employing organization.

The study yields insufficient evidence to support the hypothesis that as role ambiguity increases, job involvement decreases. The relationship between role ambiguity and job involvement was positive rather than negative, contrary to the direction hypothesized, and did not reach statistical significance. As a correlate of organizational commitment, one would expect job involvement to behave similarly in relation to the antecedent role state variable, role ambiguity (Mathieu & Zajac, 1990). However, it may be that among technical professional employees with high autonomy needs, psychological identification with the job may increase rather than decrease as a function of increased the role ambiguity (lack of role clarity) that seems to go hand-in-hand with increased job responsibilities. For some individuals, role ambiguity is perceived as consonant with latitude or freedom to do things one’s own way, rather than a negative state of affairs. In other words, one perception is that if there are no institutionalized ways of doing certain things, then individuals with high autonomy needs can create their own ways.
Hypothesis 7A states that as role conflict increases, turnover intent should increase significantly. This relationship, while in the hypothesized direction, did not reach statistical significance. The literature supports a positive relationship between role conflict and turnover intent (e.g., Fisher & Gitelson, 1983; Jackson & Schuler, 1985; VanSell, Brief, & Schuler, 1981).

Hypothesis 7B states that as role conflict increases, organizational commitment and job involvement should decrease significantly. Both relationships were in the positive rather than negative direction, and neither reached statistical significance. The literature tends to support an inverse relationship between role conflict and organizational commitment.

Support includes a review by Van Sell, Brief, and Schuler (1981), and meta-analyses by Jackson and Schuler (1985), Fisher and Gitelson (1983), and Mathieu and Zajac (1990). Similar to problems experienced with role ambiguity around technical professional job duties, these employees tend to exhibit reduced organization commitment when grappling with increased role conflict on the job. It may be that having conflicting simultaneous job requirements, for example, trying to fulfill both technical and managerial roles simultaneously, or assigned as an ad hoc member to several teams concurrently causes increased distress, and, thus, may lead to reduced organization commitment. One
solution for utilizing technical professionals in "high tech" industries these days is the assignment, as needed, to various project teams, or as consultants to various manufacturing floor units. Indeed, nine percent of survey respondents stated that they are loaned to a variety of teams, while 27% stated that they operate from a home team in addition to being loaned to others as needed.

The positive relationship between role conflict and organizational commitment was unexpected, although quite weak, which suggests negligible effects on the modeling process. The positive relationship between role conflict and job involvement was somewhat stronger although still did not reach statistical significance. The positive sign is again opposite from that hypothesized. It may be that both relationships are mediated by affective responses such as general job satisfaction or stress effects that fell out of the present analysis.

Hypothesis 8 states that as job-related tension increases, career commitment should decrease significantly. This relationship was supported in the present study. Career commitment and tension (stress) are both considered correlates of organizational commitment (Mathieu & Zajac, 1990), with tension considered a causal precedent of organizational commitment. Job-related tension is thought to result from perceptions of the work environment. Among technical professionals, as stress increases the employee
may begin to rethink his or her career choice. Stress among survivors of corporate downsizing is particularly endemic in "high tech" industries. Job-related tension tends to consist of aversive physical and psychological symptoms the employee will want to avoid. Seeking an escape route would include questioning career choice. Survey write-in comments focused heavily on tight schedules, deadlines, multiple urgent demands, workload etc. as causes of job-related stress such as "too much work and too little time."

Hypothesis 9 states that as general job satisfaction increases, turnover intent should decrease significantly, and as turnover intent increases, general job satisfaction should increase significantly. Hypothesis 9 was partially supported. The first part of the relationship is supported in the literature (see Table 11), for example, Arnold and Feldman (1982), Bluedorn (1982), Hollenbeck and Williams (1986). Considered an affective response to the particular aspects of the job, job satisfaction among technical professional employees reduces the potency of the last step in the sequence of withdrawal cognitions, that is, the "deliberate willfulness to leave the organization" (Tett & Meyer, 1993, p. 262). Among the technical professional employees surveyed in the present study, increased job satisfaction reduces the desire to leave the current organization. It may be that the two variables dynamically affect each other.
However, this study yields insufficient evidence to support the second part of the hypothesis which is as turnover intent increases, job satisfaction increases. The sign is in the opposite (negative direction) and is not significant. The relationship is derived from the results of the pilot analysis conducted with support personnel prior to the present study and thus does not have empirical backing from the literature. In fact, it seems counterintuitive, as one would probably expect an inverse relationship to occur.

Hypothesis 10 states that as organizational commitment increases, general job satisfaction should increase significantly, and as general job satisfaction increases, organizational commitment should increase significantly. The first part of Hypothesis 10 was not supported, that is, this study yields insufficient empirical evidence to support the hypothesis that as organizational commitment increases, job satisfaction increases (see Table 12).

In fact, this relationship was quite weak in the present study. According to the literature, the causal order of organizational commitment and general job satisfaction is quite equivocal. The less popular position is probably that organizational commitment causally precedes general job satisfaction (e.g., Bateman & Strasser, 1984; Williams & Hazer, 1986) rather than the reverse. There is sufficient evidence in the literature to suggest a positive
correlation between the two variables (e.g., Bluedorn, 1982; Clegg, 1983; Dougherty, Bluedorn, & Keon, 1985). It may be that among technical professional employees, the level of organizational commitment is more reflective of the current economic climate (downsizing, survivor mentality, etc.) than true loyalty to the organization, thus having little bearing on job satisfaction.

The second part of Hypothesis 10 states that as general job satisfaction increases, organization commitment increases. Job satisfaction is based on perceived rewards—tangible and intangible. When the organization is perceived increasingly as a source of rewards, emotional commitment will tend to follow. This relationship was strongly supported in the current study and is also supported in the literature, for example, Bluedorn (1982), Koch and Steers (1978), Steers (1977). Professionals are likely to feel increased commitment to the employing organization if their feelings about facets of the job are positive. Again, this may be more reflective of perceived increased job security among technical professional employees rather than true loyalty to the employing organization.

**Hypothesized LISREL Model Rival Hypotheses**

Modification of the hypothesized LISREL model revealed several new relationships that were not previously hypothesized (see Table 10). These relationships reached
statistical significance and are considered to be rival hypotheses.

**P1: General Job Satisfaction to Career Commitment**

Considering career commitment as a correlate of organizational commitment, the job satisfaction-career commitment relationship is consistent with the literature that assumes job satisfaction is a precursor of organizational commitment (e.g., Bluedorn, 1982; Koch & Steers, 1978; Steers, 1977). General job satisfaction is thought to take less time to develop than the commitment correlates and is, thus less stable than career commitment (Porter, Steers, Mowday, & Boulian, 1984). Among technical professionals, the long years of schooling and socialization into the profession support this causal ordering of the variables.

**P2: Job Involvement to Career Commitment**

(covarying relationship)

Evidence for a covarying relationship between job involvement and career commitment was found. Job involvement and career commitment are both considered correlates of organizational commitment. As positive feelings about the career increase, professionals seem to identify more strongly with the job, finding it a more central part of the self image. Thus, generalized positive feelings about the career choice seem to affect the
individual's perceptions of the job as a personal referent and its organizing value in daily life.

**P3: Work Locus of Control to Organizational Commitment**

The strong negative relationship between work locus of control and organizational commitment suggests a relationship between internal locus of control and organizational commitment. Internal locus of control is the generalized expectancy that rewards, reinforcements, or outcomes in life are controlled by one's own actions rather than forces outside one's control (Spector, 1988). Organizational commitment, as "the bond or linking of the individual to the organization" (Mathieu & Zajac, 1990) is expected to be stronger for internals than externals. The general expectation is that technical professional employees, because of long years of schooling and socialization, would more likely fit the internal profile than the external profile.

**P4: Organizational Commitment to Job Involvement (covarying relationship)**

This relationship suggests that as an individual's identification with the organization and its goals increases, so does the individual's positive identification with the job. In other words, the more positive affect the individual exhibits toward the organization, the more important the job becomes to his or her self image. As job involvement is considered a correlate of organizational
commitment, the expectation is that they would behave in a similar direction.

**P5: Work Locus of Control to Turnover Intent**

The strong positive relationship between work locus of control and turnover intent suggests a relationship between external locus of control and turnover intent. External locus of control is the generalized expectancy that rewards, reinforcements, or outcomes in life are controlled by other forces outside one’s control. This suggests that externals are more likely than internals to exhibit withdrawal cognitions such as a strong desire to leave the organization. Among technical professionals, this may illustrate the belief that they believe they have little control over what happens to them in the particular employing organization, thus it is time to look for work elsewhere.

**Comparison of the Structural Models**

Of the 10 hypotheses, one was supported, five were partially supported, and the remaining four were not supported. Partial support was attained when at least one pair of variables included in the hypothesis attained significance in the hypothesized direction but other relationships did not. The number of unsupported hypotheses enabled the investigator to drop those paths from the final theoretical model and arrive at a more parsimonious model, parsimony being a major objective of model building.
Parsimony was achieved with minor decrements in $R^2$ in the modified model in four of the eight dependent latent variables (see Table 9). In other cases, $R^2$ increased between the initial and modified models (see Table 10). In all, 22 paths were dropped from the original hypothesized theoretical model, leaving a final theoretical model of 14 direct paths and two covarying relationships.

The original hypothesized theoretical model (Figure 1) posited in Chapter II represented a confirmatory model derived from the pilot data analysis results, interviews conducted in Phase I of the study, and results of empirical research studies reported in the literature. Thirty-three paths were hypothesized in the initial model, with 17 paths which represented relationships between antecedent and mediating latent variables, and 14 paths which represented relationships between mediating and outcome latent variables. Two additional paths which represented reciprocal relationships between outcome and mediating variables were also added. Of the 33 initial paths, 22 paths were dropped in the modified model (Figure 2) because of nonsignificant $t$ values. The five additional paths discussed previously were added that had not been hypothesized in the original theoretical model but had achieved significance in the modified model and resulted in a final parsimonious hypothesized theoretical model of 16 paths.
Two of those paths represented covarying relationships. Of the 15 expected covarying relationships, only the organizational commitment-job involvement, and career commitment-job involvement paths were added into modified model. Career commitment and job involvement are considered correlates of organizational commitment in the literature (Mathieu & Zajac, 1990), thus there is ample empirical support for these relationships.

Interesting results include the relation of locus of control to career commitment, organizational commitment, and turnover. These findings suggest that in organizations undergoing redesign to team-based structures, technical professional employees with internal locus of control are more committed and likely to stay, and perhaps they are more comfortable in the general chaotic states typically generated by redesign initiatives.

Co-worker social support plays a major role in the model. It related significantly to ambiguity, job-related tension, and job satisfaction. These findings suggest that positive exchanges with co-workers provide valuable information for dealing with role stressors and other sources of stress. General job satisfaction tends to increase as well. This may suggest that the increased interaction and interdependence of co-workers that results from working on teams provides an immediate payoff in reducing stress and increasing job satisfaction.
Role overload plays an equally key role predicting role conflict, job-related tension, and job satisfaction. Overload is likely to increase during the transformation of the organization. Many new tasks and responsibilities are added to the job. Consequently, managers should pay special attention to perceptions of overload.

General job satisfaction relates directly to career commitment, organizational commitment, and turnover intent. In an era of extensive downsizing, managers may not be concerned as much with these three variables, however turnover in a team disrupts the structure and the journey to team maturity must be started over each time membership changes. This has obvious implications for team performance.

Finally, general job satisfaction also appears to moderate relationships that co-worker social support and role overload have with the commitment and turnover variables, suggesting a complex model that requires managers to think in more systemic ways. In the future, isolated variables will be insufficient bases for decision making and the effective leadership of teams of technical professional employees.

An overall comparison of the original hypothesized model and the final model yielded very different results. The original model was constructed based on empirical studies conducted primarily with production workers in
traditional settings, whereas the final model resulted from an empirical test with technical professionals in work teams. Thus, with such significantly different samples, one would expect differing results. The autonomy/role ambiguity relation did not hold in the final model, nor did role conflict and role ambiguity act as predictors of the outcome variables, organizational commitment, job involvement, and turnover intent. The autonomy/role ambiguity relationship was in the hypothesized direction but not significant (see Table 9). The nature of knowledge work engaged in by professionals (as contrasted with traditional production work) may partly explain the weakened relationship between the two variables. Purser and Pasmore (1992) suggest that knowledge work results in "more uncertainty" (rather than a reduction in ambiguity as hypothesized). Thus, with this population, one would not expect a strong negative relationship between the two variables.

