





Helmut Nold John Dony (Eds.)

# JOURNEY TO VISION ZERO

DOCUMENTATION



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# Introduction



### From "Navigating Uncharted Territory" to "Vision Zero. No Accidents and a Healthy Workplace"

Helmut Nold

In 2004, I was asked to join the "Cost Conference" of the National Institute of Occupational Safety and Health (NIOSH). I was delighted to be given my first opportunity to attend a meeting in the US.

What was the reason behind the invitation? In 2000, I had been asked to evaluate the objectives of our "Seminars for Owners of Small and Medium Enterprises." After a number of people had cited our results, the 2004 conference planners wanted to discuss the data with me. In preparation for my trip, I checked publications by some of the other presenters and I was fascinated by a speech by John Howard, the Director of NIOSH. The address, titled "Navigating Uncharted Territory in Occupational Safety and Health Research: 21<sup>st</sup> Century Challenges," was delivered at the Dallas Convention Center in May 2003. In his speech, John Howard brought eight challenges to our attention:

#### 1. The evolving organization of work

"The first challenge concerns the rapid evolution of how work is organized. And that evolution is challenging an injury and illness prevention system whose exclusive focus on physical, chemical, and biologic hazards now seems to be incomplete."

#### 2. The changing face of the American workforce

"The second challenge involves the face of the American workforce and the challenge that it poses for us to build a transcultural workplace injury and illness prevention system."

#### 3. Health Promotion

"Our third challenge is to integrate workplace health promotion together with our traditional health protection strategies."

#### 4. Persistence of readily preventable hazards

"Fourth, while challenges from changing work organization, workforce demographics and overall workface health occupy our safety and health agendas, we must not forget that traditional workplace hazards that give rise to traumatic injuries still persist despite the existence of effective control strategies for their prevention. The persistence of readily preventable workplace hazards challenges us to more effectively communicate these injury prevention solutions."

#### 5. Control strategies

"The challenge of making control strategies contained with standards, recommendations, and guidance documents relevant to the needs of small and medium-sized employers is our fifth challenge."

#### 6. Genetic research

"An important milestone in the history of medical science is the recent completion of a 'working draft' of the human genome sequence. The identification of all human genes and their regulatory structural regions provides the framework to greatly expedite our understanding of the molecular basis of disease and is destined to revolutionize the practice of medicine."

#### 7. Global terrorism and the security of the workplace

"We are now faced not only with the need to respond to the challenge of how to eliminate safety and health hazards *in* our workplace, but also to respond to the challenge of controlling threats to our workplace."

#### 8. HIV, SARS and the role of communicable diseases in the workplace

"As occupational safety and health professionals, we need to better understand how communicable diseases can be transmitted in the workplace – whether it is the human immunodeficiency virus, which causes AIDS, [...] or the far more common influenza virus or cold viruses." It is obvious that John Howard's eight challenges were visionary. The sixth challenge is problematic, as genetic research is controversial in Germany and Europe, but the idea behind this point is indisputable.

During my stay in Washington, DC, I was introduced to colleagues who were establishing a panel of global partners and reviewers for the Robert W. Campbell Award. Every year, the Robert W. Campbell Award honors the best OSH concepts which demonstrably integrate environmental protection, occupational safety and health, and the promotion of good health. The prize is named after an early-twentieth-century pioneer of the safety movement in the USA. Companies involved in the competition receive detailed feedback about their OSH management systems. Corporations of all sizes use this feedback as part of their continuous improvement programs. To participating firms, the global award is not simply beneficial in general terms, but is rather viewed as making a clear contribution to financial goals.

The BG RCI has been a global partner of the Robert W. Campbell Award since 2004. Every year, the BG RCI is actively involved in selecting the award winner as part of a comprehensive and demanding evaluation of safety and health management systems from across the globe.

The award is organized by the National Safety Council, an organization which works, among other things, to prevent occupational incidents and health risks in the workplace in the USA. Its first president was Robert W. Campbell. The BG RCI works in close cooperation with the National Safety Council. German companies that are members of the BG RCI, operate internationally, and wish to take part in the competition are extensively counseled and supported by the BG RCI. This includes the guidance provided by the BG RCI seminar "Navigating Uncharted Territory."

The idea of the "Navigating Uncharted Territory" seminar was to bring companies of all sizes together to discuss global challenges. We had a very helpful supporter in Mei-Li Lin, the Senior Director of Research & Statistical Services at the NSC at the time, who joined us in Germany three times. We discussed the following questions:

- Are the German BGs ready for the John Howard's eight global challenges?
- What are the experiences with OSH systems in Germany, Europe, and the US?

The discussion surrounding these questions was given a holistic perspective. We compared different degrees of regulation, the problem of regulating healthcare, and even questions of well-being. The spirit and the very practical review checklists of the "Robert W. Campbell Award" provide excellent guidelines for helping companies with these issues.

Companies can benefit from the award winners' 'recipes for success.' In 2010, Dow Chemical Company was the first member company of the BG RCI to win the prestigious award. In 2013, it was DuPont's turn when they convinced the international jury of the high quality of their OSH concept, which is literally at 'World Class Level.' "For more than 200 years, the four core values of DuPont have defined who we are and what we stand for. One of these core values is safety and health. This commitment has fundamentally helped us to become the company that we are today," said DuPont's CEO, Ellen Kullman.

After the fusion of the German BGs and an increase in the focus on healthcare in Germany, a commitment to "Vision Zero" was initiated by the BG RCI. International competition, demographic change, continual structural change, and increased information density present great challenges to the economy and to society – and to German accident insurance providers in the work they do in prevention.

The prevention committees of the board and representatives' group of the BG RCI discussed in detail the BG RCI's future strategic direction for prevention against this background, while taking into consideration the position paper of the members' general meeting of the DGUV (German Social Accident Insurance). As a result they decided on a new prevention strategy: **"VISION ZERO. Zero accidents – healthy working!"** 

In August 2014, occupational safety and health experts from around the world met in Frankfurt for the 20<sup>th</sup> World Congress for Safety and Health at Work. The theme was: "Our Vision: Designing Sustainable Prevention"

- 1. Prevention Culture Prevention Strategy Vision Zero
- 2. Challenges for health at work
- 3. Diversity in the working world

The first of these points is as: "Vision Zero – a world in which people work safely and in good health, and where they are protected from serious acci-

dents. This requires all continents to be involved in a prevention culture of safety and health at work as well as sustainable strategies for the well-being of humans and the benefit of economic and social systems."

