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Work Design: Learning from the Past and Mapping a New Terrain

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In this article, we review the practice and theory of work design with the aim of learning from the past and looking to the future. Starting from the Industrial Revolution and job simplification, we outline major practical and theoretical developments in work design. We describe established theories, including Hackman and Oldham's Job Characteristics Model (1976) and the socio-technical systems approach, as well as complementary theoretical perspectives. We suggest that work design theory can be usefully expanded via the inclusion of work design antecedents, a broader set of work characteristics and outcomes, consideration of mechanisms and contingencies, and attention to work design processes. We also propose key implications for work design research in the light of the changing workplace. These include: the recurrent issue of job simplification; the continued importance of uncertainty as an antecedent and contingency variable; interdependence, team working and social complexity as increasingly important work features; a greater emphasis on cognitive demands and knowledge aspects at work; and the effect of demographic and contractual changes on work design.

Consider a company that is in the process of planning to introduce teamwork. Those responsible ask themselves the following questions: Will the advantages of teamwork outweigh the costs? How self-managing should the team be? If the team is self-managing, who will take responsibility in an emergency? How should the team be led? Similarly, if the company were considering setting up individual jobs, the questions might include: What range of tasks should be combined to make up a job? What kind of feedback should be provided? and, How much discretion should the job incumbent have in deciding how to work?

All these questions concern work design. They are important because the decisions made can affect the performance of employees, as well as their stress, motivation, commitment, and even their learning and development. Thus work design is concerned with choices made about the nature or content of people's jobs, and how these choices affect individual and organizational outcomes such as employee well-being and productivity. In some respects, of course, work design choices can be constrained. They are affected by the nature of the product or service in question, the supporting technology, and other organizational aspects such as culture and supervisory style. Yet none of these is deterministic or immutable, all leave considerable latitude, especially with regard to the range of tasks undertaken by individuals or groups and the amount of discretion they have in carrying them out. This is the domain of work design.

Our aim in this chapter is to provide an overview of the practice and theory of work design, to learn from the past and look to the future.
EARLY WORK DESIGN: JOB SIMPLIFICATION

Historically, the dominant approach to work design has been that of job simplification. This can be traced back to views that emerged in Great Britain during the Industrial Revolution from 1760 to around the mid-1830s. As people came together to work in factories, the question arose of how to organize their activities. Adam Smith (1776) offered an answer. He advocated breaking down complex jobs into simpler and narrower ones, arguing that this would lead to employees becoming more dexterous, and time being saved through their not having to move to different tasks. Charles Babbage (1835) added to these ideas, and pointed out that an additional advantage of job simplification is that it requires less skilled, and therefore cheaper, labor.

At the turn of the twentieth century, the idea of job simplification was given much momentum through the contributions of two key individuals -- Frederick Taylor and Henry Ford. Taylor (1911) developed a work design method called 'Scientific Management', which involved identifying the most efficient ways of carrying out particular tasks (e.g., eliminating all false, slow or unnecessary movements), and reconstituting the job on the basis of those 'best ways'. Thus, while the emphasis of Smith and Babbage was on the horizontal division of labor, on breaking work down into narrower sets of tasks, Taylor was also concerned with the vertical division of labor, of removing from employees the discretion they had under how to carry out the tasks. This was to be determined 'scientifically' and enforced by management.

Henry Ford's contribution was to take this approach further through the development of the moving assembly line, which he introduced in 1914 at his automobile factory in Michigan in the United States. Having broken up a complex task into a set of simpler ones, it was a logical development to use the technology of the day (e.g., transporters, conveyors) to move the work between stages and so eliminate 'unproductive' time spent in carrying. The outcome was simplified jobs that were paced by the speed of the resultant assembly line.

Job simplification and assembly line work spread to other companies in the United States, both in the automobile industry and outside, and crossed the Atlantic to Europe. Davis, Canter and Hoffman (1955) illustrated the pervasiveness of the practice in a survey of personnel responsible for designing jobs in US companies. Asked about the importance of a range of different work design criteria, respondents rated the single most important factor as 'minimizing the time required to perform operations', closely followed by 'minimizing skill requirements'. Later studies showed the continuing dominance of job simplification ideas within manufacturing (Braverman, 1974; Taylor, 1979), as well as their extension into administrative domains. Even today, despite much rhetoric about empowerment, the thinking behind scientific management is still firmly embedded in the structure and culture of many organizations. Indeed it may even be the 'natural' response, as suggested by Campion and Stevens' (1991) study showing that naive participants (college students) in work design simulations intuitively opt for job simplification.

DESIGNING WORK: ESTABLISHED THEORY AND PRACTICE

Early Research and Practice

At the time that job simplification was taking hold in industry, studies began to emerge supporting intuitive views about its psychological costs. Over nearly three decades, investigations in the UK of such jobs as bicycle chain assembly showed that simplified work was dissatisfying and not necessarily more productive (e.g., Wyatt & Ogden, 1924), and could even damage mental health (Fraser, 1947). Research conducted in the US resulted in similar conclusions (e.g., Walker & Guest, 1952).

The main recommendations for job 'redesign' to which the above research gave rise were for job rotation and horizontal job enlargement. Job rotation involves employees moving at regular intervals between (simplified) jobs. The jobs remain unchanged, but people are not tied to one narrow set of tasks. This form of job redesign can reduce employees' boredom, provide physical relief from repetitive movements, and enhance workforce flexibility. In contrast, horizontal job enlargement involves expanding the range of activities in a given job. For example, an office employees' job might be changed from carrying out only filing for many clients to carrying out all key clerical tasks (filing, mail, typing, etc.) for fewer clients.

Another example of job enlargement is to expand the content of machine operators' jobs so that they not only load and unload their equipment, but also set up their machines and inspect the quality of their work. Walker (1950) evaluated just such an initiative within an American IBM plant, and found that the redesign resulted in positive outcomes such as improved quality and much reduced set-up and inspection times. Many similar programs and outcomes were reported around this time in different national contexts (e.g., Thornley & Valentine, 1968). On the whole, job enlargement was shown to have positive, albeit not especially marked, effects for employees and organizations (Davis & Canter, 1956). A limitation, however, is that although the approach expands the range of tasks it does little to put the 'thinking' back into 'doing' the job.
Major Theoretical and Practical Developments: 1950s to 1980s

Herzberg’s Two-Factor Theory and Job Enrichment

It was not until the mid-twentieth century that theories of work design began to be formulated. An early influential example is the Two-Factor (or Motivation-Hygiene) Theory (Herzberg, 1966; Herzberg, Mausner & Snyderman, 1959). Herzberg and colleagues used a critical incidents technique to obtain evidence on people’s causal attributions for times when they had been particularly satisfied and dissatisfied at work. It was found that the reasons for satisfaction were typically intrinsic to the work itself (e.g., opportunity for achievement), whereas those associated with dissatisfaction were extrinsic (e.g., company policy). This led to the idea that the determinants of satisfaction (motivator factors) differed from those that determined dissatisfaction (hygiene factors).

The simplicity of this idea made it amenable to application. From it emerged the notion of job enrichment, described by Paul and Robertson (1970: 17) as ‘building into peoples’ jobs, quite specifically, greater scope for personal achievement, recognition (and) more challenging and responsible work’. In other words, to obtain positive effects it was necessary to capitalize on intrinsic rather than extrinsic factors. In contrast to job rotation or horizontal job enlargement, job enrichment entails enhancing the discretion people exercise in carrying out their work, thus reversing the vertical division of labor that Taylor sought to achieve. For example, an enriched job could involve an employee making their own decisions about the methods and timing of their task, rather than a supervisor making these decisions. It is in putting this vertical dimension back on the agenda that the significance of Herzberg’s work lies.