There may be a simple explanation for the fact that role conflict and role ambiguity did not predict organizational commitment, job involvement, and turnover intent. In this day and age with significant downsizing, it is possible that the negative effects of role stressors are held in abeyance. With fewer jobs available, employees tend to hold onto their jobs and "suffer through." It may be that survivors, in particular, are experiencing more role conflict and ambiguity but are not allowing these stressors
to significantly affect how they feel about their jobs, their employing organizations, and their desires for other employment.

**Implications**

The comparison of goodness-of-fit indices for the LISREL models indicates that structure is present in the data. However, the fit indices for the final model indicated only a *fair fit* which means that the data contains variance not accounted for by the paths in the model. Because the paths for the hypothesized model are taken directly from prior empirical studies, differences between those studies and the present one may account for the lack of fit. For example, in most prior studies researchers examined production workers in traditional settings rather than technical professional employees in teams.

No prior model of role strain antecedents and consequences seems to exist in the literature on technical professionals in teams, and no prior role strain model exists using the set of variables examined in this study. Hence, the overall models cannot be compared to an established standard, but are offered as tentative platforms for further research. In addition, the fact that all but three of the scale measures were changed from those used in the pilot study provides some evidence that the results are not method bound.
The modification index that LISREL produces with each successful run guided the introduction of additional paths in the model. Each of the new paths improved the fit by accounting for more of the variance in the data matrix. Improvement of the fit after modifications suggests the presence of some important relationships that have not been addressed in prior empirical studies. For example, as mentioned previously, the following paths were added to the modified model: general job satisfaction to career commitment; job involvement to career commitment; work locus of control to organizational commitment; organizational commitment to job involvement; work locus of control to turnover intent.

**Limitations and Key Assumptions**

This study suffered from all the weaknesses associated with opinion research in field settings, and with the problems inherent in doing qualitative research. The research objective of opinion research in the field is to gather respondents' opinions about something that has happened in the past, is happening in the present, or will happen in the future. The ultimate goal is the understanding or prediction of behavior. In opinion research the investigator can only infer that the data represent respondents' attitudes (or values, views, perceptions, judgments, affective reactions) about the phenomena of interest. Generalizability is limited to
similar persons or situations depending on the type of quasi-experimental design used.

Common disadvantages of opinion research include (1) nonresponse error which is error caused by a difference between those who respond to a survey and those who do not; (2) bias introduced in questionnaire design; (3) response bias; (4) primacy and recency effects; (5) interviewer bias; (6) the fact that opinions are nonfactual and unstable over time; (7) difficulty of capturing group opinion; (8) dependence on pre-experimental or quasi-experimental research designs which lack random assignment and therefore do not control for threats to internal validity; (9) time and cost requirements; (10) possible lack of anonymity of respondents; (11) limitations of correlational analysis; and (12) lack of a representative sample which limits generalizability beyond the respondent groups.

The success of exploratory studies based on the grounded theory approach depends to a large extent on the skills of the investigator. Extreme care must be taken in designing and executing interview strategies and other unstructured data gathering methods so that demand characteristics (e.g., social desirability) and other types of investigator-primed responses are minimized. In addition, expertise is needed in data reduction and coding activities so that the integrity of actual respondent
productions is maintained and not distorted through unwarranted interpretation.

This study represents a combination of qualitative and quantitative data gathering, using both exploratory and substantive approaches. The convenience sample relied upon for this study included only organizations that were willing to be studied. Generalizability was decreased by attempting to generalize across very different industries. The lack of a representative sample severely limited external validity. Furthermore, reliance on a pre-experimental design generally precluded inferences beyond those of a correlational nature. In this study, issues that emerged from the qualitative analyses that did not have sufficient prior empirical validation in the literature were necessarily treated in this manner.

The one exception to this rule that was invoked in this study was the instance of complex model building based on a well-developed body of empirical research. Causal analysis of endogenous and exogenous variables (e.g., LISREL analysis) is possible when the sample is sufficiently large to warrant such analysis, the assumptions of path analysis are met (e.g., see James, Mulaik, & Brett, 1982), and there is adequate, prior empirical research to support the substantive causal hypotheses under investigation. The particular model tested through the survey portion of this
study (Phase II) met the conditions necessary to justify this analysis.

Kidder and Judd (1986) suggest that if an investigator limits a query to descriptive and correlational data (rather than to questions of interpretation of causality), then threats to validity have no meaning. However, the investigator was interested in positing some directional relationships in the model building section of the study (Phase II). Thus, particular threats to validity apply. The use of a pre-experimental design without random assignment makes the study vulnerable to selection biases. The cross-sectional nature of the sample (range of work sites) may contain pre-existing differences that account for the results.

Instrumentation problems based on interviewer bias or lack of standardized interviewing practices (experimenter effects) may also exist. Statistical conclusion validity is another possible threat in the form of multicollinearity. The fact that the interviews were conducted several weeks prior to actual administration of the survey could have introduced the possibility of history, maturation, and mortality threats had the identical sample been used for both phases of the project. Also, in the same circumstances, it is possible that information might circulate from the qualitative data gathering sessions (Phase I) and thus affect responses on the questionnaires.
However, in this case, survey respondents in Phase II of the project were entirely different individuals from those interviewed in Phase I, thus negating these problems.

The major threat to external validity, aside from lack of true random assignment, is the interaction of treatment with setting (treatment being defined as the condition under study). Because of the various field settings surveyed, there is no way of gauging the impact that particular settings have on the data. Results may be confounded by the particular setting, thus reducing generalizability to other settings. Finally, construct validity is always a concern in a study of this nature. For the survey portion, the investigator relied on constructs from the literature which had been previously validated, however, the qualitative data gathering (Phase I) represents unchartered territory.

**Ideas for Future Research**

A tremendous need exists for research studies of technical professional employees in team-based settings. Most work team research has focused on production units for the obvious reason that the production function has been the first to make the transition to self-managing work teams in many industries. While technical professional employees have historically tended to work in a comparatively isolated fashion, companies are now beginning to study the possibilities of moving their technical professional support personnel into team arrangements.
In may be that the phenomena that are currently being observed transcend the old terminology or mental categories. For example, Purser and Pasmore's (1992) revisiting of sociotechnical theory from a knowledge work perspective is grounded in the original terminology, however they redefine the meanings to fit this type of work. It may be that reliance on the old categories sets the limits of our understanding and that, to some extent, new vocabularies will be needed to capture the widespread changes in thinking and practice currently transforming organizations.

In follow-up research, investigators may want to explore several issues arising from the present study. Specifically, some new relationships between constructs have been identified that need to be studied empirically in team contexts. A longitudinal study would capture the dynamic side of these relationships. Future researchers would be well-advised to move away from a dependence on cross-sectional, non-experimental approaches in favor of longitudinal designs which incorporate additional contextual variables. In addition, the use of objective performance outcomes rather than sole reliance on self-report measures would strengthen this line of research.
APPENDIX A
PILOT TEST
The Pilot Analysis

The pilot analysis initially tested the Schaubroeck et al. (1989) cross-validated model with two sets of data from a team-based setting, specifically a "greenfield" site. "Greenfield" denotes a work site that has implemented the self-managing work team (SMWT) structure from the onset of operations. The general question was whether the SMWT environment differs sufficiently from traditional settings to require a new theoretical model to explain employee perceptions.

Subjects

Subjects were recruited from a facility which was a subsidiary of a large United States defense contractor located near a large metropolitan area in the southwestern United States. This particular facility employed approximately 400 workers. Of the 254 (n = 266) employees who marked the gender category on the survey, 129 were male and 125 were female. Tenure with the organization ranged from less than one year to slightly more than eight years, with a mode of three years. Age ranged from 20 to 59 years with a median age of 30 years.

Usable surveys were returned by 210 employees. Of the 210 responses, 100 were professionals engaged in support functions such as engineering, human resources, and information systems. The other 110 employees were production workers on the shop floor. Employees were either
members of self-managing work teams or team coordinators who operated loosely as "supervisors" of the teams. The teams met daily for scheduling and problem solving. Teams were responsible for deciding when to stop the work flow to solve a problem, hiring for job openings, and assignment of leadership roles among team members. Most of the respondents were involved in the design and assembly of complex wiring harnesses for airplanes.

Instruments

Scales from the literature were included in the pilot test that yielded acceptable reliabilities (generally greater than $\alpha = .70$). Included were measures of the various variables used in the Schaubroeck et al. model, that is, autonomy, general satisfaction, affective commitment, job stress, role ambiguity, role conflict, role overload, co-worker social support, and locus-of-control. For purposes of the pilot analysis, these variables were computed as summative measures using their respective item responses. The Pilot Study Instrument section further details the sets of items used to compute each variable and the type of scaling used.

Job Characteristics

The Job Diagnostic Survey (JDS; Hackman & Oldham, 1980) was used to collect information on employee perceptions of selected job characteristics. The JDS variables included in the survey are measured on a 7-point Likert-type scale.
ranging from "1 = Disagree Strongly" to "7 = Agree Strongly." The three items with the highest item-total correlation were selected from Hackman and Oldham's survey for each of the job characteristics. Internal consistency reliabilities for the original Hackman and Oldham scales are all reported as higher than .70. Since subsets of items were used in this survey, reliabilities were calculated for each scale using Cronbach's coefficient alpha, $\alpha$.

The following reliabilities are from the pilot test that was conducted utilizing portions of the survey. Autonomy represents the degree to which the job provides substantial freedom, independence, and discretion to the individual in scheduling the work in determining the procedures to be used in carrying it out. The reliability for this scale in the pilot sample was $\alpha = .76$. Hackman and Oldham (1980) argued that individuals react to changes in job characteristics and that the reaction manifests itself in the job outcomes such as attitudes, performance, and intent to quit. The variable general satisfaction was measured by items from the Job Diagnostic Survey (Hackman & Oldham, 1980). Included are items that measure general as well as growth satisfaction. The reliability for this scale in the pilot sample was $\alpha = .86$.

Other Scales

Affective commitment, at attitudinal disposition to stay with the organization and work toward its goals, was
measured using items from the McGee and Ford (1987) Affective Commitment Scale (ACS). The coefficient alpha for this scale in the pilot sample was $\alpha = .75$. Continuance commitment (intent to quit) was measured in the pilot sample with items from McGee and Ford's (1987) Continuance Commitment Scale (CCS). However, these items represented two separate dimensions of continuance commitment, that is, commitment based on having few alternative employment opportunities, and commitment stemming from expected high personal sacrifice if the individual quit the job (McGee & Ford, 1987). The reliability for this scale in the pilot sample was $\alpha = .41$. The construct does not appear to be unidimensional, and thus was dropped from the present study.

Stress was measured with a subset of the Perceived Stress Scale (PSS; Cohen, Kamarack, & Mermelstein, 1983) a global measure of perceived stress. The coefficient alpha for this scale in the pilot sample was $\alpha = .81$.

Role ambiguity, conflict, and overload have often been associated with stress in research studies. Role ambiguity was measured with three items from Caplan et al. (1980). Reliability for the role ambiguity scale in the pilot sample was $\alpha = .83$. Role conflict was also measured with items from Caplan et al. (1980). The coefficient alpha for this scale in the pilot sample was $\alpha = .75$. Role overload was measured with one item from Cohen et al. (1983). It is recommended that at least three items be used to measure a
particular construct, therefore three items from Beehr, Walsh, and Taber (1976) were substituted in the present study.

Co-worker social support was measured by three items from Caplan et al. (1980) that tap the availability aspect of social support in occupational settings. The reliability for this scale in the pilot sample was $\alpha = .78$.

Procedure

Questionnaires were distributed to employees in all jobs in the facility by their supervisors. Participation in the survey was voluntary and individual results were kept anonymous. Completed surveys were returned to a drop box at the receptionist’s desk in the facility.

Findings

The means and standard deviations of the variables included in the pilot test were computed indicating each variable shows a reasonable degree of variance, and skewness and kurtosis were not excessive (see Table 14).

Intercorrelations among the variables for production workers were computed. Examination of the correlations reveals that the dependent variables were not highly related. Some strong relationships existed among the independent variables, and some relationships existed between independent and dependent variables. The largest correlations occurred between global perceived stress and role overload ($r = .81$), and between general job
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Note: \(^n = 110.\quad ^b n = 100.\)
satisfaction and affective commitment ($r = .62$).

Correlations between the variables autonomy and role 
overload, role overload and co-worker social support, and 
autonomy and co-worker social support were not reported in 
the Schaubroeck et al. (1989) study, but were large enough 
to note in this study, $r = -.11$, $r = -.10$, and $r = .23$, 
respectively.

Intercorrelations among the variables for support staff 
reveal that the dependent variables were not highly related. 
Some strong relationships existed among the independent 
variables, and some relationships existed between 
independent and dependent variables. The largest 
correlations occurred between global perceived stress and 
role overload ($r = .71$), and between general job 
satisfaction and affective commitment ($r = .66$).

