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Organizational Context (WP2.1)**

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## Appendices

# 1 Introducing the background, focus and content of this report

## 1.1 Background

This report is part of the Early Research Program (ERP) Human Resilience. Aim of this four-year project is to develop interventions and tools to increase resilience of individuals, in professional sports teams, but also in a working context. Individual resilience in this project is defined as: *'A process in which employees sustain performance, motivation and health under demanding conditions using resources within themselves (e.g., beliefs, skills, personality) and in their social environment (e.g., team, leader, organization, family).'*' (p.13, Paradies et al., 2015). People are, or will be resilient, if they are able to use their (individual, team or organizational) resources, either to adjust the demands to be in line with their own work abilities or to cope with the demands (for more information see report of Work Package 1 by Paradies et al., 2015). In the report by Paradies and colleagues, a model is developed of the determinants and outcomes of individual resilience. With the tool that will be developed in the next phases of this project, data will be gathered on a selection of these individual determinants and outcomes. Data will be collected on the level of the individual employee and will be confidential. However, aggregated data on these factors, if agreed by the employee, could be available to the employee's organization and its management. Aggregated level data can give organizations insight in the state of their workforce and in potential risks the workforce is facing. This insight can be used to develop interventions on a group or organization level to increase individual resilience. Individual resilience is in the interest of organizations since it influences the ability of a group to reach organization targets (for example on productivity or safety), as is also described in the report of WP2.1 of this project (Oeij et al., 2015).

## 1.2 Focus of this report

In this report we examine the relevance of various data collected at an individual, employee level, for the management, when it comes to resilience of employees. In this report we look into the link between four management areas and resilience of individual employees: management of (employability of) human resources, management of performance (the operation), management of health and safety (H&S) and management of quality. We describe what data, gathered on the level of the individual can provide information that is needed to monitor targets and goals for each of these management areas. Which manager in the organization is responsible for the goals and targets of the different areas (and therefore interested in aggregated data on this topic) depends on the type of organization, as is described in the report of WP2.1 (Oeij et al., 2015). In a Functional System these tasks are concentrated on a central level. In these organizations, for example, a human resources (HR) manager will be responsible for the management of human resources. In a Flow System, however, these tasks are divided and decentralized. Every line manager will be responsible for the management of human resources, health and safety and quality, supported by an HR, H&S or Quality department.

### 1.3 Research question

The main research question of this study is:

*What data gathered on the individual resilience of workers (described in Work Package 1), can, on an aggregated level, serve as useful input information for the four selected management areas (human resources management, performance management, occupational health and safety management and quality control management)?*

### 1.4 Content of this report

In the next chapter, Chapter two, the methods will be described. In Chapter three, results will be presented. In this chapter we describe the way individual data can serve as input for the aggregated level, briefly introduce the four selected management areas and present literature sources for each factor related to resilience relevant for the four management areas. In Chapter four, the last chapter of this report, a conclusion and further project steps will be presented.

## 2 Methods

In order to answer the research question, we have carried out three steps. Firstly, a number of meetings with members from WP1 were organized in order to develop a research model that joins individual to an aggregate level data. Secondly, an expert meeting was organized, where the choice has been made concerning the management areas that are of interest when it comes to resilience of employees. In this meeting, experts from the broad field of social sciences (social psychology, sociology, social innovation) participated. Brief overview of the management areas chosen is provided as an outcome of this expert meeting. Thirdly, a research was conducted in order to examine which data, collected on an individual level, may be of interest for the different management areas. The starting point was the table with variables related to individual resilience (divided in outcomes, demands and resources) developed in Work Package 1 (Paradies et al., 2015). All variables were gathered in an Excel file. Using expert knowledge of the authors, every variable listed in this file was evaluated to determine whether this variable would, on an aggregated level, be useful input for one or more of the selected areas. For this third, research step, we carried out interviews and the desk research, which we describe in more detail below.

1. *Conducted three interviews with managers in a research company (TNO), responsible for one or more of the selected areas*

One manager is primarily responsible for quality management, one for health and safety management and one, as manager of a research group, is responsible for all areas. For the interviews an interview protocol is used (see Appendix). The focus in this interview protocol was on the tasks of the manager, the information they used, or would like to have available and the (feedback) information that they need to evaluate whether norms are met and goals are achieved. We evaluated for every outcome, demand and resource listed in the table of Work Package 1, whether the data could serve as feedback information for one (or more) of the management areas.

2. *Conducted a desk research*

The focus of this desk research was on the goals and concerns of (the ones responsible for one of) the four management areas and on the information needed to evaluate these goals in relation to resilience of employees. We looked for literature sources for every outcome, demand and resource listed in the table of Work Package 1, on how the data could serve as information for one (or more) of the management areas.

Per identified variable, information was searched in the handbooks of the human resources management, leadership, quality management and health and safety management. If insufficient information was found, the search was expanded by using the variable and the resilience related outcomes of wellbeing, performance or motivation, as keywords in the google scholar search engine (e.g. HPA sensitivity and wellbeing, was one of keywords).

## 3 Results

In this section we describe

1. the model we developed describing data collection from an individual to an aggregate level,
2. an overview of the four chosen management areas, and
3. literature findings concerning relevance of various outcomes, demands and resources concerning individual level resilience that are relevant for the four management areas.

### 3.1 Research model: From individual data to organizational data

Data collection scheme (Table 3.1) is based on the assumption that a digital application or platform will be developed. In this scheme, data will be measured in three ways (at different points in time and with different frequency):

Table 3.1 Measurement moments for resilience data in organizational settings

<b>T0</b>	The moment the user (individual) starts using the application or platform he or she will receive a questionnaire as part of intake procedure. This questionnaire will measure all independent variables in the resilience model: the demands, the resources (internal as well as external) and the coping strategies of the user. T0 measure occurs once, at the start of the data collection.
<b>TC (continuous monitoring)</b>	An early indicator of resilience problems will be monitored continuously (i.e. at least once a day). An example for such an indicator is 'quality of sleep'. Deviations of the regular sleeping pattern will be fed back to the user, by for example using big data techniques.
<b>TP (periodical monitoring)</b>	Periodically the most important demands, resources or coping strategies will be measured with a very short questionnaire to see if changes occurred since T0. The time points for periodic monitoring will depend on the variables measured and on results of the continuous monitoring (deviations might be a trigger to send out a short questionnaire).

Based on the information gathered at T0 the individual employee will receive advice concerning how to increase his or her resilience. Advice could, for example, focus on how to increase the internal or external resources, in order to be better able to meet the demands. The individual employee could also receive an advice on how to decrease the demands. The more accurate the employee fills out the intake questionnaire, the more tailored the advice can be.

A change in demands or resources (measured with the short questionnaire at TP) can alter the advice to the user.

Deviations in the stress indicator (in this case: the quality of sleep) signalled at TC can also be a signal to change advice. For example, perhaps it becomes clear that the user started developing health complaints and should take measures to prevent this (advice would be tailored to suit his or her particular situation). The changes in complaints would also be monitored.

Data gathered at T0 as well as the monitor data on sleep quality can be collected at aggregated level. Aggregating these data will provide the following insights:

1. Insight in risks at group level (in which department are the demands (too) high, in which departments are workers lacking resources and do they use inadequate coping strategies?):
  - a. This will guide the selection and implementation of interventions (aimed at decreasing demands or improving resources or coping strategies).
2. Insight in 'the state of being' of workers (where are the groups with potential health complaints located?):
  - a. This too will guide selection and implementation of interventions, it will give insight in the target groups.

By relating aggregated data it will be possible to:

1. Analyze which combination of demands and resources results in stress complaints (and which prevents stress complaints):
  - a. This will guide interventions in the organization.
2. Analyze which interventions are effective in decreasing stress complaints (in specific groups):
  - a. This will guide development and implementation of future interventions in the organization;
  - b. It will also be possible to improve and personalize advise given to the individual (by mentioning example of groups of people similar to the participant, who also benefited from ...-giving examples of what those particular activities were).
3. Anticipate on risks (prognostic modelling):
  - a. This too can guide interventions at the level of the organization (we will change demands, and know up front what should be done to prevent negative outcomes);
  - b. It can also guide advises on the level of the individual ('if you do not change your habits, you will develop stress complaints at some point').

Figure 3.1 shows the model that depicts how data measured on an individual level can be connected to the organizational level.

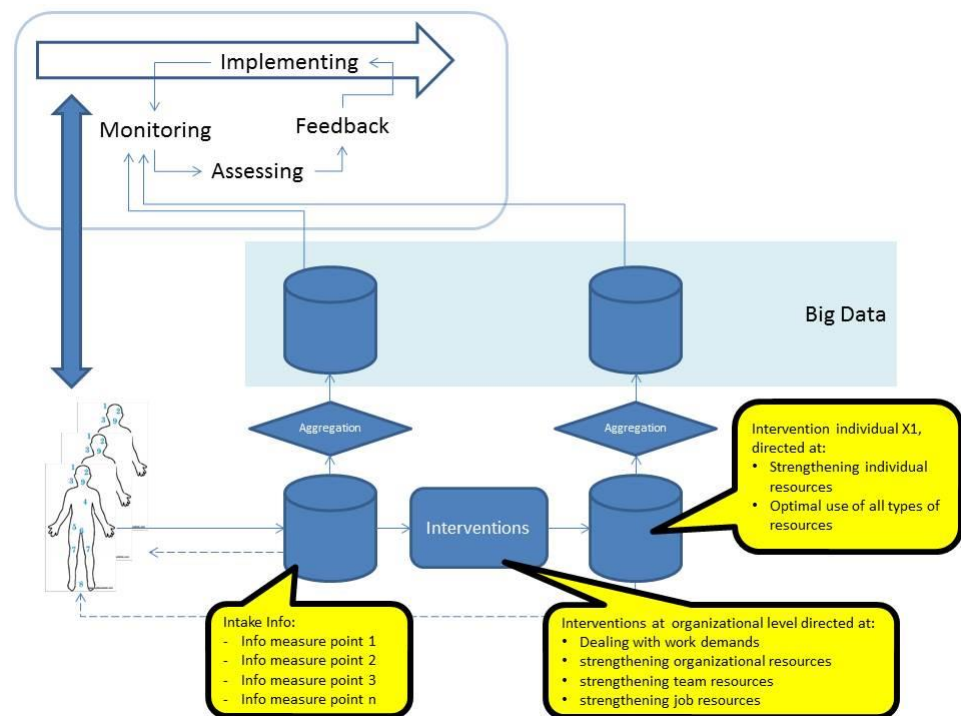


Figure 3.1 A simplified representation of the data collection process for resilience data

### 3.1.1 Relevance for the management systems

The aggregated data are relevant for different management areas for two reasons:

1. Decrease in individual resilience will have a negative impact on outcomes that are relevant for different management areas:
  - a. Number of mistakes will increase, productivity will decrease: relevant for quality management and performance management;
  - b. Quality will decrease: relevant for the quality management;
  - c. Decrease of the fit between workers and their job, this will have a negative effect on productivity and increase the chance of health problems: relevant for human resource management manager, the line manager and the health and safety management;
2. In their control cycle the manager responsible for the different areas can intervene:
  - a. Adapt or reorganize the demands and the external resources (quality and performance management);
  - b. Support and strengthen the internal and external resources and coping strategies, advice on changing demands (HR management);
  - c. Support and strengthen the internal resources and advice for changing demands (OSH management).