We took advantage of the fact that so many members of the global OSH community were gathered in one location and organized a side event to answer the following questions:

- Is there a common understanding of "Vision Zero"?
- Is there a common understanding of "Zero accidents healthy working"?
- Are there practical examples?

Discussions quickly showed that international experts vary in what they imagine "Vision Zero. Zero accidents and healthy working" to mean. This does not mean that the vision itself is in question but rather that the path towards "Zero accidents" is assessed differently and that, in particular, consensus has not yet been reached on the importance of the additional concept of "healthy working."

The aim of this book is to provide an open discussion of these different views. In global organizations it is particularly important in financial terms to know how much focus is placed upon "Vision Zero." As 'health protection' is a topic of intense discussion in Europe and is a core part of the prevention strategy of many European countries, it deserves to be given ample consideration. Health protection is firmly embedded in the Joint German OSH Strategy (GdA) of the German federal states and the statutory accident insurance providers. The GdA Directive goes beyond pure health protection. As of 2015, one primary objective is to identify and reduce psychological strain in the workplace and an additional goal from the area of "healthy working" is to reduce the cases of musculoskeletal disorders. In Germany, the integration of health-promoting activities is considered an integral part of general safety work. What is the situation in the USA? How is the issue viewed in other countries?

This book lists individual paths to "Vision Zero." How do experts imagine the path to "Zero Accidents"? How important is "healthy working?"

The experts involved in these discussions come from many sources. Some took part in the ancillary event organized by the BG RCI during the World Congress for Safety and Health in Frankfurt on 24 August 2014. Some attended the Executive Summit of the Campbell Institute on 15 September 2014 in San Diego. Some are global partners of the Robert W. Campbell Award family. Others were asked by the publishers to contribute an article because they are recognized experts in the field of occupational safety and health.

Back in 2003, John Howard quoted the great American baseball player Yogi Berra, who is famous for commenting, "The future ain't what it used to be." Be that as it may, we hope this book will be of help in coping with whatever the future will bring.

#### 2. Navigating in the Global Nation of EHS

John Dony

So often, EHS and business leaders are reminded to "think global" – yet the strategies and processes in place in their organizations create unintentional (or perhaps intentional) regional silos. Certainly, there are valid reasons for this – no one would argue that the culture of the United States is exactly the same as that of Western Europe, let alone Canada. Yet when it comes to environmental, health, and safety (EHS), for all our cultural differences, we are a Global Nation. Each life, each community, and each region of the world are equally valuable.

Assuming we believe this vision to be true, we must own up to the challenge it represents. We must find ways to break through silos, communicate across languages, and translate not just words but genuine care. We must be our own navigators in this Global Nation. Fortunately, what is uncharted territory for one of us may be familiar ground for another. By leveraging partnerships, sharing ideas and best practices, even simply opening conversations beyond our own industries or regions of the world, we will be able to chart a course strengthened by collective knowledge and wisdom.

It is for this reason that this collection of insightful articles, studies, and papers exists. In some ways, this book represents one small tool we can use to orient ourselves and continue to find our way. In my view, though, it is much more significant. It represents a strategy, and perhaps even provides a network, for better understanding the Global Nation of EHS. Born of a decade-long collaboration between the National Safety Council in the United States and BG-RCI in Germany, this collection is the outcome of a comprehensive effort that has seen countless successes both large and small. It is the spirit of partnership behind this book that truly sets it apart.

Of course, I hope you find value in the content of the articles themselves. As you read on, you will find diverse viewpoints on issues of culture, metrics, and everything in between. Yet I urge you to consider what lies beyond the page as you read each piece. The people published here are those who have embraced our shared challenge, who continue to play their part each and every day in shaping a safer, healthier, better world. Best of all, they are willing to help you.

In the coming days, I suspect you will find yourself investigating many new avenues as a result of reading this book – the better to navigate with. As you continue your journey, I ask you not to hesitating in reaching out to myself, Dr. Nold, or any of the authors included in these pages. We know that we grow stronger with each new voice and perspective, and we look forward to sharing with – and learning from – you in the future.

# "Navigating Uncharted Territory" Laubach 2004–2014



## 3. Worksite Health Promotion in Small and Large Businesses

Bernhard Zimolong

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- 1.2 Health and accident statistics
- 1.3 The OSH regulation challenge
- 1.4 Worksite health promotion
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#### 1. A change in perspective

#### 1.1 The dominance of small businesses

The dynamic nature of small and medium-sized enterprises (SMEs) appears to have been a crucial factor in the recovery from the global crisis since 2008, as documented in last year's 2013/2014 Annual Report on EU SMEs. SMEs have come to be regarded as a driving force behind modern economies due to their contributions in terms of technological upgrading, product and process innovation, job creation, and export promotion. The ability of SMEs to innovate is important because it improves not only their own competitiveness but also, through linkages and knowledge spillover with other firms, that of entire industries and the macro economy. There were an estimated 21.2 million SMEs in the non-financial business sector in the EU-28 in 2013. SMEs employed 88.8 million people and generated € 3.666 trillion in value added. They accounted for 99.8% of all enterprises in this particular sector, 66.8% of total employment and 57.9% of total value added generated by the non-financial business sector. Five key economic sectors account for approximately 78% of all SMEs in the EU-28: manufacturing; construction; professional, scientific and technical activities: accommodation and food; and wholesale and retail trade, repair of motor vehicles and motorcycles (Ecorys, 2012).

There are an estimated 2.2 million non-financial enterprises in Germany. Of those, more than 99% are SMEs, which account for more than 60% of the working population. Almost 34% of sales, nearly 43% of gross investments and fully half of all gross value-added are allotted to SMEs. Additionally, not only 52.1% of all economic activities but nearly 80% of all training is also produced by mid-sized businesses.

However, if the relationship with other companies is taken into consideration, many mid-sized businesses would lose their SME status. In 2011, there were a total of 160,000 dependent SMEs under majority control of another business (Söllner, 2014). Among medium-sized enterprises, almost half (47%) of all SMEs are majority controlled by another company. They would therefore have to be classified as large enterprises.