Correlations between the variables autonomy and role 
overload, role overload and co-worker social support, and 
autonomy and co-worker social support were not reported in 
the Schaubroeck et al. (1989) study, but were large enough 
to note in this study, $r = -.19$, $r = -.33$, and $r = .36$, 
respectively.

Structural equation modeling was used to examine the 
path analytic models depicted in Figures 3 and 4. These 
figures indicate the hypothesized relationships between 
predictor variables and the outcome variables. Figure 3 
depicts a model for only production workers. Figure 4
Fig. 3. Path Model for Production Workers. All path coefficients are statistically significant.

Fig. 4. Path Model for Support Staff. All path coefficients are statistically significant.
depicts a model for only support teams. The support team model is of particular importance in this study because it is derived from responses of technical professional employees. In the models, each path arrow indicates a hypothesized, specific direct relationship. The LISREL 7 program computed separate coefficients for the production and support team (technical professional) models.

Table 15 gives a summary of the goodness-of-fit indices for both the production and support team models. Analysis in each case began with the null model, to examine the fit of the data to a model with no relationships (all paths forced to have zero beta weights). As expected, goodness-of-fit indices (GFI) for both null models were very poor; GFI = .619, p = .000 for production teams, and GFI = .622, p = .000 for support teams; the Root Mean Square Residual (RMSR) differences between observed and constructed correlation matrices were large: RMSR = .258 for production teams, and RMSR = .277 for support teams.

For exploratory purposes, model fit was improved through theory trimming; modification indices were examined separately for the production and support teams' LISREL output. The rule of thumb is that a modification can be made by freeing a new path when the index exceeds 8.0 and makes theoretical sense. Table 15 shows a series of five modifications made for the support team data. Each step in the series was based on a separate LISREL computer run.
Table 15
Summary of Goodness-of-fit Indices

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<th>Model</th>
<th>Description</th>
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<th>X²</th>
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</tr>
<tr>
<td>B</td>
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<td>47.18</td>
<td>.000</td>
<td>.965</td>
<td>.906</td>
<td>.048</td>
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<td>C</td>
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<td>38.29</td>
<td>.001</td>
<td>.970</td>
<td>.917</td>
<td>.042</td>
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<td>D</td>
<td>Add Stress -&gt; Affective Commitment</td>
<td>15</td>
<td>29.61</td>
<td>.013</td>
<td>.976</td>
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<td>E</td>
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<td>.964</td>
<td>.899</td>
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Note: 'n = 110. 'n = 100.
The runs were stopped when the modification index dropped below 8.0. The final path coefficients, after modifications were completed, are shown in Figure 3 for production workers and Figure 4 for support teams.

**Discussion**

Prior studies indicated a set of variables and instruments that yielded the variables under investigation. These variables were computed and analyzed according to two separate models. The model of particular interest was the support team model because it reflected the response of technical professional employees in a greenfield site.

Since technical professionals are the focus of the present study, it is worth noting that several paths appeared in the support team model that were not discussed in the literature. These were: positive relationships between role overload and role conflict \((\beta = .20)\); role overload and role ambiguity \((\beta = .51)\); co-worker social support and affective commitment \((\beta = .24)\); global perceived stress and role ambiguity \((\beta = .85)\); and continuance commitment and general satisfaction \((\beta = .42)\).

**Survey Items Used in Pilot Analyses** (Yeatts, D., M. Thibodeaux, & M. Beyerlein, 1990 Employee survey, Boeing Electronics Corporation, Corinth, TX)

**Affective Commitment** (McGee & Ford, 1987)

1. I do not have a strong sense of belonging to company \((V64)\).\(^1\)
2. This organization has a great deal of personal meaning for me \((V66)\).\(^1\)
3. I do not feel "emotionally attached" to company (V103).¹

**Autonomy** *(Hackman & Oldham, 1980)*

1. The job does not allow me to use my own initiative or judgment in carrying out the work (V10).¹
2. The job gives me a lot of freedom in how I work (V14).¹
3. To what extent does your job permit you to decide on your own how to go about doing the work (V26)?²
4. The amount of independent thought and action I can exercise in my job (V73).³

**Continuance Commitment** *(McGee & Ford, 1987)*

1. Right now, staying with company is a matter of necessity as much as desire (V8).¹
2. One of the major reasons I continue to work for this organization is that leaving would require considerable personal sacrifice -- another organization may not match the overall benefits I have (V24).¹
3. I frequently think of quitting this job (V54).¹
4. I feel I have too few options to consider leaving company (V105).¹

**General Satisfaction** *(Hackman & Oldham, 1980)*

1. Generally speaking, I am very satisfied with this job (V48).¹
2. I am generally satisfied with the kind of work I do on this job (V58).¹
3. The amount of personal growth and development I get in doing my job (V71).¹
4. The amount of challenge in my job (V74).³
5. The feeling of worthwhile accomplishment I get from doing my job (V75).³
6. When thinking about company employees who have similar tasks as mine most are very satisfied with their job (V85).¹

**Global Perceived Stress** *(Cohen et al., 1983)*

1. In general, how often have you been upset because of something that happened unexpectedly (V40)?²
2. In general, how often have you felt that you were unable to control the important things in your life (V41)?²
3. In general, how often have you felt nervous and "stressed" (V42)?²
4. To what extent are you currently under more stress than normal (V44)?

**Role Ambiguity** (Caplan et al., 1980)

1. I am very clear on what my job responsibilities are (V127).\textsuperscript{1}
2. I can always predict what others will expect of me on the job (V128).\textsuperscript{1}
3. My work objectives are well defined (V129).\textsuperscript{1}

**Role Conflict** (Caplan et al. 1980)

1. Sometimes I am given work to do which conflicts with other work I have to do (V68).\textsuperscript{1}
2. My co-workers and team leader sometimes ask me to do things which conflict (V123).\textsuperscript{1}
3. Sometimes different people ask me conflicting things to do (V126).\textsuperscript{1}

**Role Overload** (Caplan et al., 1980)

1. In general, how often have you felt difficulties were piling up so high that you could not overcome them (V43)?\textsuperscript{2}

**Social Support -- Co-workers** (Caplan et al., 1980)

1. To what extent do the people you work with go out of their way to make your work life easier (V38)?\textsuperscript{2}
2. If I got into difficulties at work I know the people I work with would try to help me out (V62).\textsuperscript{1}
3. I can trust the people I work with to lend me a hand if I need it (V95).\textsuperscript{1}

**Scales**

1) Disagree 1----2----3----4----5----6----7 Agree
   Strongly  Neutral  Strongly

2) Very 1----2----3----4----5----6----7 Very Much
   Little  Moderately

3) Extremely 1----2----3----4----5----6----7 Extremely
   Dissatisfied  Neutral  Satisfied
APPENDIX B

PHASE I
November 6, 1991

Susan Beyerlein
UNT Box 9701
Denton, TX 76203

Dear Mrs. Beyerlein:

Your proposal entitled "Technical Support Personnel Affect, Behavior, and Cognition in Self-Managed Organizations: Qualitative and Covariance Structure Analyses," has been approved by the IRB and is exempt from further review under 45 CFR 46.101, Exemption #2,3.

If you have any questions, please contact me at (817) 565-3946.

Good luck on your project.

Sincerely,

Peter Witt, Chair
Institutional Review Board

PW/t1
EXPLANATION OF RESEARCH AND INFORMED CONSENT FORM

This study is being conducted by investigators at the University of North Texas to gain an understanding of how technical support personnel involved in the transition to a more self-managed work environment experience self-managed work teams. By participating in this interview you will provide information about how the self-managed work team concept is working in your technical area, how the change has affected the nature of your work, and perhaps some ideas on how it can be improved for all employees.

Complete confidentiality will be maintained concerning each individual’s responses. The only document on which your name will appear is the consent form. The biographical data form and interview form will be coded numerically by participant. Once all the data is collected, any individually identifiable information will be destroyed.

If you are interested, the investigators will be able to send you a copy of the results of this study. Should you wish to receive a copy of the results, please indicate your name and mailing address below.

Your participation is entirely voluntary. You may leave at any time if you find your participation to be undesirable to yourself for any reason. You have the right to withdraw from the study at any point in time, and have your records pertaining to the study destroyed. It is also your decision to not respond to any question or item you so choose.

Thank you for your participation in this study. If you desire further information, contact either Susan Beyerlein, Department of Management, University of North Texas (817/565-3140) or Dr. Michael Beyerlein, Interdisciplinary Center for the Study of Work Teams, Department of Psychology, University of North Texas (817/565-2653 or 817/565-3096).

I have read the above statement and understand the nature of the study and my rights as a participant in the study. I agree to participate in the study on a voluntary basis.

NAME (Please Print) ________________________________________________________________

SIGNED ________________________________

SUBJECT ________________________________

Please send a copy the results to:

______________________________________________________________
BIOGRAPHICAL DATA FORM

This section to be completed by the Interviewer.

Site __________________________ Date ___________ Time ______
12 ___ 13 ___

Circle One: Exempt Nonexempt IntCode _______ SCode ______

Directions: Your response will be kept completely confidential. Only percentages will be reported in any written documents. Please provide answers to the following questions.

1. Sex: Male _____ Female _____
2. Age: ______
3. Marital Status: ______
4. Education: What is the highest level of education you have completed? Please list any degrees you have earned (for example, B.S., B.B.A., B.S.E.E., M.S., M.B.A., Ph.D.).
5. What special training (educational, certification, on-the-job-training) do you bring your job?________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
6. What is your job title ________________________________________
   and number of subordinates ____________________________________
7. What functional group are you associated with (check one):
   _____ Planning       _____ Facilities/Maintenance
   _____ Human Resources   _____ Manufacturing
   _____ Management       _____ Information Systems
   _____ Quality/Reliability
**BIODATA FORM**

Page 2

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Other: Please List________________________________________________________

8. What is your self-managed work team NAME ____________________________

9. How long have you worked in this industry?
   Years ____  Months ____

10. How long have you been in your present profession?
    Years ____  Months ____

11. How long have you worked for this organization?
    Years ____  Months ____

12. How long has your self-managed work team been operating?
    Years ____  Months ____

13. How long have you been a member of your self-managed work team?
    Years ____  Months ____
INTERVIEW QUESTIONS (Revised 3/17/92)

1. How did you react when you were first informed that you would be working in SMWTs?

2. What is your definition of a SMWT?

3. How much and what kind of SMWT training did you receive?

4. What steps were followed in creating your SMWT?

5. If you were in charge of implementing SMWTs, what steps would you follow?

6. How does the pace of transition to SMWTs suit you?

7. Based on your observation, are there any particular types of people that have (or would have) trouble making the transition to SMWTs?

8. Should (insert specialty) be involved in SMWTs? What are the pros and cons of using SMWTs with (insert specialty)?

9. How has participation in a SMWT changed the nature of your work?

10. How consistent are the words and actions of management with respect to the use of SMWTs?

11. How do your co-workers feel about SMWTs? (thoughts, actions)

12. Where are the decisions regarding your work made?

13. Do you have the authority to see your plans through to completion?

14. How has problem solving efficiency and effectiveness changed since the introduction of SMWTs? (or how would it change?)

15. Tell me about the amount of freedom you have to do your job the way you see fit (How much freedom do you have).

16. Who is your customer and what do you do to meet your customers' needs?

17. How do you think the formation of SMWTs in your area will (does) affect your customers' satisfaction?

18. How do you feel SMWTs will influence your career advancement (Probe: promotions, performance appraisal and compensation).
19. What is your overall opinion of SMWTs? (Probe: What concerns do you have with SMWTs being implemented here?). Will SMWTs take hold here?

20. Is there anything you would like to add or you would like us to know that didn’t get covered? Do you have any questions for me?
INTERVIEW GUIDELINES (3/17/92)

I. Materials:

For each interview have 1 Biodata Form, 2 Informed Consent Forms (one to be signed and a blank to offer the interviewee), and 1 list of interview questions for yourself, portfolio and paper, pen etc.

II. Procedure:

Introduction. The following is the gist of the information you need to provide the interviewee. Introduce yourself. "I am from the University of North Texas. (Explain your badge if you are in a company site, otherwise do not wear it). I am part of a research team studying SMWTs among professionals. No one appears to have done any study of professionals in teams. There are no written principles on how to go about creating teams with professionals or even when/where they are appropriate. We are coming into the field to talk with people like yourself involved in teams in different stages of development to get your experiences and insights. We are interviewing individuals in a number of sites and disciplines, e.g., engineering, quality, HR, finance, information systems etc. This is the beginning of a major study. The first stage is interviews. Later the interview data will be used to develop a survey. The interview has three parts (discuss as the interviewee does each part). The first is the Explanation of Research and Informed Consent Form (hand it to the interviewee) which tells you a little about the nature of the study and stresses the voluntary nature of your participation. I need to have you read this and sign it if you find this acceptable. I can provide you with a blank copy of the Informed Consent form if you like" (have interviewee complete Informed Consent Form and place in portfolio).