Paradoxically, the Two Factor Theory and the practice of job enrichment to which it gave rise, have fared very differently. The theory lost credibility as subsequent studies using different methods failed to replicate the original results (Wall & Stephenson, 1970). The idea of job enrichment, however, has survived, and is central to contemporary notions such as that of empowerment.

The Job Characteristics Model

A theory that has better stood the test of time, and also promoted job enrichment, is Hackman and Oldham’s (1976, 1980) Job Characteristics Model. Drawing on earlier work (Turner & Lawrence, 1965; Hackman & Lawler, 1971), these authors identified five core job characteristics: skill variety (requiring different skills; SV), task identity (completing a whole piece of work; TI), task significance (having an impact on other people; TS), autonomy (having choice and discretion; A), and feedback (obtaining feedback about performance from the job; F).

These job characteristics were posited to result in three critical psychological states: the first three leading to experienced meaningfulness of the work; autonomy promoting experienced responsibility; and feedback determining knowledge of results of work activities. The critical psychological states in turn were suggested collectively to promote work satisfaction, internal work motivation, work performance, and to reduce absence and turnover. Additionally, an individual’s growth need strength (i.e., desire for challenge and personal development) was proposed to moderate the relationships, with stronger effects predicted for individuals with stronger growth needs. Other moderators (knowledge and skill, and satisfaction with the work context) were added in later formulations of the model (Oldham, 1996).

A feature of the model was that the five core job characteristics were combined into a single index of the overall potential of a job to promote work motivation (the motivating potential score [MPS]). This formula \( MPS = (SV + TI + TS) \times A \times F \) weights autonomy and feedback more heavily than the other core job characteristics. The researchers also developed a set of measures for the variables in the model (the Job Diagnostic Survey; Hackman & Oldham, 1975), which contributed to the popularity of the approach.

There is no doubt that the Job Characteristics Model was an important development. Indeed, many of its principles are central to current notions of empowerment (e.g., Spreitzer, 1995) and high involvement management (Lawler, 1992). However, as with the Two-Factor Theory, not all of the model’s predictions have been supported (for reviews see: Fried & Ferris, 1987; Parker & Wall, 1998; Roberts & Glick, 1981). Some of the key problems are that the mediating role of the critical psychological states has not been confirmed; the five job characteristics have not always been shown to be distinctive; a simple additive score has proved to be as strongly related to outcomes as the complex MPS score; if not more so; the assumed positive interrelationships among the outcome variables are not consistent with other research findings (e.g., job satisfaction and performance are only weakly correlated); and the model considers only narrow range of work characteristics and outcomes. We expand on this last criticism later.

Although incorrect in some of its finer points, the core proposition of the model, that the specified job characteristics can be important determinants of the outcomes, has been supported. On the whole, stronger and more consistent effects have been demonstrated for attitudinal outcomes (job satisfaction and internal work motivation) than for behavioral ones (performance, absence) (see Fried & Ferris, 1987;
Kelly, 1992). Growth need strength has also been found to be an important moderating variable.

The Socio-Technical Systems Approach and Autonomous Work Groups

The Two-Factor Theory and the Job Characteristics Model both concern individual work design. The sociotechnical systems (STS) approach, in contrast, reflects a broader organizational perspective with the focus on group work design. The approach originated at the Tavistock Institute of Human Relations in London during the 1950s (Trist & Bamforth, 1951), and is based on a distinction between the social and technical subsystems of organizations, and the proposal that there should be joint optimization and parallel design of the two (also taking account of the fit with the external environment). More specific principles include that methods of working should be minimally specified, and that variances in work processes (e.g., breakdowns) should be handled at source (Cherns, 1976).

Applied to work design, the STS approach gave rise to the idea of autonomous work groups (alternative terms include self-managing or self-directed groups or work teams). It is significant that the recommended work properties for such groups, independently specified, parallel those of the Job Characteristics Model. For example, it was proposed that groups should have a variety of meaningful tasks to complete, and a clear area of decision-making authority. The latter was expected to include members being able to decide among themselves on the work methods to use and to manage most operational problems. Group members were also expected to have responsibility beyond the task itself, such as making collective decisions about training team members and managing group resources. Changes in supervision style, selection, training, payment and information systems often accompany this form of work design.

A notable example of the use of autonomous work groups is that of Volvo in Uddevalla, Sweden, where, breaking away from assembly-line work which dominates car making, teams of around nine employees were responsible for assembling a whole car. Later examples include Levi Strauss, AT & T, and Xerox (Appelbaum & Batt, 1994).

The effects of autonomous work groups on employees and organizational outcomes have been widely investigated (for reviews see: Beekun, 1989; Cummings, Molloy & Glen, 1977; Guzzo, Jette & Katzell, 1985; Pasmore, Francis, Haldeman & Shani, 1982). Many positive outcomes have been documented, such as: reduced costs; decreased absenteeism and turnover; reduced accidents; enhanced organizational commitment; increased perceived opportunities for skill use; improved mental health, and faster customer service. However, only a handful of studies have had comparative or longitudinal research designs. These have generally shown positive effects of autonomous groups on job satisfaction (e.g., Cohen & Ledford, 1994; Cordery, Mueller & Smith, 1991; Goodman, 1979; Wall, Kemp, Jackson & Clegg, 1986). As was the case with job enrichment, however, results are less consistent in relation to the effects of autonomous work groups for other outcomes such as mental health and particularly performance (Goodman, Devadas & Griffith-Hughson, 1988; but see Pasmore, 1988).

As we describe later, we believe clearer findings will be obtained when we better understand the circumstances affecting the viability of such work design initiatives.

Criticisms have been levelled at the STS approach to work design (e.g., Kompier, 1996). Problems include the rather vague recommendations about work characteristics and their expected consequences; an overemphasis on mass production; a tendency to see autonomous work groups as the only solution; and insufficient attention to organizational culture or individual differences. Another criticism is that the STS approach does not deal directly with the political issues surrounding the balancing of human and efficiency criteria (Moldaschl & Weber, 1998). Nevertheless, there is no doubt that the sociotechnical systems approach is one of enduring value, and the practical idea of autonomous work groups has been one of the major contributors to work redesign practice.

BEYOND ESTABLISHED WORK DESIGN THEORY

Despite their differences, the approaches to work design described above have much in common. They are all based on the premise that job characteristics affect individual and organizational outcomes, and they show convergence with regard to the particular characteristics and outcomes of interest. This allows consideration of their common limitations. The most general criticism is that they are narrowly conceived. Perhaps this reflects the context of job simplification against which the approaches were developed. Nonetheless, it is the case that these approaches do not systematically consider the antecedents or context of work design, focus on a limited set of work characteristics and outcomes; assume motivation to be the main or even sole mechanism underlying the relationship between job characteristics and outcomes; do not fully identify individual or organizational factors that might influence the effectiveness or appropriateness of particular work designs; and do not consider the process of work redesign. In this section, we consider ways to constructively extend work design theory to address these limitations (see Parker & Wall, 1998 for a more detailed discussion).
Antecedents

A long-standing criticism of work design research is that it has failed to take account of contextual factors that influence and constrain the choice of work design (Clegg, 1984). Many of these are internal organizational factors, such as managerial or supervisory style (e.g., close, directive supervision implies low autonomy); the nature of technology and tasks (e.g., assembly lines limit the potential for job variety and autonomy; the type of task affects job complexity, Wood, 1986); and organizational strategy, structure, culture, reward systems, and human resource policies (e.g., individual bonus payment systems inhibit group work design; and information systems can negate autonomy, Clegg & Fitter, 1978). Separately or in combination, these factors can help shape and influence work design.