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	Percentage	#of Employes	Percentage	#of Enterprises	15taff Annual turnover	

year 2011). Jable 1 Company sizes of non-financial enterprises in Germany (Söllner, 2014, reporting

However, SMEs' positive economic outcomes are juxtaposed against a significant lack of occupational safety and health (OSH, Zimolong & Kohte, 2006). A number of papers (see Sorensen, Hasle and Bach, 2007) have identified increased tisks for SMEs, either in terms of accident tisks or incidence rates, especially when it comes to serious injuries, although accident underreporting is estimated to be higher in SMEs (Clifton, 2005). The European accidents happen in SMEs despite the fact that less than 70% of the workforce is employed in them. It is widely recognized that OSH in SMEs involves a number of particular challenges:

- SMEs are subject to greater risks, as shown by the relevant statistics.
- Many OSH improvements are low-cost solutions, yet sometimes SMEs have problems financing OSH policies due to limitations on their access to capital and do not benefit from the effects of economies of scale.
- SMEs have problems implementing OSH policies due to a variety of organizational features.
- Authorities face difficulties in fostering effective OSH management in SMEs mainly because there are so many SMEs and these businesses have limited resources (Targourzidis et al., 2014).

Despite the overwhelming magnitude and economic force of SMEs, small businesses are not well represented in the OSH literature, indicating a limited number of published evaluations of Worksite Health Promotion (WHP) in the SME population. The literature is dominated by American studies of large organizations, often with very considerable investment in management systems. This has led to the idea that health and safety management systems must be rule-bound and rule dominated. Audit systems, certification regimes and regulatory checks reinforce this view with their search for indicators that can be easily detected and proven. Hale and Baram (1998) have already pointed out that small companies have different structures, means of coordinating their activities, and of setting and monitoring their standards, which sometimes scarcely overlap with those of large organizations. Many do not rely on extensive explicit rules for their normal management control but rather much more on competence and communication. Existing assessment techniques are not very well equipped to measure these.

In a recent comprehensive review on return of investments of health promotion, large companies accounted for 59% (n = 30) of the included studies, of which all but two originated in the United States and 15 exceeded 5,000 employees. SMEs only accounted for two studies; five studies were of mixed sizes. Some of the former reviews also excluded studies conducted outside the United States, which may lack applicability for shareholders in countries like the EU-28, where SMEs predominate and employee health care provisions are not incumbent on employers due to national health care systems. The European Agency for Safety and Health at Work had recently launched a report on cost-benefit analyses of interventions in small and medium-sized enterprises (Targoutzidis et al., 2014). This study had two main strands: identifying case studies of OSH interventions in the existing literature and developing new case studies on OSH initiatives in European SMEs. The report identified 91 existing case studies, however, only 19 of them were from Europe.

#### 1.2 Health and accident statistics

The World Health Organization defines health as 'a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity', which points to its multidimensional nature and possible ways of measuring it. EU member states and other countries rely on three key indicators describing the levels and distribution of health status of their populations (Eurostat/Health status 2014).

- self-perceived health gives an overall assessment by the respondent of his/her health in general;
- chronic morbidity assesses the presence of a long-standing illness or health problem;
- disability or activity limitation assesses the limitations people have had in carrying out their usual activities for at least six months because of health problems; this measure is called the Global Activity Limitation Indicator (GALI), which is used to calculate the Healthy Life Years indicator.

In the EU-28, 69 % of the population aged 16 years or over perceived their health as very good or good in 2011 while 22 % perceived it as fair and 9 % as bad or very bad. Across European countries, the prevalence of very good and good self-perceived health ranged from 84% in Ireland, 81% in Switzerland and 80 % in Sweden to less than half of the population in Latvia (47%), Lithuania (46%) and Croatia (45%). Assessment of health was fairly stable over time: There was no significant change in the prevalence of good or very good self-perceived health in the EU-28 overall between 2005 and 2011. However, the situation differed considerably among individual countries (Eurostat/Health status 2014). In the EU-27 in 2007, approximately 23 million people had a health problem that had been caused or made worse by work in a 12-month period (Eurostat/Health and safety at work in Europe 2010). In addition, prevalence rates among European workers indicate that in 2007 a total of 23 million workers or 8.6 % of the workforce (aged between 15 and 64 years) suffered from work-related health problems. The health problems most often reported were musculoskeletal disorders, stress, depression and anxiety.

In 2011, there were just over 2.7 million serious accidents that resulted in more than three days of absence from work and 3,691 fatal accidents in the EU-28 (Eurostat/Health and safety at work 2014). These figures marked a considerable reduction in comparison with 2008, when there were approximately 399,000 more serious accidents and nearly 696 more fatal accidents (based on time series for the EU-27). An alternative way to analyze the information about accidents at work is to express the number of accidents in relation to the number of persons employed (called the 'incidence rate'). Across the EU-28, there were on average 1.94 fatal accidents per 100,000 persons employed in 2011 while there were 1,601 serious accidents at work per 100,000 persons employed. Among the EU member states, the highest incidence of fatal accidents at work in 2011 was recorded in Portugal (4.3 deaths from accidents at work per 100,000 persons employed). By contrast, at the other end of the range, the United Kingdom and the Netherlands recorded the lowest incidence rates, below 1.0 fatal accidents at work per 100,000 persons employed.

The incidence of serious accidents at work in 2011 was highest in Southern and Western Europe, with Spain reporting in excess of 3,000 serious accidents per 100,000 persons employed. By contrast, among the Eastern European member states, Slovenia was the only one to report an incidence rate of more than 1,000 serious accidents per 100,000 persons employed.

The likelihood of being affected by workplace accidents varies considerably when accounting for gender and location as well as industry. Men are, on average, 2.5 times more likely to have a serious accident at work than women, although this is largely driven by the gender patterns of employment by sector and occupation. Across a selection of European countries, fatal accident incidence rates per 100,000 workers ranged from over five in Poland to less than one in Germany, Denmark, the Netherlands, the United Kingdom and Slovakia.

In addition to accidents, exposure to hazardous substances at work is believed to contribute significantly to mortality through carcinogenic and respiratory diseases. For example, exposure to occupational carcinogens alone is estimated to result in a global disease burden of 152,000 deaths and nearly 1.6 million disability-adjusted life years (Driscoll et al., 2005). More specific figures show that, for example, in 2005 in the United Kingdom alone, 8,019 cancer deaths were attributable to occupation, the majority of which were associated with substance exposure (Rushton et al., 2010).

#### 1.3 The OSH regulation challenge

OSH regulations and occupational health services have evolved to safeguard and maintain employee health. In most industrialized countries, the regulatory approach has led to a tremendous improvement of occupational safety and health conditions as compared to former centuries. One of the problems with regulation to control OSH risks is that it requires an agency, such as a labor inspectorate, to check if employers are complying with the law. As most work is carried out in small businesses, it is impossible to inspect all workplaces regularly due to the sheer number of them. Another issue is that OSH regulation in many countries is considered complex and bureaucratic, which is one of the reasons behind the lack of compliance.

