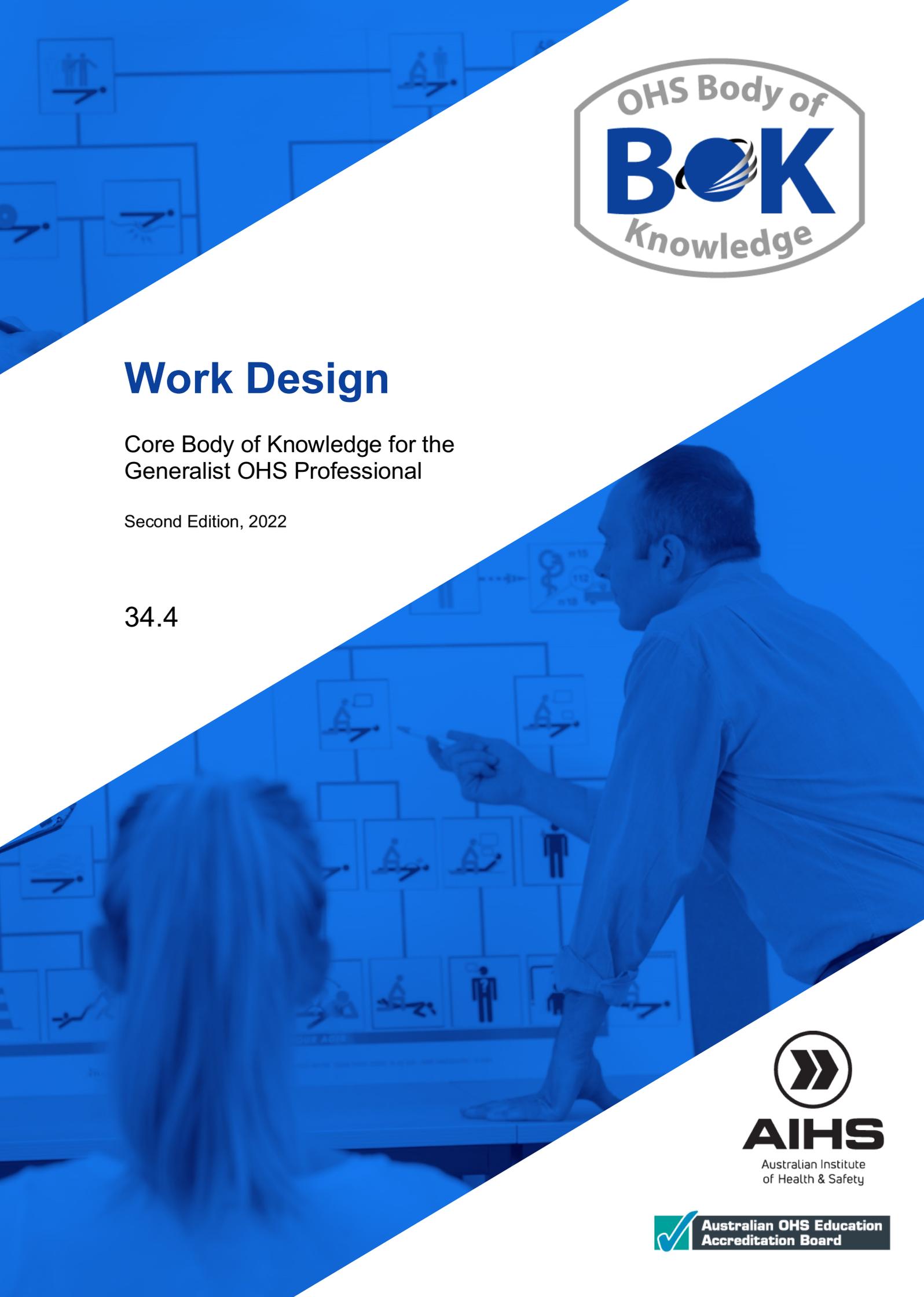


# Work Design

Core Body of Knowledge for the  
Generalist OHS Professional

Second Edition, 2022

34.4



**AIHS**

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The Psychology at Work (PaW) Laboratory is located within the School of Psychological Science at the University of Western Australia. The lab applies psychology skills and knowledge to workplaces to help create better workplaces, and conducts research, consultancy, industry placement activities and training with a wide range of industry partners.

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# Work Design

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## Work Design

### Abstract

Work design – “the content and organisation of one’s work tasks, activities, relationships, and responsibilities” (Parker, 2014) – is a key way to ensure health and safety in the workplace. This chapter describes the theoretical understanding of work design based on more than a century of research and clarifies the relevance of work design principles for OHS professionals. Central to the way that work design is addressed is the distinction between characteristics that act as resources for the worker or work team (e.g. autonomy, meaningfulness, task and skill variety, and social support) and characteristics that act as demands (e.g. time pressure, role conflict and emotional demands). Work design characteristics are associated with a broad range of outcomes, including outcomes related to safety, health and wellbeing. The chapter includes practical guidance for supporting organisational efforts to improve work design.

### Keywords

work design, occupational health and safety, OHS, wellbeing, psychological health, motivation, job crafting, performance

### Contextual reading

Readers should refer to 1 *Preliminaries* for a full list of chapters and authors and a synopsis of the OHS Body of Knowledge. Chapter 2, *Introduction* describes the background and development process while Chapter 3, *The Generalist OHS Professional: International and Australian Perspectives* provides a context by describing the role and professional environment.

### Terminology

Depending on the jurisdiction and the organisation, Australian terminology refers to ‘Occupational Health and Safety’ (OHS), ‘Occupational Safety and Health’ (OSH) or ‘Work Health and Safety’ (WHS). In line with international practice, this publication uses OHS with the exception of specific reference to the Work Health and Safety (WHS) Act and related legislation.

### Jurisdictional application

This chapter refers to the Australian model work health and safety legislation. This is in line with the Australian national application of the *OHS Body of Knowledge*. Readers working in other legal jurisdictions should consider these references as examples and refer to the relevant legislation in their jurisdiction of operation.

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# 1 Introduction

The way in which work is designed impacts a range of outcomes for individual workers, work teams and organisations. Achieving safety, health and wellbeing in the workplace through work design represents a primary intervention (i.e. aimed at prevention of harm)<sup>1</sup> and it is important for occupational health and safety (OHS) professionals to have an understanding of work design principles.

This chapter introduces work design research, theory and practice, and examines the relationship between work design and occupational health, safety and wellbeing. It is the third in a suite of *OHS BoK* chapters focused on design. While chapter 34.2 An Introduction to User-Centred Safe Design and chapter 34.3 Health and Safety in Design address the design of physical elements of work (work environment, workstations, plant and equipment), this chapter addresses psychosocial work design characteristics.<sup>2</sup> It covers the right-hand side of Figure 1.



Figure 1: Key work design characteristics and associated hazards (SWA, 2020, p. 9)

<sup>1</sup> See *OHS BoK* 34.1 Prevention and Intervention.

<sup>2</sup> See also *OHS BoK* 19 Psychosocial Hazards and 4 Global Concept: Work (in development at time of writing).

In the scientific literature, work design is typically defined as:

- A process – “the study, creation, and modification of the composition, content, structure, and environment within which jobs and roles are enacted” (Morgeson & Humphrey, 2008, p. 47) or
- A result – “the content and organization of one’s work tasks, activities, relationships, and responsibilities” (Parker, 2014, p. 662).

Both of the above definitions cover the types of work tasks in a job and the environment in which they are performed. The ‘environment’ in Morgeson and Humphrey’s (2008) definition encompasses the physical and the social environments, and the ‘relationships’ in Parker’s (2014) definition points to social interactions as part of work design. Good work design is particularly relevant in preventing psychosocial hazards,<sup>3</sup> defined as “anything in the design or management of work that increases the risk of work-related stress [which] if prolonged and/or severe can cause both psychological and physical injury” (SWA, 2019, p. 9).

Section 2 of this chapter provides a brief history of work design research and practice as background for section 3, which presents contemporary work design theory and models. Section 4, an overview of the various work-related outcomes impacted by work design, highlights outcomes connected to safety, health and wellbeing. Section 5 identifies external, organisational, work group and individual factors that influence how work is designed, and section 6 focuses on the measurement of work design to enable identification of opportunities for improvement and assessment of the effectiveness of work design interventions. Top-down (management-led) and bottom-up (worker-initiated ‘job crafting’) interventions are discussed in sections 7 and 8, respectively. Section 9 addresses the implications for OHS professionals, and the chapter concludes with a summary.

## 2 Historical perspective

Work is as old as humankind; people have always needed to carry out tasks to make sure they have food and shelter for survival. Workers, and where applicable those they work for, have always looked for the best way of doing their work. Formal interest in how best to design work developed during the Industrial Revolution (approximately 1760-1840) when large numbers of people worked with machines in factories. At this time, the possible production, as well as health and safety, consequences of things not going to plan increased manifold, and factory owners and managers were keen to ensure smooth operations. Classical economist Adam Smith (1776) introduced the concept of division of labour,

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<sup>3</sup> The importance of work design in hazard and risk control is evident in the number of *OHS BoK* chapters that reference 34.4 Work Design, e.g. 16 Work-related Musculoskeletal Disorders, 19 Psychosocial Hazards, 20 Fatigue, 21 Bullying and Violence, 35 Mitigation of Health Impacts, 37.4 Workers Working From Home.

recommending that production processes be divided into different stages, with workers focused on specific tasks to increase efficiency and reduce training requirements.

Early in the 20th century, engineer Frederick Winslow Taylor (1911) introduced principles of scientific management, which embraced the idea of division of labour for economic efficiency and added enforced standardisation of how tasks should be done. Scientific time-based studies determined the most efficient method and therefore the method in which workers were trained. Taylor argued that this approach created incentives for worker effort and “maximum prosperity” for both employer and worker by ensuring maximum productivity. Scientific management principles were first adopted in steelworks and subsequently in other industries (most famously in the Ford assembly lines). We now know that applying a scientific management (or Tayloristic) approach to designing work can have detrimental effects (e.g. low motivation and impaired wellbeing for workers, high turnover of employees) and it has been either modified or abandoned in most high-performing organisations (e.g. Uddin & Hossain, 2015). Nevertheless, work design based on scientific management principles still exists in some large-scale production settings.<sup>4</sup>

Industrial engineers Frank and Lillian Gilbreth (1917) also advocated a scientific approach to optimising how work was done. Whereas Taylor (1911) focused mostly on time involved in task performance and economic benefits, the Gilbreths studied time and motion, with emphasis on making sure that workers’ body postures and movements were not only efficient, but also tolerable and safe (Gilbreth & Gilbreth, 1917). The Gilbreths’ concern with worker welfare and fatigue made them pioneers in ergonomics, or human factors, research. Lillian Gilbreth was one of the first scientists to apply psychology to management and engineering (Gibson et al., 2015).

From 1924 to 1932, psychologist Elton Mayo, engineer Fritz Roethlisberger and human resource manager William John Dickson conducted a series of work design studies at the Hawthorne plant of the Western Electric Company in Chicago (Roethlisberger & Dickson, 1939). One of their findings that contributed to furthering our understanding of work design was that informal social connections within work groups and supportive supervision positively impacted productivity. These studies were the source of the so-called *Hawthorne effect* – a reactive effect in which study participants modify their behaviour in response to awareness of being observed (e.g. Gale, 2004).

A few decades later, social scientist Eric Trist, industrial relations scholar and ex-miner Ken Bamforth, and psychologist Fred Emery of the Tavistock Institute in London focused on work design, particularly in their research on the effects of the introduction of ‘longwall’ mining, in

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<sup>4</sup> See *OHS BoK* 10.1 The Organisation for a summary of the history of management theory.

which a multiple-kilometres-long wall of coal is mined in a single slice (Trist & Bamforth, 1951). They found that the longwall method did not result in as large an increase in productivity as expected. The associated introduction of work specialisation and shift work led to the loss of the strong social bonds among miners in the previously small autonomous teams that were responsible for all parts of the mining work. Morale and absenteeism improved when the social aspects and excessive task specialisation were addressed. This research became the basis for *sociotechnical systems theory*, which proposes that organisations are complex systems and organisational performance depends on joint optimisation of its interdependent social and technical subsystems.<sup>5</sup> It also highlighted problems associated with extreme specialisation consistent with the scientific management approach.

A subsequent major contribution to our understanding of work design was psychologist Frederick Herzberg's two-factor (motivator-hygiene) theory of job satisfaction (Herzberg, 1968), which he developed based on interviews with engineers and accountants. Herzberg argued that satisfaction and dissatisfaction are not on the same continuum. The theory poses that on the one hand, motivators stemming from conditions intrinsic to the job (such as responsibility, meaningful work, achievement) lead to job satisfaction, and on the other hand, hygiene factors stemming from conditions Herzberg considered extrinsic to the job (such as salary, supervision, interpersonal connections, work conditions), if insufficient, lead to job dissatisfaction. This categorisation into two factors with separate associated outcomes proved controversial and limited (e.g. Basset-Jones & Lloyd, 2005). It contributed to a lack of research investigating the role of workplace social characteristics (i.e. connections with coworkers and supervisors) in motivation and job satisfaction, as they were only seen as connected to job *dissatisfaction* (Morgeson & Humphrey, 2008). However, Herzberg's (1968) associated concept of *job enrichment* to improve worker satisfaction, motivation and performance (by, for example, increasing recognition, and providing job variety and training/development opportunities) continues to impact contemporary work design. Like the Tavistock Institute research that proposed sociotechnical systems (Trist & Bamforth, 1951), this is a clear departure from Taylor's (1911) scientific management.