(After interviewee completes Informed Consent Form)

"The second part of the interview is the Biographical Data form. I would like you to fill this out if you would please. We think that, people with different backgrounds and experience may have different reactions to various facets of SMWTs. We're collecting this information so we can break the data into those subsets" (have interviewee complete Biographical Data form. Note: Make sure to ask whether interviewee is Exempt or Nonexempt and circle appropriate category at top of Biodata form, and place in portfolio).

"The third part of the interview is what I call the core part--the interview questions. I have a list of approximately 20 questions." Make eye contact with the interviewee and say something like: "Please answer with whatever comes to mind." (The goal is to put the person at ease).

Interview Questions. When interviewing do not give the interviewee a copy of the interview questions (or Biodata
form) (that was only for the pilot interviews because we were dealing with managers and wanted a more collegial atmosphere).

Wrap-Up. Notice we have done some more revisions--Question 20 is a kind of wrap-up question: "Is there anything you'd like to add or anything you'd like us to know that didn't get covered?" and "Do you have any questions for me?" This gives the interviewee a chance to get closure, get his/her unanswered questions about the interview process/study etc. addressed, and/or add anything that has come up during the interview that you didn't specifically address with the structured interview.

Thanking the Participant. When you have completed question 20, thank the person for their participation, shake their hand, make eye contact, call them by name, e.g., "Thanks Paul for participating in this interview. I sincerely appreciate your taking the time out from your busy schedule" etc. If they have signed up for a copy of the report (Informed Consent form) make sure you have a mailing address and you can tell them the report will take awhile to prepare (probably late fall of 1992 at the earliest).

III. Coding:

I have combined the subject and interviewer codes. Sue's code is 1, Mike--2, Ben--3. All documents for each subject should contain the same 3 digit number beginning with the interviewer code: Sue: 110...(subject 1 is 110, subject 2 is 111 etc.); Mike: 210...(subject 1 is 210, subject 2 is 211, etc.); Ben: 310...(subject 1 is 310, subject 2 is 311 etc.). Please type interview notes for each interviewee. You will then have 4 documents for each subject: 1) original handwritten notes with half-sheet identification attached, 2) typewritten notes with half-sheet identification attached, 3) Biodata sheet with interviewer identification sheet at top of first page filled in, and 4) Informed Consent form. All four documents must have the 3-digit identification number (put this in upper right hand corner of Informed consent form). Please bring all 4 documents per subject to be placed in the communal notebook as you get them finished. Copies of typewritten notes will be made later for each interviewer for the analysis.

IV. Guidelines for Typing Interview Notes:

1) Type interview number (e.g. "INTERVIEW 310") at top of the transcript.

2) Type transcript single spaced with appropriate space between questions and answers.

3) I will provide the questions on disk. Interleave questions and answers so we can match them more easily during analysis (see example).

4) Type your interview notes verbatim. Put your added comments, clarifications in parentheses ( ). For
purposes of analysis we will assume that anything in parentheses was added by the interviewer after the time of the interview for later interpretation, clarification.

5) Underline or use CAPS to indicate the interviewee’s emphasis (louder tone, facial expression etc. that shows strong emphasis). If you tend to summarize (put interviewee’s comments into your own words), then be sure to use quotation marks when you record a direct quote. If you write the interviewee’s words verbatim the quotes aren’t necessary (it will be clear early on what your note taking style is—Sue tends to write comments verbatim, Mike tends to boil down, summarize. In general, the more verbatim information you can get down in your notes the better—"directly from the horse’s mouth.”

6) Design page breaks so that the complete question and answer for each item is contained on one page (in other words, does not run on to the subsequent page). This will be useful at analysis time if we want to cut questions/answers apart to group them for comparison purposes.

V. Confidentiality:

For purposes of confidentiality, type interview notes and keep copies on file on your home computer system only (not work systems). Do not keep copies of interview data files on diskettes that might be transported to your work setting. The only hard copies of interview transcripts in existence should be the copy brought to the Principal Investigator (S. Beyrelein) and a copy for your home files, if you wish. Interview transcripts (hard copy or diskette files) must not under any circumstances be shared with any individuals outside the research team in order to insure confidentiality to participants.

VI. Other Items (Notes)
The following represents a condensation of 25 interviews conducted with technical support personnel working in three team-based, high tech manufacturing facilities in a large southwestern metroplex during the Spring, 1992. The interviews represent the first stage of a larger project involving technical professional employees in teams. All individual and company identifying information has been omitted in keeping with the researchers’ obligation of participant confidentiality. The material is presented in 20 general categories of interest. Each line (including indentations) represent a separate theme or illustrative comment.

**Accountability:**

Accountability = responsiveness to customer, customer satisfaction, quality.

**Boundaries:**

Boundaries = constraints = circumscriptions = culture
Who sets boundaries?
Boundaries are our customer requirements; customer requirements drive the system.
Boundaries between disciplines mark places of territorial issues—conflict between support groups.
SMWT may be inappropriate if members don’t share tasks, goals, customers.
Interfaces between support groups need attention.
What is the team’s environment? Management support? Co-worker support?
When the supervisor becomes a facilitator, it changes status to something more egalitarian, reducing barriers therefore improving performance.

**Costs:**

It takes time to get up to speed—now we’re going down the learning curve—first part is investment, then the payoff.
Efficiency decreased but effectiveness is much better—when a problem gets fixed it stays fixed—better solutions, in more depth, even anticipate problems.

**Customer Satisfaction:**

My customers are my bosses—there are lots and their demands may conflict.
Who is your customer? Anybody I interact with.
SMWTs increase customer satisfaction through improved efficiency, response time, cycle time, and correcting problems at root causes.
Definition of Self-Managed Work Team:

A group of people with common goals and varied backgrounds trying to achieve common objectives without being told, have latitude of decision making to get there without over supervision.

We changed name from SMWT to Empowered Work Team (EWT) so we don't imply teams set policies, but work within them. SMWTs is not a program; it's a business process.

If SMWTs are perceived as RIFFING tool, it could undermine implementation.

Team of people who have authority and responsibility for job accountability and free to act within boundaries like policies, quality restrictions, personnel relations boundaries. Empowered to do our job--define, plan and execute it--operationalizing the work "empowered."

A grass-roots approach to immediate customer satisfaction (customer drives the operation), self determination in the workplace, self-commitment through group activities which increase ownership.

Emotional Reaction:

Security = sense of control, predictability
I'm proud of our effort. Very excited. Enjoy it. Happy to come to work.
I'm frightened because of lack of structure and predictability.
Scary but exciting.
Making mistakes is okay.
My boss empowers and supports me, so I'm comfortable empowering my teams.

Engineers:

Engineers seldom get trained in teaming and so don't buy into the process.
Engineers' expertise buys them idiosyncracy credits.
Engineers' specialization, limits cross-training.
Some engineers learn to enjoy teaching of production workers.
Engineers have more responsibility than authority--a change in one warrants a change in the other.
Engineers come from an individualistic, competitive society. They take pride in personal accomplishments.
There is generally competition between engineering disciplines. This culture rewards it too. So they may have trouble transition to teams.

In engineer groups there is a diversity of skills, creative, entrepreneurial, high energy, but some just want to crunch numbers. Must set it up so we can utilize it all and meet the needs of the members and the team.

Engineers are teaching people on the line how to look at data and solve problems--simple technical things that empower.
Traditionally engineering was concerned with quality of design but that doesn't mean a concern with cycle time or cost.
"I now have three bosses--I'm "matrixed out."

"I now have three bosses--I'm "matrixed out."
Engineers (continued):

Engineering groups used to report to programs, and now report to functions as well. The functional organizations haven't exercised their power yet, but when they do it will create a lot of conflict. Moving engineers into systems where they need to be concerned with cost, cycle time, quality, and direct contact with the customer leads to a lot of resistance. Engineers are too independent to work in teams. If engineers are seen as part of management it could intimidate and stifle teams unless engineers are involved from the beginning. My engineering team will be sought after by customers because they will understand the customer's needs. Engineers interface with manufacturing teams in problem solving groups.

General:

There are many types of teams. Teams are often at different stages of development. The stronger, more mature teams can assume responsibility more quickly. Areas that are already autonomous and informed will be easier to transition. So far more change is occurring in production than support groups. We have more to lose if fails--more complete ownership--so our teams gain more. The key is communication. And honesty in communication. And key is continuous improvement. It's an evolutionary process. As we trust the process more, we get less tense. I'm wearing multiple hats--role overload.

Management:

Management too detail/control oriented. Management needs big picture for good decisions and catching errors. Must have two-way communication. Do not make them guess what you want and where you want them to go. Reduce resistance to change by keeping them informed. Need cheerleaders/champions of teams. Need training in facilitating teams and supporting them. Team members can burn out--so try making things easier for them. Traditionalists micromange. Resistance of older managers to give up responsibility; may be due to fear of loss of identity, security and control, and concern for quality. May lack knowledge on how to implement teams. Is it true that to empower someone you have to give up power? Interfaces with support groups are critical. Can help by getting resources, removing barriers, giving teams guidance, and helping resolve conflicts.
Management (continued):

Upper management and customer perceptions could stifle teams.

Metrics:

Metrics need to drive the decisions.
If you can measure and analyze it, you can manage it.
There's no accountability without measurement--can pinpoint source of defects. Have to measure the right thing and use the information. We publish customer satisfaction indices.
Feedback calibrates inspector and operator judgement so we're both in line with the same metric.
Basic measures to see how you're doing: quality, quality improvement, cost, cycle time, on time delivery. In a traditional organization these were the concern of separate departments so it generated a lot of conflict.
The data was public to the team members.
Management is a key to our job--data driven as much as possible.
If the teams show good data, managers can't argue, so it protects their empowerment to be data driven.

Participation:

Participation in decision making prevents perceptions of favoritism.
Shared leadership.
I demonstrated more competence then got more power, then demonstrated more competence and then got more power.
Suggestions coming from team carry more clout than from individuals so more gets done.

Payoffs for Teams:

Job satisfaction
Operator pride
Better end quality
Better understanding of customer wants/needs
Better understanding of whole operation/management
Human development
Increased productivity, decreased cost, increased morale,
  improved attendance, improved schedule, improved cycle time
Not as much pressure doing things as teams.
As plants' profitability increases, so does my compensation.
Freed up from a lot of detail work. I can now do more of what I was trained to do and attack bigger and better problems which can lead to raises and promotions.
A team can get things done that an individual can't: it has more clout.
Lower defects
Better decisions because of increased information.
It's a significant culture change, so it takes time.
A cookbook approach doesn't work; have to tailor it to our own organization.
Payoffs for Teams (continued):

Get teams involved in meaningful work, don't give them a trivial empowerment; they need some challenge. As some teams mature, some subgroups can do the problem solving the entire team did before--experience curve.

Peer Appraisal:

You can fool your supervisor buy not the person you work next to.
Tough to measure professional work.
Merit pay must be tied to performance.
Poor performance can hold back team--how can they be dealt with fairly?

Peer Competition:

With split shift teams, competition develops between teams. Peer pressure plays a part--social influence.

Problems in Implementing Teams:

Resistance to change
Uncertainty/anxiety
Slower cycle time at first but 3 to 5 time faster later.
Need for power
Habits hard to change
Expectations are a lot higher than for any other program in the past; hardliners would like to see it fail.
Can't build trust between supervisors and employees until get over need to be watched and whipped to do the job.
Status differences between supervisors and operators created barriers that inhibited performance.

Quality:

SMWTs are part of TQM.

Restructuring:

Reducing numbers of management.
Span of control has doubled.
Pay is now tied to group performance--so better be data driven.
Communication doesn't have to go through supervisor, so it's more direct and effective which lowers costs and improves quality. Team members want to talk to employees of vendors, not managers and CEOs.

Rewards:

Recognition will follow good performance. You get what you reward. Traditional is still being rewarded. Traditional engineers are just being smart. If you don't change the reward system, you can't change the behavior. So if compensation is the last thing to change, you're creating an artificial impediment to changing the behavior.
Supervisors:
Visit the line every day. They’re my customer. The team is about burned out, so I’m trying to make it easier for them. Supervisor becomes liaison with support groups and handling conflicts.