The assumption underlying regulations protecting worker health is that the market would not provide such protection at a socially optimal level if left unregulated (Verbeek, 2010). However, accident and health statistics indicate a greater risk for the overwhelming majority of employees working in small businesses. Although most people are inclined to think that regulation is the best solution, there is evidence that it is not effective if it is insufficiently implemented (Tompa et al. 2007). If traditional regulation cannot ensure health and safety at an optimal level for small businesses, contractors, temporary staff, freelancers, and self-employed people against the backdrop of global competition, what kind of regulations and incentives do the markets need to guarantee safe and healthy workplaces?

Worksite Health Promotion (WHP) programs have emerged as a priority topic to support self-care and self-management at the workplace. WHP has been introduced as an addition to the traditional regulatory OSH approach, focusing more on general health factors through workplace promotion of a healthy lifestyle. The main driving force behind employers' growing interest in providing WHP services to their workers is undoubtedly rapidly rising health care costs (Pelletier, 2011).

Managing one's physical and mental health requires a high degree of personal responsibility in maintaining a healthy lifestyle and positive attitudes. Self-care or self-management refers to the notion that the individual is an active participant in his or her medical treatment or in ensuring health maintenance. Self-management education is designed to teach skills and increase the participant's confidence in his or her ability to define and solve problems, make decisions, find resources, and form partnerships with health care providers. Such an approach can reduce symptoms and distress caused by many chronic diseases and improves psychological wellbeing as measured by standardized instruments (Lorig & Holman, 2003).

#### 1.4 Worksite health promotion

WHP encompasses health promotion and illness prevention activities that are available at the workplace. At their core, WHP programs support primary, secondary and tertiary prevention efforts. Primary prevention efforts at the workplace are directed at employed workers who are generally healthy. They also offer opportunities for employees who do not maintain good health and who may fall prey to diseases and disorders that can be prevented or delayed if preventive actions are taken. Examples of primary prevention include programs that encourage exercise and fitness, healthy diet, weight management, stress management and use of safety belts in cars (Goetzel & Ozminkowski, 2008).

Health promotion also incorporates secondary prevention directed at individuals already at high risk because of certain lifestyle practices (e.g., smoking, frequent sedentary states, high stress) or abnormal biometric values (e.g., high blood pressure, high cholesterol, overweight). Examples of secondary prevention include hypertension screenings and management programs, telephone quit lines for smoking cessation and weight loss classes. Health promotion sometimes also includes elements of tertiary prevention, often referred to as disease management, directed at individuals with existing ailments such as asthma, diabetes, musculoskeletal disorders and depression with the aim of ameliorating the disease or retarding its progression. Activities may range from single, one-off interventions (e.g., influenza vaccination) to multicomponent, multilevel health interventions. The interventions range from those with a single-target focus (e.g., smoking cessation) to those with a multicomponent focus (programs offering two or more behavioral targets). Key components of a comprehensive program include: (a) health education, (b) links to related employee services,

(c) supportive physical and social environments for health improvement,
(d) integration of health promotion into the organization's culture and (e)
employee screenings with adequate treatment and follow up (Linnan et al., 2008).

The annual report of the statutory health insurance institutions (GKV, 2014) reports on financially and technically supported health promotion activities in business and public services. According to the statistics of the reporting year 2013, 4.667 enterprises participated in one of the offered programs. Participation rate of small (1-99) firms was 35%, medium firms (100-499) 42% and large firms (>500 employees) 23%. With respect to the EU classification classes (see Table 1), medium and large enterprises (>250 employees) clearly dominate the WHP landscape. WHP interventions provided at the worksite reached 1.1 million employees. Activities targeted prevention and reduction of physical loads including promotion of physical activity (74%), stress management (45%), healthy nutrition (35%), health promoting leadership (28%), cessation of smoking (15%) and reduction of alcohol consumption (3%).

The Community Guide Task Force completed a comprehensive review of workplace-based health promotion and disease prevention programs in 2007 (Task Force Comm. Prev. Serv., 2007). The Task Force examined the literature for 50 worksite programs that qualified for inclusion in the review. In most cases, WHP interventions provided at the worksite were offered free of charge to encourage participation. The outcomes included a range of health behaviors, physiological measurements, and productivity indicators linked to changes in health status. Most of the changes in these outcomes were small when measured at an individual level; however, such changes at the population level were considered substantial. Aside from changes in health risks, the review reported additional benefits associated with worksite programs. These include increasing worker awareness of health topics, increasing detection of certain diseases or risk for disease at an earlier stage, referral to medical professionals for employees at high risk of disease, and creation of need-specific health promotion programs based on an analysis of aggregate results.

Recent benchmarking and best-practice studies suggest that the effectiveness of worksite programs is influenced greatly by such factors as having senior management support, alignment between the program and broader organizational objectives, data documenting program achievements and the ability to create a healthy company culture (Zimolong et al., 2008). Although several key process components leading to successful program outcomes have been documented, there is insufficient evaluation of program outcomes, especially financial outcomes, using rigorous study methods (Uegaki et al., 2010). Thus more research is needed before early successful WHP applications can be generalized to the broader employer community. The dominance of large US firms in the studies and the lack of evidence for small businesses limit generalizability (Baxter et al., 2014). Outcomes of several older reviews may also reflect the impact of US employees' health care provisions that are not reliant on a national health care system.

# 1.5 Public Service Study: Worksite health promotion in the German tax administration

The project INOPE (health promotion and prevention supported by Integrated Network, Organizational, and Personnel development) started in nine local tax offices in the Rhineland tax administration (Zimolong & Elke, 2011). The tax offices volunteered to participate in the pilot project and included a total of 2,136 employees. The organizational change process pursued a dual approach to the structural and psychosocial model, drawing on top-level commitment and from the bottom up on strong participatory support from employees, members of employee committees, and health and safety representatives. The starting point was an update of previous and ongoing worksite health activities and programs at the local tax office level, an assessment of their outcomes, a health risk appraisal, and the participatory implementation of steering committees in each of the tax offices. Their responsibility was to plan, coordinate, evaluate and improve health promotion activities. Participants in the local steering committees were senior and deputy managers, first-level managers, employees, members of the local employee committee, and health and safety representatives. The president of the Rhineland tax administration chaired the central steering committee of the nine tax offices. This committee incorporated all senior managers of the tax offices, central health and safety representatives, members of the central employee committee and scientific consultants.