### 3.2 Introducing the management areas relevant for resilience of employees: A short description

During the expert meeting, it was decided to focus on the following four management areas in organizations because they relate to resilience of employees: management of (employability of) human resources, management of performance (the operation), management of health and safety (H&S) and management of quality. It is important to highlight that the information below per management aspect is not coupled to one



person, but can be part of several functions. For example, a line manager may be responsible for management of performance, but also for management of human resources or safety and health. Who in an organization is responsible for the different management areas depends on the organization type (see report Oeij et al., 2015).

### 3.2.1 *Human resources management*

'Strategic HRM is the process of linking the HR function with the strategic objectives of the organization in order to **improve performance**.' (p.37 Bratton & Gold, 2003). Having the right worker for the job, able and willing to perform the tasks that are needed to be productive, falls under the human resources management. According to Bratton and Gold (2003) the management of human resources includes:

1. planning (forecasting of future HR needs),
2. staffing (hiring people with required skills and knowledge),
3. developing (analyzing learning needs and providing learning opportunities),
4. motivating (designing reward systems),
5. maintaining (administering and monitoring workplace safety, health and wellbeing policies to keep a competent workforce),
6. managing relationships (e.g. negotiating contracts, administering collective agreement in a union environment),
7. managing change (reallocating resources and reorganizing people when needed), and
8. evaluating (measuring and evaluating HR system of the organization).

### 3.2.2 *Occupational Health and Safety (OHS) management*

Organizations that consist of more than five employees are required by law to monitor and implement health and safety measures that protect and enhance employees' health. Besides the legal aspect, OHS is very important for organizations, as it is associated with the psychological contract of employees: the more an organization invests in OHS, the more employees feel appreciated and the higher their loyalty, motivation and commitment (Bratton & Gold, 2003). '*Occupational health and safety is concerned with the identification and **control of hazards associated with the physical workplace environment**. These hazards, which range from technological, physical and chemical agents to psychosocial disorders such as workplace stress, shape objective patterns of interaction, behavior and process and also subjective feelings about the employment relationship*' (p.149 Bratton & Gold, 2003).

Tasks of the occupational health and safety managers are occupational risk assessment, health and safety training and development and implementation of interventions. Although occupational health and safety is a primary focus of the occupational health and safety manager, HR managers as well as line managers also monitor and pay attention to occupational health risks. Many organizations have feedback loops in place, whereby information from the shop floor is given back to the OHS managers. Over the years, occupational health and safety risks have changed from mainly risks in the physical environment (such as noise, pollution, heavy lifting, dangerous chemicals) to more psychosocial aspects related to stress at work and its impact on health. OHS managers use information such as percentages of sickness absence, number of accidents, number of near-accidents, results based on measures of well-being, costs occupational health and safety and employee work satisfaction results to improve quality of organizational health and safety.

### 3.2.3 *Performance management*

Reaching the strategic objectives of an organization by managing the performance of workers, teams, and departments is what performance management is about. In most organizations line management is primary responsible for the performance and for reaching targets. Targets can be formulated on different levels (production targets, targets on impact, on customer satisfaction, etc.). Production outcomes (amount of goods produced, amount of services provided, and amount of billable hours made) are important parameters for the manager responsible for performance. These outcome figures are compared to performance targets (the norm). If the targets are not met, the performance manager will be held responsible and be requested to act in order to improve the results. Health and motivation influence performance, and are hence of importance for performance managers.

### 3.2.4 *Quality control management*

Since the last two decades of the previous century, quality control has become an important issue in every organization. According to de Vaal et al. (2013) quality management consists of the following principles: client orientation, leadership, inclusion of employees, win-win relations with suppliers, attention for the processes (process approach), attention for the system (system approach) and continuous improvement. In a nutshell, the focus lies on eliminating errors and making products or services at the optimal level of quality. Quality management system is a technique that communicates to employees about what is required from them to create a quality product or deliver a quality service, and to motivate employees to rely on quality specifications when completing tasks. The quality system is concerned with essential elements that every quality design, production and distribution should embed, without prescribing specific ways to establish these elements. Thus, the quality control manager is responsible for implementing, supporting and evaluating the quality control systems that are in place in every organization. The requirements for organizations prescribe a quality management system that is in conformity with ISO standards (Marcelissen & Weel, 2002).

## 3.3 **Mapping data on outcomes, demands and resources on the needs of the aspect systems**

In the first part of the results we described the way data gathered on the level of the individual can, on an aggregated level, be useful on organizational level.

In general, all management areas would benefit from a signal if outcome scores are deviating from the norm, because this will be a signal that 'something is wrong'. If a manager can act the moment the scores start deviating, early interventions could prevent (more) negative results. To be able to detect the precise moment the outcome starts deviating from the norm, continuous data are necessary. This is, however, not relevant for all indicators. It will only be relevant for scores that change easily over time.

For the managers it will also be relevant to receive a signal if one of the important risk factors is deviating from the norm. It would be useful if a manager would be able to evaluate the resources in case of an increase of a risk factor. If the resources are not sufficient for the risk, early interventions (aimed at increasing resources or decreasing risks) can prevent negative outcomes. To be able to detect the precise moment of deviation, continuous measurement on risks is necessary. And again this is only relevant for variables that can easily change over time. To be able to 'match'

resources it would be necessary to be able to have the up to the minutes score on resources at the moment the risks start to increase. Continuous data would provide this opportunity, but the possibility to put out a small questionnaire to measure relevant resources would also be sufficient.

Compared to stochastic measurement continuous data have the advantage of the ability to 'prompt risks or decreasing outcomes'. Information is provided the moment it is relevant, compared to information that can be gathered from the system on request of the management.

In the tables below (Table 3.2, Table 3.3, Table 3.4 and Table 3.5) we indicated for which variables continuous data would provide useful information. Some of these variables can be measured with sensors or other devices (e.g. quality of sleep). For other variables, at this moment, a daily question would be the only way to gather continuous data (e.g. engagement, satisfaction).

In the tables below (Table 3.2, Table 3.3, Table 3.4 and Table 3.5) we summarize, per management area, variables relevant for individual level of resilience (Table 3.2 Human Resources, Table 3.3 Occupational Health and Safety, Table 3.4 Performance and Table 3.5 Quality). The tables are divided into five columns. The first column indicates per group of variables whether it is an outcome, demand or resource variable, column two describes the type of outcome, demand or resource, in the third column (an example of) the variable is described and in column four we describe what measurement preferably should be used. In the last column the literature and interview references and quotes are provided.

The tables below show that data gathered on individual resilience (and incorporated in the excel file of WP1) provide the most information for the HR management, somewhat less for the OSH management and performance management and the least information on quality management.

Table 3.2 Human Resources Management area

Outcome, demand, resource	Type of outcome, demand or resource	Variable (examples)	Type of measurement	Literature
<b>Outcome</b>	Wellbeing	Personal growth	Intake and periodic monitoring	'The employer has a legal duty to maintain a healthy and safe workplace, the health and safety function being directly related to key HRM activities, such as selection, appraisal, rewards and <b>learning and development</b> .' (p.151 Bratton & Gold, 2003)
		Absenteeism, presenteeism, Health, Vitality	Intake and periodic monitoring, continuous data	One of the key functions of HRM is maintaining: 'the administration and monitoring of <b>workplace safety, health and welfare</b> policies to retain competent workforce and comply with statutory standards and regulations.' (p. 15 Bratton & Gold, 2003) 'The decreasing tolerance for work-related hazards, the rising costs associated with workplace injuries and illnesses, and the growing recognition that <b>health and safety</b> forms an important subgroup of organizational contingencies affecting HRM.' (p.150 Bratton & Gold, 2003) 'Working knowledge of <b>OHS</b> is important for every manager.' (p.150 Bratton & Gold 2003) 'The employer has a legal duty to maintain a healthy and safe workplace, the <b>health and safety function being directly related to key HRM activities</b> , such as selection, appraisal, rewards and learning and development.' (p.151 Bratton & Gold, 2003)
		Stress related symptoms	Continuous data	One of the key functions of HRM is maintaining: 'The administration and monitoring of <b>workplace safety, health and welfare policies</b> to retain competent workforce and comply with statutory standards and regulations.' (p. 15 Bratton & Gold, 2003) 'Like other occupational hazards, stress needs to be controlled at source... <b>stress</b> arises from a variety of sources, and it is <b>important for HR managers</b> to identify priorities and investigate ways of dealing with the problem...management should look at the <b>job design</b> and <b>organizational structure</b> and conduct <b>detailed surveys</b> to identify priorities for action.' (p.170 Bratton & Gold, 2003)
	Performance	Engagement (vigour, dedication)	Intake and periodic monitoring, continuous data	<b>Increasing engagement</b> is top HR priority in 2016, said 83% of HR professionals in the study (p.5, Virgin Pulse, 2016) ' <b>Performance appraisal</b> is the process of evaluating individuals in terms of their job performance...' (p.302 Bratton & Gold, 2003)
		Job satisfaction	Intake and continuous data	<b>Improving employee satisfaction/morale</b> is top HR priority in 2016, said 81% of HR professionals in the study (p.5, Virgin Pulse, 2016)
		Risky behaviour, errors	Continuous data	'The maintenance of a healthy and safe workplace can be facilitated in the selection process by choosing applicants with <b>personality traits</b> that <b>decrease the likelihood of an accident</b> .' (p.151 Bratton & Gold, 2003)