While not all of the early work design theories have stood the test of time, they provided the basis for development of theory and models that capture contemporary knowledge on work design.

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<sup>5</sup> See *OHS BoK* 12.1 Systems and Systems Thinking.

## 3 Work design – current theory and models

Since the 1970s, there has been significant development in how work is designed and our understanding of the interconnectedness of work design, work performance, safety and health (e.g. Knight, Kaur, et al., 2021; Parker, Morgeson, et al., 2017). This section reviews the key work design models that emerged from scientific studies during this period and are currently used in work design research and practice.

The first — the job characteristics model (JCM) — presents a list of motivational work design characteristics that impact on personal psychological states and job outcomes; with the second model — the expanded work design model — adding social and contextual/physical work design characteristics to the list. Two further models — the job demands-control model (JDC model) and the job demands-resources model (JD-R model), alongside work design characteristics typically associated with positive outcomes, explicitly also include job demands and their role in leading to strain and health effects. The recently proposed SMART model, presented as the fifth model in this section, draws out the positive features of good work design while acknowledging the need to manage the likely negative features so that they are “tolerable demands”. Discussion of these five models is followed by an outline of theory concerning the design of teamwork and a summary of the section’s key points.

### 3.1 Job characteristics model

Richard Hackman and Greg Oldham’s job characteristics model (JCM) and corresponding theory (Hackman & Oldham, 1974, 1975, 1976) are arguably the most influential model/theory to date (e.g. Parker, 2014). Inspired by sociotechnical systems theory and Herzberg’s two-factor theory, supported by the US Office of Naval Research, and tested with 658 workers in 62 different jobs at seven organisations, the JCM distinguished five core job dimensions:

- *Skill variety* – “the degree to which a job requires a variety of different activities in carrying out the work, which involve the use of a number of different skills and talents of the person.”
- *Task identity* – “the degree to which the job requires completion of a ‘whole’ and identifiable piece of work; that is, doing a job from beginning to end with a visible outcome.”
- *Task significance* – “the degree to which the job has a substantial impact on the lives or work of other people, whether in the immediate organization or in the external environment.”
- *Autonomy* – “the degree to which the job provides substantial freedom, independence, and discretion to the individual in scheduling the work and in determining the procedures to be used in carrying it out.”
- *Feedback* – “the degree to which carrying out the work activities required by the job results in the individual obtaining direct and clear information about the effectiveness

of his or her performance.” (Hackman & Oldham, 1976, pp. 257-258)<sup>6</sup>

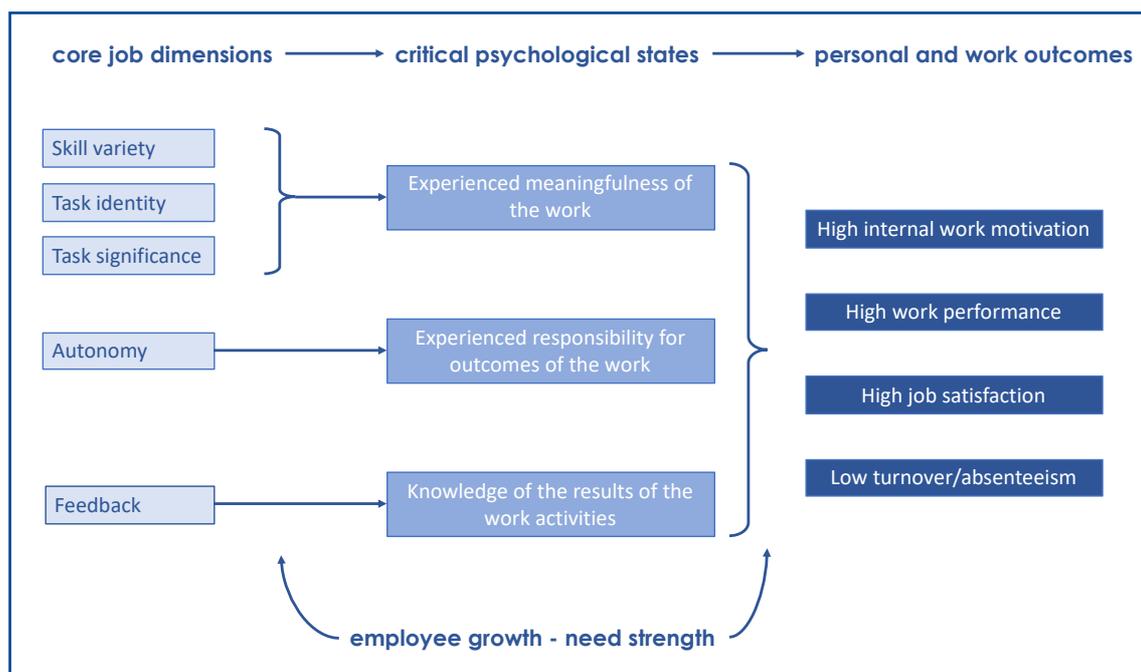
As shown in Figure 2, the job dimensions, or characteristics, prompt critical psychological states (meaningfulness of the work, responsibility for work outcomes, and knowledge of results of work activities) that lead to personal and work outcomes (motivation, high-quality performance, satisfaction and low absenteeism/turnover). Subsequent research associated the JCM’s job characteristics with worker wellbeing (Humphrey et al., 2007; section 4.1) and safety outcomes (Nahrgang et al., 2011; section 4.2), and experienced meaningfulness was identified as the main critical psychological state through which job characteristics are connected to personal and organisational outcomes (Humphrey et al., 2007).

The JCM acknowledges the importance of individual differences for work design by including the worker’s need for growth as impacting the relationships between job dimensions, psychological states and outcomes. Although some studies using the JCM found no evidence of such an impact (e.g. Fried & Ferris, 1987; Roberts & Glick, 1981), Barrick et al.’s (2013) theory of purposeful work behaviour reintroduced the role of individual differences to provide a more nuanced understanding of how individual differences and job characteristics interact to influence outcomes.

Aside from the mixed findings regarding need for employee growth as a moderator, the JCM has remained popular with researchers, and the relationships it predicts between job characteristics, psychological states and outcomes have been confirmed by many studies.

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<sup>6</sup> The JCM focuses on factors intrinsic to the job and does not include social characteristics of the work environment because an earlier study by the research team (Hackman & Lawler, 1971) did not find a clear relationship with outcomes.



**Figure 2: Job characteristics model (Hackman & Oldham, 1976, p. 256)**

### 3.2 Expanded work design model

Three decades later, based on a meta-analytic review of 259 work design studies, Stephen Humphrey, Jennifer Nahrgang and Frederick Morgeson extended the JCM (section 3.1) into the expanded work design model (Humphrey et al., 2007) (Figure 3).

To the JCM's five job dimensions, the expanded work design model added five motivational characteristics:

- *Task variety* (different from the JCM's 'skill variety' as various tasks may involve the same skills) – "the extent to which an individual performs different tasks at his or her job"
- *Information processing* – "the extent to which a job necessitates an incumbent to focus on and manage information"
- *Job complexity* – "the extent to which a job is multifaceted and difficult to perform"
- *Specialisation* – "the extent to which a job involves the performance of tasks requiring specific knowledge and skill"
- *Problem solving* – "the extent to which a job requires the production of unique solutions or ideas." (Humphrey et al., 2007, p. 1335)

Within the JCM's autonomy dimension, the expanded work design model identified:

- *Work scheduling autonomy* (determining when to do what)
- *Work methods autonomy* (determining how to do things)
- *Decision-making autonomy* (the freedom to make decisions at work) (Humphrey et al., 2007, p. 1336).

Recognition of the importance of the social environment at work saw the inclusion of four social characteristics in the model:

- *Interdependence* – “the extent to which a job is contingent on others’ work and other jobs are dependent on the work of the focal job”
- *Feedback from others* (as opposed to just feedback from the job itself as in the JCM) – “the extent to which other organizational members provide performance information”
- *Social support* – “the extent to which a job provides opportunities for getting assistance and advice from either supervisors or coworkers”
- *Interaction outside the organisation* – “the extent to which a job requires an incumbent to communicate with people (e.g. suppliers or customers) external to the organization.” (Humphrey et al., 2007, p. 1336)

Based on findings from the domains of human factors and ergonomics, the expanded work design model also included work context characteristics:

- *Physical demands* – “the amount of physical activity or effort necessary for a job”
- *Work conditions* – “aspects of the work environment such as health hazards, temperature, and noise”
- *Ergonomics* – “the extent to which work permits appropriate posture and movement.” (Humphrey et al., 2007, p. 1337)

In addition to expanding the work design characteristics, the model provided a wider range of work outcomes, including the wellbeing outcomes of anxiety, stress, burnout and overload that are of particular relevance to OHS professionals (section 4).

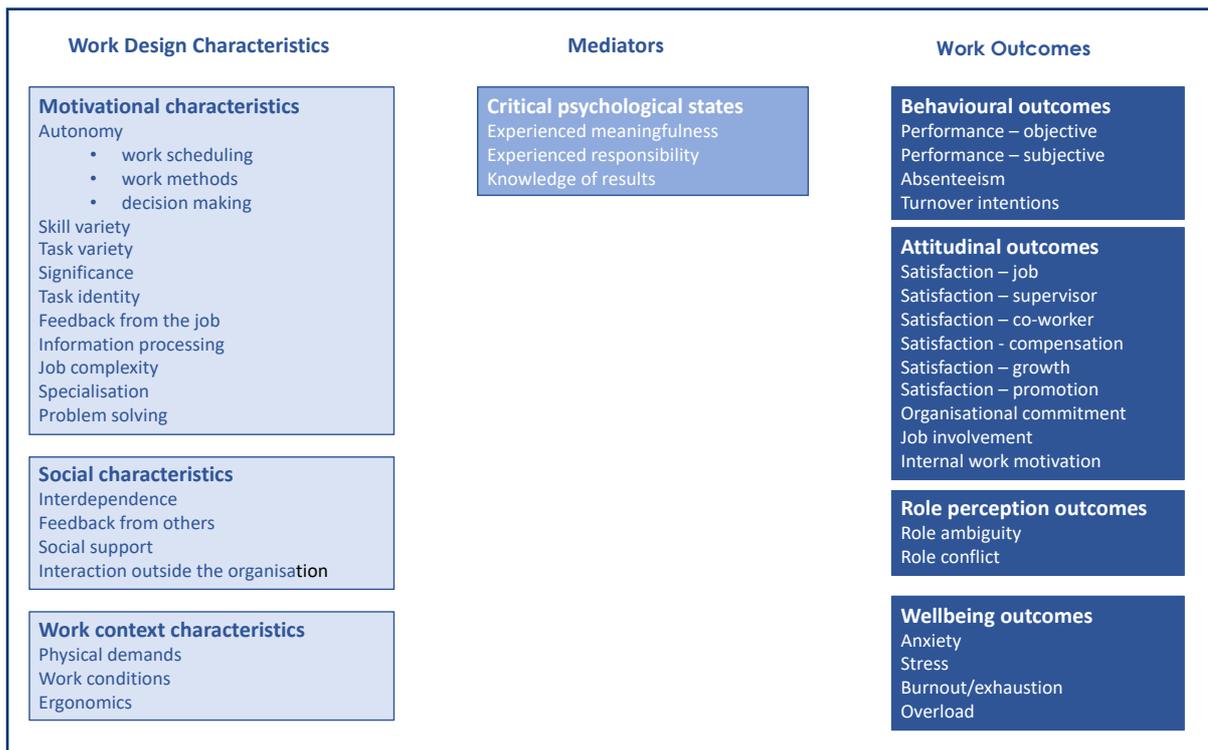
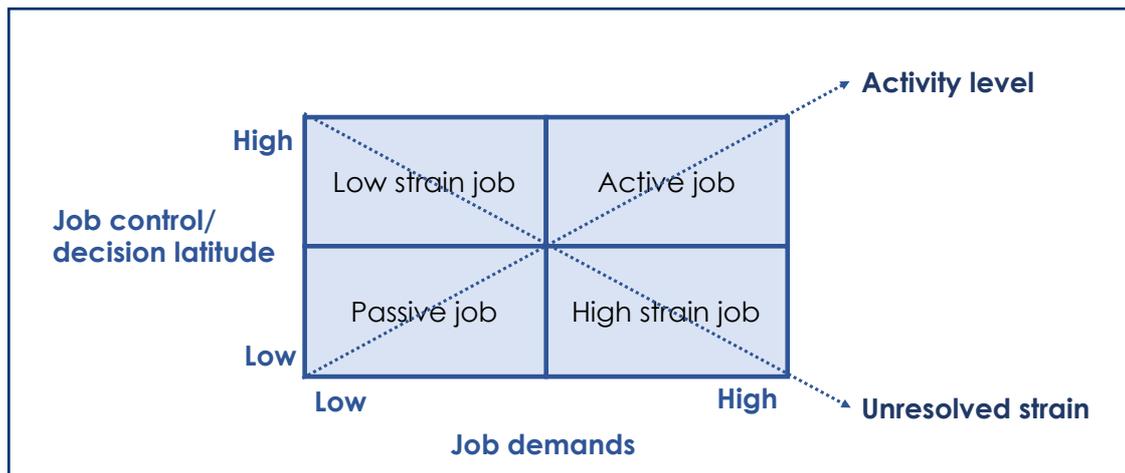


Figure 3: Expanded work design model (Humphrey et al., 2007, p. 1334)

### 3.3 Job demands–control model

In the late 1970s, Robert Karasek developed a job strain model that attributed psychological strain to “the joint effects of the demands of a work situation and the range of decision-making freedom (discretion) available to the worker facing those demands” (Karasek, 1979, p. 287). This model, which became known as the job demands–control (JD-C) model, proposed that there is an interaction between job demands and control, in that having control, or personal discretion or decision latitude, in the job<sup>7</sup> can act as a buffer for the negative impact of high job demands. As can be seen in Figure 4, the model predicts the highest amount of job strain in jobs with high demands and low control, referring to these jobs as *high strain* jobs; jobs with high demands matched by high control are referred to as *active* jobs; jobs with low demands and low control are *passive* jobs; and jobs with low demands and high control are *low strain* jobs. A later version of the model – demands–control–support (JD-C-S) (Johnson & Hall, 1988; Karasek & Theorell, 1990) – included social characteristics of the workplace as additional buffers against high job demands.