Work design antecedents can also be external to the organization, such as the nature of the environment (e.g., greater uncertainty about type of output required may increase cognitive demands); political and labor institutions (e.g., industry-based demarcation lines can prevent some forms of work design); the availability of new technology; social customs; economic circumstances; and the nature of the labor market (Burns & Stalker, 1961; Frenkel, Korczynski, Shire & Tam, 1999). In the latter case, for example, a lack of skill in the labor market may limit the extent to which enriched work design is feasible. Indeed, it is not a coincidence that job simplification arose at a time when, because factory work was a new departure, relevant skills were by definition scarce.

Finally, as implicit in the discussion of labor markets above, attention might also be paid to individual level antecedents of work design. Virtually no attempt has been made to determine the extent to which work design is influenced by the characteristics of employees. Yet it is reasonable to assume that the degree of autonomy in a job will at least in part reflect the abilities of people to respond to such an opportunity, and that people with more to offer may mould the nature of the work to their own abilities. Research has shown, for example, that more proactive individuals are likely to expand their task domain through a process of role making (e.g., Graen, 1976).

There are, therefore, various organizational, environmental and individual antecedents of work design that vary in their proximity and the nature of their influence. Incorporating these antecedents into work design theory will allow better prediction of the likely work designs found in particular settings, as well as better prediction of the feasibility of alternative forms of work design for these contexts. It also reminds us that there may be ways of changing work design in ways other than by directly manipulating job characteristics, such as by running leadership development programs or introducing flexible technologies.

An Expanded Set of Work Characteristics and Outcomes

A further limitation of the work characteristics approach as developed so far is the narrow range of independent and dependent variables it encompasses. For example, as noted by many (e.g., Oldham, 1996; Wall & Martin, 1987), there are important job features over and above the five identified in the Job Characteristics Model. These relate to physical characteristics, such as work load and physical context; job security; the opportunity for skill acquisition; social aspects, such as social contact, social interaction and social support; various types of demands such as cognitive demand, the costs associated with error, performance monitoring pressures, and home–work conflict; and role features such as role ambiguity, role conflict, role overload. As we shall expand upon later, many of these additional characteristics have become more important because of the changes occurring in the workplace. For example, the opportunity to acquire skills (especially those that are transferable) is likely to become increasingly salient as downsizing and related changes result in employees needing to move from one organization to another more frequently.

Although there has been research demonstrating that the above factors affect well-being and performance at work, they have not been integrated into work design theory. As a consequence we do not know whether such factors add to, interact with or are accounted for by the traditional focus on variables such as autonomy and variety. Extending the range of work characteristics we investigate, and looking at how they relate to existing work design variables, is necessary to more fully understand the effects of modern changes on job content, and to design jobs that promote desired outcomes.

A particular weakness in the current approaches to work design concerns an imbalance in the types of work characteristic measures available. Considerable effort has been devoted to developing measures of individual job properties, but much less to team work properties. Team work is becoming increasingly popular in practice, and there is considerable value in examining group level work characteristics. This means not only covering the work design dimensions of traditional concern at the group level (e.g., team autonomy), but also properties that are a function of groups or teams per se, such as the degree of cohesion among members. This line of development will gain from considering models of group effectiveness (e.g., Campion, Medsker & Higgs, 1993) that focus attention on a broader range of predictors than just the nature of
the tasks, such as the organizational context (e.g., rewards, training) and group diversity.

Interactions between work characteristics have also rarely been considered in traditional job design research. The demand–control model of job stress (Karasek, 1979) has taken the lead in this respect. A high level of demands is proposed to result in only average strain when one also has high autonomy (a so-called active job), but if the high demands co-occur with low autonomy then a high strain job results. Evidence regarding the hypothesized interaction effect is mixed, but the idea remains an appealing one since the implication is that demands can be increased without causing stress so long as autonomy is also increased.

On the other side of the coin, the outcomes of traditional interest are narrowly drawn, and need not be so limited. Whereas job satisfaction, motivation, attendance behavior, and performance will remain central to the agenda, individual or group work characteristics are also likely to affect other outcomes such as safety behavior, industrial relations attitudes, grievances, outside work relationships, leisure activities, and even individual learning and development.

Regarding the latter, research has traditionally focused mostly on how people react to job content in the short term, but a growing body of research suggests work redesign affects people in the longer term. Studies have shown a link between enhanced autonomy and cognitive development (Kohn & Schooler, 1978); the application and development of knowledge (Wall, Jackson & Davids, 1992); the greater use of personal initiatives (Frese, Kring, Soose & Zempel, 1996); the development of more proactive role orientations (Parker, Wall & Jackson, 1997), and increased self-efficacy (Parker, 1998). This evidence suggests that work redesign is not just a motivational technique, as it is often narrowly construed, but is an intervention that promotes learning and growth.

Such a perspective is entirely consistent with Action Theory, a German development (Hacker, Skoll & Straub, 1968) that has recently been made accessible in English (Frese & Zapf, 1994). We cannot do justice to the theory here, but its basic tenet, that work is goal-directed and action-oriented, leads to an emphasis on learning and employee personality development through work redesign.

The above is a long list of additional independent and dependent variables to be considered in future research. We are not arguing that any one study or even theory should attempt to cover them all. Rather, the message is that the time is now ripe to expand the horizons of work design research along the above lines, as well as to take on board the additional issues discussed next.

**Mechanisms**

A weakness of contemporary approaches is their failure to specify the mechanisms through which work design has its effects. It might be argued that the Job Characteristics Model can be excluded from this charge, as it includes critical psychological states as mediators. However, these have not been shown to account for the effects of work characteristics on outcomes as predicted (Fried & Ferris, 1987), and indeed these states have been found to be unnecessary as mediators (Wall, Clegg & Jackson, 1978).

Fundamentally, the assumption underpinning current work design theory is that the mechanism is motivational, at least as far as performance effects are concerned. This is certainly explicit in the Two Factor Theory, though perhaps less so in the Job Characteristics Model (where, oddly, motivation is categorized as a joint outcome with performance). In the sociotechnical systems approach the mechanisms are even less clear.

So why should jobs designed to enhance employee autonomy or self-management enhance performance? Kelly (1992) suggested several possibilities, including some that elaborate on the motivational theme. One was that job redesign might entail improved goal-setting which is known to have motivational properties, or alternatively it may create closer perceived links between effort, performance, and valued rewards. Clearly, a motivational component in the link between work design and outcomes has to be assumed, but there are several other pathways to consider. One mechanism, implicit in the sociotechnical principle that variances should be controlled at source, is that giving employees responsibility for tasks otherwise completed by support staff means that employees can deal with disruptive events as and when those arise. Thus increased responsibility for problem management can enable quicker responses to performance threatening events.