Outcome, demand, resource	Type of outcome, demand or resource	Variable (examples)	Type of measurement	Literature
		Performance evaluation	Intake and continuous data	<p>One of the core HR functions is motivating employees: 'Motivating: the design and administration of reward systems. HR practices include job evaluation, <b>performance appraisal</b>, pay and benefits'. (p. 15 Bratton &amp; Gold, 2003)</p> <p>'Strategic HRM is the process of linking the HR function with the strategic objectives of the organization in order to <b>improve performance</b>.' (p.37 Bratton &amp; Gold, 2003)</p> <p>Top 2016 HR priority is <b>improving productivity</b>, said 85% of HR professionals in the study (p.5, Virgin Pulse, 2016).</p> <p>'En dan zijn er natuurlijk nog de andere taken van P&amp;O, waaronder personeelsplanning, personeelsadministratie, het begeleiden, <b>beoordelen</b> en trainen van medewerkers, loopbaanontwikkeling en promotiebeleid, beloningen, enzovoort.' (p.123 Visser &amp; Zwetsloot, 2004)</p>
	Motivation			<p>One of the core HR functions is motivating employees '<b>Motivating</b>: the design and administration of reward systems. HR practices include job evaluation, performance appraisal, pay and benefits.' (p. 15 Bratton &amp; Gold, 2003)</p> <p>"...the way in which work is designed impacts on both the effectiveness of the organization and the experience and motivation of the individual and work group. The need to harness HR in innovative ways to give organizations a competitive advantage has focused on the question of <b>job design</b>. This has been defined as: the process of combining tasks and responsibilities to form complete job and the relationship of jobs and organizations.' (p.117 Bratton &amp; Gold, 2003)</p> <p>-The more a job possesses the 5 core job characteristics (skill variety, task identity, task significance, autonomy and feedback), the greater its <b>motivating potential</b>. Knowledge and skill, growth need and context satisfaction explain why jobs theoretically high in <b>motivating potential</b> will not automatically generate a high level of <b>motivation</b> and satisfaction of all employees.' (p.124, Bratton &amp; Gold, 2003).</p>
<b>Demands</b>	Work context	High job demands (e.g. complex, emotional, high quality, time pressure)	Intake and periodic monitoring, if possible continuous data	<p>'Key practices are HR planning, <b>job analysis</b>, recruitment and selection.' (p. 15 Bratton &amp; Gold, 2003)</p> <p>"...the way in which work is <b>designed</b> impacts on both the effectiveness of the organization and the experience and motivation of the individual and work group. The need to harness HR in innovative ways to give organizations a competitive advantage has focused on the question of <b>job design</b>. This has been defined as: the process of combining tasks and responsibilities to form complete job and the relationship of jobs and organizations.' (p.117 Bratton &amp; Gold, 2003)</p>

Outcome, demand, resource	Type of outcome, demand or resource	Variable (examples)	Type of measurement	Literature
		Job demands are unclear (Role conflict and clarity)	Intake and periodic monitoring	'Key practices are HR planning, <b>job analysis</b> , recruitment and selection.' (p. 15 Bratton & Gold, 2003) "...the way in which work is <b>designed</b> impacts on both the effectiveness of the organization and the experience and motivation of the individual and work group. The need to harness HR in innovative ways to give organizations a competitive advantage has focused on the question of <b>job design</b> . This has been defined as: the process of combining tasks and responsibilities to form complete job and the relationship of jobs and organizations.' ( p.117 Bratton & Gold, 2003)
		Changes and insecurity, unpredictability	Intake and periodic monitoring	...studies show the perception of <b>job insecurity</b> to be a work stressor, with negative consequences for a variety of indicators of health and wellbeing, like job satisfaction, work engagement, burnout, mental well-being, and a multiplicity of somatic variables ranging from receptiveness for colds and flu to non-fatal heart attacks. As a work stressor, <b>job insecurity</b> scores among the most prominent psychosocial risks at the workplace, alongside aspects such as workload, lack of control, role ambiguity, role conflicts, and poor interpersonal relationships at work (Leka & Jain, 2010).' (p.19 De Witte, Pienaar, de Cuyper, 2016)
		Bullying and violence, aggression, negative atmosphere. Physical threats	Intake and periodic monitoring, if possible continuous data	One of the key functions of HRM is maintaining: 'the administration and monitoring of <b>workplace safety, health and welfare</b> policies to retain competent workforce and comply with statutory standards and regulations.' (p. 15 Bratton & Gold, 2003)
		Irregular work	Intake and periodic monitoring, if possible continuous data	Workers who do <b>shift work</b> have less control over their work times (Netwerk zelfroosteren, 2015) 'Health effects of <b>irregular working hours</b> can lead to a loss of productivity due to increased sickness absence of the involved employees (Henderson, Glozier & Elliott, 2005; Whitaker, 2001).' (p. 8, van Drongelen, 2015) Consequences of <b>irregular work</b> include fatigue and sleep loss. 'This can have detrimental effects on human performance and decision making, and might result in an increased number of errors and accidents (Arendt, 2010; van Dongen, Maislin, Mullington, Dinges, 2003; Folkard, Lombardi, Tucker, 2005).' (p. 9, van Drongelen, 2015).

Outcome, demand, resource	Type of outcome, demand or resource	Variable (examples)	Type of measurement	Literature
	Personal	Work-family conflict. Life events	Intake and periodic monitoring	<b>Work-life balance</b> (WLB) is an important area of <b>human resource management</b> which is receiving increasing attention from policy makers, organizations, <b>management</b> , employees and their representatives globally'. (p. 158 McCarthy, Darcy & Grady, 2010) ...'Stress and <b>difficulty at home</b> may impede adjustment at work. Also, the lack of a stable, close and available network of family and friends is likely to be associated with burnout.' p. 129, Schaufeli & Enzman, 1998.
<b>Resources</b>	Organizational	Appreciation, Acknowledgement, reliability, psychological safety	Intake and periodic monitoring	One of the key functions of HRM is maintaining: 'the administration and monitoring of <b>workplace safety, health and welfare</b> policies to retain competent workforce and comply with statutory standards and regulations' (p. 15 Bratton & Gold, 2003) <b>Improving corporate culture</b> is top HR priority in 2016, said 80% of HR professionals in the study (p.5, Virgin Pulse, 2016)
		Mobility	Intake and periodic monitoring	'Key function of HR is also development: 'Analyzing learning requirements to ensure that employees possess the knowledge and skills to perform satisfactorily in their jobs <b>or to advance in the organization</b> . Performance appraisal can identify employees' key skills and 'competencies' (p. 15 Bratton & Gold, 2003)
		Meaningful work	Intake and periodic monitoring	'Having <b>better jobs</b> and work organization reduces the risk of stress, enhances wellbeing and leads to a lower tendency to quit the job. Better work organization implies in particular a balance between job demands (job intensity) and job control (job autonomy), <b>wholeness of tasks</b> and more open access to decision-making processes.' (p.22 Pot, Totterdill & Dhondt, 2016)
		Support (functional and social)	Intake and periodic monitoring	Quality of <b>manager-subordinate relationship</b> is important in HR strategy (p.49, Bratton & Gold, 2003)
		Influence, voice, participation, open communication	Intake and periodic monitoring	Managing relationships is yet another key function of HR: 'it encompasses a range of employee involvement/ <b>participations schemes</b> in non-union or union workplaces. In a union environment, this includes negotiating contracts and administering collective agreement.' ( p. 15 Bratton & Gold, 2003)
	Team	Support (management and team, social and functional)	Intake and periodic monitoring	Link between empowerment and transformational leadership: 'Transformational leader is empowering workers. ...focus on psychological contract and individualization of the employment relationship.' (p.60 Bratton & Gold, 2003)
		Team cohesion, collective identification	Intake and periodic monitoring	'New forms of work organization require enhanced formal and informal learning in technical, decision making and <b>team building skills</b> .' (p.139 Bratton & Gold, 2003)

Outcome, demand, resource	Type of outcome, demand or resource	Variable (examples)	Type of measurement	Literature
		Team efficacy	Intake and periodic monitoring	' <b>Team-efficacy</b> refers to perceptions of task-specific team capability, whereas potency refers to broader perceptions of team capability spanning tasks and situations (Gibson, 1996). The sense of confidence generated by high levels of efficacy and potency is believed to help teams persevere in the face of adversity. Research has demonstrated that both <b>team-efficacy</b> and generalized potency are linked to <b>team effectiveness</b> (Campion, Medsker, & Higgs, 1993; Campion, Papper & Medsker, 1996; Gibson, 1999; Gibson, Randel, & Earley, 2000; Mitchell, 1997; Shea & Guzzo, 1987b).' (p.819, Gully, Incalcaterra, Joshi, & Beaubien, 2002).
		Leadership efficacy	Intake and periodic monitoring	' <b>Effective managers</b> seemed concerned about their subordinates whereas ineffective ones were concerned only with the task.' (p. 337, Arnold, Cooper & Robertson, 1998). 'McGoldrick and Stewart (1996) have identified <b>leadership</b> as a key variable in linking <b>strategy, culture and the commitment</b> of employees.' (p.319 Bratton & Gold, 2003)
	Job	Role clarity	Intake and periodic monitoring	'Key practices are HR planning, <b>job analysis</b> , recruitment and selection.'(p. 15 Bratton & Gold, 2003) ' <b>Job</b> and organizational design is related closely to all key HRM activities, including recruitment and selection, learning and development, rewards and employee relations; <b>job design</b> is basic to the recruitment and selection function.' (p.139 Bratton & Gold, 2003)
		Autonomy	Intake and periodic monitoring	'The more a job possesses the 5 core job characteristics (skill variety, task identity, task significance, <b>autonomy</b> and feedback), the greater its motivating potential .' (p.124, Bratton & Gold, 2003)
		Personal development, challenge	Intake and periodic monitoring	Key function of HR is also development: 'Analyzing learning requirements to ensure that employees possess the <b>knowledge and skills</b> to perform satisfactorily in their jobs or to advance in the organization. Performance appraisal can identify employees' key skills and 'competencies.' (p. 15 Bratton & Gold, 2003) 'Job design affects workplace learning and employee training and development. As one of us noted elsewhere, 'high quality <b>workplace learning</b> ...is contingent upon the quality of job design in the workplace (Bratton, 1999, p.491).' (p.139 Bratton & Gold, 2003) 'New forms of work organization require <b>enhanced formal and informal learning</b> in technical, decision making and team building skills.' (p.139 Bratton & Gold, 2003) 'En dan zijn er natuurlijk nog de andere taken van P&O, waaronder personeelsplanning, personeelsadministratie, het <b>begeleiden</b> , beoordelen en trainen van medewerkers, loopbaanontwikkeling en promotiebeleid, beloningen, enzovoort.' (p.123 Visser, & Zwetsloot, 2004) 'Studies have demonstrated the benefit of planning a 'high road' HRM strategy involving <b>training</b> , involvement, high rewards and quality commitment.' (p.216 Bratton & Gold, 2003)