Training:
Training is essential. Been told to go do it, but not how. Match pace of training with pace of empowerment. Where should order of empowerment steps be decided? When team members get a new responsibility they are anxious at first. Must train in new thought processes for problem solving. Authority—who is going to take the rap if you make a bad decision? Teaching is a new role for supervisors. Can substitute personal development for vertical (promotions). Training is the key element. Cross training gives them a lot more interest and enthusiasm for their jobs. The feeling that training was mandatory contradicted the spirit of empowerment. Team members need to be taught to give each other social support. If I’d had more training, it would have been easier. Interpersonal training leads to working well in teams which leads to flexibility in the job. Many production workers wanted more thinking things to do. It broke down barriers that inhibited performance. Engineering manager as teacher.
MEMORANDUM

TO: Technical Professional Support Personnel

FROM: Research Team*, Center for the Study of Work Teams, University of North Texas

RE: Survey of Technical Professional Employees in Teams

DATE: January 23, 1993

Attached is a questionnaire that we have carefully crafted at the Center for the Study of Work Teams based on a number of interviews with engineers and other technical professionals working in the Dallas/Fort Worth area. As far as we know, no one has systematically studied technical professional employees in team situations. This study has been designed to explore how technical professional support personnel involved in transitioning to a more self-managed work environment experience working in teams. By participating you will provide us with information such as how the team concept is working in your technical area (if you have indeed already made the transition), how the change is affecting your experience at work, and how this type of work structure can be improved for all professional employees.

Thus, in order for us to understand how teams of professionals work best, we need your input. The questionnaire consists of questions about your work situation and your perceptions of the work environment. We have invited over 40 companies to participate in this study. We believe that at least three positive outcomes are possible from your participation:

1) You have the opportunity to express your ideas about how to best organize work for professional employees at your site.

2) Your company has the opportunity to benchmark your current work situation, use this as baseline data in comparison with other similar companies in the industry, and update it annually through our longitudinal survey program.
3) As researchers at the University of North Texas, we can develop a solid theoretical base about the workings of professional teams in industry that will be available to managers to guide job design for professional employees in the future.

The questionnaire will take about 45 minutes to complete and should be filled out individually. You can then mail it directly to the Center or deliver it to the collection site designated by your company liaison person.

Your participation in this study is entirely voluntary. You have the right to withdraw from the study at any point in time, and have your records pertaining to the study destroyed, if you find your participation to be undesirable to yourself for any reason. It is also your decision not to respond to any question or item if you so choose.

Your individual responses are solicited anonymously and kept strictly confidential. NO ONE will have access to your individual questionnaire except the research team for analysis purposes. The research team will keep all the questionnaires at the University and all data reported to participating companies will be in aggregated form only, which means no one individual's responses will be traceable in any way.

If you have any questions, please direct them to your company liaison person or call us. Thank you in advance for your participation.

Sincerely,

Michael M. Beyerlein, Ph.D.  
Director

Susan Tull Beyerlein, M.S.  
Project Manager

(817) 565-2653; (817) 565-3096

(817) 565-3140

*The Research Team at the Center for the Study of Work Teams, University of North Texas, is comprised of Dr. Michael Beyerlein, Director of the Center for the Study of Work Teams, Susan Tull Beyerlein, M.S., a doctoral candidate in the Department of Management, UNT, and Sandra Richardson, M.S., a master's candidate in I/O Psychology, UNT.
TECHNICAL PROFESSIONAL EMPLOYEES IN TEAMS (REV)

Directions: Each biographical item is optional but will enable us to compare the results of employees in different subgroups, for example, in different jobs and age groups. Please circle the appropriate number unless a check mark or fill-in response is indicated. (Numbering of items is solely for data entry purposes).

Organization Demographics:

11. My company is (please check one):
   - divisionalized
   - NOT divisionalized

   Please complete the questionnaire with respect to your division.

   Please complete the questionnaire with respect to your Company AS A WHOLE.

2. What is your company’s principal industry?

3. What are your company’s primary business objectives? (please list)

4. Is your company unionized? 1. yes 2. no

Individual Demographics:

5. Sex: 1. Male 2. Female

6. Age: ______ years


8. Education: What is the highest level of education you have completed?
   1. high school 2. some college 3. Bachelor’s degree 4. Master’s degree 5. Ph.D.
   6. Other

9. What special training (educational, certification, or on-the-job-training) do you have? (please describe)

10. How long have you worked for this company? ______ years ______ months

11. How long have you been in your present position? ______ years ______ months

12. What is your job title?


14. How many subordinates do you have? ______

15. During the past three months, how many days have you been absent from regularly scheduled work, not counting vacations, holidays, and scheduled leaves of absence? ______

16. How well do you know the company’s overall mission, vision, and goals? (please circle the appropriate number)
   1 2 3 4 5
   Not at all Thoroughly

1
On the average, how long is it before you know whether your work efforts are successful?
1. 1 week 2. 1 month 3. 3 months 4. 6 months 5. 1 year 6. longer than 1 year

During the average week, how many hours do you work, not counting the time you take off for meals? ___

In the last month how many hours of what you consider "overtime" did you put in? ____

How many of these overtime hours did you actually want to work, either for the money or to get something done? ____

Questions 21-24 are Strictly Voluntary:

If you are working on a "black" (classified) project, what is your current level of security clearance?
1. no clearance or confidential 2. secret or top secret

How long have you been at this level of security clearance? ___ years ___ months

How many hours a day do you spend in secure areas? ____

Do you feel that the level of security for your projects is warranted? 1. yes 2. no

Team Demographics:

If you are a member of one or more self-managed work teams*, answer items 26-30 referring to the primary team in which you work (*also known as "self-directed work teams," "high-performing teams," "empowered work teams," "quality improvement teams," etc.).

What is the name or code number of your primary team? ____________________________

How long has your team been operating? ___ years ___ months

How long have you been a member of this team? ___ years ___ months

How would you characterize your involvement in your team (please circle one number):
1. Get involved as needed, but major part of my work is performed as a member of a permanent "home" department away from the team.
2. Full-fledged member of the team on a day-to-day basis; do not function as part of a "home" department outside of the team.
3. Full-time member of both the team and a "home" department; expected to give up to 100% to both.
4. Other. Explain _______________________________________________________________

If your team is fairly permanent, how many members does it typically have? ____

If your team changes from project to project, how many members were on the:
smallest team ___ largest team ___ typical team ___

How many project teams are you on now? ____

On these project teams you are involved in, what percentage of employees come from units outside your own functional area? ____

Approximately how many meetings does your primary team have per week? ____

How long does an average meeting last?
1. 15 minutes 2. 30 minutes 3. 1 hour 4. 2 hours 5. 3 or more hours

How much work gets accomplished in a typical meeting?
1. none 2. a little 3. a fair amount 4. a great deal
Directions: Each of the statements below is something that a person might say about his or her experience at work. Using the following scale, write a number in the blank for each item that best expresses how you feel.

<table>
<thead>
<tr>
<th></th>
<th>1 Strongly Disagree</th>
<th>2 Moderately Disagree</th>
<th>3 Slightly Disagree</th>
<th>4 Neither Agree nor Disagree</th>
<th>5 Slightly Agree</th>
<th>6 Moderately Agree</th>
<th>7 Strongly Agree</th>
</tr>
</thead>
</table>

1. It's hard, on this job, for me to care very much about whether or not the work gets done right.
2. My opinion of myself goes up when I do this job well.
3. Generally speaking, I am very satisfied with this job.
4. Most of the things I have to do on this job seem useless or trivial.
5. I usually know whether or not my work is satisfactory on this job.
6. I feel a great sense of personal satisfaction when I do this job well.
7. The work I do on this job is very meaningful to me.
8. I feel a very high degree of personal responsibility for the work I do on this job.
9. I frequently think of quitting this job.
10. I feel bad and unhappy when I discover that I have performed poorly on this job.
11. I often have trouble figuring out whether I'm doing well or poorly on this job.
12. I feel I should personally take the credit or blame for the results of my work on this job.
13. I am generally satisfied with the kind of work I do on this job.
14. My own feelings generally are not affected much one way or the other by how well I do on this job.
15. Whether or not this job gets done right is clearly my responsibility.
16. Most people on this job feel a great sense of personal satisfaction when they do the job well.
17. Most people on this job are very satisfied with the job.
18. Most people on this job feel that the work is useless or trivial.
19. Most people on this job feel a great deal of personal responsibility for the work they do.
20. Most people on this job have a pretty good idea of how well they are performing their work.
21. Most people on this job find the work very meaningful.
22. Most people on this job feel that whether or not the job gets done right is clearly their own responsibility.
23. My work is important for the lives or well-being of other people.
24. This job is one where a lot of other people can be affected by how well the work gets done.
25. The job itself is not very significant or important in the broader scheme of things.
26. People on this job often think of quitting.
27. Most people on this job feel bad or unhappy when they find that they have performed the work poorly.
28. Most people on this job have trouble figuring out whether they are doing a good or a bad job.
29. I would go into a different profession if it paid the same.
30. If I could do it all over, I would not choose this profession.
31. I feel disappointed that I ever entered this profession.
32. I live, eat, and breathe this job.
33. Most of my interests are centered around this job.
Service Quality: A Critical Component of Customer Engagement

Service quality is a critical component of customer engagement because it directly affects customer satisfaction and loyalty. A high level of service quality can lead to repeat business, positive word-of-mouth referrals, and increased customer loyalty. Conversely, poor service quality can result in customer dissatisfaction, negative word-of-mouth, and decreased loyalty.

Customer satisfaction is highly correlated with service quality. When customers feel that they have received exceptional service, they are more likely to be satisfied with the product or service they purchased. This satisfaction can translate into positive word-of-mouth recommendations and increased sales. On the other hand, if customers feel that they have received poor service, they are more likely to be dissatisfied with the product or service they purchased. This dissatisfaction can result in negative word-of-mouth recommendations and decreased sales.

Customer trust is another important factor in customer engagement. When customers trust a company, they are more likely to purchase its products or services again in the future. Trust can be built through consistent high-quality service, fair treatment of customers, and a reputation for integrity. Conversely, if customers do not trust a company, they are less likely to purchase its products or services again, even if the products or services are of high quality.

In conclusion, service quality is a critical component of customer engagement. Companies that prioritize service quality are more likely to build customer satisfaction, trust, and loyalty, which can lead to increased sales and profitability.

References:


1. There are appropriate orientation procedures in this company for new hires.
2. I have received the training I need to do a good job.
3. I would like more training.
4. Most departments review their work on a regular basis.
5. Most of us in this company are committed to helping each other learn from our work.
6. In general, this company learns as much as is practically possible from its activities.
7. I am allowed to participate sufficiently in significant decisions which affect my work.
8. I am delegated work and authority appropriate to my expertise.
9. I am only made responsible for those things I can influence.
10. I work under a great deal of tension.
11. I have felt fidgety or nervous as a result of my job.
12. Problems associated with my job have kept me awake at night.
13. I have health problems as the result of my work.

Note: In the following questions, "work group" is also used to mean "department unit" or "project or work team."
14. The members of my work group vary widely in their amount of work experience.
15. The members of my work group vary widely in their skills and abilities.
16. The members of my work group vary widely in their personalities and interests.
17. The members of my work group vary widely in their technical backgrounds.
18. If given the choice, I would prefer to work as part of a team rather than work alone.
19. I find that working as a member of a team decreases my ability to perform effectively.
20. I generally prefer to work as part of a team.
21. Most members of my work group know each other's jobs.
22. It is easy for the members of my work group to fill in for one another.
23. My work group is very flexible in terms of changes in membership.
24. My work goals come directly from the goals of my work group.
25. My work activities on any given day are determined by my work group's goals for that day.
26. I do very few activities on my job that are not related to the goals of my work group.
27. Feedback about how well I am doing my job comes primarily from information about how well the entire work group is doing.
28. My performance evaluation is strongly influenced by how well my work group performs.
29. Many economic rewards from my job (e.g., pay, promotion, etc.) are determined in large part by my contributions as a work group member.
30. The members of my work group are responsible for determining the methods, procedures, and schedules with which the work gets done.
31. My work group rather than my manager decides who does what tasks within the team.
Most work-related decisions are made by the members of my work group rather than by my manager.

The work performed by my work group is important to the customers in my area.

My work group makes an important contribution to serving the company's customers.

My work group helps me feel that my work is important to the company.

Teaming allows all the work on a given product/service/project to be completed by the same set of people.

My work group is responsible for all aspects of a product/service/project for its area.

My work group is responsible for its own unique area or segment of the business.

I cannot accomplish my tasks without information or materials from other members of my work group.

Other members of my work group depend on me for information or materials needed to perform their tasks.

Within my work group, jobs performed by members are related to one another.

Higher management in the company does not support the concept of teams.

My manager supports the concept of teams.

Members of my work group are very willing to share information with other members about our work.

Teams enhance the communication among people working on the same product.

Members of my work group cooperate to get the work done.

I frequently talk to other people in the company besides the people in my work group.

There is a lot of competition between my work group and other work groups in the company.

Work groups in the company cooperate to get the work done.

Most members of my work group get a chance to learn the different tasks the work group performs.