Employee learning and development also potentially explain performance gains as a result of work design initiatives. As we described above, studies have shown that increased autonomy can promote changes in role orientation (e.g., greater internalization of quality concerns), self-efficacy, personal initiative and cognitive development; and these types of changes are highly likely to lead to better performance. Indeed, two studies of work redesign for operators of complex manufacturing technology have shown how performance benefited from the prevention of operational problems that previously had not been resolved. In other words, employees were not working harder, but 'smarter' (Jackson & Wall, 1991; Wall, Jackson & Davids, 1992). Performance gains that occur as a result of work redesign might therefore be due as much to quicker responses and learning as to motivational benefits, or the combination of all three.

Similar questions about mechanisms apply to the relationship between work content and other outcomes such as job strain and safety. Frese (1989;
see also Jackson, 1989) proposed several ways that autonomy might prevent job strain, such as by enabling employees to directly reduce stressful work aspects (for example, having the control to shut a noisy door) or by reducing the negative impact of stressful work aspects (for example, having the autonomy to take rest breaks could reduce the impact of repetitive work). Strain might also be reduced via a learning mechanism, as Karasek and Theorell (1990) proposed in an extension to the demand–control model of strain. They suggested that well-designed jobs promote mastery, which in turn helps people to cope with the strain caused by the job.

The above suggestions are largely speculative, being supported by very limited empirical data. The key point is that the nature of the mechanisms underlying the effects of work design have been mostly neglected by researchers. We know that work design can affect behavior and attitudes at work, but we have little systematic evidence of why. Yet if we ascertain why a given work characteristic or more general work design affects outcomes, it will be easier to judge the circumstances under which a particular form of work design will and will not be effective. The significance of this last point emerges in the following section.

Contingencies

Work design theory has been largely universalistic in nature. Yet it is plausible to assume that alternative forms of work design will be more or less effective under different conditions. In other words, there will be contingencies that affect the appropriateness and outcomes of work design.

At the individual level, the contingency factor that has received the most attention is that of growth need strength. Most research has confirmed that job enrichment is most likely to lead to positive outcomes for individuals high in growth need strength (Spector, 1985). Studies of other individual level moderator variables (e.g., need for achievement, the Protestant Work Ethic), however, have produced less consistent results. In addition, some potentially important individual difference variables like proactivity, self-efficacy, and tolerance of ambiguity have received little attention. A study by Parker and Sprigg (1999), for example, showed that proactive personality moderated the interactive effect of job autonomy and demands on job strain.

Though knowledge of individual differences as contingencies is scant, that for organizational factors has a stronger theoretical base. Cummings and Blumberg (1987) proposed three variables that affect the choice of work design. The first is technical interdependence, or the degree of required cooperation to make a product or service. When there is high technical interdependence, and employees need to interact and share information to get the job done (as in a hockey team), work should be designed at the group level to facilitate the coordination of interrelated tasks. Low technical interdependence, such as in the job of a lighthouse keeper, implies a need for individual job redesign such as enlargement or enrichment because there is little need for cooperation. The implication is that a mismatch between the form of work design and the degree of interdependence will lead to underperformance or employee dissatisfaction (see Sprigg et al., 2000, for an example study).

The second factor is technical uncertainty, or the amount of information processing and decision-making required when executing the task. Software developers using computer tools that are frequently being updated, for example, experience such uncertainty in that they have to keep changing how they complete the work. In these situations, decision-making should be devolved to the employees because it is not possible to specify rules or procedures for all the uncertainties that arise; neither is it possible for a supervisor or manager to make all, or the best, decisions. Control can be achieved by setting and monitoring goals, and by establishing norms of appropriate behavior, whilst allowing considerable discretion over how these are achieved (Ouchi, 1977). In contrast, when there is low technical uncertainty, such as when an employee is producing a highly standardized product on a very reliable machine, control can be achieved through rules and procedures or direct supervisory control (Clegg, 1984).

Cummings and Blumberg (1987) made similar arguments in relation to environmental uncertainty, that is variability from external sources such as change in customer requirements or market demand. To the extent that this affects requirements for employees (e.g., to deliver services to different specifications), the implication is that more autonomous work designs are best. This argument reflects the tenets of more general organizational theory, which proposes that ‘mechanistic’ structures involving routinized tasks and centralized decision-making are appropriate for stable and predictable conditions, and that ‘organic’ structures with decentralized decision-making are best for more uncertain and complex environments (e.g., Burns & Stalker, 1961).

Both technical and environmental uncertainty can be manifest at the job level in equivalent ways, so for work design purposes they can sensibly be considered as together as operational uncertainty. The implication for work design is that more autonomous forms will be most appropriate where there is high operational uncertainty, whereas more simplified forms of work design will be effective where operational uncertainty is low. Empirical support for this proposition comes from a study by Wall, Corbett, Martin, Clegg and Jackson (1990), who compared the effect of enhanced operator control
over complex technology characterized by different levels of operational uncertainty. For machines with low uncertainty, no performance benefits were recorded. In contrast, when machines were liable to frequent operational problems (e.g., because of the delicacy of the product they dealt with), the increase in operator control led to substantial performance gains. A complementary study of group work design showed similar results (Cordery, Wright, Morrison & Wall, in preparation), and although we are aware of no studies that have tested this, parallel arguments have been made in relation to empowerment within white collar settings (Bowen & Lawler, 1992).

It is interesting to note how operational uncertainty as a contingency relates to the earlier discussion of learning-based mechanisms (see p. 95). Essentially, uncertainty means a lack of knowledge about when problems will arise and how best to deal with them (Jackson, 1989). Thus in conditions of low operational uncertainty, events are predictable and the means of dealing with them known; the ‘one best way’ of doing the job can therefore be determined and enforced. Where there is high operational uncertainty, in contrast, problems are less predictable as are the means of solving them. This implies that, in uncertain situations, structuring work in a way that promotes learning and enables this to be applied will be both possible and important. In the words of Wall and Jackson (1995: 163), ‘production uncertainty is important as a contingency because it defines the conditions under which knowledge development and application can occur and affect performance’.

From the above evidence it is clear that operational uncertainty is a strong candidate as an organizational contingency variable linking work design to performance, one which needs to be integrated into theory. The failure to do so may well explain the apparently inconsistent performance effects of work design recorded to date. In addition there are other organizational factors that can affect whether job redesign leads to the predicted outcomes, such as those concerned with the process of introducing work redesign; adequacy of training; appropriateness of reward systems; level of job security; management style; and culture. Regarding the latter, for example, work design theory is largely derived from studies of industrialized Western jobs, and therefore theory and practice are likely to need adapting for other cultures (e.g., Nicholls, Lane & Brech, 1999). The general point is that we need to establish which contingencies are important, and incorporate them into our theoretical frameworks. Until then, the practice of work redesign will remain a very inexact and unpredictable process, and research findings will continue to be inconsistent. We return to the particular importance of understanding the process of introducing work redesign next.

**Work Design and Redesign Processes**

Most of the above criticisms of existing work design theory concern the ‘what’ and ‘why’ of work design. A further challenge concerns giving greater attention to the ‘how’ of work design, or the processes involved in successfully designing and redesigning work roles. Work redesign is rarely a straightforward or short-term intervention, particularly as it typically involves a redistribution of responsibility and power. Redesigning work roles requires careful consideration of implications for multiple stakeholders (e.g., employees, supervisors, managers, support staff, unions), as well as alignment between the work design system and other human resources, control, information, and technology systems (Parker & Wall, 1998). It is also a dynamic and evolving intervention that requires considerable learning and adjustment (Mohrman, Cohen & Mohrman, 1995).