Outcome, demand, resource	Type of outcome, demand or resource	Variable (examples)	Type of measurement	Literature
		Task variety	Intake and periodic monitoring	<p>'Key practices are HR planning, <b>job analysis</b>, recruitment and selection.'( p. 15 Bratton &amp; Gold, 2003)</p> <p>"...the way in which work is <b>designed</b> impacts on both the effectiveness of the organization and the experience and motivation of the individual and work group. The need to harness HR in innovatory ways to give organizations a competitive advantage has focused on the question of <b>job design</b>. This has been defined as: the process of combining tasks and responsibilities to form complete job and the relationship of jobs and organizations.' (p.117 Bratton &amp; Gold, 2003)</p> <p>'<b>Job</b> and organizational <b>design</b> is related closely to all key HRM activities, including recruitment and selection, learning and development, rewards and employee relations; <b>job design</b> is basic to the recruitment and selection function.' (p.139 Bratton &amp; Gold, 2003)</p>
		Task feedback	Intake and periodic monitoring	<p>'Lack of <b>feedback</b> is positively related to all three burnout dimensions....a meta analysis of six studies showed that lack of <b>feedback</b> explains 18% of the variance of emotional exhaustion, 12% of depersonalization, and 9% of reduced personal accomplishment (Pfenning &amp; Husch, 1994).' (p.83, Schaufeli &amp; Enzmann, 1998).</p> <p>'The more a job possesses the 5 core job characteristics (skill variety, task identity, task significance, autonomy and <b>feedback</b>), the greater its motivating potential. Knowledge and skill, growth need and context satisfaction explain why jobs theoretically high in motivating potential will not automatically generate a high level of motivation and satisfaction of all employees.' (p.124, Bratton &amp; Gold, 2003)</p>
		Time for recovery	Intake and periodic monitoring, if possible continuous data	<p>Unable to recover from work is an early sign of burnout. 'The critical point occurs when people are <b>unable to recover from work</b> demands. That is, acute fatigue resulting from an especially demanding event at work - meeting a deadline or addressing a crisis - need not lead to burnout if people have an <b>opportunity to recover</b> during restful periods at work or at home (Shinn, Rosario, Morch, &amp; Chestnut, 1984). When this kind of overload is a chronic job condition, not an occasional emergency, there is little opportunity to rest, recover, and restore balance.' (p.500 Maslach &amp; Leiter, 2008)</p>

Outcome, demand, resource	Type of outcome, demand or resource	Variable (examples)	Type of measurement	Literature
	Socio-emotional	Socio competences, self- reflection, optimism, pro-activity, locus of control, flexibility, task self- efficacy, meaning making, coping self- efficacy	Intake and periodic monitoring	<p>'Burnout is likely to occur when few successes are achieved and many failures are experiences. Because of the lack of positive feedback, the development of social competence and professional <b>self-efficacy</b> is impeded so that when failures occur the risk of burnout increases.' (p.115, Schaufeli &amp; Enzmann, 1998)</p> <p>'The development of burnout seems to be moderated by relatively stable <b>individual characteristics</b> that influence social information processing such as communal orientation, need for social comparison, career orientation and 'feeling type'.' (p.191, Schaufeli &amp; Enzmann, 1998)</p> <p>Persons with <b>external locus of control</b> are more likely to experience emotional exhaustion and depersonalization than persons with internal locus of control (p. 78, Schaufeli &amp; Enzmann, 1998)</p> <p>Findings suggest that <b>self-efficacy</b> is a strong predictor of self-set goals, task-related effort, and <b>individual task performance</b> across a variety of domains (Phillips &amp; Gully, 1997; Sadri &amp; Robertson, 1993; Stajkovic &amp; Luthans, 1998).' (p. 820 Gully, Incalcaterra, Joshi, &amp; Beaubien, 2002).</p>
		Emotional stability	Intake and periodic monitoring, if possible continuous data	<p>'Social comparison and social induction processes, including <b>emotional contagion</b>, are likely to play a role in the development of burnout' (p.191, Schaufeli &amp; Enzmann, 1998)</p> <p>'<b>Emotional contagion</b> is particularly likely, for example, if individuals pay close attention to others, and if they construe themselves as interrelated to others rather than as independent and unique. In addition, a number of studies have shown that there exist stable individual differences in <b>people's susceptibility to emotional stimuli</b> (Doherty, Orimoto, Singelis, Hatfield &amp; Hebb, 1995; Stiff, Dillard, Somera, Kim, &amp; Sleight, 1988), and that these individual differences are good predictors of the extent to which people catch positive and negative emotions from others.' (p. 86-87, Bakker, Schaufeli, Sixma &amp; Bosveld, 2001)</p>
	Cognitive	Cognitive capacity, executing cognitive function	Intake and periodic monitoring	<p>'This shift from traditional to knowledge work has an important outcome for HRM because of recognition that an organization's wealth and ability to compete exists 'principally in <b>the heads of its employees</b>, and moreover that it effectively 'walks out of the gates' every day (Noud &amp; Garrick, 1999, p48).' (p.132, Bratton &amp; Gold, 2003)</p>

Outcome, demand, resource	Type of outcome, demand or resource	Variable (examples)	Type of measurement	Literature
		Knowledge and skills	Intake and periodic monitoring	<p>Key function of HR is also development: 'Analyzing learning requirements to ensure that employees possess the <b>knowledge and skills</b> to perform satisfactorily in their jobs or to advance in the organization. Performance appraisal can identify employees' key skills and 'competencies.' (p. 15 Bratton &amp; Gold, 2003)</p> <p>'The resource based perspective (on HR) emphasizes the strategic importance of exploiting internal 'strengths and neutralizing internal weaknesses-'internal strengths being <b>skills and capabilities</b> of its workforce.' (p.52 Bratton &amp; Gold, 2003)</p> <p>'En dan zijn er natuurlijk nog de andere taken van P&amp;O, waaronder personeelsplanning, personeelsadministratie, <b>het begeleiden</b>, beoordelen en <b>trainen</b> van medewerkers, loopbaanontwikkeling en promotiebeleid, beloningen, enzovoort.' (p.123 Visser, &amp; Zwetsloot, 2004)</p> <p>'Human resources development comprises the procedures and processes that purposely seek to provide <b>learning activities</b> to enhance <b>the skills, knowledge and capabilities</b> of people, teams and the organization so that there is a change in action to achieve the desired outcomes.' (p. 316 Bratton &amp; Gold, 2003)</p> <p>'Jobs with high demands and low control can be called 'high strain jobs' which are a risk for work-related stress. Moreover, stress inhibits <b>learning</b>. But jobs with high demands as well as high control are called 'active jobs' which offer <b>opportunities for learning</b> and coping with stressors (Karasek, 1979; Karasek and Theorell, 1990).' (p.24 , Pot, Totterdill, &amp; Dhondt, 2016)</p>
	Home	Financial security Social support	Intake and periodic monitoring	<p>One of the core HR functions is motivating employees 'Motivating: the design and administration of reward systems. HR practices include job evaluation, performance appraisal, <b>pay and benefits</b>.' (p. 15 Bratton &amp; Gold, 2003)</p> <p>'<b>Work-life balance</b> (WLB) is receiving increasing attention in the human resource management field.' (p. 158 McCarthy, Darcy &amp; Gradyt, 2009)</p> <p>'Individual factors causing <b>stress</b> are varied and complex, they include <b>financial worries</b>, marital problems....<b>death of spouse</b>.' (p.168 Bratton &amp; Gold, 2003)</p>
	Energetic	Sleep quality	Continuous data	<p>One of the key functions of HRM is maintaining: 'The administration and monitoring of <b>workplace safety, health and welfare</b> policies to retain competent workforce and comply with statutory standards and regulations.' (p. 15 Bratton &amp; Gold, 2003)</p> <p>'This [<b>fatigue and sleep deprivation</b>] can have detrimental effects on human performance and decision making, and might result in an increased number of errors and accidents (Arendt, 2010; van Dongen, Maislin, Mullington, Dinges, 2003; Folkard, Lombardi, Tucker, 2005).' (p. 9, van Drongelen, 2015).</p>

Table 3.3 Occupational Health and Safety Management area

Outcome, demand, resource	Type of outcome	Variable (examples)	Type of measurement	Literature
<b>Outcome</b>	Wellbeing	Absenteeism, presenteeism, Health, Vitality	Intake and periodic monitoring, continuous data	<p>'Occupational health and safety is concerned with the identification and <b>control of hazards associated with the physical workplace environment</b>. These hazards, which range from technological, physical and chemical agents to psychosocial disorders such as workplace stress, shape objective patterns of interaction, behavior and process and also subjective feelings about the employment relationship' (p.149 Bratton &amp; Gold, 2003)</p> <p>'Managers are immersed in one of society's greatest challenges-the design and maintenance of a work organization that is both effective in meeting business objectives, and <b>heathy and safe</b> for its employees' (p.150 Bratton &amp; Gold, 2003)</p> <p>Working knowledge of <b>OHS</b> is important for every manager.' (p.150 Bratton &amp; Gold, 2003)</p> <p>'...de voor werkgevers belangrijkste verplichtingen zijn: het voeren van <b>ziekteverzuim</b> beleid, de melding en registratie van <b>beroepsziekten</b>, het voorkomen van gevaar voor anderen...' (p.126 Kompier &amp; Vink, 1994)</p>
		Stress related symptoms	Continuous data	<p>'Occupational health and safety is concerned with the identification and control of hazards associated with the physical workplace environment. These hazards, which range from technological, physical and chemical agents to psychosocial disorders such as <b>workplace stress</b>, shape objective patterns of interaction, behavior and process and also subjective feelings about the employment relationship.' (p.149 Bratton &amp; Gold, 2003)</p> <p>'In areas of knowledge work, office workers, managers and professionals are increasingly anxious about repetitive strains injury, sick building syndrome, <b>work-related stress</b>, workplace violence and second-hand smoke.' (p.150 Bratton &amp; Gold, 2003)</p>
	Performance	Risky behaviour, errors	Continuous data	<p>'Research suggests that safety management programs are more effective when the <b>accident rates</b> of their sections are an important criterion of managerial performance.' (p.151 Bratton &amp; Gold, 2003)</p> <p>'Studies indicate that safety training for new employees is particularly beneficial because <b>accidents</b> are highest during the early months on a new job.' (p.151 Bratton &amp; Gold, 2003)</p>

Outcome, demand, resource	Type of outcome	Variable (examples)	Type of measurement	Literature
<b>Demands</b>	Work context	General		<b>Het belangrijkste hulpmiddel voor realisatie van het arbobeleid is de risico-inventarisatie en evaluatie (RIScE).</b> Daarmee wordt vastgesteld welke risico's er zijn voor de gezondheid van iedereen in de onderneming (en de bezoekers) en de mogelijke gevolgen daarvan. De RI&E valt in twee fasen uiteen: <ol style="list-style-type: none"> <li>de risico-inventarisatie; welke risico's zijn er?</li> <li>de risico-evaluatie; wat is de ernst van de risico's in relatie tot de andere risico's? <b>Gegevens voor de risico-inventarisatie zijn vooral te halen</b> uit het werkoverleg, ongevallencijfers, werkplekonderzoek, verzuimcijfers, inspecties en doorlichtingen, gevaarmeldingen, personeelsverloop, informatie over stoffen, enquêtes, enzovoort.' (p.144 Visser &amp; Zwetsloot, 2004)</li> </ol>
		Emotional demands	Intake and periodic monitoring. If possible continuous data	'Inappropriate expectations and <b>emotional demands</b> play a major role in the development of burnout.' (p.33 Schaufeli & Enzmann, 1998) Human service professionals experience <b>high emotional demands</b> (they 'work with difficult and troubled recipients who take the professionals' efforts for granted' and are particularly prone to burnout (p.141 Schaufeli & Enzmann, 1998).
		Changes and insecurity, unpredictability	Intake and periodic monitoring	' <b>Job insecurity</b> is a work stressor. In support of this claim, various studies show negative correlations with a variety of health and well-being indicators.' <b>Job insecurity</b> is negatively correlated with job satisfaction, mental health, and somatic health (p.18 De Witte, Pienaar, de Cuyper, 2016) 'The effect of <b>downsizing and job insecurity</b> on occupational safety and health was negative in almost all the studies.' (p.2 de Jong, Wiezer, de Weerd, Nielsen, Mattila-Holappa, & Mockaĳo, 2016)
		Bullying and violence, aggression, negative atmosphere, physical threats	Intake and periodic monitoring. If possible continuous data	'In areas of knowledge work, office workers, managers and professionals are increasingly anxious about repetitive strains injury, sick building syndrome, work-related stress, <b>workplace violence</b> and second-hand smoke.' (p.150 Bratton & Gold, 2003) 'Vooral onderwerpen als werkdruk, <b>seksuele intimidatie en sfeer</b> komen voort uit het PAGO.' (p.144 Visser & Zwetsloot, 2004) 'Sexual harassment 'poisons the atmosphere in the workplace' (Keith, 2000, p.287). It is a health and safety issue for 2 primary reasons: legal and economic.' (p.173 Bratton & Gold, 2003)