<sup>7</sup> Akin to autonomy in Humphrey et al.’s (2007) expanded work design model.



**Figure 4: Job demands–control model (adapted from Karasek, 1979, p. 288)**

Since the introduction of the JD-C/JD-C-S model, a range of studies have demonstrated the effects of job demands, job control and workplace support on strain and wellbeing outcomes. However, meta-analytic and systematic reviews have found less evidence of the buffer effect – i.e. the interaction between demands and control/support – perhaps as a result of inconsistency in how the model variables are measured (e.g. de Lange et al., 2003; Fila, 2016; Häusser et al., 2010; van der Doef & Maes, 1999). This notwithstanding, the JD-C/JD-C-S model has played a key role in furthering understanding of work design by adding a focus on job demands and health outcomes, and has helped to position work design as an area of interest for OHS professionals.

### 3.4 Job demands–resources model

At the start of the 21st century, originally in an effort to explain burnout at work,<sup>8</sup> Evangelia Demerouti, Arnold Bakker, Friedhelm Nachreiner and Wilmar Schaufeli (2001) developed the job demands–resources (JD-R) model, which, similar to the JD-C model, includes work demands and a focus on health. The JD-R model positions work demands alongside job characteristics that are considered resources for the worker:

*Job demands*...those physical, social, or organizational aspects of the job that require sustained physical or mental effort and are therefore associated with certain physiological and psychological costs (e.g. exhaustion). ...

*Job resources*...those physical, psychological, social, or organizational aspects of the job that may do any of the following:

- a) be functional in achieving work goals;
- b) reduce job demands and the associated physiological and psychological costs;
- c) stimulate personal growth and development. (Demerouti et al., 2001, p. 501)

<sup>8</sup> Demerouti et al. (2001, p. 499) applied Maslach’s definition of burnout, i.e. “a syndrome of emotional exhaustion, depersonalization, and reduced personal accomplishment.” For an overview of research on burnout, see Maslach & Leiter (2016).

The first version of the JD-R model of burnout included job demands of physical workload, time pressure, recipient contact, physical environment and shift work, and job resources of feedback, rewards, job control, participation, job security and supervisor support (Demerouti et al., 2001),<sup>9</sup> and distinguished two burnout dimensions:

- Exhaustion – “a consequence of intensive physical, affective, and cognitive strain”
- Disengagement – “distancing oneself from one’s work, and experiencing negative attitudes toward the work object, work content, or one’s work in general.” (Demerouti et al., 2001, pp. 500, 501)<sup>10</sup>

While the first version of the model linked higher job demands with exhaustion, and lower job resources with disengagement (Demerouti et al., 2001), subsequent research led to the development of the JD-R theory (Bakker & Demerouti, 2014, 2017) in which job demands and job/personal resources interact to predict outcomes of strain/exhaustion and motivation/engagement and, in turn, job performance. The relationship between job demands and resources has been demonstrated to impact safety outcomes (e.g. Nahrgang et al., 2011; section 4.2).

Figure 5 is the most recent version of the JD-R model. It indicates whether the depicted relationships are positive or negative, and introduces new concepts, including:

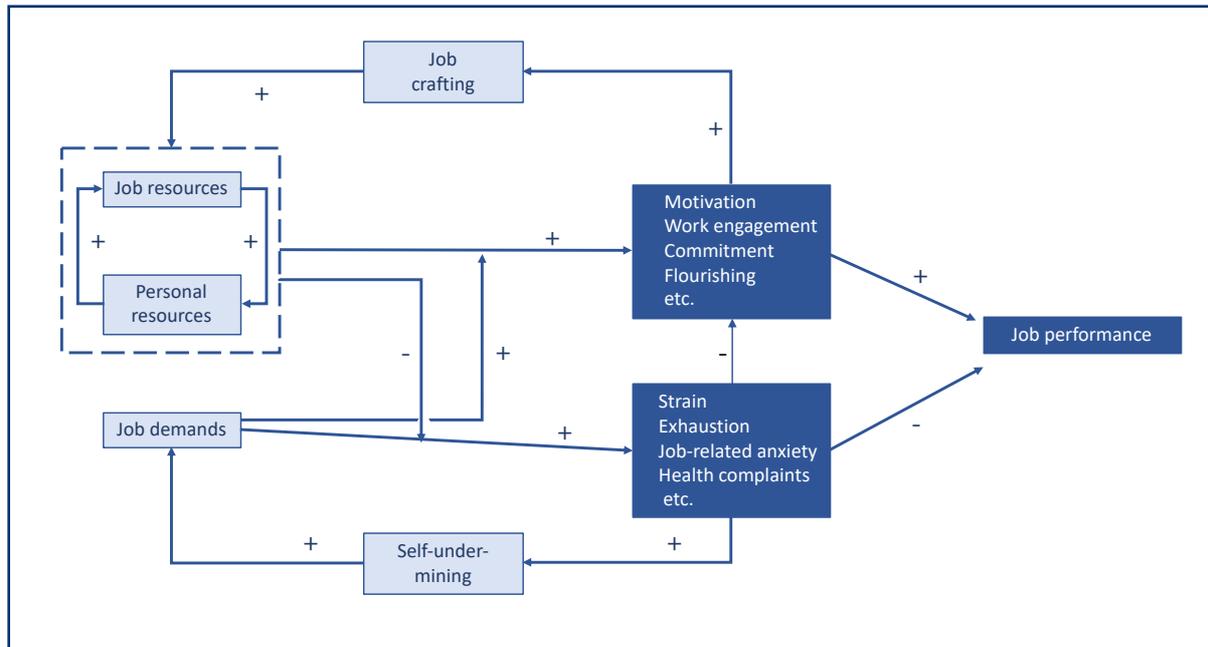
- *Personal resources* – “the beliefs people hold regarding how much control they have over their environment. Individuals who are high in optimism and self-efficacy believe that good things will happen to them, and that they are capable to handle unforeseen events.”
- *Job crafting* – “proactive changes employees make in their job demands and resources” [section 8]
- *Self-undermining* – “behaviour that creates obstacles that may undermine performance... [E]mployees who engage in self-undermining...communicate poorly, make more mistakes and create more conflicts” (Bakker & Demerouti, 2017, pp. 275, 276, 277)

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<sup>9</sup> See *OHS BoK 19 Psychosocial Hazards*, section 4, for an explanation of psychosocial hazards from a work demands–resources perspective.

<sup>10</sup> This view of burnout incorporates two of the three dimensions of the Maslach Burnout Inventory (MBI) (Maslach & Jackson, 1981; Maslach et al., 2001). The MBI includes exhaustion and depersonalisation/cynicism dimensions that resemble Demerouti et al.’s (2001) exhaustion and disengagement, and a third dimension – professional inefficacy (i.e. reduced productivity, inability to cope).

Workers who are motivated are likely to engage in job crafting, which generates additional job resources, thus creating a positive 'gain spiral'; self-undermining, on the other hand, is associated with a negative 'loss spiral' of job demands and exhaustion (Bakker & Demerouti, 2017). Personal resources (e.g. optimism, self-esteem and belief in one's abilities) have been found to reinforce job resources and vice versa (Xanthopoulou et al., 2009).



**Figure 5: Job demands–resources model (Bakker & Demerouti, 2017, p. 275)**

Various reviews have demonstrated empirical support for the JD-R model's assumptions (e.g. Schaufeli & Taris, 2014; Lesener et al., 2019). The JD-R is particularly relevant for OHS professionals because it:

- Has a clear focus on psychosocial aspects of work design
- Includes work demands that concern human factors issues with known safety and health consequences
- Covers the health impairment processes that can result from excessive work demands
- Is flexible in regard to specific job demands and resources included, and therefore applicable to different work domains (Bakker & Demerouti, 2014; Schaufeli & Taris, 2014).

### 3.5 SMART model

A recent addition to the current work design models, the SMART model was developed within a 'Thrive at Work' framework by Sharon Parker and colleagues at the Centre for Transformative Work Design (e.g. Klonek & Parker, 2021; Parker & Jorritsma, 2021; Parker et al., 2022). This model proposes that SMART work has five dimensions:

- **Stimulating** – “A high degree of mental complexity and variety as a result of the nature and organization of one’s work tasks, responsibilities, and relationships”
- **Mastery-oriented** – “When work is organized in a way that one can understand what one’s tasks, activities, relationships, and responsibilities are, how they ‘fit’ in the wider system, and how well they are executed”
- **Agentic** – “A high degree of autonomy, control, and influence over one’s work tasks, activities, relationships, and responsibilities”
- **Relational** – “Experiencing support, connection, and an opportunity to positively impact others as a result of the nature and organization of one’s tasks and activities”
- **Tolerable** – “Work demands that are not overly taxing of one’s personal resources / coping ability and/or that do not significantly impair one’s ability to carry out non-work roles.” (Parker et al., 2022, p. 741)

Figure 6 lists some of the work characteristics identified within these dimensions. Although research has yet to validate the model and its assumptions, it has been successfully applied in various industry projects (Parker & Jorritsma, 2021). Parker and colleagues maintain that SMART work design not only prevents harm by addressing psychosocial risks, but also enables both workers and organisations to thrive.<sup>11</sup>



Figure 6: SMART model<sup>12</sup>

<sup>11</sup> The SMART Work Design website ([www.smartworkdesign.com.au/overview](http://www.smartworkdesign.com.au/overview)), provides practical guidance on how to assess and improve work design.

<sup>12</sup> Based on [www.smartworkdesign.com.au/overview](http://www.smartworkdesign.com.au/overview)

## 3.6 Teamwork

A lot of work design research and theory has focused on the jobs of individual workers. Given the ubiquitous nature of teamwork and recognition of the importance of the social context in which a job is performed,<sup>13</sup> increasing attention is being given to the design of teamwork and teams, and it makes sense to jointly address job and team design (Morgeson & Humphrey, 2008). After all, teams provide the social and organisational context for work.

Human factors research has long recognised that team functioning and performance impact safety outcomes. This is particularly so in complex systems, where workers, work teams, and the equipment and technology they interact with are considered joint cognitive systems (e.g. Hollnagel & Woods, 2005) or sociotechnical systems (e.g. Emery, 2016). From a human factors perspective, work design characteristics such as communication systems, distribution of authority, time pressure, interface design, etc., are examples of performance-shaping factors (section 4.2.2) particularly relevant for teams. Performance-shaping factors not only influence the probability of team and individual errors, but also the probability of timely error detection within the team and subsequent recovery (e.g. Sasou & Reason, 1999). Error detection and recovery are important both for safety performance (avoiding accidents) (Kanase & van der Schaaf, 2001) and effectiveness/performance in general (van Dyck et al., 2005). Teams play a key role in the processes involved in error detection and recovery, and hence it is important to design teamwork (and individual team members' jobs) in such a way that these processes are optimally supported (e.g. Helmreich et al., 2001; Kanase et al., 2006). Also, human factors research has demonstrated the important role played by work design in team members' ability to arrive at an accurate shared mental model of the team's context, goals and progress towards goals, or shared situation awareness (Endsley, 1995; Stanton et al., 2017). Situation awareness feeds into decision making and actions, and impacts both general and safety performance (e.g. Endsley, 1995).

Although the research on work design characteristics for teams described below has mainly investigated links with effectiveness and general performance outcomes, given the parallels described above between safety and general performance outcomes of team work design, it is of relevance to OHS professionals.

In one of the earlier studies of team work design, Campion et al. (1993) distinguished five themes, or clusters, of work group characteristics (which have commonalities with the individual job characteristics presented in the previous sections):

- *Job design* includes task identity, task variety, task significance, participation and self-management (i.e. autonomy); closely linked to Hackman and Oldham's JCM (section 3.1), but with job characteristics investigated at (or aggregated to) the group level

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<sup>13</sup> See OHS BoK 8.3 People in Organisations (in development at time of writing).