Most everyone on my work group gets a chance to do the more interesting tasks.

Task assignments often change from day to day to meet the work load needs of the team.

There are times at work when things really make me angry.

I sometimes feel quite frustrated over things that happen at work.

Things hardly ever annoy me at work.

Getting the job you want is mostly a matter of luck.

Making money is primarily a matter of good fortune.

It takes a lot of luck to be an outstanding employee on most jobs.

As soon as I can find a better job, I'll leave.

I am seriously thinking about quitting my job.

I am actively looking for a job outside.

It is sometimes unclear who has the formal authority to make a decision.

The policies and organization structure have been clearly explained.

Excessive rules, administrative details, and red-tape make it difficult for new and original ideas to receive consideration.

We don't rely too heavily on individual judgment; almost everything is double-checked.
Directions: Indicate how much each of the following characteristics, responsibilities and decisions describes your work group by writing the appropriate number in the blank beside each item.

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at All</td>
<td>Some</td>
<td>A Fair Amount</td>
<td>A Large Amount</td>
<td>Completely</td>
</tr>
</tbody>
</table>

- 11: responsible for a whole product or process
- 12: pay based on knowledge and/or skills
- 13: shared leadership
- 14: training co-workers
- 15: high amount of job sharing
- 16: involvement in setting goals
- 17: involved in planning
- 18: monitoring performance
- 19: peer evaluations
- 20: safety
- 21: quality
- 22: recruiting
- 23: hiring
- 24: Other: _________________

- 118: firing
- 119: identifying and solving problems
- 120: quality control
- 121: work on budget
- 122: suggests new product ideas
- 123: maintenance
- 124: purchasing
- 125: contact with customers
- 126: takes action on discipline problems
- 127: elects leaders
- 128: has permanent formal leader (e.g., supervisor)
- 129: work scheduling
- 130: controls division of labor

---

Supervision here is mainly a matter of setting guidelines for your subordinates; you let them take responsibility for the job.

There are an awful lot of excuses around here when somebody makes a mistake.

People are rewarded in proportion to the excellence of their job performance.

There is a great deal of criticism here.

There is not enough reward and recognition given for doing good work.

Our business has been built up by taking calculated risks at the right time.

Decision making here is too cautious for maximum effectiveness.

Our management is willing to take a chance on a good idea.

In this company we set very high standards for performance.

Around here there is a feeling of pressure to continually improve our personal and group performance.

People here don't seem to take much pride in their performance.

The attitude of our management is that conflict between competing units and individuals can be very healthy.

We are encouraged to speak our minds, even if it means disagreeing with our superiors.

In meetings the goal is to arrive at a decision as smoothly and quickly as possible.
Directions: For each question, choose the category that describes your job by writing the appropriate number in the blank beside each statement.

1  2  3  4  5
A Minimum  A Some  A Moderate  A Quite a Lot  A Maximum
Amount  Amount  Amount  Amount  Amount

____ [206] The feedback from my manager on how well I'm doing.
____ [207] The opportunity to do a number of different things.
____ [208] The freedom to do pretty much what I want on my job.
____ [209] The degree to which the work I'm involved with is handled from beginning to end by myself.
____ [210] The opportunity to find out how well I am doing on my job.
____ [211] The amount of variety in my job.
____ [212] The opportunity to do a job from the beginning to end (i.e., the chance to do a whole job).
____ [213] The extent of feedback I receive from individuals other than my manager.

Directions: Using the scale below, please indicate the degrees to which you would like to have each characteristic present in your job by writing the appropriate number in the blank beside each statement.

1  2  3  4  5  6  7
Would like having Would like having Would like having
this only a moderate this very much this
amount (or less)

____ [214] Stimulating and challenging work.
____ [215] Chances to exercise independent thought and action in my job.
____ [216] Opportunities to learn new things from my work.
____ [217] Opportunities to be creative and imaginative in my work.
____ [218] Opportunities for personal growth and development in my job.
____ [219] A sense of worthwhile accomplishment in my work.

Directions: Please indicate how satisfied you are with each aspect of your job listed below. Write the appropriate number in the blank beside each statement.

1  2  3  4  5  6  7
Extremely  Dissatisfied  Slightly  Neutral  Slightly  Satisfied  Extremely
Dissatisfied  Dissatisfied  Dissatisfied  Satisfied  Satisfied  Satisfied

____ [220] The amount of personal growth and development I get in doing my job.
____ [221] The feeling of worthwhile accomplishment I get from doing my job.
____ [222] The amount of independent thought and action I can exercise in my job.
____ [223] The amount of challenge in my job.
Directions: For each question, choose the category that describes your job by writing the appropriate number in the blank beside each statement.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Little</td>
<td>Some</td>
<td>A Moderate Amount</td>
<td>Quite a Lot</td>
<td>Very Much</td>
<td></td>
</tr>
</tbody>
</table>

____ [231] How much variety is there in your job?
____ [232] How much are you left on your own to do your own work?
____ [233] To what extent do you find out how well you are doing on the job as you are working?
____ [234] How much of your job depends upon your ability to work with others?
____ [235] To what extent are you able to act independently of your supervisor in performing your job function?
____ [236] To what extent is dealing with other people a part of your job?

Directions: The following items deal with work load. Please write the appropriate number in the blank beside each statement.

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Fairly Often</th>
<th>Very Often</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

____ [237] How often does your job require you to work very fast?
____ [238] How often does your job leave you with little time to get things done?
____ [239] How often does your job require you to work very hard (physically or mentally)?
____ [240] How often is there a great deal to be done?
____ [241] How often is there too much work to be done?

Directions: Please rate the extent to which each of the following items describes your current job by writing the appropriate number in the blank beside each item.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Much</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

____ [242] Information is unreliable
____ [243] Time is not available
____ [244] Consequences are unknown
____ [245] Improper design instructions
____ [246] Little decision input
____ [247] Little time to learn details
____ [248] Resources inadequate
____ [249] Quality standards are unknown
____ [250] Project manager is unpredictable
____ [251] Lack of technical feedback
____ [252] Unrealistic expectations
____ [253] Improper training preparation
____ [254] Decisions are not influential
____ [255] Lack of support in making decisions
____ [256] Demands cannot be met
____ [257] Information is contradictory
____ [258] Job is fatiguing
____ [259] Conflicts with colleagues
____ [260] Lack of support in making decisions
____ [261] Control is beyond the decision maker
____ [262] Unexpected emergencies
____ [263] Future plans are unpredictable
____ [264] Must meet schedules
Directions: The following statements describe various things people do or try to do on their jobs. Using the following scale, write the number that best describes your own actions in the blank beside each statement.

1  2  3  4  5  6  7
Never  Almost Never  Seldom  Sometimes  Usually  Almost Always  Always

____  1. To what extent do the people you work with go out of their way to make your work life easier?

____  2. I do my best work when my job assignments are fairly difficult.

____  3. I try very hard to improve on my past performance at work.

____  4. I try to avoid any added responsibilities on my job.

____  5. My manager trusts the members of my work group to exercise good judgment in the interest of the organization.

____  6. My manager encourages close interpersonal relationships between him/herself and his/her subordinates and among work group members.

____  7. My manager stresses being ahead of competing groups.

____  8. My manager provides definite guidelines for work procedures, and expects work group members to follow them.

____  9. My manager expects acceptance of his/her expertise and ideas regarding the technical aspects of task performance.

____ 10. My manager seeks members' ideas and opinions, including criticism.

____ 11. My manager encourages members to interact in goal setting and planning without his/her direct involvement.

____ 12. My manager considers improving "the way we work together" to be as important as improving task accomplishment.

____ 13. My manager urges the group to beat its previous record.

____ 14. My manager values differences of opinion and tries to achieve consensus in problem solving.

____ 15. My manager modifies subordinates objectives in light of organization goals.

____ 16. My manager develops overall plans and schedules and uses them to control the group's activities.

____ 17. The future of the company has been well communicated to all of us.

____ 18. I am clear about the part I can play in helping the company achieve its goals.

____ 19. The vast majority of the company shares a clear understanding of where this company is going and what it is trying to achieve.

____ 20. When it comes to the provisions of our services, only the best will do.

____ 21. We are proud of the quality of service in our department.

____ 22. The company has quality standards which are higher than those of its competitors.

____ 23. I feel valued by my colleagues in the department.

____ 24. I feel valued by my colleagues in the company as a whole.

____ 25. My department is respected by the other departments.

[00]  What PROGRAM are you associated with at this time? (please indicate) ____________________________
Open-ended Questions: Please answer the following questions (please write on the back of this sheet if you need more space).

1. What happens when problems arise in your work group?

2. What changes do you expect in your work situation following the transition to teams?

3. What are the major sources of stress you deal with on the job? How have you successfully coped with them?

4. Please describe one situation where effective teamwork solved a challenging problem.

5. Describe your ideal job environment. How does your current job situation differ?

6. In what way does/will the transition to teams improve or hinder your work?

Thank You For Your Participation!
Questionnaire Items

Work Locus of Control (Spector 1988)

1. Getting the job you want is mostly a matter of luck (V156).²

2. Making money is primarily a matter of good fortune (V157).¹

3. It takes a lot of luck to be an outstanding employee on most jobs (V158).¹

Autonomy (Sims, Szilagyi, and Keller 1976)

4. The freedom to do pretty much what I want on my job (V208).³

5. How much are you left on your own to do your own work (V226)?⁴

6. To what extent are you able to act independently of your manager in performing your job function (V229)?⁴

Work Method Autonomy (Breaugh 1985)

7. I am allowed to decide how to go about getting my job done (the methods to use) (V73).¹

8. I am able to choose the way to go about my job (the procedures to utilize) (V74).¹

9. I am free to choose the method(s) to use in carrying out my work (V75).¹

Work Scheduling Autonomy (Breaugh 1985)

10. I have control over the scheduling of my work (V76).¹

11. I have some control over the sequencing of my work activities (when I do what) (V77).¹

12. My job is such that I can decide when to do particular work activities (V78).¹

Work Criteria Autonomy (Breaugh 1985)

13. My job allows me to modify the normal way we are evaluated so that I can emphasize some aspects of my job and play down others (V79).¹
Work Criteria Autonomy (continued)

14. I am able to modify what my job objectives are (what I am supposed to accomplish) (V80).¹

15. I have some control over what I am supposed to accomplish (what my supervisor sees as my job objectives) (V81).¹

Social Support--Co-workers (Caplan et al. 1980)

16. If I got into difficulties at work, I know the people I work with would try to help me out (V97).¹

17. I can trust the people I work with to lend me a hand if I need it (V101).¹

18. To what extent do the people you work with go out of their way to make your work life easier (V257)²

Role Overload (Beehr, Walsh and Taber 1976)

19. I am given enough time to do what is expected of me on my job (V82, R).¹

20. It often seems like I have too much work for one person to do (V83).¹

21. The performance standards on my job are too high (V84).¹

Role Ambiguity (Caplan et al. 1980)

22. I am very clear on what my job responsibilities are (V91, R).¹

23. I can always predict what others will expect of me on the job (V92, R).¹

24. My work objectives are well defined (V93, R).¹

Role Conflict (Caplan et al. 1980)

25. Sometimes I am given work to do which conflicts with other work I have to do (V94).¹

26. My co-workers and manager sometimes ask me to do things which conflict (V95).¹
Role Conflict (continued)

27. Sometimes different people ask me conflicting things to do (V96).\(^1\)

Job-related Tension (House and Rizzo 1972)

28. I work under a great deal of tension (V111).\(^2\)

29. I have felt fidgety or nervous as a result of my job (V112).\(^1\)

30. Problems associated with my job have kept me awake at night (V113).\(^1\)

General Job Satisfaction (Hackman and Oldham 1980)

31. Generally speaking, I am very satisfied with this job (V38).\(^1\)

32. I frequently think of quitting this job (V44, R).\(^2\)

33. I am generally satisfied with the kind of work I do on this job (V48).\(^1\)

34. Most people on this job are very satisfied with the job (V52).\(^1\)

35. People on this job often think of quitting (V61, R).\(^1\)

Career Commitment (Blau 1988)

36. I would go into a different profession if it paid the same (V64, R).\(^1\)

37. If I could do it all over, I would not choose this profession (V65, R).\(^1\)

38. I feel disappointed that I ever entered this profession (V66, R).\(^1\)

Organization Commitment (Blau 1988)

39. I find that my personal values are similar to the organization's values (V70).\(^1\)

40. I am proud to tell others that I am part of this organization (V71).\(^1\)

41. This organization inspires one's best job performance (V72).\(^1\)
Job Involvement (Blau 1988)

42. I live, eat, and breathe this job (V67).\textsuperscript{1}

43. Most of my interests are centered around this job (V68).\textsuperscript{1}

44. I consider this job to be central to my existence (V69).\textsuperscript{1}

Turnover Intent (Landau and Hammer 1986)

45. As soon as I can find a better job, I’ll leave (V159).\textsuperscript{1}

46. I am seriously thinking about quitting my job (V160).\textsuperscript{1}

47. I am actively looking for a job outside (V161).\textsuperscript{1}

Scales

1) Strongly
   Disagree
   1----2----3----4----5----6----7 Strongly Agree
   Neutral

2) Never
   1----2----3----4----5----6----7 Always Sometimes

3) A Minimum
   Amount
   1----2----3----4----5 A Maximum Amount
   A Moderate
   Amount

4) Very
   Little
   1----2----3----4----5 Very A Moderate Much
   Amount

   Note. These items are cross-referenced with the questionnaire.
Table 16. Covariance Matrix for the Initial Structural Model Involving Mediating Variables Predicted by Antecedent Variables.