Key elements of the health management system to be implemented incorporated human resource management structures and activities, e.g., introduction of leadership accountability for OSH objectives aligned with appraisal and reward systems, top-down and bottom-up health goal setting and negotiations, setting up of monitoring and feedback systems, promotion of OSH responsibility among self-managed teams and individuals, and training systems linked to managers' and subordinates' needs. Additionally, peer pressure with respect to health activities and positive health attitudes generated by work teams supplemented both managerial influence and internalized member commitment.

Work-design management emphasized the allocation of accountability to first-line managers and teams. This was linked to an ongoing monitoring and improvement loop with a focus on physical (ergonomic) as well as psychosocial aspects of the workplace environment. Health circles developed work process improvements and were encouraged to adjust characteristics of their computer software. The implementation and continuing improvement of the generic OSH management system was guided and redirected by annual health surveys. Specifically tailored health interventions such as a twelve-month lasting 'Healthy Back' program (Lehnhoff & Elke, 2009) and ongoing menu offers of physical and psychosocial activities at the local tax offices completed the OSH system. One noteworthy aspect of the offers arose from networking with local and regional healthcare providers and institutions.

Health-promotion interventions incorporated employee counseling and coaching, invitations to group health education and active training classes, and telephone-based support activities aimed at encouraging or assisting employees in their efforts to adopt healthy behaviors. Interventions with an environmental focus covered enhancing access to physical activity programs (exercise facilities, time off for exercise, establishment of training classes such as Nordic Walking), providing healthy food choices in cafeterias and enacting policies that support a healthier worksite environment (such as a smoke-free workplace). In most cases, WHP interventions provided at the worksite were offered free of charge to encourage participation. Results of various evaluation campaigns are documented in Gurt et al. (2009), Görg & Wieland (2009), Zimolong & Elke (2011).

#### 2. Safety and health management

#### 2.1 Generic system elements

Management as a function comprises all processes and functions resulting from the division of labor within an organization, such as planning, organization, leadership and supervision. In most organizations, more or less formalized management systems serve to structure, develop and direct business processes. Systems differ with respect to industry types, nature of business, company size and human factors such as culture and policy. As firms grow in size, management systems become more complex and difficult to use resulting in domain-specific systems such as safety, health, environmental resources, quality and personnel management. Given that Safety, Health, and Environmental (SHE) management includes a number of overlapping areas and those fields are actually practiced by the same people in an integrated manner, companies are moving towards integrated SHE management systems as a subsystem of business/operations management.

OSH management can be understood as a domain-specific management system within a broader risk management domain. Many of the features of OSH management are indistinguishable from the sound management practices advocated by proponents of quality and business excellence (Zimolong & Elke, 2006). This is reflected in standards, usually based on ISO 9000, e.g., BS 7750 and the ISO 14000 series, and in legislative developments in many countries. The safety management principles of the ISO standards and of the standard textbooks on safety management would seem to suggest that science and industry have reasonable models for operating safe and reliable organizations. However, this is not the case. Hale and Baram (1998) conducted a thorough OSH management literature review and concluded that the OSH literature can be characterized as the accumulated experience of common sense and as general management principles applied to the specific field of safety and health. The elements of the systems are considered to present 'best practices' of large, mostly US-dominated enterprises. They are not designed for small businesses and do not take into account cultural specifics, such as work design, leadership style, scale of expected employee participation and decision making, or type of reward and promotion systems (Steers et al., 2013).

Companies with world-leading records in OSH integrate their general achievement systems based on management by objective, appraisal, reward and career-development systems with the OSH function (Beckmann et al., 2001). They mainly rely on strong OSH leadership responsibility, appraisal and reward systems that are combined in an integrative human resource management system. These systems not only include indicators of business performance, they also address OSH indicators and performance. OSH culture serves as a substitute for managerial influence and fosters internalized member commitment. A specific contribution of the OSH culture addresses the development of employee health resources towards self-sustaining health consciousness, commitment and activities. The traditional approach to managing people focuses on selection, training, performance appraisal and compensation for individuals in specific jobs. When tall organizations become flatter and/or are restructured around teamwork. different forms of team autonomy and OSH responsibilities emerge. Selection, performance appraisal and reward policies are the most likely candidates for change. Contingent pay and peer pressure generated by teams are emerging as substitutes for both managerial influence and internalized member commitment.

The challenge is finding a way to implement the previously described WHP practices within the OSH management system to develop its effects. There are basically two feasible approaches: the organization acquires menu-based health services from health vendors (surface acting) or the organization decides on a sustainable solution and adopts some kind of a health management system (deep action). In the latter case, OSH activities have to be incorporated into managers', supervisors' and employees' daily routines and OSH standards and processes into products', services' and work systems' life cycles. Best Human Resource Management (HRM) practices support employees' long-term commitment to and involvement with OSH. The system elements to be managed are risk control and health promotion systems. Key elements of the systems are human resources management, management of information and communication, (re)design of work and technology, and development of a culture that is supportive of OSH. Generic management activities include those of ISO-standards' management control loops. The health and safety risks associated with the life cycle of systems, products and services are managed by risk assessment in each phase of the life cycle and by continuous risk performance measurements as part of information and communication management.

#### 2.2 Enterprise Study: Best practices in the chemical industry

Zimolong & Elke (2001) performed a longitudinal study in the chemical industry to identify key practices and systems of healthy work organization, particularly focusing on OSH management systems that are connected with organizations' OSH performance. A total of 18 plants participated, ranging in size from 200 to 1,500 employees. Research topics were best practices, processes and structures in OSH-related planning and design of work systems, human resource management, information and communication management, and cultural aspects. Other topics addressed the control strategies of the human resource subsystems such as guiding, training, and incentive systems and the kind of substitutions companies have developed to maintain an efficient control loop. Companies' OSH performance levels were measured based on frequency of injury days and lost workdays due to ill health.

The study covered excellent and poor companies as well as firms that improved or worsened over a period of four years. Companies' achievement levels were measured based on frequency of reportable injuries and lost workdays due to ill health. The excellent group included all companies that performed above the median of their particular risk group for four years. The progressing group included companies that improved their performance level during the last two years of the study period. They provided accident figures similar to those of the excellent group. The digressing group included companies whose OSH performance declined, revealing a median near that of the risk group. Finally, the poor group covered those companies that continually performed below the median of their risk group. An HRM questionnaire addressed the actual status of the HRM process in each company with respect to control strategies, recruitment, selection and placement, performance appraisal, training, leadership style and incentive programs. The most frequently documented systems in OSH were appraisal systems (53/31%), career development and promotion systems (53/26%), training systems (47/24%) and reward systems (40/34%). The second figure indicates the practiced systems as derived from interviews with managers. As might be expected, there was a considerable difference between the documented state and the actual application of those systems.