Despite the complexity of work redesign processes, there is remarkably little research-based guidance to inform practitioners about how to achieve this type of change successfully (Hackman & Oldham, 1980; Oldham, 1996). For example, to what extent should employees participate in work redesign and how should this process be managed? How do you motivate employees who have been in long-term simplified jobs to be interested in enrichment? How do the expectations and needs of employees change over the work design process?

To investigate these and other such questions, we advocate studies that are designed specifically to investigate work design change processes (e.g., Campion and Stevens, 1991); the wider reporting of process issues in studies assessing the outcome of work redesign; the development of research-based tools and guidelines to assist practitioners in redesigning work (see Franklin, Pain, Green & Owen, 1992, for a human-centered approach to redesign); and a more pluralistic research approach including qualitative methods and drawing on perspectives from disciplines other than psychology (e.g., sociology, anthropology, management, and engineering). Regarding the latter point, there is likely to be value in complementing the dominant positivist tradition to consider other methods of inquiry. For example, Hardy and Leiba-O’Sullivan (1998: 472) criticized mainstream approaches to the study of empowerment, which they argued ‘skirt the issue of power’ and, in so doing, make employees vulnerable to its abuse. These researchers recommended a more critical approach informed by postmodern perspectives in which power is put back into the equation.

Work design theory has therefore not developed much in regard to understanding the processes involved in implementing and sustaining work redesign. Researchers recommending redesign will
be in a stronger position to influence practice if they can simultaneously give theoretically-sound and empirically-derived advice about how to manage the change process.

**Summary**

The aim of this section has been to suggest avenues along which work design theory should be developed; these suggestions are summarized in Table 5.1. Of course, there are also alternatives to the job characteristics approach that have informed our knowledge of work design, and we describe these next.

**COMPLEMENTARY APPROACHES IN WORK DESIGN RESEARCH**

As well as the dominant theories of work design described thus far, there are complementary theoretical perspectives which serve to broaden the agenda for work design research. We have already noted above two approaches that have implications for work design theory; German action theory and the demand–control model of strain. Additional contributions come from the social information processing approach, an interdisciplinary perspective on job design, and models of group effectiveness.

**Social Information Processing Approach**

The job characteristics theories assume that there are ‘objective’ job characteristics that employees perceive and react to. However, the Social Information Processing Approach (Salancik & Pfeffer, 1977) questions this assumption, and proposes that social cues determine reactions to jobs (e.g., Griffin, 1983; O'Reilly & Caldwell, 1979, 1985). Put simply, the argument is that if an employee is told by others that the job is interesting and autonomous, s/he will believe it. Many studies have investigated this proposition by simultaneously manipulating social cues and objective job properties (e.g., Griffin, Bateman, Wayne & Head, 1987). Meta-analyses of these studies show that, although social information does indeed affect employees’ job ratings, objective job features have a much stronger effect on how people see their jobs (Taber & Taylor, 1990). Changing objective features of jobs is thus more likely to result in positive outcomes such as job satisfaction than simply manipulating social cues, although these studies show that it is nevertheless important to consider social aspects (such as supervisory communications) when redesigning work.

**An Interdisciplinary Perspective on Work Design**

Campion and colleagues (Campion, 1988, 1989; Campion & Berger, 1990; Campion & McClelland, 1991, 1993; Campion & Thayer, 1985, 1987) summarized four distinct models of work design from the literature, each varying in their derivation, recommendations for design, and anticipated costs and benefits. Two of these approaches we have already discussed. The motivational approach refers to the job characteristics theories and is basically concerned with designing enriched jobs. The benefits of motivational work design are proposed to include satisfaction, motivation, better job performance, and lower absenteeism, while anticipated costs include longer training times, more chance of error, and a greater likelihood of mental overload and stress. The mechanistic approach derives from classic industrial engineering and is basically concerned with designing simplified and Taylorized jobs. Benefits include faster training times, less chance of error, and less chance of overload, while costs include lower satisfaction, motivation and higher absence.

The two additional models summarized by Campion and colleagues are the biological and the perceptual-motor approaches. The former emerged from fields such as bio-mechanics, work physiology, and ergonomics. The aim is to minimize employee physical stress and strain, by improving the ergonomic design of work stations. Expected benefits include lower fatigue, better physical health, fewer aches and pains, and fewer injuries; whereas costs include the expenses associated with modifying equipment and making changes to the environment. The perceptual-motor approach is concerned with ensuring cognitive capabilities are not exceeded by job demands. This approach arose out of research in such areas as human factors engineering, skilled performance and human information processing. Benefits of jobs designed in this way include a reduced likelihood of errors and accidents, reduced mental overload, fatigue, stress and boredom and shorter training times. An important cost, however, may be decreased job satisfaction due to a lack of stimulating mental demands.

Investigations by Campion and colleagues show that the different approaches to job design largely give rise to the costs and benefits they propose (Campion & Thayer, 1985; Campion, 1988), although there are methodological limitations of many of these studies (Parker & Wall, 1998). A methodologically improved study (Campion & McClelland, 1993) showed more complex results of the motivational approach than the model proposed. There were benefits when jobs were expanded in terms of the number of products employees had to understand (‘knowledge enlargement’), but when employees did more tasks with the same product
<table>
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<tr>
<th>Table 5.1</th>
<th>An expanded framework for work design research and theory</th>
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<tr>
<td><strong>Antecedents</strong></td>
<td><strong>Traditional work design theory</strong></td>
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<tr>
<td></td>
<td>- Little or no consideration of contextual or individual factors that constrain or shape work design</td>
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<td></td>
<td>- Consider external factors that shape work design (e.g., environmental uncertainty, social customs, labor markets)</td>
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<td>- Consider individual-level factors that shape work design (e.g., proactive employees take on broader roles)</td>
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<tr>
<td><strong>Range of work characteristics and outcomes</strong></td>
<td>- Narrow focus on core individual-level work characteristics (autonomy, skill variety, task identity, task significance, task feedback)</td>
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<td></td>
<td>- Narrow set of outcomes, most focus on affective reactions (e.g., job satisfaction and strain)</td>
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<tr>
<td><strong>Mechanisms linking work characteristics and outcomes</strong></td>
<td>- Assumed performance gains derive from extra effort (i.e. motivational mechanism)</td>
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<td>- Assumed well-being gains are based on motivation, need fulfillment and intrinsic interest</td>
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<tr>
<th>Contingencies</th>
<th>Traditional work design theory</th>
<th>Recommended extensions</th>
<th>Advantages of extended approach</th>
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<tbody>
<tr>
<td></td>
<td>• Most attention to individual difference factors, especially growth need strength</td>
<td>• Expand the range of individual differences considered (e.g., tolerance of ambiguity, preference for group work)</td>
<td>• Identifies who will benefit most from particular forms of work design</td>
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<td></td>
<td></td>
<td>• Consider organizational factors (e.g., production uncertainty; interdependence; support for training and type of rewards; methods of implementation)</td>
<td>• Predicts what types of work design will be most appropriate for particular contexts</td>
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<td></td>
<td></td>
<td></td>
<td>• Explains inconsistencies in findings linking work characteristics to outcomes</td>
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<tr>
<td>Processes</td>
<td>• Little attention given to the processes involved in redesigning work</td>
<td>• Consider processes involved in redesigning work (e.g., effect of employee participation)</td>
<td>• Influences practice by providing practitioners with research-based tools and guidance for successfully redesigning work</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Consider dynamic nature of work design (e.g., changing employee expectations and needs)</td>
<td>• Links work design theory into wider organizational change and development theories</td>
</tr>
</tbody>
</table>

Source: Adapted from Parker and Wall, 1998, p. 30.
Work Design: Learning from the Past and Mapping a New Terrain

("task enlargement") there were long-term costs such as lower satisfaction and more errors.