- *Interdependence* concerns interdependence between team members with regard to tasks, goals, feedback and rewards
- *Composition* includes aspects of team composition such as heterogeneity/diversity in terms of abilities, disposition and experience, preference for group work, flexibility in job assignments, and size of team
- *Context* includes organisational situational characteristics and resources such as the training provided to team members, managerial support, and communication and cooperation between groups
- *Process* includes team potency/functioning, social support, workload sharing, and communication and cooperation within the group.

Campion et al. (1993) found that while all five themes contained characteristics that predicted work group effectiveness criteria, “the job design and process themes were slightly more predictive than the interdependence, composition, and context themes” (p. 823).

Cohen and Bailey (1997) drew on the work of Campion et al. (1993) and others to present a framework for analysing team effectiveness that included three ‘design factors’:<sup>14</sup>

- Task design, e.g. autonomy, interdependence
- Group composition, e.g. size, tenure, demographics, diversity
- Organisational context, e.g. rewards, supervision, training, resources.

Stewart (2006) applied Cohen and Bailey’s (1997) design categories in a meta-analysis and found improvement in team performance to be associated with: task design characteristics of autonomy, intrateam coordination and, to some extent, task meaningfulness; group composition aggregated characteristics of team member cognitive ability, personality and expertise; and leadership in the organisational context, particularly, transformational and empowering leadership.

Carter et al.’s (2019) meta-analytic review of 398 studies of the effects of team work design characteristics on team performance applied the Cohen and Bailey (1997) and Stewart (2006) team design categories as: team composition, task design and team leadership. Carter et al. (2019, p. 172) concluded:

Regarding team composition, assessing individual skills and complex patterns of diversity across group members appears to be more valuable than simple variance investigations of team composition characteristics. Team designers should pay particular attention to core and prominent members whose influence is likely stronger than other team

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<sup>14</sup> In addition to these design factors (i.e. categories of work design characteristics), Cohen and Bailey’s (1997) heuristic model of group effectiveness included environmental factors, internal processes, group psychological traits and effectiveness outcomes. The design factors were conceived as “those features of the task, group, and organization that can be directly manipulated by managers to create the conditions for effective performance” (Cohen & Bailey, 1997, p. 244).

members...For task design characteristics, the results situate autonomy, feedback, interdependence, and meaningfulness as important factors...Finally, the current results underscore the substantial impact of team leadership on team performance.

The work design characteristic of *interdependence* between team members has seen perhaps the largest variation in findings in regard to its associated outcomes. To understand this variation, it is important to note that different types of interdependence tend to have different effects (e.g. Courtright et al., 2015; Handke et al., 2020). While conflicting findings are yet to be fully resolved, Courtright et al. (2015) defined two types of interdependence that positively impact team performance via different mechanisms:

- *Task interdependence* – “the degree to which taskwork is designed so that members depend upon one another for access to critical resources and create workflows that require coordinated action” (p. 5) – improves coordination of activities and collective efficacy
- *Outcome interdependence* – “the degree to which the outcomes of taskwork are measured, rewarded, and communicated at the group level so as to emphasize collective outputs rather than individual contributions” (p. 5) – improves cohesion and promotes the collective good.

Also, Courtright et al. (2015) found that the benefits of interdependence were more pronounced in collectivist national cultures than they were in individualistic cultures.

In virtual teams – i.e. teams “in which members are geographically dispersed and coordinate their work predominantly with electronic information and communication technologies” (Hertel et al., 2005, p. 69) – the impact of various work design characteristics can differ from the impact in co-located team settings. For example, Gibson et al. (2011) demonstrated that perceptions of electronic dependence and a lack of colocation increase the importance of task significance for experiencing jobs as meaningful in virtual team contexts. Also, Handke et al. (2022) elucidated the vital role of feedback in virtual teams and found that “virtual teams benefit particularly from feedback that (a) combines performance-related information with information on team processes and/or psychological states, (b) stems from an objective source, and (c) targets the team as a whole” (p. 41).<sup>15</sup>

### 3.7 Key points

Key points to take away from this overview of work design theory and models include the distinction between characteristics that act as resources for the worker or work team (e.g. autonomy, task significance, task and skill variety, and social support) and characteristics that act as demands (e.g. time pressure, role conflict and emotional demands). Resources

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<sup>15</sup> For more on virtual work, see section 5.2.2 and *OHS BoK* 37.4 Workers Working From Home.

tend to have beneficial outcomes for the individual worker, the work team and the workplace or organisation in general, and demands, if not balanced with sufficient resources, tend to have negative outcomes. Furthermore, while all the models and corresponding theory in this section reflect contemporary understanding of work design, some models include a wider variety of work design characteristics. When presented with an opportunity to evaluate and influence work design, it can be helpful to use a more detailed model that encompasses characteristics that operate as resources (including social characteristics) and characteristics that operate as demands, such as the expanded work design model (section 3.2), the JD-R model (section 3.4) or the SMART model (section 3.5). For teamwork, any of the models of team work design characteristics described in section 3.6 will direct attention to relevant characteristics (e.g. interdependence between team members, cooperation, coordination, communication and team composition).

## 4 Outcomes of work design

As noted in section 1, work design impacts a variety of outcomes for individual workers, work teams and organisations, with poor work design contributing to the existence of psychosocial hazards in the workplace.<sup>16</sup> This section unpacks how work design impacts various outcomes. Firstly, it summarises research linking work design characteristics with a broad range of individual, team and organisational outcomes; secondly, it presents evidence of links with safety-specific outcomes; and concludes with some work design considerations relevant to finding the right balance of job characteristics.

### 4.1 Individual, team and organisational outcomes

Humphrey et al.'s (2007) expanded work design model (section 3.2) was based on a meta-analysis of 259 work design studies that investigated links between work design characteristics and a range of outcomes. It involved replication and extension of an earlier meta-analytic summary (Fried & Ferris, 1987) and included the following work outcomes (Humphrey et al., 2007; Figure 3):

- Behavioural outcomes
  - Objectively rated performance
  - Self-rated (subjective) performance
  - Absenteeism
  - Turnover intentions
- Role perception outcomes
  - Role ambiguity (lack of clarity about one's job role)

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<sup>16</sup> See *OHS BoK 19 Psychosocial Hazards*.

- Role conflict (conflicting demands within one's job role)
- Wellbeing outcomes
  - Anxiety
  - Stress
  - Burnout/exhaustion
  - Overload
- Attitudinal outcomes
  - Satisfaction with job, supervisor, coworker, compensation, growth, promotion opportunities
  - Organisational commitment
  - Job involvement
  - Internal work motivation.

The variety of outcome types associated with work design characteristics is noteworthy, spanning behaviours, performance, intentions, attitudes, perceptions and wellbeing. Some outcomes are direct consequences of the work design characteristics, while others are indirect, in some cases including an intermediate outcome, such as the path from task significance via work motivation to performance (Humphrey et al., 2007).

Table 1 summarises the effects identified by Humphrey et al. (2007). Specific results included:

- *Behavioural/performance outcomes.* Autonomy was the only work design characteristic that was significantly positively correlated with objectively measured performance (i.e. not reported by the worker). Job complexity had the strongest positive correlation with subjective performance, and social support at work had the strongest negative correlation with turnover intentions, meaning that a supportive work environment helps to prevent people from wanting to leave their job.
- *Role perception outcomes.* Feedback from the job had the strongest negative correlation with both role conflict and role ambiguity, indicating that the more obvious it is from a job how well workers are performing, the less conflict and ambiguity they will feel about their role.<sup>17</sup>
- *Wellbeing outcomes.* Feedback from the job had the strongest negative correlation with anxiety, indicating that when it is easy to see how well workers have done in a job, their anxiety levels tend to be lower. Social support had the strongest negative association with burnout (i.e. reducing burnout) indicating the importance of supportive supervisors and coworkers. Work conditions (i.e. aspects of the work environment such as health hazards, temperature and noise) had the strongest link

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<sup>17</sup> Note that the role perception outcomes (i.e. role conflict and role ambiguity) are considered job demands in other work design models. Humphrey et al.'s (2007) research did not distinguish between job resources and demands, and the characteristics they included are mainly job resources. This research positions role ambiguity and role conflict as negative outcomes that are minimised by job feedback, job autonomy and social support.

with stress (i.e. better conditions mean less stress). This was confirmed with a regression analysis:

...work conditions explained an [additional] incremental 16% of the variance in stress. The variance explained by this single work characteristic was larger than the variance explained by either the five motivational characteristics or three social characteristics, highlighting the power of work conditions to influence work outcomes. (p. 1347)

- *Attitudinal outcomes.* Social support had the strongest positive correlation with job satisfaction and organisational commitment. Task significance (i.e. meaningfulness) had the strongest positive correlation with both job involvement and work motivation, meaning that workers who found their tasks personally meaningful were more motivated to do that work. (Humphrey et al., 2007)

**Table 1: Correlations\* between work design characteristics\*\* and various outcomes based on Humphrey et al. (2007, p. 1342)**

Outcome type	Motivational characteristics								Social characteristics				Work context characteristics	
	Autonomy	Skill variety	Task variety	Task significance	Task identity	Feedback from the job	Information processing	Job complexity	Interdependence	Feedback from others	Social support	Interaction outside organisation	Physical demands	Work conditions
<b>Behavioural outcomes</b>														
Performance – objective	+	ns	ns		ns	ns		ns						
Performance – subjective	++	ns	++	++	+	+		+++	+	++	+			
Absenteeism	-	ns		ns	-	-		ns	ns		-			
Turnover intentions	ns	ns		ns	ns	ns		ns	-	--	--			
<b>Role perception outcomes</b>														
Role ambiguity	--	ns	ns	ns	ns	---		ns	ns	ns	--			ns
Role conflict	-	ns	ns	ns	-	--			ns		--			
<b>Wellbeing outcomes</b>														
Anxiety	-	ns		ns	ns	--		ns			--			
Stress	--	ns		ns	-	--			-	--	--			---
Burnout/ exhaustion	--	ns		--	--	ns				-	--			ns
Overload	ns		+++	+++				+++	ns		-			
<b>Attitudinal outcomes</b>														
Job satisfaction	+++	+++	+++	+++	++	+++	+++	+++	++	+++	+++	+	--	++
Organisational commitment	+++	++		+++	++	++			+++		+++			
Job involvement	++	++		++	+	++		++	++	+	ns			
Internal work motivation	++	+++		+++	++	++			++	++	+			

\* Positive correlations: + up to .15; ++ from .15 up to .30; +++ .30 or more  
 Negative correlations: - down to -.15; -- from -.15 down to -.30; --- .30 or less  
 ns = not significant; empty cell = no data available to test correlation

\*\*Characteristics of specialisation, problem solving and ergonomics were not included due to lack of available research.

Worth noting is that research has established that *work motivation* is associated with a range of work design characteristics and is one of the pathways through which work design is connected to other outcomes such as performance, absenteeism and turnover. Self-determination theory (Deci & Ryan, 2000) maintains that satisfaction of the basic psychological needs for *competence*, *autonomy* and *relatedness* is an underlying motivational mechanism that energises and directs people's behaviour.<sup>18</sup> Deci and Ryan (2000, pp. 235, 236, 237) distinguished between *intrinsic motivation* (which "involves people freely engaging in activities that they find interesting"), *extrinsic motivation* ("in which people's behavior is controlled by specific external contingencies") and *amotivation* ("a state in which people...lack motivation"). Applications of self-determination theory to the work context include the development of a questionnaire to measure *work-related basic needs satisfaction*, with subscales for competence, autonomy and relatedness (van den Broeck, Vansteenkiste et al., 2010), and a questionnaire to measure work motivation (Gagné et al., 2015).

## 4.2 Safety outcomes

Of particular interest to OHS professionals is Nahrgang et al.'s (2011) meta-analysis of 203 studies that applied the JD-R model (section 3.4) to test the relationship between job demands/resources and burnout, engagement and workplace safety outcomes. The variables investigated by Nahrgang et al. (2011, p. 76-77) included:

### Job demands

- *Risks and hazards* includes perceived risk, level of risk, number of hazards, and perceptions of safety...
- *Physical demands* includes physical demands, workload, and work pressure or high work pace
- *Complexity* includes cognitive demands, task complexity, and ambiguity.

### Job resources

- *Knowledge* includes employee understanding of safety, policies, rules and procedures, as well as safety training
- *Social support* includes involvement and support from coworkers, teamwork, and coworker support for safety
- *Leadership* includes styles of leadership (i.e. transformational), relationships between leaders and workers (i.e. leader-member exchange), trust, and supervisor support for safety...
- *Safety climate* includes the overall perceptions of the safety climate, the perceptions of management's involvement in safety, and proactive management of safety
- [*Autonomy*, i.e. "the freedom individuals have in carrying out their work" (p. 3)].

### Burnout

- *Burnout* includes worker anxiety, health, and depression, and work-related stress.