Outcome, demand, resource	Type of outcome	Variable (examples)	Type of measurement	Literature
		Irregular work	Intake and continuous data	Workers who do <b>shift work</b> have less control over their work times (Netwerk zelfroosteren, 2015) 'Health effects of <b>irregular working hours</b> can lead to a loss of productivity due to increased sickness absence of the involved employees (Henderson, Glozier & Elliott, 2005; Whitaker, 2001).' (p. 8, van Drongelen, 2015) Consequences of <b>irregular work</b> include fatigue and sleep loss. 'This can have detrimental effects on human performance and decision making, and might result in an increased number of errors and accidents (Arendt, 2010; van Dongen, Maislin, Mullington, Dinges, 2003; Folkard, Lombardi, Tucker, 2005).' (p. 9, van Drongelen, 2015).
		Dangerous	Intake and continuous data	'Occupational health and safety is concerned with the identification and <b>control of hazards associated with the physical workplace environment</b> . These <b>hazards</b> , which range from <b>technological, physical and chemical agents</b> to psychosocial disorders such as workplace stress, shape objective patterns of interaction, behavior and process and also subjective feelings about the employment relationship.' (p.149 Bratton & Gold, 2003)
		Dirty, noise and light, extreme temperatures	Intake and continuous data	'Occupational health and safety is concerned with the identification and <b>control of hazards associated with the physical workplace environment</b> . These <b>hazards</b> , which range from <b>technological, physical and chemical agents</b> to psychosocial disorders such as workplace stress, shape objective patterns of interaction, behavior and process and also subjective feelings about the employment relationship.' (p.149 Bratton & Gold, 2003) ' <b>Slechte werkomstandigheden</b> hebben ook direct invloed op de productiviteit van de werkende mens. <b>Geluid, klimaat, verlichting, gevaarlijke stoffen</b> kunnen van invloed zijn op de alertheid en snelheid van handelen. Mensen kunnen in deze omstandigheden vermoeider worden.' (p.74 Visser & Zwetsloot, 2004) Expert interview: one of his functions is to make risk analyses (Health & safety manager, TNO, 2015)'
	Personal	Work-family conflict, live events	Intake and periodic monitoring	<b>Work-life balance</b> (WLB) is an important area of human resource management which is receiving increasing attention from policy makers, organizations, <b>management</b> , employees and their representatives globally' (p. 158 McCarthy, Darcy & Grady, 2010) 'Occupational stress cannot be separated from <b>personal life</b> : illness in the family or divorce puts an employee under pressure and leads to <b>stress</b> '. (p. 166 Bratton & Gold, 2003)

Outcome, demand, resource	Type of outcome	Variable (examples)	Type of measurement	Literature
	Physical	Heavy, static heavy, static light	Intake and continuous data	...'kan de RI&E ook de aanleiding zijn om tijdens het PAGO meer aandacht te besteden aan bijvoorbeeld de ogen (bij beeldschermwerk) of rugklachten (bij <b>fysiek zwaar</b> werk.' (p.145 Visser & Zwetsloot, 2004)
		Sedentary	Intake and continuous data	'One of his tasks is also office ergonomics.' (Expert interview, Health and safety manager, TNO, May 2015)
<b>Resources</b>	Organizational	Participation	Intake and periodic monitoring	'De instelling heeft als <b>arbodoelen</b> geformuleerd: een betere <b>samenwerking</b> realiseren tussen de instelling, de arbodienst en het eigen personeel.' (p.131 Visser & Zwetsloot, 2004) 'In veel Europees onderzoek wordt de <b>participatie</b> van werknemers sterk benadrukt als succesfactor bij de vormgeving van <b>arbomanagement</b> .' (p.63-64, Visser & Zwetsloot, 2004)
		Quality workplace	Intake and periodic monitoring	Expert interview: 'One of his tasks is also <b>office ergonomics</b> .' (Expert interview, Health and safety manager, TNO, May 2015) 'According to law, work safety experts...have the following duties: ...the <b>organization of work and time breaks, the design of workplaces, work flow and the working environment</b> ...' (p.224 Beermann, Kuhn & Kompier, 1999)
		Support (functional and social)	Intake and periodic monitoring	'Although correlations between support and burnout are less strong than for job demands, clear evidence exists for a positive relationship between <b>lack of social support and burnout</b> .' (p.82, Schaufeli & Enzmann, 1998)
		Psychological safety	Intake and periodic monitoring	'Vooral onderwerpen als werkdruk, <b>seksuele intimidatie en sfeer</b> komen voort uit het PAGO.' (p.144 Visser & Zwetsloot, 2004) <b>Psychological safety</b> climate is 'influenced by senior management (and) affects psychosocial working conditions and in turn psychological health and engagement...' (p.579, Dollard & Bakker, 2010)
	Team	Support (management and team, social)	Intake and periodic monitoring	Target groups for health and safety manager: Policy (strategic level), <b>line managers</b> (structural level) and work floor (operational level). Line managers need to translate policy and signal if there are troubles on the work floor back to the policy makers (Expert interview, Health and safety manager, TNO, May 2015)
		Leadership efficacy, leader membership exchange	Intake and periodic monitoring	' <b>Effective managers</b> seemed concerned about their subordinates whereas ineffective ones were concerned only with the task.' (p. 337, Arnold, Cooper & Robertson, 1998). 'McGoldrick and Stewart (1996) have identified <b>leadership</b> as a key variable in linking <b>strategy, culture and the commitment</b> of employees.' (p.319 Bratton & Gold, 2003) ' <b>Leadership quality</b> has been found to be related to <b>occupational safety</b> and safety outcomes (Hofmann et al., 2003; Hofmann & Morgeson, 1999; Zohar, 2002a; Zohar & Luria, 2003). Further, Hofmann et al. (2003) found that <b>high-quality relationships</b> with supervisors predicted employees' <b>safety-related citizenship behaviors</b> .' (p.110, Bradley, Wallace, & Burke, 2009).

Outcome, demand, resource	Type of outcome	Variable (examples)	Type of measurement	Literature
	Job	Autonomy	Intake and periodic monitoring	'De instelling heeft als <b>arbodoelen</b> geformuleerd: management en medewerkers bewust maken van de <b>eigen verantwoordelijkheid</b> .' (p.131 Visser & Zwetsloot, 2004) Strategy: bring a lot of knowledge to the organization so that people can do a lot of things themselves (Expert interview, Health and safety manager, TNO, May 2015)
		Personal development, challenge	Intake and periodic monitoring	' <b>Training</b> and HR development play a critical role in promoting health and safety awareness among employees... Studies indicate that safety <b>training</b> for new employees is particularly beneficial because accidents are highest during the early months on a new job.' (p.151 Bratton & Gold, 2003)
		Task variety/skill variety	Intake and periodic monitoring	According to Job characteristics model (Hackman & Oldham, 1980), there are 5 job characteristics that result in the worker experiencing favourable psychological states, which in turn lead to positive outcomes. <b>Skill variety</b> is one of the 5 job characteristics, defined as ' the degree to which job requires a variety of different activities in carrying out the work, requiring the use of a number of the worker's skills and talents.' (p.123 Bratton & Gold, 2003)
		Task feedback	Intake and periodic monitoring	'Lack of feedback is positively related to all three burnout dimensions....a meta analysis of six studies showed that lack of feedback explains 18% of the variance of emotional exhaustion, 12% of depersonalization, and 9% of reduced personal accomplishment (Pfenning and Husch, 1994).'
		Time for recovery	Intake and periodic monitoring. If possible continuous data	Unable to recover from work is an early sign of burnout. 'The critical point occurs when people are <b>unable to recover from work</b> demands. That is, acute fatigue resulting from an especially demanding event at work - meeting a deadline or addressing a crisis - need not lead to burnout if people have an <b>opportunity to recover</b> during restful periods at work or at home (Shinn, Rosario, Morch, & Chestnut, 1984). When this kind of overload is a chronic job condition, not an occasional emergency, there is little opportunity to rest, recover, and restore balance.' (p.500 Maslach & Leiter, 2008)



Outcome, demand, resource	Type of outcome	Variable (examples)	Type of measurement	Literature
	Socio-emotional	Optimism, pro-activity, locus of control, flexibility, task self-efficacy, meaning making, coping self-efficacy	Intake and periodic monitoring	<p>'Burnout is likely to occur when few successes are achieved and many failures are experienced. Because of the lack of positive feedback, the development of social competence and professional <b>self-efficacy</b> is impeded so that when failures occur the risk of burnout increases.' (p.115, Schaufeli &amp; Enzmann, 1998)</p> <p>'The development of burnout seems to be moderated by relatively stable <b>individual characteristics</b> that influence social information processing such as communal orientation, need for social comparison, career orientation and 'feeling type'.' (p.191, Schaufeli &amp; Enzmann, 1998)</p> <p>Persons with <b>external locus of control</b> are more likely to experience emotional exhaustion and depersonalization than persons with internal locus of control (p. 78, Schaufeli &amp; Enzmann, 1998)</p>
		Emotional stability	Intake and periodic monitoring. If possible continuous data	<p>'Social comparison and social induction processes, including <b>emotional contagion</b>, are likely to play a role in the development of burnout' (p.191, Schaufeli &amp; Enzmann, 1998)</p> <p>'Emotional contagion is particularly likely, for example, if individuals pay close attention to others, and if they construe themselves as interrelated to others rather than as independent and unique. In addition, a number of studies have shown that there exist stable individual differences in <b>people's susceptibility to emotional stimuli</b> (Doherty, Orimoto, Singelis, Hatfield &amp; Hebb, 1995; Stiff, Dillard, Somera, Kim, &amp; Sleight, 1988), and that these individual differences are good predictors of the extent to which people catch positive and negative emotions from others.' (p. 86-87, Bakker, Schaufeli, Sixma &amp; Bosveld, 2001)</p>
		Affective organizational commitment	Intake and periodic monitoring. If possible continuous data	<p>'<b>Affective commitment</b> concerns the person's emotional attachment to his or her organization.' (p. 209, Arnold, Cooper &amp; Robertson, 1998)</p> <p>'There is a relation between downsizing and negative atmosphere (<b>less affective emotional attachment, lower levels of commitment and loyalty</b> and renegotiation of the <b>psychological contract</b>.' (p.139-140 Bratton &amp; Gold, 2003)</p> <p>'People's <b>motivation/commitment</b> is affected by factors in the work environment such as leadership, practical support, reward and recognition, learning and development.' (p. 204 Bratton &amp; Gold, 2003)</p>
		Recovery after work/disengagement	Intake and periodic monitoring. If possible continuous data	<p>Unable to recover from work is an early sign of burnout. 'The critical point occurs when people are <b>unable to recover from work</b> demands. That is, acute fatigue resulting from an especially demanding event at work - meeting a deadline or addressing a crisis - need not lead to burnout if people have an <b>opportunity to recover</b> during restful periods at work or at home (Shinn, Rosario, Morch, &amp; Chestnut, 1984). When this kind of overload is a chronic job condition, not an occasional emergency, there is little opportunity to rest, recover, and restore balance.' (p.500 Maslach &amp; Leiter, 2008)</p>