This latter study highlights the importance of distinguishing between different types of motivational work design. However, such distinctions were not built into Campion and colleagues' description of the motivational model. Perhaps a necessary trade-off given the breadth of the interdisciplinary orientation, the motivational approach is rather oversimplified in this and other respects. In addition, the proposed outcomes are not necessarily supported in the literature (e.g., there is little evidence that mental overload and stress occur as a result of motivational work redesign), and some important benefits of motivational job redesign are not indicated (such as faster response time to problems, employee learning and greater flexibility). Parker and Wall (1998) proposed that one way to develop the interdisciplinary approach is to build organizational contingencies into the framework. The different models, or combinations of them, might suit different contexts. For example, as proposed earlier, the motivational approach to work design might be most suited to highly uncertain environments.

An important contribution of this interdisciplinary perspective is that it makes clear how different professionals are likely to have contrasting underlying values and assumptions about how best to design jobs. It suggests the need to reduce the compartmentalization within organizations to help avoid the problem of specialists approaching topics such as work design purely from their own narrow framework (Campion & Thayer, 1985).

Models of Group Effectiveness

To date, we have described the sociotechnical systems perspective on designing work groups. However, other models have been developed to further elaborate how group work should be designed and supported to maximize its effectiveness (e.g., Campion, Medsker & Higgs, 1993; Cohen & Ledford, 1994; Cohen, Ledford & Spreitzer, 1996; Gladstein, 1984; Hackman, 1987). For example, Hackman's (1987) Normative Model of Group Effectiveness proposes that, assuming the necessary material resources are present, an increase in various process criteria (i.e., effort, knowledge, and appropriateness of task performance strategies) will lead to more effective work group. There are three levers, or inputs, that affect the process criteria. The first is group design, comprising organizing tasks so that members have a good work design (e.g., job variety and autonomy), designing an appropriate group composition (e.g., the right number and diversity of people), and ensuring the group has appropriate norms about performance. The other two levers concern the organizational context, or having the appropriate reward, education, and information systems to support and reinforce effective performance, and group synergy, that is ways to help the group to interact effectively.

Models such as Hackman's (1987) are important developments on the earlier sociotechnical systems approach to group work design. They include a more precise delineation of how various group features link to outcomes, and they also encompass aspects that have received less attention in traditional research on autonomous work groups, such as consideration of the broader organizational systems and the role of group processes. There is general support for the main components of these models. For example, Campion, Papper and Medsker (1996) reported that team effectiveness was most strongly predicted by various process characteristics (such as the degree of social support and communication within the team) and job design features (the degree of self-management, variety, etc.). Contextual characteristics and the level of interdependence were predictive to a lesser extent, and various composition characteristics (such as group heterogeneity) were inconsistently related to effectiveness.

One issue, however, is that most investigations of team effectiveness models remain cross-sectional. They suffer from many of the methodological problems that have long been observed in work design research. Moreover, with some recent exceptions (e.g., Druskat & Kayes, 1999), most of the tests of the models do not examine the specific mediating or moderating pathways that have been proposed. Parker and Wall (1998) recommended conceptual development and refinement of these models. They also recommended, along with Cordery (1996), more attention to the social and cognitive processes within groups. A recent study, for example, has shown the importance of teams having shared mental models for effective group processes and ultimately team effectiveness (Mathieu, Heffner, Goodwin, Salas & Cannon-Bowers, 2000).

WORK DESIGN IN THE FUTURE

The call for a more comprehensive approach to work design is given added weight and direction by changes currently underway in the world of work. New technologies, practices and forms of work make it clear that traditional concerns with job simplification remain salient, but at the same time they give substance to the view that there is a need to broaden the approach. In this section, we look at some developments in the nature of work, and the directions these suggest for the future of work design theory and practice. We start with the wider context.
The Developing Work Context

Spurred by a global marketplace, more demanding customers, new enabling technologies, and various economic and political developments, many organizations are changing in fundamental ways in their attempt to maintain or increase their competitiveness. Traditional distinctions between departments are disappearing, and organizations are becoming more integrated and 'boundaryless' in order to enable the rapid delivery of low-cost, high-quality and customized products (Dean & Snell, 1991) and to provide customers with seamless service (Davis, 1995). Many organizations are becoming leaner through downsizing and the growth of a large contingent workforce. Boundaries between organizations are also blurring, as shown by a growth in new forms such as network organizations in which independent firms work together through joint ventures, subcontracting, franchising, strategic partnerships and the like.

Developments in information technology in particular are beginning to have major implications for work (van der Spiegel, 1995). Faxes, modems, the Internet, notebook computers, and other such computer-based systems allow employees to share information even though they are separated by time and space. Thus for many kinds of service, employees no longer need to work in a designated 'office'. Telecommuters can now operate from elsewhere, such as at home (teleworking), and employees in different locations and on different schedules can work together as 'virtual teams' (Mohrman & Cohen, 1995). People freed from the constraints of an office can work a 'working week' rather than the traditional 'working week'.

There are also changes occurring in employment structures. The introduction of labor saving technologies in manufacturing, a growing demand for services, and the loss of lower-skilled production work to lower-wage countries have all led to a decline in manufacturing jobs and a rise in service work. Over the period 1974 to 1994, service sector employment increased by 9% to 73%, in the United States; by 13% to 71%, in Australia, and by 10% to 60%, in Japan (Organization for Economic Cooperation and Development, 1996). 'Front-line work', that concerned with direct contact with customers, has also grown considerably, as a result of service-based competition now being seen as more than twice as important as cost-based competition (Osterman, 1997).

Future Work Design Priorities

The changes taking place in work have many implications for the development of work design theory and practice. Here we outline five key implications, ranging from more established to newer themes. They concern: the recurrent issue of job simplification; the continued importance of operational uncertainty as an antecedent and contingency variable; interdependence, team working and social complexity as increasingly important work features; a greater emphasis on cognitive demands and knowledge aspects at work; and the effect of demographic and contractual changes on work design.

The Recurrent Job Simplification Issue

The question of job simplification has always been at the center of work design, and looks set to remain so. A widely expressed concern is that new technologies, practices and forms of work will reinforce job simplification. This concern has been most clearly articulated in relation to manufacturing, where the argument can be traced back more than 25 years to Braverman's (1974) analysis of the precursor to current advanced manufacturing technology, the numerically controlled machine tool. In essence, Braverman argued that traditional operator expertise is built into the computer program, making it possible to limit operators to the more mundane tasks of loading, unloading, and monitoring.

The concern that new technology will simplify skilled jobs has been generalized to the more sophisticated forms of computer-based technology that have followed, such as computer-numerically-controlled machines, robots and groupings of such equipment into flexible manufacturing systems. The concern of job simplification has also been raised in relation to complementary initiatives such as just-in-time and total quality management practices (e.g., Delbridge & Turnbull, 1992). For instance, it has been argued that the removal of buffer stocks central to just-in-time reduces employees' autonomy to leave the workstation; and that the standardization of processes involved leads to reduced employee discretion over work methods. To illustrate the latter, Delbridge and Turnbull (1992: 62) cited a training manual that is used at Nissan in which employees are instructed 'you should never change the work procedure at your discretion' because otherwise '[you] may put the process before or after that process is in jeopardy, or increase the cost'.