### Engagement

- *Engagement* includes worker participation in safety as well as safety communication and information sharing with workers
- *Compliance* includes compliance with safety and preventative measures such as personal protection equipment and housekeeping

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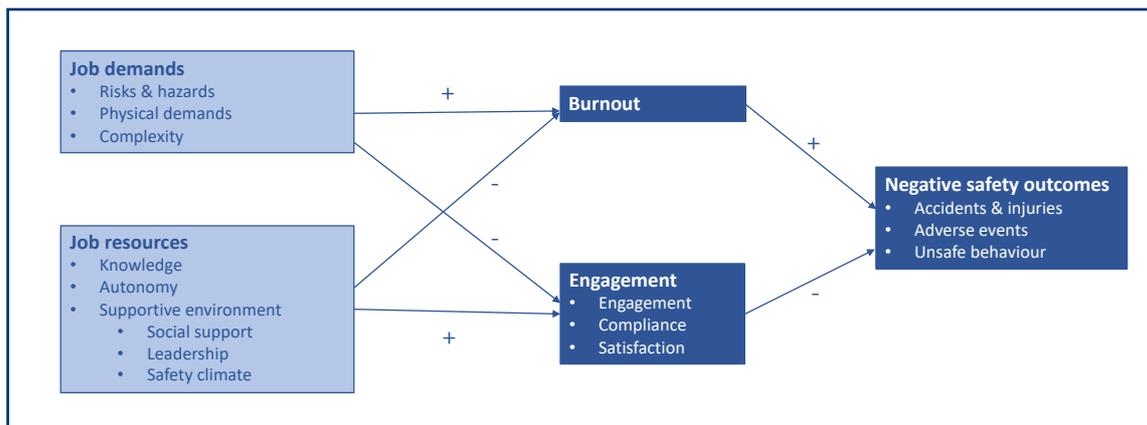
<sup>18</sup> See OHS BoK 37.4 Workers Working From Home.

- *Satisfaction* includes job and organizational satisfaction and organizational commitment.

Safety outcomes

- *Accidents and injuries* includes accident and injury rates and injury severity
- *Adverse events* includes near misses, safety events, and errors
- *Unsafe behavior* includes unsafe behaviors, absence of safety citizenship behaviors, and negative health and safety.

Figure 7 depicts the relationship between these variables, consistent with the JD-R model.



**Figure 7: Nahrgang et al.'s (2011, p. 72) research model**

Nahrgang et al. (2011, p. 86) found that, in line with JD-R predictions:

Job demands such as risks and hazards and complexity impair employees' health and lead to burnout. Likewise, we found support for job resources such as knowledge, autonomy, and a supportive environment motivating employees toward higher engagement. Job demands were also found to hinder an employee's progress toward engagement, whereas job resources were found to mitigate burnout. Finally, we found that burnout was detrimental to working safely but that engagement motivated employees toward working safely.

Table 2 summarises Nahrgang et al.'s (2011) findings. Specific results included:

*Job demands*

- Of the job demands, risks/hazards and complexity were positively related to burnout and negatively related to engagement.
- Risks/hazards contributed the most to increasing burnout, reducing engagement, reducing procedure compliance and increasing accidents/injuries and adverse events.
- Physical job demands had the strongest negative link with job satisfaction.
- Job complexity had the strongest link with unsafe behaviour.
- In all three categories of safety outcomes, burnout and procedure compliance had

the greatest impact, with burnout associated with worse outcomes, and compliance associated with improved outcomes.

#### *Job resources*

- All the job resources (knowledge, autonomy, social support, leadership and safety climate) were negatively related to burnout; knowledge, social support, leadership and safety climate were positively related to engagement, compliance and satisfaction
- Autonomy, leadership and safety climate<sup>19</sup> contributed the most to reducing burnout.
- Safety climate and social support contributed the most to increasing engagement and procedure compliance.
- Leadership and social support had the strongest links with job satisfaction.
- Social support contributed the most to reducing accidents/injuries; social support, autonomy and safety climate contributed the most to reducing adverse events; safety climate contributed the most to reducing unsafe behaviour. (Nahrgang et al., 2011)

The researchers found some variability in the relative importance of the job demands across four industries (construction, healthcare, manufacturing and transportation), indicating the importance of domain-specific investigations and targeted interventions. A supportive environment for workers was consistently important for wellbeing and safety outcomes in all four industries, suggesting that provision of such support may rival safety training as a key safety intervention (Nahrgang et al., 2011).

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<sup>19</sup> See *OHS BoK 10.2.2 Organisational Culture: Reviewed and Repositioned*.

**Table 2: Relationships between job demands/resources, burnout, engagement and safety outcomes based on Nahrgang et al. (2011, pp. 79-80)\***

Variable	Engagement				Safety outcomes		
	Burnout	Engagement	Compliance	Satisfaction	Accidents and injuries	Adverse events	Unsafe behaviour
<b>Job demands</b>							
Risks and hazards	++	---	---		+	++	+
Physical demands			-	--	+		++
Complexity	+	---	--	--	+	+	++
<b>Job resources</b>							
Knowledge	-	++	++	+	-	-	--
Autonomy	--	++		++	-	--	--
Social support	--	+++	+++	+++	---	--	--
Leadership	--	+++	+++	+++	-	-	--
Safety climate	--	+++	+++	+++	--	--	--
<b>Burnout</b>					+	++	++
<b>Engagement</b>							
Engagement						--	--
Compliance					-	--	--
Satisfaction					-	--	-

\* Includes only statistically significant relationships (95% Confidence Interval does not cross zero), + represents positive relationship, - represents negative relationship, + or - explains 0%-24% of variance, ++ or -- explains 25%-49% of variance, +++ or --- explains >50% of variance.

## 4.2.1 Psychological safety

A work design outcome of particular interest to OHS professionals is *psychological safety*, which has been defined as “perceptions of the consequences of taking interpersonal risks in a particular context such as a workplace”<sup>20</sup> (Edmondson & Lei, 2014, p. 24). In a meta-analysis of psychological safety research, Frazier et al. (2017) demonstrated that the work design characteristics of autonomy, interdependence, role clarity and supportive work context are antecedents that positively impact psychological safety, and that psychological safety is positively associated with outcomes such as satisfaction, work engagement, learning, task performance and creativity.

Psychological safety has been found to impact a proactive worker behaviour referred to as *voice*, i.e. speaking up with ideas, suggestions or concerns (e.g. Chamberlin et al., 2017; LePine & van Dyne, 1998; Liang et al., 2012; Maynes & Podsakoff, 2014). Workers who perceive their workplace as psychologically safe are more inclined to speak up without fear of being ridiculed or punished (Edmondson & Lei, 2014). Voice is essential for maintenance of high levels of safety, particularly in dynamic, high-risk organisations (e.g. Vogus et al., 2010). A key characteristic of so-called high-reliability organisations (HROs) is that they encourage worker voice and heed workers’ warnings (Roberts & Bea, 2001; Vogus et al., 2010; Weick & Sutcliffe, 2007). Also, HROs delegate decision-making authority to those with the most expertise and experience in the area where the decision is needed, providing frontline workers with autonomy in alignment with the principles of good work design (SWA, 2020).

## 4.2.2 Work design and errors<sup>21</sup>

There is a long history of human factors and human reliability research focused on the role of work design characteristics in error causation and the likelihood of errors being made. Additionally, human reliability research in various industries, including aviation, healthcare and chemical processing, has highlighted the importance of work design for error management (e.g. Frese & Keith, 2015; Helmreich et al., 2001; Kanse & van der Schaaf, 2001; Kanse et al., 2006; van Dyck et al., 2005). The influence of work design on error causation, detection and recovery applies in both individual and team work settings. Human factors researchers and professionals consider work design characteristics such as task complexity, workload, time pressure, interface design, task frequency/repetitiveness and work schedule as performance-shaping factors (e.g. Reason, 1990; Reason et al., 1998; Sasou & Reason, 1999; Swain & Guttman, 1983), performance-influencing factors (e.g. Anderson, 2016; Embrey, 2000; HSE, n.d.) or threats (e.g. Gordon et al., 2005; Helmreich et al., 2001). Other types of performance-shaping/influencing factors include physical design

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<sup>20</sup> Psychological safety differs from the concept of safety climate/culture. As defined by Zohar (1980, p. 96; 2010), safety climate “reflects employees’ perceptions about the relative importance of safe conduct in their occupational behavior.”

<sup>21</sup> This section does not enter the philosophical discussion of the attribution of ‘errors’ in safety.

aspects of the workplace and organisational/cultural factors. Performance-shaping/influencing factors are considered proactively in human reliability assessment (Kirwan, 1994) and reactively in accident investigations/analyses.

### 4.3 Balancing work design characteristics

Ideally, all jobs would contain only those work design characteristics associated with positive outcomes; however, this is not always possible. In such cases, counterbalancing, or offsetting, characteristics associated with negative outcomes with characteristics associated with positive outcomes is essential.

Inspired by research applying a challenge stressor–hindrance stressor framework (LePine et al., 2005; Podsakoff et al., 2007), recent work design research (particularly studies based on the JD-R)<sup>22</sup> has differentiated between two types of demands:<sup>23</sup>

- *Hindrance demands* are “health-impairing job demands that hinder optimal functioning” (van den Broeck, de Cuyper et al., 2010, p. 736), e.g. “excessive bureaucracy, role ambiguity, role conflict, and hassles,” which have negative outcomes such as reduction in work engagement and lower positive affect (Tadić et al., 2015).
- *Challenge demands* are “job demands that require some energy, but are nonetheless stimulating” (van den Broeck, de Cuyper et al., 2010, p. 736), e.g. “workload, time urgency, job responsibility, and job complexity,” which have positive outcomes such as work engagement and positive affect that can be boosted by sufficient job resources (Tadić et al., 2015).

This distinction suggests that “job hindrances need to be reduced, whereas job challenges must not necessarily be decreased, as they play, together with job resources, a key role in the enhancement of employees’ vigour” (van den Broeck, de Cuyper et al., 2010, p. 756).

A work design issue that requires balancing is worker autonomy versus control via rules and procedures. As shown in sections 4.1 and 4.2, having autonomy to make decisions at work contributes positively to engagement, motivation and job satisfaction, is protective against burnout, and is associated with fewer accidents, injuries and adverse events, and less unsafe behaviour. On the other hand, prescriptive rules and procedures can have a negative impact on the management of complex systems:

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<sup>22</sup> For example: Crawford et al. (2010); Tadić et al. (2015); van den Broeck, de Cuyper et al. (2010).

<sup>23</sup> It is important to note that perception of job demands as challenges or hindrances can differ among workers (e.g. Gerich, 2017; Gerich & Weber, 2020) and across work domains (e.g. Bakker & Sanz-Vergel, 2013).

Generally, prescriptive rules and procedures are not conducive to the empowerment, opportunity, diversity and creativity required to manage emergence and dynamic processes. Deference to protocol should be balanced with deference to expertise in complex systems (e.g. Amalberti, 2013). ... [I]t is not possible to specify rules and procedures for all situations and contexts, and there is concern that proceduralisation has been adopted well in advance of the evidence base, and that procedures can improve compliance without improving performance or safety (Pélegrin, 2013).<sup>24</sup>

However, in high-risk work, rules and procedures may be required as 'hard boundaries' for tasks or situations. Thus, where the objective is improved health and safety, OHS professionals play a key role in determining the appropriate balance between giving workers autonomy in work methods and using strict proceduralisation to control for safety risks.<sup>25</sup>

Although it is tempting to conclude that it is always a good idea to improve/increase a particular work design characteristic that has been consistently linked with positive outcomes, balance is also important in this regard. Work design characteristics do not operate in isolation – they correlate and interact with other job characteristics and the environment in which a job is performed. Changing one characteristic may have knock-on effects.<sup>26</sup> For example, excessive skill variety can negatively impact perceived task identity (Johns, 2010). More is not always better; for example, curvilinear (u-shaped) relationships have been identified between job complexity and emotional exhaustion – neither too little nor too much job complexity is a good thing (Xie & Johns, 1995) – and, similarly, between autonomy and stress, and between work pressure and creativity (Johns, 2010). Parker, Morgeson et al. (2017) argued that findings such as this need to be considered in organisational restructuring processes “in which disparate tasks are combined into ‘super jobs’ that may greatly tax their incumbents.” While what constitutes the best work design can vary for individual workers, good work design practice should minimise health and safety risk across the workforce.

## 5 Influences on work design

Given all the available research on what constitutes good and bad work design, one would expect that nowadays most jobs are well designed. However, poorly designed jobs continue to exist. This poses the question as to what factors influence work design, as awareness of these could help to overcome barriers to good work design. Interestingly, not much research has been dedicated to work design influences. To address this gap, Parker, van den Broeck et al. (2017) presented a multilevel framework that accounts for direct and indirect effects of the following contextual influences on work design:

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<sup>24</sup> OHS BoK 12.3.1 Rules and Procedures (pp. 4, 7).

<sup>25</sup> See OHS BoK 12.3.1 Rules and Procedures.

<sup>26</sup> See OHS BoK 12.1 Systems and Systems Thinking.

- Higher-level external factors, e.g. globalisation, national institutional regimes, occupational tasks and values
- Organisational factors, e.g. technology, HR practices and operational uncertainty
- Local context factors at the work group level, e.g. team composition, interdependence and autonomy
- Individual factors, e.g. demographics, personality and competence.