Organizations differ significantly in the ways that they control the usage of a system. A complete control loop has three phases: monitoring, measuring and reviewing and taking any necessary action. Most companies monitored the application of systems (65%) and 16% measured it, however 31% reviewed the outcomes. As compared to the poor group, excellent companies performed a higher percentage of reviews (57/20%) but had similar monitoring (57/60%) and measuring (14/0%) figures.

Leadership in OSH, performance appraisal, reward system, career development and promotion, and training systems were both the most frequently documented and practiced HR system applications (see Fig.1). In general, poor companies only used one or two systems, mainly leadership responsibility and sometimes appraisal or promotion systems. The most remarkable difference between the excellent and poor groups was the adoption of reward systems related to OSH performance for managers and workers. Companies striving to improve their OSH performance were the ones that invested the most into those systems: Their application rates were even higher as compared with the excellent firms. Combined systems create a further distinction between the groups. Excellent firms mostly introduced reward systems and combined them with appraisal and career development systems. This effective triad formed the successful HRM-system in OSH. The study's progressing firms adopted a variety of systems. It is very likely from our research that eventually they will reduce the multitude of systems to only a few combined systems, which will form their typical HRM profile.



Fig. 1 Application rate of human resource systems for OSH management in excellent, progressing and poor companies. Data are based on 100 interviews with managers from different departments at 18 chemical industry production sites (Beckmann et al., 2001, p. 68).

#### 2.3 Leadership and culture

Leadership qualities have proven to be an important explanatory structural factor with regard to sick leave, employee health and wellbeing (Dellve, Skagert & Vilhelmsson, 2007). In addition to their direct influence on employee health, leaders are also seen as promoters of a supportive organizational climate and culture (Zohar & Luria, 2004). Safety climate and culture are regarded as important outcomes of all health and safety initiatives. The leaders' impact on safe and healthy employee behavior seems to be twofold: First, management and leaders shape organizational processes and management sub-systems, e.g., human resource management. Through these systems, they exert control over a variety of health-related workplace

characteristics and the working environment such as individual workload, work scheduling and physical working conditions. It has also been demonstrated that leadership has an impact on the design of these workplace characteristics and can act as a buffer or resource for health-related outcomes (Nielsen, Randall, Yarker & Brenner, 2008). Conversely, leadership can create an additional burden.

Secondly, leaders also influence safety behavior and employee health through day-to-day direct and personal interaction and communication. Two distinct ways of exerting influence can be identified:

(1) The direct approach to immediate modification of behavioral functions via behavior control through training, personnel appraisal and reward systems; (2) the indirect influence of leadership interaction on health and safety behavior through mediating variables, e.g., safety climate and culture. Leaders serve as role models. Norms and values develop through this learning process, which may substitute for actual leadership guiding employee behavior. Ethical and transformational leadership seem to contribute even more to a supportive safety culture. These leadership styles rest on the leader's value-based behavior, charisma and authenticity (Zohar & Tenne-Gazit, 2008).

In sum, the studies point out that leadership is a crucial variable for improving workplace safety. Safety climate is the most important mediator, but the mechanisms behind the effects are highly complex and not yet fully understood. With respect to health promotion, direct leader-employee interaction is also seen as crucial for the success of organizational health promotion programs (Zimolong & Elke, 2010).

#### 3. Health promotion in small businesses

#### 3.1 Potential and restrictions

SMEs' dynamic role is considered one of the driving forces of modern economies due to their contribution in terms of technological development, product and process innovation, job creation and export promotion. In Germany, SMEs account for 99.3% of all businesses and 60.2% of all
employees. There is no single kind of small business; the small- and microbusiness landscape is extremely heterogeneous, comprising small, knowledge-intensive multimedia companies as well as building contractors with five employees. The demands, dangers, and burdens are as varied as the knowledge and action that OSH requires. Nonetheless, SME market potential is also characterized by certain commonalities (Zimolong & Kohte, 2006; Kohte et al., 2006).

- Small businesses are frequently managed by their owners. Depending on how they see themselves, they may bear responsibility for their company's economic outcomes, act on their own authority and assume their companies' risk themselves. Conditions and regulations that limit freedom of action for the company are rejected.
- The range of activities for most SME employees is broad, presents wide room for maneuvering and requires skilled worker qualifications. Nonetheless, worker preparation and development are seldom planned in detail. The work itself requires frequent improvisation and flexibility, which calls for attentive, responsible employees. The lack of well developed planning and frequent improvisation leads to a higher risk potential.
- Mobile, flexible on-site work means that each employee must be responsible not only for the quality of his or her own work but also for performing healthy and safe work. Central monitoring by the workplace fails due to scarce staffing resources.
- Employees and managers share a close relationship. In SMEs, values such as loyalty to and trust in managers are important for employees. On the other hand, managers feel obligated to take care of the employees. Many workplaces lack institutionalized advocacy groups and employees therefore represent their own interests with the company

Deficiencies in implementing OSH are often used as a way to compare small businesses with middle-sized and large enterprises in order to account for the following applicable deficiencies and insufficiencies in the small enterprise. This perspective, however, does not take the potentialities with which small businesses have been able to achieve a relatively high degree of OSH into consideration (Sczesny et al., 2014).

- Small businesses have a narrow financial framework, their order volume and numbers of employees are limited, and their qualifications have strengths and weaknesses.
- With respect to staff and organizational development, short-term planning and action prevails in small businesses. Business owners and employees accept the attendant insecurity and regard it as a challenge. The downside is that the view of unpredictability in company development hardens.
- Most business owners do not regard the topic of OSH as critical. Due to a strong personal work ethic, they regard health hazards as tolerable within limits.
- Many OSH improvements are low-cost solutions, but sometimes SMEs have problems financing an OSH policy due to limitations on their access to capital and do not benefit from the effects of economies of scale.
- There are shortcomings in OSH-related cooperation between company and inter-company actors, particularly with regulatory authorities. Information and communication within OSH networks are insufficiently utilized.
- OSH authorities face difficulties fostering effective OSH management in SMEs primarily because there are so many SMEs and these businesses have limited resources (Targoutzidis et al., 2014).
- There are few or no OSH experts in small businesses. The lawfully required operating times for external OSH services including occupational physicians and safety officers are fragmentary or only utilized to the minimum extent required by law (Zimolong & Kohte, 2006).
- Small businesses very scarcely join health promotion activities. They are clearly underrepresented in the statistics of participation of WHP activities (GKV, 2014).