Though starting in manufacturing, concerns about work simplification are not limited to that context; equivalent arguments are now being raised in other domains. A case in point is the fast expanding world of call centers where, in many instances, agents are required to respond to customer inquiries on the basis of computer delivered protocols. This means that the way in which they perform their work is closely prescribed. Additionally, the number of calls agents complete, and how they deal with customers, is often automatically recorded. In effect, information technology can be used to control, monitor and constrain the detail of interactions with customers in ways that would not be possible with
traditional technologies (e.g., face-to-face or traditional telephone contact). In a similar way, computer technology can be used to monitor the performance of teleworkers, thereby reducing autonomy and even threatening their privacy.

It is clear, therefore, that job simplification can be perpetuated or accelerated by the changes occurring in the workplace, and the issue remains an important one in future work design research. Nevertheless, this is not the whole story. Some commentators are highly optimistic about the effects of modern changes on work design. For example, it has been argued that the new work practices can reunite conceptual and manual tasks (Abernathy, Clark & Kantrow, 1981); that teleworkers removed from the traditional office will have greater discretion about how and when they do their work (Feldman & Gainey, 1997); and that information technology increases individuals' and teams' access to information (such as customer databases), which means they are able to act more autonomously and make decisions at the point of action (Muhlen & Cohen, 1995).

These two perspectives, that new initiatives at work will lead to the simplification or enrichment of jobs, may not be as contradictory as they first appear. Both may be correct in different cases, and we may expect to see instances of job simplification and enrichment side by side, within and across organizations in the future. Consistent with others (e.g., Dean & Snell, 1991), we suggest that the effect of modern technologies and initiatives on work design depends on the nature of the systems involved, the organizational context (such as the level of uncertainty), and the choices made in organizing work. Research supports this view. For instance, although it is clear that the potential exists for just-in-time to reduce individual autonomy, studies have shown it can enhance group autonomy (Mallarkey, Jackson & Parker, 1995), and that the factors can be influenced by the extent to which operators are involved in designing and implementing the changes (Parker, Myers & Wall, 1995). Likewise, studies have shown mixed effects of information technology on work design, and a range of factors that can influence the nature of the associated work design such as individual difference and demographic variables, system characteristics, and the implementation process.

It is clear there are currently no definitive answers to the question of whether developments in the world of work will lead to greater job simplification. Nor do we expect there to be, for this is probably the wrong question. Rather, the issue is under what circumstances does job simplification arise and when is it most and least effective for different outcomes? We describe next the importance of operational uncertainty in this respect. At this stage, the conclusion to be drawn is that job simplification, along with its antecedents and contingencies, remains as salient to the future of work design research and practice as it has always been.

**Uncertainty as an Antecedent and Contingency**

One of the most powerful ideas for guiding the design of work is to maintain the principle that the effect of work enrichment is contingent on uncertainty. We presented evidence earlier showing how the impact of enhanced autonomy on performance increased as uncertainty increased, both in the case of individual and group work redesign (see p. 96).

We raise this idea again because many commentators have argued that today's organizations face greater operational uncertainty than they have in the past. For example, the existence of more flexible technology supports meeting more differentiated market demand through greater product customization, and therefore more frequent changes in design and smaller batches. The trend toward more variability and complexity in work processes, and hence in operational uncertainty, looks set to continue. Thus job enrichment and self-management initiatives are put forward as general recipes for future work design (e.g., Hayes, Wheelwright & Clark, 1988). Greater operational uncertainty has therefore been suggested as an antecedent factor that is leading to the wider introduction of autonomous forms of work design.

There is nevertheless a danger of misreading the nature and scale of these trends. Even if there is a move towards greater operational uncertainty, there will be many organizations, and areas of work within organizations, characterized by relatively stable and certain operating conditions. It should not be forgotten that the objective of many initiatives is to reduce uncertainty. In call centers, developments in telecommunications that enable customers to route their calls according to their nature, reduce the range of problems encountered by any one agent. Similarly, quality management programs aim to reduce errors; engineers strive to build ever more reliable machines; supply-chain partnering is designed to eliminate variability in component availability and quality; and lean production aims to eliminate unpredictability (Graham, 1988). Thus, although some forces may be leading towards greater operational uncertainty, developments in technology and various management practices are likely to counteract, and may even sometimes reverse, the effect.

The effect of new technologies and practices on work design, and indeed the choice of work design, is therefore likely to depend partly on the uncertainty of the situation. Niepece and Molleman (1998) argued that lean production methods, which aim to reduce production uncertainty, are most likely to be successful if the tasks are stable, repetitive and uncomplicated. However, they suggested that
sociotechnical work designs such as autonomous work groups will be more appropriate if there is high uncertainty because these contexts require ‘knowledge about the product and the process as a whole, a larger analytical capability and problem-solving capacities’ (p. 277). In this regard, it is interesting to note that critical theorists who have reported deskilling as a result of just-in-time and related initiatives (e.g., Delbridge & Turnbull, 1992) have mostly focused their attention on cases of mass production, such as the automobile industry, where the uncertainties are fewer. Bratton (1993) also showed that cellular manufacturing was likely to lead to deskilling in low uncertainty mass production situations, but was likely to lead to, and require, job enrichment in high uncertainty, small-batch settings.

This does not mean to say that organizations always make the right choices about work design. There is already ample evidence that the frequent failure of new technologies and practices to realize their potential (e.g., Waterson et al., 1999) is often due, not to the initiatives themselves, but to deficiencies in the associated work design (e.g., Hayes et al., 1988). Most often, simplified work designs are retained or introduced in spite of highly uncertain and unpredictable contexts. We can thus expect work designs to be introduced which are not in tune with circumstances, which means that considering operational uncertainty as a contingency variable will continue to be a central issue for the foreseeable future.

Interdependence, Team Working, and Social Complexity

As we described earlier, interdependence is a key criterion on which to distinguish the choice of work design (see page 96); with group-based strategies being most appropriate when there is a high level of interdependence and a strong need for cooperation. We raise interdependence as an issue again here because this feature of work is accentuated in the modern workplace, which in turn creates a need for more group-based forms of work design, and the use of various other lateral integration mechanisms. Interdependence is therefore emerging as an important work characteristic in its own right.

A key feature of the various production technologies and techniques that are being deployed to improve competitiveness (e.g., just-in-time, advanced manufacturing technology) is that they serve to integrate previously separate stages and functions of production (Dean & Snell, 1991). For example, just-in-time involves removing buffers between processes, and hence closer coordination is required than before. Nevertheless, the trend towards increased interdependence is not just restricted to manufacturing, and may be even stronger elsewhere. For example, with complex knowledge-work such as that involving software development or complex product design, the need to integrate separate areas of expertise to arrive at the end product creates a high level of interdependence. The uncertainty about the process signals not only the need for groups, but also teams with sufficient autonomy and information to manage the complex environment (Goodman et al., 1988). However, this is far from a complete picture. As Mohrman et al. (1995) argued, it will not be enough to install teams, we will also need much greater specification of team processes and their interface with the larger organization.