The framework features two indirect effects of these factors on work design:

...first, factors affect formal decision-making processes via influencing managers' work design-related motivation, knowledge, skills, and abilities (KSAs), and opportunities; and second, factors shape informal and emergent work design processes via influencing employees' work design-related motivation, KSAs, and opportunities (Parker, van den Broeck et al., 2017, p. 267).

The four types of contextual influences are addressed below, followed by a discussion of the first indirect effect, that is, formal top-down work design by managers. (The second indirect effect – informal work design undertaken by workers – is addressed in section 8.) This section concludes with a discussion of potential triggers for work (re)design.

## 5.1 External factors

Higher-level external (international, national and occupational) influences on work design include, for example, legislation, codes of practice, standards and guidance materials provided by government bodies, and professional and community groups.

### 5.1.1 Legislation

While there are jurisdictional differences, Australian work health and safety laws generally require persons conducting a business or undertaking to ensure the health and safety of their workers by eliminating risks to health and safety and, if elimination is not possible, by minimising risk so far as is reasonably practicable to protect people from work-related harm (SWA, 2022).<sup>27</sup> Eliminating or minimising hazards at the source before risks are introduced into the workplace is a very effective way of providing the highest level of protection and can be achieved through good work design. This is the case particularly for psychosocial hazards, which are most often associated with poor work design, but also for physical health and safety hazards.

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<sup>27</sup> All Australian jurisdictions have acts and regulations based on the *Model Work Health and Safety Bill* (SWA, 2022).

### 5.1.2 Codes of practice, standards and guidance materials

Government policy bodies often provide codes of practice and guidance for achieving the standards specified under the legislation.<sup>28</sup> For example, Safe Work Australia’s *Principles of Good Work Design: A Work Health and Safety Handbook* “provides information on how to apply the good work design principles to work and work processes to protect workers and others who may be affected by the work” (SWA, 2020, p. 3).

International and national standards bodies also influence work design, as organisations put structures and processes in place to adhere to standards relevant for their domain. Some standards have a particular focus on work design. For example, the International Organization for Standardization’s *ISO 27500:2016 The Human-centred Organization – Rationale and General Principles* contains guidance on applying human factors/ergonomics work design principles that characterise a human-centred organisation, including “adopt a total system approach, ensure health, safety, and well-being are business priorities [and]... create a meaningful work environment” (ISO, 2016). Also, *ISO 45003:2021 Occupational Health and Safety Management – Psychological Health and Safety at Work – Guidelines for Managing Psychosocial Risks* (ISO, 2021) addresses a range of work design characteristics.

In recent years, professional and community groups have started to address the importance of good work design, in particular with regard to its impact on mental health. For example, relevant position statements have been released by professional organisations including the Royal Australasian College of Physicians – *What is Good Work?* (RACP, 2013); the Human Factors and Ergonomics Society of Australia – *Good Work Design* (HFESA, 2020); and the Australian Institute of Health & Safety – *Psychological Health and Safety at Work* (AIHS, 2020).

Also, a wide range of community-level guidance material is aimed at positively influencing work design. For example:

- Heads Up<sup>29</sup> (an initiative of Beyond Blue supported by the Mentally Healthy Workplace Alliance) and the Black Dog Institute<sup>30</sup> offer a range of resources for workplaces targeting worker mental health.
- *Developing a Mentally Healthy Workplace* (Harvey et al., 2014) resulted from a

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<sup>28</sup> In Australia, various states and territories have developed codes of practice with guidance on how to achieve the standards under the work health and safety legislation. Most jurisdictions either have, or are in the process of developing, a code of practice on managing psychosocial hazards that covers work design. Links to jurisdictional Work Health and Safety regulators are available at [www.safeworkaustralia.gov.au/law-and-regulation/whs-regulators-and-workers-compensation-authorities-contact-information](http://www.safeworkaustralia.gov.au/law-and-regulation/whs-regulators-and-workers-compensation-authorities-contact-information)

<sup>29</sup> [www.headsup.org.au/](http://www.headsup.org.au/)

<sup>30</sup> [www.blackdoginstitute.org.au/education-services/workplaces/mental-health-toolkit/](http://www.blackdoginstitute.org.au/education-services/workplaces/mental-health-toolkit/)

collaboration between the Black Dog Institute and the University of New South Wales.

- *Blueprint for Mentally Healthy Workplaces* (NMHC, 2021) resulted from a collaborative project of the Mentally Healthy Workplace Alliance.
- The Centre for Transformative Work Design at Curtin University offers various resources to assist workplaces in designing better work.<sup>31</sup>
- The People at Work psychosocial risk assessment survey is an outcome of the People at Work Project research collaboration (University of Queensland, Australian National University, Workplace Health and Safety Queensland, WorkCover NSW, WorkSafe Victoria, Comcare, Safe Work Australia and Beyond Blue).<sup>32</sup>

These and similar initiatives play an important role in creating awareness in the wider community about good work design and psychologically healthy workplaces, equipping workers to call out poor work design and advocate for better work design.

## 5.2 Organisational factors

Organisational-level influences likely to increasingly impact work design include technology, non-standard work arrangements and operational uncertainty.

### 5.2.1 Technology

The technology adopted by an organisation for production or service processes can place restrictions on how workers perform their jobs. With increasing levels of automation and digitally driven work allocation and monitoring, careful consideration of the impact of these trends on work design and worker outcomes is important. Research on automation, robots and algorithmic management (i.e. the use of computer algorithms to manage aspects of a worker's job such as scheduling, monitoring and performance management) has shown that these technological advances can have both negative and positive effects on work design characteristics (e.g. Parent-Rocheleau & Parker, 2021). For example, automated decision making has the potential to replace or support human judgement and autonomy (Parker & Grote, 2020). Parker and Grote (2020) asserted that it is more likely that certain tasks within jobs will be automated rather than entire jobs, with workers increasingly working alongside automation. By proactively considering the work design implications of automation, it is possible to create meaningful work for humans while harnessing the benefits of automation (Parker & Grote, 2020; Smids et al., 2020).

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<sup>31</sup> [www.transformativeworkdesign.com/](http://www.transformativeworkdesign.com/)

<sup>32</sup> [www.peopleatwork.gov.au/](http://www.peopleatwork.gov.au/)

Technology, particularly information and communication technology (ICT), has facilitated the rise of more flexible work arrangements, such as remote/virtual work and gig work.

### 5.2.2 Work arrangements

Work structure and arrangements provide the context for job creation and hence are key organisational-level influences on how work is designed (e.g. shift work to ensure continuous operations). The remote location of some work sites, particularly in the resources industry, has led to fly-in-fly-out (FIFO) or drive-in-drive-out (DIDO) work arrangements, in which workers leave their homes for extended periods and are provided with food and lodging during their rostered time on site. Both shift work (Parkes, 1999, 2012) and FIFO/DIDO work arrangements (Parker et al., 2018) have been associated with increased potential for mental health issues, emphasising the need for work design that prevents such negative outcomes.

The increasing prevalence of flexible working arrangements, including working from home (which has become more accepted as a result of the COVID-19 pandemic), has highlighted the design issues associated with such work.<sup>33</sup> Typically, without colocation it is harder to provide workers with the kind of social support from coworkers and supervisors that occurs during face-to-face interactions in the workplace. Organisations have to get creative in their use of various communication media to build in opportunities for social support for remote workers, who may feel isolated from their workplace and professions (Charalampous et al., 2019). This is not a case of ‘one size fits all’ – different workers prefer different ways of checking in and are likely to juggle different home/family responsibilities. Some managers struggle with what they perceive as a lack of control over their workers when they work remotely; however, work performance tends to benefit from management trusting their workers, devolving job autonomy, and *checking in* to provide guidance and support rather than micromanaging workers by *checking up* on them (Parker et al., 2020).

Well before the COVID-19 pandemic, research had identified beneficial effects of remote work, or telecommuting:

...meta-analytic findings indicate that telecommuting is mainly a good thing. In terms of the psychological mediators, it is associated with increased perceptions of autonomy and lower work-family conflict. ... [It] was positively associated with the quality of employee-supervisor relationship...increased job satisfaction and lower turnover intent and role stress... (Gajendran & Harrison, 2007, p. 1535)

However, perceived autonomy was considered “pivotal for maximizing beneficial outcomes” and concern was raised about “the possibility that telecommuting may *increase* work-family conflict by making boundaries between domains more permeable” (Gajendran & Harrison, 2007, p. 1537, 1535).

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<sup>33</sup> See OHS BoK 37.4 Workers Working From Home.

Since the advent of COVID-19, a growing number of evidence-based resources have become available to assist in optimising the work design characteristics for working from home.<sup>34</sup> Research on how work design characteristics affect the challenges of working from home (e.g. work-home interference, loneliness, ineffective communication and procrastination) demonstrated that “social support was positively correlated with lower levels of all remote work challenges; job autonomy negatively related to loneliness; workload and monitoring both linked to higher work-home interference; and workload additionally linked to lower procrastination” (Wang et al., 2021).

Another type of flexible work arrangement worth noting because of its associated work design issues is ‘gig work,’ which refers to “fragmentation of work facilitated by gig economy business models that reduce labour costs by deeming workers ‘independent contractors’” (Kaine & Josserand, 2019, p. 479). Gig work is generally managed via online platforms where gig work supply and demand meet (e.g. ride-sharing and food delivery) and “gig workers typically face irregular work schedules, driven by fluctuations in demand for their services” (Stewart & Stanford, 2017, p. 420). There has been a steady increase in the amount of gig work over the past decade or so, and this trend is expected to continue. Goods et al. (2019) evaluated job quality in the Australian food-delivery sector and found that while gig work is promoted as a great way to gain work flexibility, undesirable job quality aspects have become evident, including income insecurity, high job demands and, perhaps surprisingly, low autonomy over various aspects of the work. Also, there are concerns regarding the legal protection of gig workers, including concerns pertaining to work health and safety (Stewart & Stanford, 2017).<sup>35</sup>

### 5.2.3 Operational uncertainty

Organisations with high levels of operational uncertainty need to design their work in such a way that it can cope with unpredictable demands and unexpected variations. These organisations typically use a highly skilled workforce that is allowed high autonomy and great task variety in performing their jobs. For example, high-reliability organisations (e.g. Roberts & Bea, 2001; Vogus et al., 2010; Weick & Sutcliffe, 2007) have embraced the delegation of decision-making authority (i.e. autonomy) to allow for prompt and efficient responses to unexpected events.

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<sup>34</sup> For example, the Centre for Transformative Work Design’s ‘Thrive at Work at Home’ resources available at [www.transformativeworkdesign.com/working-from-home](http://www.transformativeworkdesign.com/working-from-home)

<sup>35</sup> For information on health and safety in the gig economy, see [www.centreforwhs.nsw.gov.au/Projects/completed-projects/gig-economy-roles-and-responsibilities-in-whs](http://www.centreforwhs.nsw.gov.au/Projects/completed-projects/gig-economy-roles-and-responsibilities-in-whs)

### 5.3 Work group factors

Interdependence between group members (section 3.6) can influence how work is designed. High interdependence creates opportunities for group member interaction and social support, both of which are work design characteristics with positive outcomes. However, high interdependence can create opportunities for some team members to contribute less, a phenomenon called social loafing (Liden et al., 2004), which puts greater demands on others (Parker, van den Broeck et al., 2017).

### 5.4 Individual factors

Individual factors such as demographics (e.g. age, gender, education level) can influence work design in that those designing jobs may do so with a particular demographic in mind and create a job they deem suitable for that demographic (Parker, van den Broeck et al., 2017). Consideration should be given to the possible impact of this approach on workplace diversity, and the inappropriateness of excluding certain demographics. Also, individual characteristics are likely to impact on the extent to which workers get involved in (re)designing their own jobs, i.e. job crafting (section 8).

### 5.5 Top-down work design by managers

Campion and Stevens (1991) investigated how people design jobs and found that when management college students were asked to combine tasks into jobs they tended to group tasks based on similarity, a work simplification approach that resembled Taylor's (1911) scientific management. However, after receiving training in work design theories, the students were able to correctly apply work design concepts. Nearly three decades later, Parker et al. (2019) set out to replicate Campion and Steven's study, and similarly found that students ("naïve job designers") "naturally tend to develop simplified, low variety work" (p. 1). In addition, Parker et al. (2019) found that industrial/organisational psychologists (compared to other human service-oriented professionals) designed more enriched jobs for others and that "individuals with autonomy in their own jobs tend to create and support autonomous work for others" (p. 15).

Why is it then that people without work design training or experience tend to design non-enriched jobs that are unlikely to be motivating for the worker? Heath (1999, p. 25) found that "people generally hold lay theories which contain an *extrinsic incentives bias* – people predict that others are more motivated than themselves by extrinsic incentives (job security, pay) and less motivated by intrinsic incentives (learning new things)." If we are to help others design good work that impacts positively on worker wellbeing, it is important to make them aware of this bias and work motivation theory. Seeking ways to reduce psychological distance – i.e. the distance between the work designer's perceptions and the motivations of the person whose job they are designing – may improve work design (e.g. Liberman &

Trope, 2014). Also, reducing this distance may increase empathic concern (e.g. Batson et al., 1981) and aid in taking the perspective of the worker (Davis et al., 1996).