In sum, shortcomings in OSH implementation can be explained not only by the lack of time and financial resources but also by the lack of knowledge about OSH among business owners and their employees. If nothing else, business owners and managers only acknowledge the benefits of OSH for productivity and competition to a limited extent.

### 3.2 OSH information networks

Because of limited resources, SMEs depend on qualified external consultation and information. Building efficient networks of experts and institutions to ensure access to targeted information is therefore one possible solution for SMEs. These companies cannot manage their complex problems and heterogeneous information needs with respect to OSH by themselves. Specific external partners, statutory accident insurance institutions and governmental supervisory authorities are hardly in any position to qualitatively or quantitatively meet that need. The necessary knowledge can only be gained with the help of various competent partners. Network building therefore puts SMEs in the best position to exploit market actors' specific technical qualifications. These include suppliers, disposal contractors, statutory accident insurance institutions, statutory health insurance, governmental supervisory authorities, insurance companies and professional associations. Networks enable mutual support in achieving company goals without exposing a company to market forces or having to meet the requirements of supervisory authorities. Audits and consultations with OSH officials have traditionally formed the basis for statutory accident insurance institutions' and governmental supervisory authority's activities. The activities of both institutions are shifting toward a greater emphasis on consultation. Additionally, the autonomous accident insurance associations are the most important institutions in providing education and professional training of OSH competencies (Zimolong & Kohte, 2006).

The most detailed study to date on the benefits of OSH intervention networks for small and middle-sized enterprises showed that SMEs systematically relied on existing OSH network options (Kohte et al., 2006). The 349 surveyed companies named accident insurance associations, external safety and health services, governmental supervisory authorities, suppliers and friendly businesses as the most important external information sources for questions regarding OSH. Results showed that smaller enterprises relied on available information sources less frequently than middle-sized enterprises. The ability of accident insurance associations, external safety and health services, supervisory authorities, suppliers and friendly businesses to resolve OSH problems was often particularly highly valued. Results indicated that small enterprises overall had a lower opinion of their network partners' problem-solving capacity than middle-sized enterprises do. The information-supply success rate for accident insurance associations, supervisory authorities, professional associations/guilds and external safety and health services were very frequently highly regarded.

Lemke-Golisch (1998) identified associations (trade, professional and employer associations, unions, guilds), tool manufacturers and dealers, and health insurance companies as cost-neutral consultation institutions. Among fee-based consultants, companies accessed information from attorneys, maintenance companies, technical inspection associations, environmental consultation institutions, business consultants and external safety and health services. The cited studies make it clear that SMEs at least use the OSH information network to a certain extent and, in addition to accident insurance associations, supervisory authorities, associations and guilds; they also rely on their market partners.

A key factor in preventive occupational safety and health is early control of risks by considering the challenges to health and safety starting during procurement processes. However, most small enterprises lack the internal resources to keep up with the information needed for prevention-oriented procurement decisions. SMEs depend on external support for access to critical OSH-related information. Questions about the services and products needed for safety and health can often only be answered by the suppliers due to their informational background. For the customers, close co-operation with their suppliers is important for choosing the best option. From the suppliers' perspective, open communication about safety and health strengthens business relations and improves opportunities to initiate prevention-oriented procurement by customers (Krämer & Zimolong, 2006).

## 3.3 Enterprise Study: Prevention-oriented procurement in the metalworking industry

The goal of the study was to find starting points for implementing a marketbased approach to funding intra-company OSH. Preventive OSH primarily focuses on early monitoring of risks through consideration of safety and health criteria in acquisition processes. This suggests that precautions against risks are particularly important for a company when only safe equipment (e.g., machines) or materials, which lead to no health hazards or the minimum possible health hazards for the employees, are acquired from the outset (Kohte et al., 2006).

Fifty-seven small and medium-sized enterprises with between five and 200 employees each participated in the survey. Scales measured the significance and relevance of economic, legal and preventive criteria on prevention-oriented equipment procurement as well as on the choice of hazardous substances. The random sampling is not representative for the metalwork industry. Fifty-seven percent of enterprises with between five and twenty employees, 67% of the companies with 21–100 employees and 76% of those classified as large (i.e., with 101–200 employees) were certified in accordance with ISO 9000 quality management. The outcomes regarding

Criteria for acquiring machines	Mean value on a scale of 1–5	Standard Deviation	
Economic criteria			
Productivity	4.87	.34	
Price	4.44	.76	
Technical and economic criteria			
Technical protective divece	4.19	.93	
Noise protection	4.16	.85	
Ease of operation	4.50	.62	
Comprehensible instruction manual	3.75	1.05	
Prevention-orientied tools, markings			
Manufacturer's risk analysis	3.47	1.16	
Internal risk assessment	3.69	1.15	
CE marking	4.22	1.07	
Manufacturer's prevention-oriented services			
Support for project execution	4.06	.88	
Introduction/training	4.41	.76	
Implementation	4.66	.60	

Table 2:	Assessment of	of the	importance	of various	acquisition	criteria	for	new	machines	51.
(Krämer,	2006)									

procurement of working materials and equipment show that a high degree of value is placed on the requirements of health and environmental protection (technical protective devices, prevention-oriented tools and markings, manufacturer's prevention-oriented services). Machine-procurement outcomes are detailed in Table 2. The productivity and cost of the machines are regarded as scarcely more important than safety and health requirements. However, there are significantly greater differences in assessment between companies where prevention-oriented criteria are concerned. That is apparent in the higher values of the standard deviations.

Another topic of the study was the identification of groups of network partners and their relative importance for supplying prevention-oriented information about procurement decisions. Groups addressed were: institutional partners, e.g., professional associations and liability insurance firms, independent consultants, suppliers and regulatory authorities (Kohte et al., 2006). Results showed that suppliers of hazardous substances, disposal companies and employers' liability insurance firms provide the most information for SMEs. Employers' liability insurance firms and suppliers provided information on different procurement topics for SMEs. The results support the notion that suppliers of hazardous substances as well as external safety and health services particularly improved the level of information about prevention-oriented procurement

In conclusion: In prevention networks, regulatory authorities and external safety and health services are important partners from the SMEs' perspective. But technical equipment and hazardous substance suppliers provide important decision-making assistance, particularly where acquisition decisions are concerned. Expanding cooperation between SMEs and their suppliers appears to be a particularly promising approach to reducing information deficiencies and supporting prevention-oriented decisionmaking.