On top of this, to reduce development or design lead times, an emerging practice is for work to be passed electronically between teams working within different time zones across the world. Thus the work process is continuous over 24 hours, even though particular teams work normal hours. Existing work design theory has little to say about this level and kind of interdependence, which is an area manifestly requiring attention. Commentators agree that theory will need development and reorientation to apply to these types of work practices (Mohrman et al., 1995).

Interdependence leads to the identification of another aspect of work likely to play an increasingly important role, that is social and emotional demands (Stevens & Campion, 1994). Work practices such as supply-chain partnering, integration across traditional departments, 24-hour product designs, and virtual team working all place social interaction and communication in key roles. The growth of front-line customer service work also highlights this issue. Such work is people-oriented and involves employees being ‘on stage’ and carrying out tasks that involve emotional labor (Hochschild, 1989). Employees are expected to display resilience and flexibility in the face of frequent internal and external uncertainties (Frenkel et al., 1999). Thus emotional demands are likely to be very salient in these contexts, and control and support to help manage these demands is likely to be an important work design issue (Frenkel et al., 1999).

Cognitive Demands and Knowledge Aspects at Work

In contrast to the continuities with traditional concerns discussed above, emerging technologies and forms of work underwrite the need for work design approaches to incorporate work characteristics and outcomes hitherto largely ignored. One area of such development to be emphasized is that of cognitive demand. As Howard (1995: 23) observed: ‘In the post-industrial information age, the balance of work has tilted from hand to head, from brawn to brain’. For example, it has been suggested that new production technologies emphasize two types of cognitive demand: attentional demand, as a result of increased vigilance requirements (e.g., Van Cott, 1985); and problem-solving demand, because of the need for fault prevention and active diagnosis.
of errors (e.g., Dean & Snell, 1991). We need to understand the impact of both, as high attentional demand is likely to have a negative impact on employees’ well-being, while problem-solving demand can add challenge to a job.

The emphasis on understanding the impact of cognitive demand is especially true in nonproduction settings, such as in research and development, sales and service, and new product development. Information technology often absorbs what is referred to as ‘routine knowledge work’ (such as processing accounts), and emphasizes complex problem-solving, or ‘nonroutine knowledge work’ (Mohrman et al., 1995). Likewise, greater product variety and more frequent policy and procedural changes are predicted to enhance the complexity of service work. Front-line workers will be increasingly expected to play multiple roles, such as to provide information, generate revenue through selling, and perform an intelligence-gathering role (Frankel et al., 1999: 272). As these researchers observed, the cognitive demands will be much greater for service workers of the future who ‘will be required to possess more higher-order contextual knowledge (i.e., about industry and market developments) to deal with more complex customer queries and to demonstrate more persuasive selling techniques’.

More generally, the emphasis on knowledge in service and professional settings requires a reorientation of existing work design theory to address questions such as ‘What forms of knowledge and expertise are designed into (and out of) work organizations? Why? How does knowledge and expertise get shared and developed?’ (Clegg, Waterson & Axtell, 1996: 247). In a related vein, Mohrman et al. (1995) argued that we need greater understanding about what can be done to help people cope with greater cognitive complexity, such as by improving people’s ability to process complex information, or by developing ‘cognitive’ tools to support collaborative decision-making.

Demographic and Contractual Changes

Against the background of short-term employment contracts and careers affected by downsizing, we have pointed to the rising salience for work design of aspects such as the opportunity to gain transferable skills. The growth of temporary contract and part-time work, as well as flexible work patterns such as job share, also highlights the importance of work design issues such as job security and autonomy over working hours. The actual composition of the workforce is also changing in ways that have significance for the design of work. Heward (1995: 33) succinctly captured this idea when he noted that the current US workforce is becoming ‘less young, less male, and less white’; a characterization that applies to most Western countries. Yet work design theory is virtually silent on the effect of demographic issues (Parker & Wall, 1998).

There are several important ways the demographic considerations influence work design practice and theory. First, the changing composition of the workforce will render salient work characteristics beyond those traditionally considered. For example, research suggests that, compared with men, working women are more likely to experience home-work conflict (e.g., Hochschild, 1989), and are therefore likely to value autonomy over working hours (i.e., flexible working patterns) as it enables them to more easily juggle the demands of home and work (Thomas & Ganster, 1995). Second, there may be different relationships between work characteristics and outcomes as a function of age, gender, and race; both in terms of the strength of these relationships and in terms of the underlying mechanisms. For example, autonomy for older workers in physically demanding work settings might be especially important in this situation, not for the usual reasons, but because it allows them to rest and alleviate any physical strain.

A third set of implications of the changing workforce concerns the effect of factors such as age, gender and ethnic status on the antecedents and processes of work design. For example, compared with men, women tend to be employed in lower-paid part-time positions; their knowledge and skill tend to be devalued, and their access to technology is often restricted (Franklin, Pain, Green & Owen, 1992). Many of the same discriminating processes apply to members of ethnic minority groups, and it is therefore important to consider the potentially restricted opportunities for work design that might arise for members of different groups as a consequence of negative stereotypes, structural barriers (e.g., home-work conflict), or other issues (e.g., language problems).

Summary

Looking at the implications of developments in the world of work, the narrowing of existing work design approaches becomes increasingly obvious. If we are to meet the challenges of the future, we need to expand our horizons. Although job simplification will remain a core concern, as will the role of uncertainty as a contingency, there is a need to take account of many other work content factors such as cognitive demand, interdependence, social interaction, emotional demand, home-work conflict, and job security. This is not to say that there will be increases in all these dimensions in the future, but rather that these will be among the factors that will distinguish between different forms of work, and will be important in understanding their consequences. The workforce for whom we are designing work is also changing, and we need to incorporate important demographic contingencies such as race, gender, and age into work design theory.
CONCLUSION: THE CHALLENGES FOR PRACTICE AND THEORY

Our aim in this chapter was to set out what is known about work design and what remains to be discovered. Applying what is known presents the main challenge for practitioners. Thus, we know from an extensive body of research that enriched work designs will promote positive outcomes for individuals and organizations, especially in those (increasingly prevalent) circumstances characterized by complexity and uncertainty. A challenge for practitioners is to put work enrichment on the agenda rather than taking for granted job simplification as the only option. Part of this challenge is to recognize that work redesign can be a way to achieve strategic objectives relating to a range of outcomes (e.g., performance, safety and learning) and can be a way to maximize the potential of new work practices, such as information technology. Work design is too swiftly categorized as a narrow motivational technique when its potential benefits are much wider.

It is equally a challenge for practitioners to choose appropriate work designs and implement them successfully. Many organizations are jumping on the empowerment and self-managing handwagon without making sensible work design choices for the context (e.g., considering the level of interdependence and uncertainty) and without careful planning for implementing and sustaining the change. The challenge for practitioners, therefore, lies largely in putting into place what we already know about work design.

For researchers, the challenge is to discover those important things we do not know. We have outlined some long-standing questions that continue to be important, as well as some new questions that arise because of the types of changes occurring in the workplace and the workforce. Investigating such questions will be helped by adopting an expanded work design framework, such as by considering a broader range of antecedents, work characteristics, mechanisms, contingencies, and processes. Rigorous methodologies and research designs will also help to meet this challenge (a feature that has unfortunately been all too rare in work design research to date), as will a willingness to complement the dominant positivist tradition with alternative modes of inquiry.

REFERENCES