Of relevance is that research on resilience engineering (e.g. Hollnagel et al., 2011) has highlighted the gap between work-as-imagined (WAI) – i.e. the envisaged way of how work should be done that is documented in procedures and job descriptions – and work-as-done (WAD) – i.e. the way work is actually done in practice (Hollnagel, 2017). If there is a large psychological distance between the managers who are designing job roles and the workers who are operating systems, there is a good chance WAI by the manager and WAD by the workers will be different, and that the job as designed will be less than ideal for both the worker and the work that needs to be done.

## 5.6 Triggers for work (re)design

The factors described in sections 5.1 to 5.5 influence *how* work design is done. This section addresses factors that influence *when* work design is done. Triggers for a workplace to address work design issues include:

- *New legislation and/or codes of practice* (e.g. regarding psychosocial hazards) will prompt organisations to assess their compliance and need for work redesign should shortcomings be detected.
- *Organisational restructuring and change processes* can reveal a need to (re)design job roles, providing an opportunity to create better, safer and healthier jobs by applying the principles of good work design.
- *Incident and near-miss investigations* can prompt work redesign, particularly if causes involving work design are identified. Such investigations can be workplace/organisation-based or draw on incident/near-miss databases that enable analysis across extended periods of time and multiple events (van der Schaaf & Wright, 2005); identifying patterns of work design factors linked with incidents can provide a more solid basis for work redesign efforts than a single incident.
- *Workplace surveys* that measure current work design (e.g. with survey instruments described in section 6) are likely to lead to redesign efforts. Also, safety climate surveys may point to required work design improvements and focus areas. Depending on the scope of OHS roles within organisations, such surveys may fall within the remit of OHS professionals and/or human resource professionals.

## 6 Measuring work design

To understand the outcomes of work design for an individual/team and determine whether improvement is required, it needs to be measured. Survey methods are commonly used to

measure work design (Daniels, 2006). In this chapter the words 'survey' and questionnaire' interchangeably. Per definition, a survey or questionnaire is a list of questions to which a respondent has to reply, or a list of statements a respondent has to evaluate or rate. Questionnaires can use open ended or multiple-choice responses – work design questionnaires tend to fall in the latter category.

Work design questionnaires ask job incumbents about their perceptions of various aspects, or characteristics, of their job. Generally, the questionnaires use response scales, on which participants have to indicate their responses to statements describing a range of job characteristics. The response scales may reflect frequency (never – always), extent (not at all – very much), similarity (not at all similar – completely similar), agreement (strongly disagree – strongly agree) and so on. Most work design questionnaires use 5-point agreement response scales, with 1 = strongly disagree, 3 = neither disagree nor agree, and 5 = strongly agree. Work design questionnaires tend to contain several items (i.e. questions or statements) for each job characteristic they measure. A respondent's score for a particular job characteristic can be calculated by averaging their scores across the items representing that characteristic. Similarly, average scores can be calculated for teams, departments and entire organisations.

Some work design questionnaires use combinations of positively and negatively worded items for the same characteristic. For example, to measure social support, the item "At my work, coworkers work together to get the job done" is positively worded, and higher agreement scores indicate higher levels of social support, whereas the item "My coworkers do not help each other" is negatively worded, and higher agreement scores indicate lower levels of social support. Therefore, the negatively worded item needs to be reverse scored (*disagree to agree, strongly disagree to strongly agree, etc.*) before it can be used to calculate the average score for the corresponding job characteristic.

Work design questionnaires are generally completed by the job incumbents themselves resulting in self-reported job characteristic data. While self-report questionnaires have been criticised for their potential to contain bias introduced by respondents (relating to, for example, respondent temperament, transient mood and perceptions of others), workers' perceptions of their job characteristics are more likely to shape their behaviour than "any 'objective' reality" (Daniels, 2006, p. 271).

Alternative work design measurement methods, that can be used alongside or instead of self-report questionnaires, include behaviour observations (typically done by researchers being objective outsiders, e.g, Grebner et al., 2005), and ratings of job characteristics done by others than the job incumbent, such as their supervisor or co-workers (Spector et al., 1988; Steinberg et al., 1982). Combinations of observations and interviews are also possible (Tomaschek et al., 2018). Documentation such as job role descriptions, either available from the organisation where work design is being investigated, or from large national or international work or job-related databases (e.g. O\*NET<sup>36</sup>), can be a useful resource to assess work design as well. Techniques often used by human factors practitioners, such as hierarchical task analysis (e.g. Annett, 1996; Stanton, 2006) and cognitive task analysis (e.g. Crandall et al., 2006)<sup>37</sup>, can also provide insight into the characteristics of the job that is being analysed. After all, these types of analyses identify the various tasks and decisions involved in a job, and any interactions with- or dependencies on others. Essentially, the time studies done by Taylor and the time-motion studies done by the Gilbreths were examples of work design measurement – in their cases through structured observations.

Alternative methods of measuring work design come with their own issues and limitations. For example, some types of job characteristics are more readily observable than others (Daniels, 2006). Task variety, for instance, can easily be observed if an observed worker carries out a range of different tasks. However, other job characteristics that involve mostly cognitive processes, such as decision-making, aren't easily visible in observable behaviour. Furthermore, job characteristics ratings by others than the job incumbent, even though often referred to as 'objective ratings', are not necessarily free from bias, affective factors may influence the ratings done by peers or superiors (Steinberg et al., 1982).

Table 3 provides an overview of widely used work design questionnaires. Importantly, these questionnaires have been subjected to rigorous validity and reliability testing, which increases the likelihood of correct measurement and availability of comparison data for benchmarking purposes. However, a questionnaire should have been designed recently enough to (1) reflect current scientific insights and (2) be suitable for contemporary work environments and arrangements. Generally, the Work Design Questionnaire (WDQ), which is underpinned by the expanded work design model, would be a safe choice.

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<sup>36</sup> See <https://www.onetonline.org/>

<sup>37</sup> See *OHS BoK 34.2 An Introduction to User-Centred Safe Design* and *OHS BoK 34.3 Health and Safety in Design*.

**Table 3: Work design questionnaires**

Underpinning model	Survey tool	Sections	Response scale	Number of items	Example item(s)
Job Characteristics Model (JCM)	Job Diagnostic Survey (JDS) (Hackman & Oldham, 1974)	The extent to which the job contains certain elements related to skill variety, task identity, task significance, autonomy and feedback	7-point scale, from 'very little' to 'very much'	7	<i>To what extent does your job permit you to decide on your own how to go about doing the work?</i>
		Accuracy of various statements about the job related to skill variety, task identity, task significance, autonomy and feedback	7-point scale, from 'very inaccurate' to 'very accurate'	14	<i>The job requires me to use a number of complex or high-level skills.</i>
		Psychological states and personal and organisational outcomes	7-point scale, from 'strongly disagree' to 'strongly agree'	15 with self as referent, 10 with 'most people' as referent	<i>The work I do on this job is very meaningful to me.</i> <i>Most people on this job find the work very meaningful.</i>
		Satisfaction with job aspects including job security, benefits, colleagues, treatment, interaction opportunities and support	7-point scale, from 'extremely dissatisfied' to 'extremely satisfied'	13	<i>The amount of job security I have.</i> <i>The amount of personal growth and development I get in doing my job.</i>
		Desired job characteristics including job security, stimulating work, friendly coworkers and opportunity to be creative	7-point scale, from 'would like having this only a moderate amount' to 'would like having this extremely much'	11	<i>Stimulating and challenging work.</i> <i>Very friendly co-workers.</i> <i>High salary and good fringe benefits.</i>
		Choice between two kinds of jobs	5-point scale, from 'strongly prefer A' to 'strongly prefer B'	12	<i>A job with a supervisor who respects you and treats you fairly vs. A job which provides constant opportunities for you to learn new and interesting things.</i>

Underpinning model	Survey tool	Sections	Response scale	Number of items	Example item(s)
Job Demands–Control (JDC) Model	Job Content Questionnaire (JCQ) (Karasek et al., 1998)	Decision latitude	4-point scale for each section, from 'strongly disagree' to 'strongly agree'	10	<i>My job requires that I learn new things. My job allows me to make a lot of decisions on my own.</i>
		Psychological job demands		9	<i>My job requires me to work very hard.</i>
		Supervisor social support		5	<i>My supervisor pays attention to what I am saying.</i>
		Coworker social support		6	<i>People I work with are helpful in getting the job done.</i>
		Physical job demands		5	<i>My job requires much physical effort.</i>
		Job insecurity		6	<i>My prospects for career development and promotions are good.</i>
Expanded Work Design Model	Work Design Questionnaire (WDQ) <sup>38</sup> (Morgeson & Humphrey, 2006)	Autonomy	5-point scale for each section, from 'strongly disagree' to 'strongly agree'	9	<i>The job gives me a chance to use my personal initiative or judgment in carrying out the work.</i>
		Variety		4	<i>The job requires the performance of a wide range of tasks.</i>
		Significance		4	<i>The results of my work are likely to significantly affect the lives of other people.</i>
		Identity		4	<i>The job is arranged so that I can do an entire piece of work from beginning to end.</i>
		Feedback		3	<i>The job itself provides me with information about my performance.</i>
		Job complexity		4	<i>The tasks on the job are simple and uncomplicated (reverse scored).</i>
		Information processing		4	<i>The job requires me to monitor a great deal of information.</i>
		Problem solving		4	<i>The job requires unique ideas or solutions to problems.</i>

<sup>38</sup> The WDQ has been translated into various languages, including Spanish, Dutch, German and Polish. The original survey and translations are available at [www.morgeson.com/wdq.html](http://www.morgeson.com/wdq.html)

Underpinning model	Survey tool	Sections	Response scale	Number of items	Example item(s)
		Skill variety		4	<i>The job requires me to use a number of complex or high-level skills.</i>
		Specialisation		4	<i>The job requires very specialized knowledge and skills.</i>
		Social support		6	<i>People I work with take a personal interest in me.</i>
		Interdependence		6	<i>The job depends on the work of many different people for its completion.</i>
		External interaction		4	<i>The job involves interaction with people who are not members of my organization.</i>
		Feedback from others		3	<i>I receive a great deal of information from my manager and coworkers about my job performance.</i>
		Ergonomics		3	<i>The work place allows for all size differences between people in terms of clearance, reach, eye height, leg room, etc.</i>
		Physical demands		5	<i>The job requires a lot of physical effort.</i>
		Work conditions		3	<i>The job has a low risk of accident. The job takes place in an environment free from health hazards (e.g. chemicals, fumes).</i>
		Equipment		3	<i>The job involves the use of complex equipment or technology.</i>
Job Demands–Resources (JD-R) Model	No dedicated survey tool. Depending on the specific demands/resources being investigated, researchers tend to select relevant items from questionnaires such as the JCQ, the WDQ, the Oldenburg Burnout Inventory (Demerouti et al., 2010), the Utrecht Work Engagement Scale (UWES) (Schaufeli & Bakker, 2004) and the Questionnaire on the Experience and Evaluation of Work (QEEW) (van Veldhoven et al., 2015).				
SMART Model	No dedicated survey tool. Most job characteristics included in the SMART model can be measured using the matching items from the WDQ survey, with the exception of emotional demands. The SMART website includes an online work design survey <sup>39</sup> covering each of the higher-order categories of work design characteristics.				

<sup>39</sup> See [www.smartworkdesign.com.au/](http://www.smartworkdesign.com.au/)

## 7 Top-down work redesign interventions

Internationally, awareness of the benefits of good work design has inspired work redesign interventions, many of which have been described and analysed in the scientific literature. In a systematic review, Knight and Parker (2021, p. 81) identified five categories of top-down (organisation-led) work redesign interventions:

- *Job enrichment and enlargement interventions*, which aimed to change the work design of individual workers...
- *Participative job enrichment and enlargement interventions* involved management-initiated means of enhancing employee participation, such as promoting employee involvement in problem solving and developing solutions to work design aspects...
- *Relational interventions* focused on developing individuals' perceptions of the significance of their jobs...
- *Autonomous work group interventions* involved work groups or teams that were able to manage their own responsibilities...
- *System-wide changes* (e.g. reward, information and communication systems) impacting work design and performance.

Systematic reviews of top-down work re-design interventions (Knight et al., 2017, 2019) have demonstrated the positive impact of work re-design on worker engagement, which is in turn positively linked with worker wellbeing. Additionally, a recent systematic review by Knight and Parker (2021) revealed good overall evidence of a positive impact of work re-design on performance. Holman et al. (2018) reviewed various types of stress interventions and found ample evidence showing the positive effect of work re-design interventions on employee wellbeing (e.g. Ahola et al., 2012; Bourbonnais et al., 2006; Le Blanc et al., 2007; Sørensen & Holman, 2014) through improving job characteristics (e.g. Bond et al., 2008; Holman & Axtell, 2016). Work re-design interventions have also been shown to lead to a sustained, long-term improvement in job characteristics and wellbeing (Bourbonnais et al., 2011). Daniels et al. (2017, p. 1177) found that successful implementation of interventions was associated with “worker involvement and engagement with interventions, management commitment to interventions and integration of interventions with other organisational systems.” These reviews, along with the research studies reviewed, represent a great starting point for guidance on how to implement top-down work redesign interventions and what benefits to expect.