COVARIANCE MATRIX OF LATENT VARIABLES

<table>
<thead>
<tr>
<th></th>
<th>AMBIO</th>
<th>CONFLICT</th>
<th>TENSION</th>
<th>JOBSAT</th>
<th>LOCUS</th>
<th>AUTONOMY</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMBIO</td>
<td>1.00</td>
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</tr>
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<tr>
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<td>0.74</td>
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<td>-0.42</td>
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COVARIANCE MATRIX OF LATENT VARIABLES

<table>
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<tr>
<th></th>
<th>WMETHOD</th>
<th>SCHEDULE</th>
<th>CRITERIA</th>
<th>COWORK</th>
<th>OVERLOAD</th>
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<tbody>
<tr>
<td>WMETHOD</td>
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Table 17. Covariance Matrix for the Modified Structural Model Involving Mediating Variables Predicted by Antecedent Variables.

### COVARIANCE MATRIX OF LATENT VARIABLES

<table>
<thead>
<tr>
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<th>CONFLICT</th>
<th>TENSION</th>
<th>JOBSAT</th>
<th>LOCUS</th>
<th>AUTONOMY</th>
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<td>-0.37</td>
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### COVARIANCE MATRIX OF LATENT VARIABLES

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<th>CRITERIA</th>
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<th>OVERLOAD</th>
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Table 18. Covariance Matrix for the Initial Structural Model Involving Outcome Variables Predicted by Antecedent and Mediating Variables.

**COVARIANCE MATRIX OF LATENT VARIABLES**

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<th>JOBINV</th>
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<td></td>
<td></td>
</tr>
<tr>
<td>ORGAN</td>
<td>0.11</td>
<td>0.43</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JOBINV</td>
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<td>0.00</td>
<td>1.50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TURNOVER</td>
<td>-0.21</td>
<td>-0.42</td>
<td>0.02</td>
<td>1.20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOCUS</td>
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<td>-0.19</td>
<td>-0.01</td>
<td>0.33</td>
<td>1.03</td>
<td></td>
</tr>
<tr>
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<td>0.04</td>
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<td>-0.28</td>
<td>0.40</td>
</tr>
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<td>0.27</td>
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<tr>
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<td>-0.29</td>
</tr>
<tr>
<td>CONFLICT</td>
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<td>-0.09</td>
<td>0.11</td>
<td>0.20</td>
<td>0.13</td>
<td>-0.09</td>
</tr>
<tr>
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<td>-0.27</td>
<td>0.03</td>
<td>0.51</td>
<td>0.24</td>
<td>-0.18</td>
</tr>
<tr>
<td>JOBSAT</td>
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<td>0.39</td>
<td>-0.01</td>
<td>-0.75</td>
<td>-0.29</td>
<td>0.25</td>
</tr>
</tbody>
</table>

**COVARIANCE MATRIX OF LATENT VARIABLES**

<table>
<thead>
<tr>
<th></th>
<th>COWORK</th>
<th>AMBIO</th>
<th>CONFLICT</th>
<th>TENSION</th>
<th>JOBSAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>COWORK</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMBIO</td>
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<td>-0.22</td>
<td>0.22</td>
<td>1.11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TENSION</td>
<td>-0.46</td>
<td>0.42</td>
<td>0.34</td>
<td>1.12</td>
<td></td>
</tr>
<tr>
<td>JOBSAT</td>
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<td>-0.54</td>
<td>-0.14</td>
<td>-0.46</td>
<td>0.70</td>
</tr>
</tbody>
</table>
Table 19. Covariance Matrix for the Modified Structural Model Involving Outcome Variables Predicted by Antecedent and Mediating Variables.

**COVARIANCE MATRIX OF LATENT VARIABLES**

<table>
<thead>
<tr>
<th></th>
<th>CAREER</th>
<th>ORGAN</th>
<th>JOBINV</th>
<th>TURNOVER</th>
<th>LOCUS</th>
<th>AUTONOMY</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAREER</td>
<td>1.56</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ORGAN</td>
<td>0.46</td>
<td>0.55</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JOBINV</td>
<td>0.46</td>
<td>0.21</td>
<td>1.68</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TURNOVER</td>
<td>-0.97</td>
<td>-0.68</td>
<td>-0.25</td>
<td>1.91</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOCUS</td>
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<td>-0.28</td>
<td>-0.10</td>
<td>0.52</td>
<td>1.08</td>
<td></td>
</tr>
<tr>
<td>AUTONOMY</td>
<td>0.26</td>
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<td>0.07</td>
<td>-0.38</td>
<td>-0.28</td>
<td>0.43</td>
</tr>
<tr>
<td>COWORK</td>
<td>0.46</td>
<td>0.30</td>
<td>0.11</td>
<td>-0.65</td>
<td>-0.30</td>
<td>0.27</td>
</tr>
<tr>
<td>AMBIQ</td>
<td>-0.50</td>
<td>-0.35</td>
<td>-0.13</td>
<td>0.75</td>
<td>0.36</td>
<td>-0.27</td>
</tr>
<tr>
<td>CONFLICT</td>
<td>-0.19</td>
<td>-0.10</td>
<td>-0.04</td>
<td>0.21</td>
<td>0.13</td>
<td>-0.09</td>
</tr>
<tr>
<td>TENSION</td>
<td>-0.56</td>
<td>-0.28</td>
<td>-0.10</td>
<td>0.61</td>
<td>0.20</td>
<td>-0.19</td>
</tr>
<tr>
<td>JOBSAT</td>
<td>0.81</td>
<td>0.56</td>
<td>0.21</td>
<td>-1.24</td>
<td>-0.26</td>
<td>0.29</td>
</tr>
</tbody>
</table>

**COVARIANCE MATRIX OF LATENT VARIABLES**

<table>
<thead>
<tr>
<th></th>
<th>COWORK</th>
<th>AMBIQ</th>
<th>CONFLICT</th>
<th>TENSION</th>
<th>JOBSAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>COWORK</td>
<td>0.89</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMBIQ</td>
<td>-0.52</td>
<td>0.98</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONFLICT</td>
<td>-0.22</td>
<td>0.19</td>
<td>1.12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TENSION</td>
<td>-0.46</td>
<td>0.36</td>
<td>0.33</td>
<td>1.13</td>
<td></td>
</tr>
<tr>
<td>JOBSAT</td>
<td>0.53</td>
<td>-0.61</td>
<td>-0.17</td>
<td>-0.51</td>
<td>1.07</td>
</tr>
</tbody>
</table>
INITIAL MODEL

HYPOTHETICAL MODEL OF PROFESSIONAL WORK TEAMS—ANTECEDENT TO MEDIATING

OBSERVED VARIABLES: V1 - V47
RAW DATA FROM FILE C: \ BRYERLEI \ RAW.DAT
SAMPLE SIZE = 535

LATENT VARIABLES: LOCUS AUTONOMY WMETHOD SCHEDULE CRITERIA COWORK OVERLOAD AMBIQ CONFLICT TENSION JOBSAT

RELATIONSHIPS:
V1 - V3 = LOCUS
V4 - V6 = AUTONOMY
V7 - V9 = WMETHOD
V10 - V12 = SCHEDULE
V13 - V15 = CRITERIA
V16 - V18 = COWORK
V19 - V21 = OVERLOAD
V22 - V24 = AMBIQ
V25 - V27 = CONFLICT
V28 - V30 = TENSION
V31 - V35 = JOBSAT

AMBIQ = LOCUS AUTONOMY WMETHOD SCHEDULE CRITERIA COWORK OVERLOAD
CONFLICT = LOCUS AUTONOMY COWORK OVERLOAD
TENSION = AUTONOMY COWORK OVERLOAD
JOBSAT = AUTONOMY COWORK OVERLOAD

METHOD: GENERALIZED LEAST-SQUARES
PATH DIAGRAM

END OF PROBLEM
MODIFIED MODEL

HYPOTHETICAL MODEL OF PROFESSIONAL WORK TEAMS - ANTECEDENT TO MEDIATING

OBSERVED VARIABLES: V1 - V47
RAW DATA FROM FILE C:\BEYERLEI\RAW.DAT
SAMPLE SIZE = 535
LATENT VARIABLES: LOCUS AUTONOMY WMETHOD SCHEDULE CRITERIA COWORK OVERLOAD

RELATIONSHIPS:
- AMBIQ = LOCUS COWORK
- CONFLICT = OVERLOAD
- TENSION = COWORK OVERLOAD
- JOBSAT = COWORK OVERLOAD

LET THE ERRORS BETWEEN JOBSAT AND AMBIQ CORRELATE
METHOD: GENERALIZED LEAST-SQUARES
PATH DIAGRAM
END OF PROBLEM
INITIAL MODEL

HYPOTHETICAL MODEL OF PROFESSIONAL WORK TEAMS - MEDIATING TO OUTCOME

OBSERVED VARIABLES: V1 - V47
RAW DATA FROM FILE C:\BEYERLEI\RAW.DAT
SAMPLE SIZE = 535
LATENT VARIABLES: LOCUS AUTONOMY COWORK AMBIQ CONFLICT TENSION JOBSAT
CAREER ORGAN JOBINV TURNOVER

RELATIONSHIPS:

\[
\begin{align*}
V1 & = 1*LOCUS \\
V2-V3 & = LOCUS \\
V4 & = 1*AUTONOMY \\
V5-V6 & = AUTONOMY \\
V16 & = 1*COWORK \\
V17-V18 & = COWORK \\
V22 & = 1*AMBIQ \\
V23-V24 & = AMBIQ \\
V25 & = 1*CONFLICT \\
V26-V27 & = CONFLICT \\
V28 & = 1*TENSION \\
V29-V30 & = TENSION \\
V31 & = 1*JOBSAT \\
V32-V35 & = JOBSAT \\
V36 & = 1*CAREER \\
V37-V38 & = CAREER \\
V39 & = 1*ORGAN \\
V40-V41 & = ORGAN \\
V42 & = 1*JOBINV \\
V43-V44 & = JOBINV \\
V45 & = 1*TURNOVER \\
V46-V47 & = TURNOVER \\
CAREER & = LOCUS TENSION \\
ORGAN & = AMBIQ AUTONOMY CONFLICT JOBSAT COWORK \\
TURNOVER & = AUTONOMY AMBIQ CONFLICT JOBSAT \\
JOBINV & = AUTONOMY AMBIQ CONFLICT \\
METHOD: GENERALIZED LEAST-SQUARES \\
PATH DIAGRAM \\
END OF PROBLEM
MODIFIED MODEL

HYPOTHETICAL MODEL OF PROFESSIONAL WORK TEAMS - MEDIATING TO OUTCOME

OBSERVED VARIABLES: V1 - V47
RAW DATA FROM FILE C:BeyerleiRAW.DAT
SAMPLE SIZE = 535
LATENT VARIABLES: LOCUS AUTONOMY COWORK AMBIQ CONFLICT TENSION
JOBSAT

RELATIONSHIPS:

\[
\begin{align*}
V_1 &= 1 \cdot \text{LOCUS} \\
V_2 - V_3 &= \text{LOCUS} \\
V_4 &= 1 \cdot \text{AUTONOMY} \\
V_5 - V_6 &= \text{AUTONOMY} \\
V_{16} &= 1 \cdot \text{COWORK} \\
V_{17} - V_{18} &= \text{COWORK} \\
V_{22} &= 1 \cdot \text{AMBIQ} \\
V_{23} - V_{24} &= \text{AMBIQ} \\
V_{25} &= 1 \cdot \text{CONFLICT} \\
V_{26} - V_{27} &= \text{CONFLICT} \\
V_{28} &= 1 \cdot \text{TENSION} \\
V_{29} - V_{30} &= \text{TENSION} \\
V_{31} &= 1 \cdot \text{JOBSAT} \\
V_{32} - V_{35} &= \text{JOBSAT} \\
V_{36} &= 1 \cdot \text{CAREER} \\
V_{37} - V_{38} &= \text{CAREER} \\
V_{39} &= 1 \cdot \text{ORGAN} \\
V_{40} - V_{41} &= \text{ORGAN} \\
V_{42} &= 1 \cdot \text{JOBINV} \\
V_{43} - V_{44} &= \text{JOBINV} \\
V_{45} &= 1 \cdot \text{TURNOVER} \\
V_{46} - V_{47} &= \text{TURNOVER} \\
\text{CAREER} &= \text{LOCUS TENSION JOBSAT JOBINV} \\
\text{ORGAN} &= \text{LOCUS JOBSAT} \\
\text{TURNOVER} &= \text{JOBSAT LOCUS} \\
\text{JOBINV} &= \text{ORGAN} \\
\end{align*}
\]