Outcome, demand, resource	Type of outcome	Variable (examples)	Type of measurement	Literature
	Energetic	Sleep quality	Continuous data	One of the key functions of HRM is maintaining: 'The administration and monitoring of <b>workplace safety, health and welfare</b> policies to retain competent workforce and comply with statutory standards and regulations.' (p. 15 Bratton & Gold, 2003) 'This [ <b>fatigue and sleep deprivation</b> ] can have detrimental effects on human performance and decision making, and might result in an increased number of errors and accidents (Arendt, 2010; van Dongen, Maislin, Mullington, Dinges, 2003; Folkard, Lombardi, Tucker, 2005).' (p. 9, van Drongelen, 2015)
	Physical	Strength, endurance speed	Continuous data	' <b>Low back pain</b> is influenced by 'age, thoracic acceleration during the trunk velocity, test, median frequency intercept of electromyography, of the right L3 erector spinae, quadriceps strength, <b>quadriceps endurance</b> , self-assessment of fitness, having, a confidante, and number of medications currently taken.' (p. 1370, Stevenson, Weber, Smith, Dumas, & Albert, 2001)
	Physiological	HPA sensitivity and HPA reactivity	Continuous data	HPA regulates the long-term adaptation of organisms to stress. Morning cortisol levels were lower on non-working than working days. However, there was no difference in HPA levels between burned out, engaged and reference group: 'The burned-out, work-engaged, and reference groups did not differ in the cortisol and DHEAS levels, the slope of the cortisol awakening response, and the cortisol : DHEAS ratio.' (p. 339, Langelaan, Bakker, Schaufeli, van Rhenen, & van Doornen, 2006)

Table 3.4 The area of Performance (Line Management area)

Outcome, demand, resource	Type of outcome	Variable (examples)	Type of measurement	Literature
<b>Outcome</b>	Performance	Commitment, dedication, vigour	Intake and periodic data, and continuous data	<p><b>Engagement</b> is related to <b>performance</b> of employees (Christian, Garza, &amp; Slaughter, 2011) ‘Employee <b>engagement</b> gives a competitive advantage including higher <b>productivity</b>, better customer service and lower turnover.’ (p.3 Need, 2006) ‘There is a relation between downsizing and negative atmosphere (<b>less affective emotional attachment, lower levels of commitment</b> and <b>loyalty</b> and renegotiation of the <b>psychological contract</b>.’ (p.139-140 Bratton &amp; Gold, 2003)</p> <p>‘<b>Commitment</b> to organizations is positively related to such desirable outcomes as job satisfaction (Bateman &amp; Stasser, 1984; Mowday, Porter, &amp; Steers, 1982), motivation (Mowday, Steers, &amp; Porter, 1979), and attendance (Mathieu &amp; Zajac, 1990; Steers &amp; Rhodes, 1978) and negatively related to such outcomes as absenteeism and turnover (Clegg, 1983; Cotton &amp; Tuttle, 1986).’ (p.464 Becker, Billings, Eveleth, &amp; Gilbert, 1996)</p> <p>‘<b>Commitment to supervisors</b> was positively related to <b>performance</b> and was more strongly associated with performance than was commitment to organizations.’ (p.464 Becker, Billings, Eveleth, &amp; Gilbert, 1996)</p> <p>Direct (as opposed to indirect hours) are one type of indicator of employee <b>performance</b>. ‘Many indirect hours can be a sign of <b>motivation problems</b>’ (Expert interview, line manager, TNO, 2015)</p>
		Job satisfaction	Intake and continuous data	<p>‘Empirical evidence may come from Korean research that has found positive relationships between positive work attitudes, such as <b>job satisfaction</b> and commitment, and <b>organizational performance</b> in the public sector (Kim, 2005). Moreover, research has shown that positive attitudes are associated with <b>reduced staff turnover</b> and superior <b>financial performance</b> (Ryan et al., 1996).’ (p. 78, Preenen, Oeij, Dhondt, Kraan &amp; Jansen, 2016).</p> <p>‘<b>Job satisfaction</b> correlates comparatively highly with all three burnout dimensions but most highly with depersonalization...followed by emotional exhaustion, and reduced personal accomplishment.’ (p. 89-90, Schaufeli &amp; Enzmann, 1998)</p>
		Presenteeism, absenteeism	Intake, periodic monitoring and if possible continuous data	<p>‘<b>Presenteeism</b>, defined as <b>decreased on-the-job performance</b> due to the presence of health problems, is a second main component of <b>productivity</b> measurement and is beginning to garner more interest from corporate management, including medical directors (Roberts, 2005). <b>Presenteeism</b> measures the “<b>decrease in productivity</b> for the much larger group of employees whose health problems have not necessarily led to absenteeism and the <b>decrease in productivity</b> for the disabled group before and after the absence period” (Burton, Conti, Chen, Schultz, &amp; Edington, 1999). Presenteeism is often measured as the costs associated with <b>reduced work output, errors on the job</b>, and failure to meet company <b>production standards</b>.’ (Schultz &amp; Edington, 2007).</p>

Outcome, demand, resource	Type of outcome	Variable (examples)	Type of measurement	Literature
		Errors, risky behaviour	Continuous data	<p>In order to be innovative, employees need to be given space to take risks and be allowed to make mistakes along the way: ‘Successful innovation depends on the willingness of employees to contribute to and stay with their organization. In high trust organizations, employees <b>dare to take on risky and innovative projects</b> and are willing to share their ideas (Buchele and Christiansen, 1999a, 1999b).’ (p.6, 2015, Preenen, Vergeer, Kraan &amp; Dhondt, 2015)</p> <p>Link between error-making, learning and coping ‘Consideration of individual differences in <b>learning from errors</b> can help managers and trainers better coach individuals to <b>perform effectively</b> in jobs where errors are common. For example, in situations where employees or trainees with low levels of emotional stability struggle with learning because of distressing negative emotions (such as fear), managers or trainers can help these <b>employees concentrate on problem-focused coping, such as learning from errors</b>, by teaching them techniques to cope with error-related emotions effectively. For example, research has found that providing trainees with error management instructions (to encourage a positive and constructive view of errors and to look at errors as learning opportunities) can help trainees control their negative emotional responses to errors and facilitate their learning (e.g., Heimbeck et al., 2003; Keith &amp; Frese, 2005).’ (Zhao, 2011)</p>
		Task efficiency, task efficacy	Continuous data	<p>‘Because <b>engaged employees</b> experience a high level of connectivity with their work tasks, they strive toward <b>task-related goals</b> that are intertwined with their in-role definitions and scripts, leading to high levels of <b>task performance</b>.’(p.120, Christian, Garza, &amp; Slaughter, 2011)</p> <p>‘Our results show that <b>engagement</b> has significant relations with in-role and discretionary <b>work performance</b>. In terms of <b>task performance</b>, this signals that an engaged workforce will likely perform <b>their tasks more efficiently and effectively</b>.’ (p.123, Christian, Garza, &amp; Slaughter, 2011)</p> <p><b>Efficiency</b> and productivity are <b>hard to be really checked</b>, one relies on percentages of direct work and it doesn’t give insight into <i>how efficiently</i> people work. It does if you follow the persons work over a year or two and compare it with what others did, and also check it with other colleagues. (Expert interview, line manager, TNO, 2015)</p>
		Performance (evaluation)	Continuous data	<p>Intrinsic and extrinsic <b>motivation</b> are both related to <b>performance</b>, but in different ways: ‘...Intrinsic motivation was less important to performance when incentives were directly tied to performance and was more important when incentives were indirectly tied to performance. Considered simultaneously through meta-analytic regression, <b>intrinsic motivation</b> predicted more unique variance <b>in quality of performance</b>, whereas <b>incentives</b> were a better predictor of <b>quantity of performance</b>. With respect to performance, incentives and intrinsic motivation are not necessarily antagonistic and are best considered simultaneously.’ (p. 1, Cerasoli, Nicklin &amp; Ford, 2014)</p>

Outcome, demand, resource	Type of outcome	Variable (examples)	Type of measurement	Literature
	Wellbeing	Health, stress related symptoms	Continuous data	<p>Whether stressors would lead to stress related symptoms depends on individual's resources to deal with the stressor, as well as individual characteristics (Lazarus, 1999).</p> <p>'A variety of work related factors: role ambiguity, frustration, conflict, job design, violence and harassment can lead to <b>stress</b>.' (p.167 Bratton &amp; Gold, 2003)</p> <p>'Previous studies revealed that <b>workaholism</b> is associated with <b>ill-health</b> and <b>poor job performance</b>...' (p.155, Shimazu, Schaufeli &amp; Taris. 2010)</p> <p>'Our findings also show that <b>workaholism and performance</b> are only weakly and indirectly connected through active <b>coping</b>. Although workaholic people may perform slightly better than others through their use of active coping strategies, this indirect effect is relatively small. Overall, although <b>workaholic people</b> may contribute slightly more to organizational performance than others, the costs for the workaholic people themselves (in <b>terms of ill-health</b>) are high.' (p.158, Shimazu, Schaufeli &amp; Taris. 2010)</p>
<b>Demands</b>	Work context	Time pressure	Continuous data	<p>Time pressure is related to burnout (and burnout is an example of poor well-being): 'Workload and <b>time pressure</b> explain about 25-50% of the variance of burnout, especially emotional exhaustion.' (p. 82, Schaufeli &amp; Enzmann, 1998).</p>
		Negative atmosphere, bullying, aggression and violence, physical threats	Intake and periodic monitoring, if possible continuous data	<p>'There is a relation between downsizing and <b>negative atmosphere</b> (less affective emotional attachment, lower levels of commitment and loyalty and renegotiation of the <b>psychological contract</b>.' A negative atmosphere is a source of stress (p.139-140 Bratton &amp; Gold, 2003).</p> <p>'Workplace <b>sexual harassment</b> is another source of stress.'(p. 166, Bratton &amp; Gold, 2003)</p> <p>It is very important to invest in the <b>culture of the organization</b>, so that it is an open culture, where people can signal the difficulties they have, and not be afraid of being sanctioned for it (Expert interview, line manager, TNO, 2015)</p> <p>'Psychosocial safety climate (PSC) related to health and wellbeing: 'organizational PSC was negatively associated with workplace bullying and harassment (demands) and in turn psychological health problems (health impairment path). PSC was also positively associated with work rewards (resources) and in turn work engagement (motivational path).' (p. 1782, Law, Dollard, Tuckey, &amp; Dormann, 2011)</p>
		Unpredictability	Intake and periodic monitoring	<p>Restructuring brings about a lot of unpredictability. '<b>Restructuring events</b>, with and without staff reductions, mainly have a <b>negative impact on the well-being</b> of employees.' (p.1, de Jong, Wiezer, de Weerd, Nielsen, Mattila-Holappa, &amp; Mocka#o, 2016)</p>