## 8 Job crafting (bottom-up work redesign)

Sections 5 and 7 dealt mostly with people who design jobs for others, but section 5 also briefly hinted at the influence workers can have over their own job design. In the past two decades, an increasing amount of work design research has focused on the proactive changes workers make to their own jobs, a process referred to as job crafting (e.g. Kooij et al., 2017; Petrou et al., 2012; Slemp & Vella-Brodick, 2013; Tims et al., 2014; Tims et al., 2012; Tims, Bakker, & Derks, 2013; Tims et al., 2015a, 2015b; Tims, Bakker, Derks, et al.,

2013; Tims et al., 2016; Wrzesniewski & Dutton, 2001; Wrzesniewski et al., 2013). Given that job crafting is done within an existing job, changes can only be made that are possible within the boundaries set by the organisation, work context, or the worker's manager<sup>40</sup>. Job crafting involves workers "creating or initiating change to the job, as opposed to reacting or responding to change in the job" (Wrzesniewski et al., 2013, p. 282). Wrzesniewski and Dutton (2001), who coined the term 'job crafting,' distinguished it from related concepts, including role innovation, personal initiative, organisational citizenship behaviour and task revision. They identified three forms of job crafting that workers can engage in to change their work in meaningful ways:

- Changing number, scope, and type of job tasks
- Changing quality and/or amount of interaction with others encountered in job
- Changing cognitive task boundaries [i.e. changing the view of the job] (Wrzesniewski & Dutton, 2001, p. 185).

Taking a job demands–resources (JD-R) perspective, Tims et al. (2012) conceptualised job crafting as "the self-initiated changes that employees make in their own job demands and job resources to attain and/or optimise their personal (work) goals." To enable measurement of job crafting via questionnaire, Tims et al. (2012) developed and validated a scale with four dimensions:

- Increasing structural job resources
- Increasing social job resources
- Increasing challenging job demands
- Decreasing hindering job demands.

The first three dimensions above are positive, things to create more of in one's job, and the fourth is negative, something to strive to have less of in one's job. Tims et al. (2012, p. 173) found that "self-reports of job crafting correlated positively with colleague-ratings of work engagement, employability, and performance."

Zhang and Parker (2019) attempted to synthesise these two perspectives on job crafting with a hierarchical (rather than dimensional) view:

The first and highest level distinguishes *job crafting orientation*, that is, whether crafting is approach- or avoidance-oriented. The second level distinguishes *job crafting form*, specifically, whether crafting is behavioral or cognitive. The third level distinguishes *job crafting content* with respect to the target that crafting seeks to change, notably job resources or job demands.

Job crafting that aligns with organisational aims has been found to positively impact work engagement (e.g. Petrou et al., 2012; Sakuraya et al., 2016; van Wingerden, Derks et al.,

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<sup>40</sup> Note that job crafting differs from implementing temporary modifications to a worker's job as part of, for example, a return-to-work plan after injury or illness, which is the responsibility of management in consultation with the worker.

2017) and in-role performance (Bakker et al., 2012). A meta-analysis by Rudolph et al., (2017) confirmed these findings across 108 job crafting studies. As noted in section 3.4, there appears to be a reciprocal relationship between work engagement and job crafting in that “engaged employees can create their own ‘gain spiral’ of resources and work engagement through job crafting” (Bakker & Demerouti, 2017, p. 276). Various questionnaires have been developed to measure the extent to which workers engage in job crafting behaviours (Ghitulescu, 2007; Kooij et al., 2017; Leana et al., 2009; Petrou et al., 2012; Sekiguchi et al., 2014; Slemp & Vella-Brodrick, 2013; Tims et al., 2012), with only the questionnaire by Tims et al., Petrou et al., Kooij et al., and Slemp and Vella-Brodrick designed for workplaces in general, and the remainder for specific professional groups.

Several job crafting training interventions have been developed and tested (Berg et al., 2008; Kooij et al., 2017; Sakuraya et al., 2016; van den Heuvel et al., 2015; van Wingerden, Bakker, et al., 2017a, 2017b; van Wingerden, Derks, et al., 2017). The most commonly used intervention is the Job Crafting Exercise (JCE) (Berg et al., 2008), which was developed at the University of Michigan’s Center for Positive Organizational Scholarship:

The *Job Crafting Exercise* is a tool that helps people identify opportunities to make their jobs more engaging and fulfilling. To do this, the exercise encourages people to view their jobs in a new way – as a flexible set of building blocks rather than a fixed list of duties. Using this perspective, participants put together a visual plan for redesigning their job to better fit their motives, strengths, and passions. (Berg et al., 2008, p. 1)

The JCE involves guiding participants, after some information about work design, through a sequence of steps (see also van Wingerden, Bakker, et al., 2017a, 2017b):

1. Analysis of key tasks in their job in terms of importance and time
2. Analysis of one’s strengths and interests
3. Analysis of fit between job and personal strengths and interests
4. Goal formulation and action plan: personal job crafting plan
5. Assessment and sharing of experiences, successes
6. Embedding the job crafting benefits for the long term.<sup>41</sup>

Meta-analytic reviews of job crafting interventions have shown mixed results (Knight, Tims et al., 2021; Oprea et al., 2019). Job crafting interventions have been found to increase job crafting behaviour among trainees. Most interventions lead to increased work engagement, as well as reductions in psychological distress, decreased negative emotions, increased positive emotions, increased confidence in one’s own abilities, and increased job resources. Conditions for success include appropriate targeting of interventions: “interventions to reduce hindering demands should be targeted at those high in initial workload [and]

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<sup>41</sup> See [www.positiveorgs.bus.umich.edu/cpo-tools/job-crafting-exercise/](http://www.positiveorgs.bus.umich.edu/cpo-tools/job-crafting-exercise/)

interventions to increase job resources should be targeted at those low in initial workload” (Knight, Tims et al., 2021, p. 1).

Berg et al. (2010) investigated whether all workers, regardless of job role and industry, are able to proactively craft their own job characteristics, and found that there were different challenges potential job crafters encountered based on their position in the hierarchy in their respective organisations. Workers in lower ranks had to change other’s expectations and behaviours to create opportunities to craft, while higher ranking workers had to change their own expectations to create such opportunities.<sup>42</sup>

## 9 Role of OHS professionals

Given the research findings described in this chapter, what is the role for OHS professionals in ensuring positive outcomes through good work design?<sup>43</sup> A key aspect of this role is sharing knowledge of work design, and its importance in the hierarchy of controls as a risk control measure, with those who are in a position to design job roles. People in leadership and human resources roles are likely to be the main stakeholders to regularly liaise with, both to keep good work design on their radar and to gain knowledge of opportunities to improve work design (e.g. organisational change projects). Sharing evidence from studies that have investigated the impact of various work design characteristics, particularly regarding the relative importance of characteristics for particular types of outcomes, will provide a solid basis for work design recommendations and activities. OHS professionals should seek evidence from work design research conducted in a similar industry as their organisation as it is more likely the findings will translate to their workplace. When necessary, OHS professionals should seek specialist input from professionals trained in work design such as organisational psychologists, occupational therapists and ergonomists.

Data on how the organisation’s workers currently perceive their job characteristics (see section 6 for advice how to collect this), and on the outcomes associated with these characteristics, such as health and safety, motivation, satisfaction, engagement, performance and organisational commitment (section 4), will help identify areas where improvements are needed. Such data, along with evidence regarding outcomes that can be achieved through work design improvements, are very powerful in convincing stakeholders. Once work design changes have been implemented, another round of data collection is

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<sup>42</sup> See *OHS BoK 3 The Generalist OHS Professional: International and Australian Perspectives* for discussion of job crafting for OHS professionals.

<sup>43</sup> See Safe Work Australia’s (SWA, 2020) *Principles of Good Work Design*, with which this chapter is aligned.

advisable to measure the impact; highlighting the benefits achieved will pave the way for future work design improvements.

Given that good work design has multiple benefits that extend beyond health and safety, the OHS professional can tailor discussion of benefits to the interests of particular stakeholders. For example, production, operations, financial and general managers often appreciate hearing about performance and productivity benefits; human resources team members are likely to be interested in job satisfaction, work engagement, role clarity and organisational commitment benefits; and research and development managers may be particularly responsive to innovation and creativity benefits. In short, good work design is good business.

Table 4 provides a high-level (and necessarily incomplete) summary of work (re)design approaches that are most likely to be effective for particular outcomes.

**Table 4: High-level summary of work design approaches for specific objectives**

Objective	Work Design Strategy
Performance improvement	<ul style="list-style-type: none"> <li>• Increase worker autonomy</li> </ul>
Job satisfaction	<ul style="list-style-type: none"> <li>• Increase opportunities to access supervisor and coworker support</li> <li>• Increase worker autonomy</li> </ul>
Work motivation	<ul style="list-style-type: none"> <li>• Increase task significance, i.e. how much of a difference a worker can make in their job for others</li> </ul>
Wellbeing	<ul style="list-style-type: none"> <li>• Increase opportunities for support and feedback from coworkers and supervisors</li> </ul>
Reduce accidents or adverse events	<ul style="list-style-type: none"> <li>• Target risks and hazards</li> <li>• Identify and address work design issues that act as performance-shaping factors impacting probability of errors, and error detection and recovery</li> <li>• Increase opportunities to access supervisor and coworker support relevant to safety matters</li> </ul>
Improve safety behavior	<ul style="list-style-type: none"> <li>• Address negative outcomes of job complexity (note that job complexity is also associated with positive outcomes)</li> <li>• Improve safety climate</li> </ul>

Based on insights into factors that influence work design (section 5), it is recommended that OHS professionals help leaders (and other organisational stakeholders involved in work design) become better at designing work for their team members by:

- Ensuring their awareness of their legal duty to provide a safe and healthy workplace in which both psychosocial hazards and physical health and safety hazards

associated with bad work design have been minimised so far as reasonably practicable

- Reinforcing the position of good work design on the hierarchy of controls as one of the higher-ranked ways to protect against health and safety risks, emphasising its importance and utility
- Keeping them informed about work design issues in the workplace, particularly those with health and safety consequences
- Ensuring leaders are educated in the principles of good work design and work motivation, since such training has proven to be effective (Campion & Stevens, 1991; Parker et al., 2019)
- Encouraging leaders to take the perspective of the job incumbent when (re)designing a job role.

Also, given that the outcomes and boundaries of job crafting (section 8) can involve work health and safety aspects, OHS professionals have a role in guiding job crafting efforts and can assist in job crafting training and interventions.<sup>44</sup> Based on their knowledge of workplace health and safety risks, OHS professionals can ensure firm boundaries are in place for job crafting efforts, so that any changes a worker plans to implement in their job design will not adversely impact workplace health and safety.

The SMART Work Design website<sup>45</sup> of the Centre for Transformative Work Design at Curtin University, and the People at Work website<sup>46</sup> provide a range of resources to assist organisations on their path to better, safer and healthier work design.

## 10 Summary

This chapter introduced work design as a key way of ensuring health and safety in the workplace and by positioning poor work design as a preventable mechanism of hazard creation. A brief history of work design research and practice (section 2) provided the background for an overview of contemporary work design theory and models (section 3). Commonalities and differences between these theories and models were highlighted. Job characteristics such as autonomy for the worker to make their own work-related decisions, and task significance and task variety are commonly identified as key to good work design. The more recent models emphasise the importance of social characteristics of the job, such as support and feedback from supervisors and coworkers. Also, recent work design models and theories tend to distinguish between job demands (e.g. time pressure, emotional

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<sup>44</sup> At the time of writing, the AIHS is in the process of developing training for OHS professionals in job crafting.

<sup>45</sup> [www.smartworkdesign.com.au/](http://www.smartworkdesign.com.au/)

<sup>46</sup> [www.peopleatwork.gov.au/](http://www.peopleatwork.gov.au/)

demands, role ambiguity) that require sustained effort on the part of the worker, and job resources (e.g. autonomy, support) that contribute to achieving work goals and help to deal with job demands. Team work design models highlight team-specific characteristics such as interdependence, cooperation and team composition.

An overview of the various work-related outcomes that are impacted by how work is designed (section 4) revealed that some outcomes, such as worker health and motivation, are directly impacted by work design characteristics. Other outcomes, such as organisational commitment, job performance, and safety outcomes including incidents and safety behaviours, are indirectly impacted via more proximal work design outcomes such as work engagement or burnout. Job resources tend to be associated with positive outcomes. Two types of job demands can be distinguished, with challenging demands such as job complexity linked with positive outcomes (as long as they are combined with sufficient job resources), and hindrance demands such as role ambiguity linked with negative outcomes.

Section 5 addressed factors influencing how work is designed (including contextual external, organisational, group and individual factors as well as top-down work design by managers) and possible triggers for work (re)design. Ways to measure work design were discussed in section 6, with survey questionnaires nominated as the main method of assessing a worker's perceptions of their job role, identifying possible improvement areas and determining if work redesign efforts have led to desired outcomes. Section 7 provided a brief reflection on top-down work redesign interventions, which have been demonstrated to provide benefits for job satisfaction, work engagement, stress and wellbeing. Worker-initiated job crafting was introduced in section 8, and positively linked with worker engagement and wellbeing.

Finally, consideration of the role of OHS professionals in work design included recommendations for how to assist leaders and other stakeholders design good work. Given the wide range of benefits of good work design, OHS professionals can make a positive difference by focusing on work design improvement.

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