METHOD: GENERALIZED LEAST-SQUARES
PATH DIAGRAM
END OF PROBLEM
HYPOTHETICAL MODEL OF PROFESSIONAL WORK TEAMS - RECIPROCAL PATHS
OBSERVED VARIABLES: V1 - V47
RAW DATA FROM FILE C:\BEYERLEI\RAW.DAT
SAMPLE SIZE = 535
LATENT VARIABLES: LOCUS COWORK OVERLOAD JOBSAT TURNOVER
RELATIONSHIPS:
  V1-V3 = LOCUS
  V16-V18 = COWORK
  V19-V21 = OVERLOAD
  V31-V35 = JOBSAT
  V45-V47 = TURNOVER
  JOBSAT = COWORK OVERLOAD TURNOVER
  TURNOVER = LOCUS JOBSAT
METHOD: GENERALIZED LEAST-SQUARES
PATH DIAGRAM
END OF PROBLEM
Dear

Part of the mission of the Center for the Study of Work Teams is the commitment to the use of state of the art research methods for increasing the knowledge available to industry about work teams. During the Fall, 1992, the Center is initiating a major study of technical professionals in teams focusing on engineers, programmers and other exempt employees with advanced educational and/or technical training. To date, there is little published research that describes how such teams of technical professionals function, how they should be structured, what performance improvements occur, and so forth. A few general practitioner papers exist, for example, the recent Fortune article on engineers (September 21, 1992), but these types of articles provide few answers to the key questions facing technical professionals in organizations transitioning to self-managed work teams.

Teams are being implemented in most production and support areas with increasing degrees of self-management as part of the continuing emphasis in companies on quality, adaptability, responsiveness to customer needs, reduced costs, and the streamlining of the managerial ranks. Although there is a common stereotype about engineers and programmers as not "people-oriented" enough to work well in teams, technical professionals are actually leading the effort to implement teams in several plants we have visited. Such leadership initiatives suggest to us the potential for some type of team structure among engineers, programmers and other technical professionals.

The research project we are initiating will involve a survey of technical professionals in organizations involved in the transition to work teams. The survey will be developed from the results of field interviews and/or focus groups. Our goal is to make this a longitudinal project (i.e., annual surveys) in order to track the development of technical professionals in teams over the next several years. The first year's work is partially supported by a grant from the Association for Quality and Participation. Organizations involved in the study will receive an annual feedback report with a statistical summary of their own participants responses as well as those of the entire sample. Based on these results, we also expect to be able to provide participating companies with some rudimentary answers to key questions as well as guidelines for implementing work teams with technical personnel.
Page 2
September 18, 1992

Our goal is to distribute the first set of surveys by January, 1993. If you are interested in participating we would be pleased to discuss the details with you at the 3rd International Conference on Self-Managed Work Teams (September 30-October 2 at the Sheraton Park Central in Dallas), or by phone. We welcome your interest and look forward to talking with you.

Sincerely,

Michael M. Beyerlein, Director
Susan Tull Beyerlein, Project Manager
Dear

Enclosed is a copy of the questionnaire the research team at the Center for the Study of Work Teams has constructed to study technical professionals in teams, as well as a list of the companies that have indicated an interest in participating in the study. This is a carefully crafted instrument designed for professional technical employees involved in the transition to teams including engineers, programmers and systems designers, as well as marketing, finance and human resources professionals, and research scientists.

The questionnaire is designed to measure variables of interest at the individual, team, and organizational levels of analysis. It includes individual, team, and organizational demographic items, and around 60 constructs of interest derived from 25 field interviews which were conducted this past Spring with engineering managers in several facilities in the Dallas/Fort Worth area. The actual construction of the questionnaire involved the examination of over 450 tests and took approximately 150 hours. Scale reliabilities from two pilot studies were used to make the final scale selections.

As you are well aware, large scale redesign to teams is a complex and dynamic process facing many organizations these days. Tools are needed to assess and reveal a myriad of complex relationships at three interacting levels which can hinder or facilitate the change, i.e., individual perceptions and attitudes, team maturity, and organizational environment and support. Results from the use of such a diagnostic tool will enable you to obtain baseline data for benchmarking, gain an overview of the company along multiple dimensions which are critical to team success, as well as assess and locate problem areas which need your attention. In turn, your company’s participation will allow us to test, modify and construct a theoretical perspective of the teaming process which will have practical value to managers because it is anchored in "real world" work processes.
I would like to discuss the project with you so that I may answer any questions you might have, as well as incorporate your suggestions in order to maximize its relevance. There will be no cost to you for participation in the project except we may ask that you do your own in-house copying of the instrument for distribution depending on the size of your organization. We, in turn, will provide you with an overall report documenting the findings from all the participating companies, as well as a report of your own company's results. Special arrangements can be made for additional subgroup reports, feedback presentations etc. by agreeing to cover our expenses for these activities. In exchange, the Center will retain the data and full publication rights. Be assured that in keeping with the rules of scientific reporting, all data will be reported in aggregate form, and neither specific individuals nor companies will be referred to by name.

I would appreciate hearing from you as soon as possible. We are committed to having the data collection phase of the project completed by January 31, 1993. Thank you for your interest.

Sincerely,

Michael M. Beyerlein, Ph.D. Director

Enclosures
January 28, 1993

Dear

Enclosed is a copy of the interview report from a series of interviews we conducted during the spring, 1992. Your participation at that time was crucial to Phase I of our research study on technical professionals in teams. We interviewed 25 technical professional employees at three high tech manufacturing facilities in the metro area. We then transcribed our notes and analyzed them for salient themes.

We have placed this material in 20 categories of interest. All company and individual identifying information has been omitted in keeping with our professional responsibility of participant confidentiality. Also included for your information is a list of the original interview questions, although the material in the report is synthesized by theme rather than by question.

We have utilized these results to produce a questionnaire which we are using to collect data for Phase II of the project. We are currently looking for sites to administer the survey and would be happy to send you a copy for your review if you would be interested in having your unit participate. Please call the Center at the above number if you would like to participate in Phase II.

Thank you very much for taking the time to meet with us. Your efforts are sincerely appreciated.

Sincerely,

Michael M. Beyerlein, Ph.D.
Director
Dear

Enclosed you will find one copy of the overall feedback report our research team has prepared that presents the results of the 1993 Survey of Technical Professionals in Teams. The Summary Report outlines the results of 14 participating companies, 10 of which are on the 1993 Fortune 500 list. This year's project (1993) has been supported by the Center for the Study of Work Teams and a grant from the Association for Quality and Participation.

We did not prepare a separate report for your facility as we require a minimum of eight surveys in order to protect respondent anonymity. We received a total of seven questionnaires from your group encompassing all three of the shortened versions. It was impossible for us to analyze these separately given the small numbers per version (2, 2, and 3). If you find the overall results useful you might consider participating next year on a larger scale so that we can provide you with feedback specific to your facility.

The overall report contains a brief executive summary of the results, several sections on how to read and use the report, spreadsheet results summarizing the responses of the 542 participating employees on each questionnaire item and scale, and a summary of the answers to the six write-in questions. Feel free to copy the report and share the information with your team members and other interested employees. If you would like extra copies mailed to you, they are $20 each, on invoice, to cover our printing and mailing costs. The enclosed copy is provided to you free of charge.

If you have any questions about the reports, the results, or related issues, we would be glad to discuss them with you. We appreciate your participation in this study. We believe there is a mutual advantage in collaborating on such a project, so we hope you find the reported information useful. We plan to repeat the study in January and February, 1994, so if you are interested in participating at that time we would be happy to discuss it with you.
June 27, 1993
Page 2

We are tentatively planning to hold a half-day feedback workshop sometime this summer to review the complete 14 company report and to provide an opportunity for the participating companies’ representatives to talk with each other about the salient issues. We will keep you informed about the scheduling of the workshop. Thanks again for your participation.

Sincerely,

Michael Beyerlein, PhD
Center Director

Enclosures
June 28, 1993

Dear

S. R. from our office spoke with you on 6/24/93 regarding a programming error in the survey report you received recently ("1993 Survey of Technical Professionals in Teams"). Enclosed are two copies of the corrected page for the Growth Need Strength scale. A programming error in scoring for the GNS scale resulted in a three point reduction in the scale average. The GNS scale on the accompanying pages can be taped over the existing scale on page 16 of the two copies of the report you currently have in hand. The Team Responsibility scale (page 22) was reported correctly after all, and the other 64 scales were not affected.

Also enclosed are two copies of the Executive Summary which include a revised interpretation of the GNS score. These pages can also be inserted in your current copies. We will be mailing you two revised copies of the report by the first week of July.

We apologize for the error and any inconvenience this may have caused you.

Sincerely,

Michael Beyerlein, Ph.D.
Center Director

Enclosures
July 5, 1993

Dear

Recently our research team at the Center for the Study of Work Teams completed a survey of technical professional employees in teams. This letter invites you to meet with us to review the survey results. As you may know, 542 employees from 117 teams in 14 companies participated. Their specialties included engineering, information systems, planning, purchasing, etc.

We generated reports of individual companies' results and a summary report of questionnaire responses for all 542 survey participants on the 66 scales. Those reports have been disseminated to participating groups, and copies are available for purchase from the Center by nonparticipating groups at $20 per copy, on invoice, to cover our printing and mailing costs. We are just beginning the theory based research analysis of the data which will take several months.

In order to assist participating companies with interpretation of the survey results and provide an opportunity for nonparticipating groups to share in the findings, our research team will hold a half day workshop from 1:00 to 5:00 p.m. on July 27 at the University of North Texas in Denton. The workshop will include review of the report contents, a review of preliminary research results, an opportunity for you to talk with other people working on implementation of technical professional teams, and possibly a panel presentation by team members or managers.

Everyone who plans to attend the workshop must register. Companies that participated in the study will have two slots reserved at the workshop without charge, and may send additional personnel for a fee of $35 per person which covers the cost of a copy of the summary report and refreshments. Nonparticipating companies may also send representatives at the same cost. Representatives of participating companies who received copies of the summary report should
bring their copies with them or be prepared to pay $20 for an additional copy. Parking information, location, etc. will be sent after registration is completed. In order to register, please contact Shirley White at (817) 565-3628; inform her that you are registering for the Team Survey Workshop. If you would like to know more about the survey or the workshop call me at the Center (817) 565-3689 or at my office (817) 565-2653.

Sincerely,

Michael Beyerlein, PhD
Center Director
August 5, 1993

Dear

Enclosed is a list of the workshop participants from the 1993 Survey of Technical Professionals in Teams workshop held July 27, 1993 at the University of North Texas. Also enclosed are three pages that list the flip chart contents produced by the workshop participants during the exercise on barriers to effective implementation of knowledge teams.

Thank you for participating. I look forward to future opportunities to explore these issues with you.

Sincerely,

Michael M. Beyerlein, Ph.D.
Center Director
Dear

Enclosed are two copies of the spreadsheet for the company unit with the bar chart revised per your recent conversation with S. R. The percentages on the right hand of the spreadsheet have been converted to numerals, summed for each scale, and then entered into the bar charts. In contrast, the spreadsheets in your bound versions of the report include bar charts which map the distributions of the scale means.

For example, in the enclosed version, the numeric sums of the percentages for the Responsibility scale (p. A1) which were entered into the bar chart are as follows:

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Moderately Disagree</th>
<th>Slightly Disagree</th>
<th>Neutral</th>
<th>Slightly Agree</th>
<th>Moderately Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>12</td>
<td>23</td>
<td>14</td>
</tr>
</tbody>
</table>

The scale mean remains the same, as do the percentages on the right hand side.

I hope this information will assist in your interpretation of the results for the company unit. We did not provide this information initially because of limitations in the statistical package, and thus the enormity of calculating these values by hand.

It was a pleasure to meet you and Ms. _____________ at the feedback workshop on July 27th. Please contact us if we can be of further assistance.

Sincerely,

Susan Beyerlein, M.S.
Project Manager
REFERENCES