Outcome, demand, resource	Type of outcome	Variable (examples)	Type of measurement	Literature
		Task unclarity	Intake and periodic monitoring, if possible continuous data	<p>'A variety of work related factors: <b>role ambiguity</b>, frustration, conflict, <b>job design</b>, violence and harassment can lead to <b>stress</b>.' (p.167 Bratton &amp; Gold, 2003)</p> <p>'...<b>personal accomplishment</b> shows a comparatively strong association with a lack of <b>role ambiguity</b>, feedback, participation in decision making and, depending on its operationalization, autonomy.' (p.83, Schaufeli &amp; Enzmann, 1998)</p>
	Personal	Work-life balance, life events	Intake and periodic monitoring (you would like to know if something significant happens)	<p><b>Private situation</b> of the employee is very important, because it also influences motivation, health and performance (Expert interview, line manager, TNO, 2015)</p> <p>Poor <b>work-life balance</b> is at an individual level associated with <b>poor health</b> and <b>burnout</b>, and on an organizational level with <b>decreased productivity</b>, increased sickness absence and high turnover rates (Allen, Herst, Bruck &amp; Sutton, 2000; Amstad, Meier, Fasel, Elfering, &amp; Semmer, 2011).</p>
<b>Resources</b>	Organizational	Acknowledgement	Intake and periodic monitoring	<p>'A strenuous job does not produce burnout as long as objective (e.g. pay, spare time) and subjective (e.g. <b>gratitude</b>, fulfilment) outcomes match the employee's efforts.' (p.191 Schaufeli &amp; Enzmann, 1998)</p> <p>'Organizations implementing total quality management practices that also <b>acknowledge</b> and reward employees' new and useful ideas are more likely to experience a favorable effect on <b>performance</b>.' (p.619 Joiner, 2007)</p>
		Meaningful work	Intake and periodic monitoring	<p>'Having <b>better jobs</b> and work organization <b>reduces the risk of stress</b>, enhances wellbeing and leads to a lower tendency to quit the job. Better work organization implies in particular a balance between job demands (job intensity) and job control (job autonomy), <b>wholeness of tasks</b> and more open access to decision-making processes.' (p.22 Pot, Totterdill &amp; Dhondt, 2016)</p>
		Learning culture	Intake and periodic monitoring	<p>'The spread of <b>career development initiatives</b> could be seen as a way of empowering and <b>motivating</b> staff...' (p.214 Bratton &amp; Gold, 2003)</p> <p>'By engaging in <b>personal development</b>, workers will become life-long learners.' (p. 215 Bratton &amp; Gold, 2003)</p> <p>'A central component of [physician]competence is professionalism, which requires <b>lifelong learning</b> that leads to <b>improved performance</b> in practice.' (p. 1137, Duffy &amp; Holmboe, 2006)</p>

Outcome, demand, resource	Type of outcome	Variable (examples)	Type of measurement	Literature
		Support (functional, social)	Intake and periodic monitoring	<p>'...<b>supervisor-employee relationship</b> to be the most commonly reported source of stress in the workplace.' (p.217 Lewis, Yarker &amp; Donaldson-Feilder, 2012)</p> <p>'A lack of social support from supervisors is especially related to <b>burnout</b>.' (p.82, Schaufeli &amp; Enzmann, 1998)</p> <p>'Independently from a direct effect on burnout, social support might buffer the effects of stressors such that employees who receive more support are better able to cope with their job demands.' (p.83, Schaufeli &amp; Enzmann, 1998)</p>
		Influence on the processes	Intake and periodic monitoring	<p>'A review of eight meta-analyses and four narrative reviews and syntheses suggests that <b>participation</b> has positive effects on <b>affective attachments</b> to the organization but only small positive effects on <b>performance</b>.' (p.508, Durant, Kramer, Perry, Mesch &amp; Paarlberg, 2006)</p> <p>'Our review of reviews finds that <b>participation</b>, broadly defined, generally leads to <b>higher satisfaction with organizational processes and decisions</b> and, ultimately, to stronger <b>commitment</b> to the organization.' (p.508, Durant, Kramer, Perry, Mesch &amp; Paarlberg, 2006)</p>
		Vision, performance	Intake and periodic monitoring, continuous data	<p>Employee <b>wellbeing</b> is related to <b>performance</b>: 'The importance of management relationships, support and employees' trust was found to predict wellbeing at work. The decision by management to embrace the business case for employee wellbeing at work is likely to complement more conventional methods of improving employee attitudes and productivity, which in turn can enhance organizational effectiveness and decision making.' (p.284, Renee Baptiste, 2008)</p>
	Team	Management support, social support	Intake and periodic monitoring, continuous data (for a manager)	<p>'For instance, a <b>manager</b> may be able to 'gate-keep' or <b>prevent stressors</b>, such as additional workload and deadlines, being passed on to employees....for example, <b>supervisor support</b> can reduce or exacerbate the impact of the work environment on employee outcomes such as absenteeism (e.g. Nielsen et al., 2008)...'</p> <p>(p.217 Lewis, Yarker &amp; Donaldson-Feilder, 2012)</p> <p>'Social exchange theory (Blau, 2006) suggests that where there is perceived <b>support from supervisors</b> and <b>employee trust in managers</b>, then employees will reciprocate and respond with positive work attitudes through increased motivation and commitment that can lead to <b>enhanced performance</b>.' (p.287, Renee Baptiste, 2008)</p>
		Team cohesion	Intake and periodic monitoring	<p>'<b>Cohesiveness</b> has a positive effect on the exchange of advice between team members and on openness for sharing opinions, whereas disagreement has a negative effect on openness for sharing opinions. Furthermore, <b>the exchange of advice</b> in a team has a positive effect <b>on the performance of individual</b> team members and acts as a mediator between cohesiveness and individual performance.' (van Woerkom, &amp; Sanders, 2010)</p>

Outcome, demand, resource	Type of outcome	Variable (examples)	Type of measurement	Literature
		Transformational leadership, leadership efficacy, leader-member exchange	Intake and periodic monitoring	<p>‘McGoldrick and Stewart (1996) have identified <b>leadership</b> as a key variable in linking <b>strategy, culture</b> and the <b>commitment</b> of employees.’ (p.319 Bratton &amp; Gold, 2003)</p> <p>‘Transformational leadership contributes to followers’ <b>work engagement</b> on a daily basis’ (p. 150 Breevaart, Bakker, Hetland, Demerouti, Olsen, &amp; Espevik, 2014)</p> <p>As the <b>line manager</b> is the person directly <b>responsible</b> for much day to day communication with the employee, it is logical to assume that the manager can also influence the way the employee perceives their working environment, and consequently the impact that environment on employee. Literature demonstrating both <b>direct</b> and <b>indirect</b> effects of <b>manager support, transformational leadership and leader-member exchange</b> would support this assumption’ (p.217 Lewis, Yarker &amp; Donaldson-Feilder, 2012)</p> <p>‘<b>Transformational leadership</b> involves generating enthusiasm for a ‘vision’, a high level of individualized consideration, creating opportunities for <b>employees’ development</b>, setting <b>high expectations for performance</b> and <b>acting as a role model</b> to gain respect, admiration and trust of employees (e.g. Bass, 1999, Bass &amp; Avolio, 1994 etc).’(p.220 Lewis, Yarker &amp; Donaldson-Feilder, 2012)</p> <p>‘Different types of tasks will require somewhat different leader characteristics and behaviours.’ (p.336 Arnold, Cooper, &amp; Robertson, 1998)</p>
	Job	Task comprehensiveness, job enrichment	Intake and periodic monitoring	<p>According to the Job demands-resources model of Karasek and Theorell (1990), task comprehensiveness would relate to higher job demands, but at the same time also higher control and would be classified as a ‘good job’, being associated with higher work satisfaction and better employee wellbeing. ‘Friedman (1977)...maintains that job design strategies such as <b>job enrichment</b> result in individuals or groups of workers being given a wider measure or discretion over their work with a minimum of supervision, and that this ‘<b>responsible autonomy</b>’ strategy is a means of maintaining and augmenting managerial authority over workers (Freidman, 1977), or <b>is a tool of self-discipline</b> (Coriat, 1980, p.40) for workers.’ (p. 125, Bratton &amp; Gold, 2003)</p>
		Role clarity, task variety, task feedback	Intake and periodic monitoring	<p>‘Goal-setting theory posits that <b>conscious and well-specified goals</b> - defined as the object or aim of an action to attain a particular standard of performance positively affect the actions of employees. A review of 11 meta-analyses and 6 narrative reviews of goalsetting research suggests that goal setting does increase <b>individual, group, and work unit performance</b>.’ (p.509 Durant., Kramer, Perry, Mesch, &amp; Paarlberg, 2006)</p> <p>‘Our review also suggests, however, that managers and researchers can expect challenging or difficult goals to be especially <b>performance enhancing</b> when committed employees give input, <b>receive feedback</b>, and perceive incentives for achieving them (Ambrose and Kulik 1999; Klein et al. 1999).’ (p. 510, Durant, Kramer, Perry, Mesch, &amp; Paarlberg, 2006)</p>



Outcome, demand, resource	Type of outcome	Variable (examples)	Type of measurement	Literature
		Autonomy	Intake and periodic monitoring	<p>'Transformational leadership and contingent reward positively influenced followers' daily <b>autonomy</b>, which consequently influenced followers' <b>work engagement</b>.' (p.151 Breevaart, Bakker, Hetland, Demerouti, Olsen, &amp; Espevik, 2014)</p> <p>'For example, <b>job autonomy</b> has been found to be positively related to employee motivation, skill development, commitment, job satisfaction, <b>wellbeing</b>, and <b>individual performance</b>, and negatively related to stress, burn-out, absenteeism, and employee turnover (see Fried and Ferris, 1987; Humphrey et al., 2007; Spector, 1986) and psychological contract breach (Oeij, 2006).' (p. 76, Preenen, Oeij, Dhondt, Kraan &amp; Jansen, 2016)</p>
		Development opportunities, challenge	Intake and periodic monitoring	'The results obtained reveal that <b>the training</b> given to the employees [...] improves the <b>performance</b> level of the employees. The increase is formed in the employee productivity after the training.' (p.1079, Anitha, & Kumar, 2016)
		Time for recovery	Continuous data	<p>'<b>Work overload</b> and <b>unrealistic time deadlines</b> will, for example, put an employee under pressure, and stress may result.' (p. 166 Bratton &amp; Gold, 2003)</p> <p>Unable to recover from work is an early sign of burnout. 'The critical point occurs when people are <b>unable to recover from work</b> demands. That is, acute fatigue resulting from an especially demanding event at work - meeting a deadline or addressing a crisis - need not lead to burnout if people have an <b>opportunity to recover</b> during restful periods at work or at home (Shinn, Rosario, Morch, &amp; Chestnut, 1984). When this kind of overload is a chronic job condition, not an occasional emergency, there is little opportunity to rest, recover, and restore balance.' (p.500 Maslach &amp; Leiter, 2008)</p>
	Socio-emotional	Social competence and self-reflection	Intake and periodic monitoring	'Theory suggests that individuals who are high in <b>emotional intelligence</b> are likely to exhibit a higher level of <b>performance outcomes</b> . The findings show positive relationships between emotional intelligence and employees' work outcomes.' (p. 403, Carmeli & Josman, 2006)

Outcome, demand, resource	Type of outcome	Variable (examples)	Type of measurement	Literature
		Pro-activity, locus of control, flexibility, emotional stability, meaning making, coping, self-efficacy	Intake, continuous monitoring	<p>Emotional stability is related to learning ability: ‘Participants with high <b>emotional stability</b> reported less negative emotionality (and three specific negative emotions: Fear, guilt, and sadness) than those with low emotional stability. The stimulating effect of negative emotions on learning was found in the structural models of guilt and sadness. Different from guilt and sadness, <b>fear</b> was directly and <b>negatively related to learning</b>.’ (Zhao, 2011)</p> <p>Research has also shown that individuals’ <b>self-esteem</b> reduces <b>anxiety</b> when faced with the stressors. This means that individuals with high self-efficacy are less likely to experience the work stressor as threatening and anxiety provoking (Lazarus, 1999)</p> <p>In order to understand <b>coping</b> properly, we need to examine it <b>continuously</b>: ‘In studying stress and coping, we must sample reactions to demands even during periods when they are being handled smoothly and without great evidence of emotional distress....coping may not be capable of terminating the stress, but the person can often manage it, which includes tolerating or accepting the stress and distress.’ (p.147, Lazarus, 1999)</p> <p>Individual characteristics are related to stress appraisal and well-being: ‘Certain <b>personality traits</b>, such as <b>negative self-esteem</b> and the perception of <b>poor social support</b> predicted a <b>rise in illness symptoms</b> following increased daily stress.’ (p. 263, Lazarus, 1999)</p> <p><b>Self-efficacy</b> is related to <b>performance</b>: ‘In results from a comprehensive meta-analysis, self- efficacy was found to have a strong positive relationship with work-related performance (Stajkovic &amp; Luthans, 1998a; also see Bandura, 2000; Bandura &amp; Locke, 2003).’ (p. 548, Luthans, Avolio, Avey &amp; Norman, 2007)</p>
		Task self-efficacy	Intake and periodic monitoring	<p>Employees with high task self-efficacy are more likely to pursue challenging work goals. This in turn relates to productivity and quality of work: ‘People tend to set non-challenging, goals in their work tasks when their <b>task self-efficacy</b> is low and generally pursue challenging, difficult goals when their <b>task self-efficacy</b> is high (Bandura, 1986; Wofford et al., 1992).’ (p. 93, Preenen, Oeij, Dhondt, Kraan &amp; Jansen, 2016).</p>
	Cognitive	Knowledge and skills	Intake and periodic monitoring	<p>‘Jobs with high demands and low control can be called ‘high strain jobs’ which are a risk for work-related stress. Moreover, stress inhibits <b>learning</b>. But jobs with high demands as well as high control are called ‘active jobs’ which offer <b>opportunities for learning</b> and coping with stressors (Karasek, 1979; Karasek and Theorell, 1990).’ (p.24 , Pot, Totterdill, &amp; Dhondt, 2016)</p>

Outcome, demand, resource	Type of outcome	Variable (examples)	Type of measurement	Literature
	Energetic, recovery	Sleep quality	Continuous data	<p><b>Sleep quality</b> (e.g. sleepless nights because of young children) affect the concentration (Expert interview, line manager, TNO, 2015)</p> <p>'<b>Chronic sleep deprivation</b> is common among workers, and has been associated with negative work outcomes, including <b>absenteeism</b> and <b>occupational accidents</b>... Participants classified as at-risk for any sleep disorder reported more work-related impairments, including significant problems related to <b>cognitive and mood-related performance at work</b>, presenteeism and absenteeism.' (Swanson, Arnedt, Rosekind, Belenky, Balkin, &amp; Drake, 2011)</p> <p>'<b>Insomnia symptoms</b>: are consistently associated with <b>excess absenteeism</b>; elevate <b>accident risk</b> in the workplace; reduce subjectively experienced <b>workplace productivity</b> (at least in the shorter term); inhibit career progression; and can degrade <b>job satisfaction</b>.' (p.547 Kucharczyk, Morgan, &amp; Hall, 2012).</p>

Table 3.5 Quality Management area

Outcome, demand, resource	Type of outcome	Variable (examples)	Type of measurement	Literature
<b>Outcome</b>	Performance	Errors, risk behaviour	Continuous data	'The function of the quality manager is <b>not to check the quality of work</b> , but to act as a <b>reminder to the project managers regarding the quality issues they should keep in mind</b> ...so he points out what needs to be done (which quality control checks), and how they are done is up to the managers (and eventually department leader who is end responsible)...so for example, he checks if the minutes of meetings are in place, but not the quality of minutes'. (Expert interview, quality manager, TNO, 2015)
		Task efficiency, task efficacy	Intake and periodic monitoring	'The management philosophy of total quality control (TQC) attempts to build quality standards into the manufacturing process by making quality every operator's concern and responsibility. TQC results in job enlargement as cell members undertake new self-inspection tasks and participate in quality improvement activities. With TQC, there are <b>savings</b> on labor and raw materials: <b>fewer quality control inspectors, fewer rework hours and less material wasted</b> (Schonberger, 1982).' (p. 128 Bratton & Gold, 2003)
<b>Demands</b>	Work context	Error avoidance culture	Intake and periodic monitoring	In organizations where it is not allowed to make mistakes and take risks, employees are less likely to report errors. 'Antoncic en Hisrich (2003) benadrukken verder, dat intrapreneurs durven af te wijken van de status quo. Dit betekent niet dat men in het wilde weg risico's moet nemen, maar dat men <b>durft om risicovolle projecten te starten en die probeert zo goed mogelijk uit te voeren</b> .' (p.11 Preenen, Kraan, van der Meulen & Dhondt, 2013).
<b>Resources</b>	Organizational	Learning culture	Intake and periodic monitoring	'Just in time production itself modifies workers' behavior by heightening a sense of 'urgency' and inducement to avoid mistakes and to discover defects in production quickly.' (p.13- Bratton & Gold, 2003) It is important for this kind of knowledge work not to have rigid norms. Only at a generic level can we specify what is needed. The quality manager interviewed finds it important that the procedures can be questioned and adapted and are not written in stone (i.e. there is <b>space for learning from previous projects</b> , tailor-making). (Expert interview, quality manager, TNO, 2015)
		Performance	Continuous data	The main focus of the quality manager is on <b>quality of the product and its process</b> , but of course health is also important...he discusses with project managers also issues of time: how long it took to complete the project (and how many overtime hours, evening hours were needed). This is important to know, because for example if one managed to reach the deadline but worked continuously on the weekends and evenings, it may set the bar too hard to others to follow and it is not healthy. And if people are overworked or working under time pressure, they also have less time/energy to pay attention to quality issues. (Expert interview, quality manager, TNO, 2015)

## 4 Conclusion

The main research question of this study was to determine what data, gathered on individual resilience of workers, can serve as useful input information for the management areas selected in this research (Human resources management, occupational health and safety management, performance management and quality control management).

We summarized the variables that measure individual resilience and that provide information (on aggregated level) for different organizational management areas. Variables in the tables provide the most information for the area of Human Resource management, Occupational safety and health and Line management, but there are only few variables of interest to the area of quality management. Most outcome and demand variables will provide useful information if measured with continuous data. Only with continuous data will it be possible to 'prompt' a signal the moment the scores deviate from the norm. To prevent negative results it is important to intervene as soon as scores on outcome and on important risks deviate from the norm.

This study provides insight for development of a dashboard on an organizational level in which each of the management areas could be provided with relevant data. In this report we examined what variables on an individual level would be interested for the management on an aggregate level, without paying attention to the privacy issues and what regulations about certain variables are. In a next step, design specifications could be developed that would take into account privacy issues and develop scenarios and use cases, describing the context in which users (management areas) interacts with the system. Furthermore, requirements could be developed about what the system should do and claims could be stated about hypothetical outcomes when the requirements are met (e.g. resilient organization).

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## 6 Signature

Leiden, 14 december 2017



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## A Appendix

### Interview protocol

Introduce the project, and the purpose of the interview.

This interview is for the purpose of the ERP project that looks into the topic of resilience. In our working package we are examining the resilience from an individual point of view, and exploring what kind of information would be useful to steer and signal resilience of employees. Thus we are examining what data information do the aspect system leaders (Manager/HR/Arbo/Quality controller) need to make the decisions that fall under their tasks. Through the interview we aim to obtain insight into information that is already used by the aspect system leaders and information that they would like to have, but do not have yet.

1. What are your main tasks and responsibilities?
2. How is the performance of these tasks measured?
3. In order to do your tasks properly, what kind of information do you rely on? Or: what kind of individual employee parameters do you rely on?
4. Do you collect information for all the employees (temporary, external, steady contracts) or only for certain subpopulations (e.g. internal employees)?
5. Is it easy to access this kind of information?
6. How often do you check these data sources?
7. Do you also examine information on a team/department level?
8. Are there any other parameters/information that you would need, but do not have access to at the moment? You can think of data that is already there, just not (easily) accessible, but also data that is not there, but would be good to collect in the future
9. How does in your eyes employees' resilience look like? How do you decide/monitor resilience of employees?
10. What is a signal to you that employee(s) are not doing well?
11. How do you measure performance, motivation and health of employees (if at all)? If so, how often do you check it? What input do you use for it?
12. To what extent is your work influenced by the type of organizational structure/educational level of employees? Or put differently: if you worked in a different organizational structure, do you think your work would differ from what it is now? And how?
13. How closely do you work together with HR manager/occupational health and safety manager/line/manager/quality manager? *For each one, ask how closely they work with managers from other areas.*