### 3.4 General recommendations

A variety of proposals exist for further health and safety development in SMEs. A few important proposals are:

- Expansion of consultation concepts that to date have been largely based on the experiences of large enterprises
- Target group-oriented consultation services that draw on company conditions
- Support for collaboration with the relevant supervisory authorities and accident insurers
- Cooperation and networking with market actors; use of the preventive potential of, among others, suppliers, disposal contractors and insurance providers
- Pooled support: unified support among entities that are already networked for the purpose of exploiting synergistic effects
- Increased use of information and communication technology (ICT) including computer and social networks, electronic data exchange and the Internet. ICT can be used to automate activities and can also help organize network processes and operations and initiate learning activities.
- Improvement of basic social conditions. One possibility that has been put forward is that it might be more efficient to take a supplementary, non-regulatory approach and use incentives such as taxes, subsidies or insurance premium differentiation to limit OSH risks. Such incentives may promote safe and healthy workplaces more efficiently because costs are an important driver for employers (Verbeek, 2010; Targoutzidis et al., 2014).

# 4. What's the ROI?

Economic evaluations of WHP are undertaken to assess benefits, either potential or realized, for a given cost of program implementation. The question for employers is whether well-conceived WHP programs can improve employees' health, reduce their risk of disease, control unnecessary health care utilization, limit illness-related absenteeism and decrease health-related productivity losses (Goetzel & Ozminkowski, 2008). Economic evaluations may also support systematic comparisons of two or more health technologies, services or programs in terms of both costs and consequences. This simultaneous comparison provides insight into which intervention is worth pursuing over another. Rigorous estimates of financial impact serve to better engage stakeholders and encourage sustainable investments in workplace health initiatives. Well-cited systematic reviews have established a strong positive message with consistent evidence of a favorable ROI in workplace health interventions (Baicker et al. 2010).

Despite this need, economic evaluations of WHP are often of poor methodological quality. This was highlighted in a recent review. Baxter et al. (2014) published a systematic review of the literature concerning returns on investment (ROIs) in worksite health promotion programs. Their final analysis included 51 studies with 61 intervention arms and 261,901 participants from nine industry types in 12 countries with studies published between 1984 and 2012. The authors scored the rigor of each study using three methodology checklists. All the studies were rated for quality. One of the criteria was study design. Based on this assessment, studies were allocated to three quality categorics: high (11 studies), moderate (9 studies) and low (27 studies) quality; five of the nine Randomized Control Trials (RCTs) were in the high- quality group and four were in the low-quality group. Of the 47 studies, 46 saved money, and 41 saved money in excess of the program costs.

Worksite health programs were predominantly offered in private companies (n = 33) along with other organizations in educational (schools, colleges and universities), government and health care settings. Two studies evaluated programs that were offered across multiple organizational types. Company size was categorized as either large (>250 employees) or small to medium (<250 employees). Large companies accounted for 59% (n = 30) of the included studies, of which all but two originated in the United States, and 15 exceeded 5,000 employees. SMEs accounted for two studies, 5 studies were of mixed sizes and 14 did not state organizational size. Sixteen health interventions were represented. Most common was Health Risk Appraisal (HRA) (59%) and programs targeting physical activity (37%), weight management (35%), smoking (29%) and nutrition (29%). Twelve studies evaluated mental health interventions; five of those additionally targeted alcohol consumption or drug use. There were three dental interventions. Ten studies evaluated flu vaccination, of which nine were single interventions, and the other offered flu vaccination as part of a multitude of initiatives. Cancer-screening programs and HRA as a stand-alone intervention were each evaluated twice. US companies adopted multicomponent programs (n = 23) almost exclusively while all other non-US studies were single interventions (n = 13).

The inclusion of single interventions played a major role in this new body of evidence, accounting for 19 new studies. Previous reviews have focused on multicomponent programs (5.8) and research conducted within the United States. The overall weighted ROI was \$2.38 returned for every dollar invested, using the business method common in the United States (ROI = benefits/costs). The 12 studies with RCTs had mean ROIs of \$1.79 whereas the five studies with the highest related methodology scores had the lowest ROIs with a mean weighted value of \$0.78. The 30 studies using quasi-experimental design had a mean weighted ROI of \$2.12, whereas those with non-experimental design had a mean weighted ROI of \$2.61.

The main finding revealed that worksite health programs generated a positive return on investment, evidenced in all instances except randomized control trials. This study also yielded a methodological quality finding in which the ROI had a propensity to change in relation to methodological quality, whereby the highest quality studies demonstrated smaller returns. Compared to the Baicker et al. review, which reported an ROI of 2.73 for programs measuring absenteeism and 3.27 when targeting health care costs, the Baxter et al. review demonstrated a more modest ROI than previously reported.

While multicomponent programs, by virtue of being more comprehensive, could be expected to have a wider impact, only the unweighted results lead to a greater positive ROI. Therefore, single intervention programs offered higher financial returns after accounting for the number of people exposed to the intervention. A smaller return was seen in studies of high quality, in which both direct and indirect costs were measured, and in studies with a control. This trend was found in both weighted and unweighted results. Additionally, the study demonstrated that economic evaluations of WHP are of low to moderate methodological quality.

What are the consequences for the promotion of safety and health? Most decisions about investments in healthier and safer workplaces are made at the company level. Studies show that legal, financial and moral reasons (in that order) are the key drivers for businesses to engage in OSH. Employers perceive regulations as a real risk and are mindful of reputational damage. In their survey of British companies, Smallman and John (2001) found no companies that calculated ROI for OSH spending as spending for OSH was not assessed in monetary terms, at least not in board-level reports or thinking. It is possible that some enterprises do in fact take into account the economic dimension of their OSH interventions but do not wish to declare it.

Cost is rarely the only motive for OSH intervention; reputation and compliance with the law appear to be more influential (Miller and Haslam, 2009). Therefore, evaluation of the economic impact of a health program may serve as an additional argument in decision-making, if at all. Consideration of the simultaneous comparison of the costs and consequences of two or more health technologies, services or programs seems to be more promising. The question is how company decision-makers can be provided with the best information on the cost-effectiveness of OSH interventions (Verbeek, 2010). While an increasing number of cost effectiveness evaluations are available, they are often difficult for employers to interpret because they tend to assume a social rather than a business perspective in calculating costs. It is also difficult to apply their results to other countries and social security systems.

## 5. New horizons

The world of work has been changing rapidly in response to business demands and new technology. Some of the general trends include an increase in the number of small businesses, increased use of contractors and temporary staff, changes in working hours and intensity, elimination of space and time boundaries at work, cultural impacts of globalization and immigration and aging of population.

The percentage of small and medium-sized enterprises has increased. Many larger companies are now operating in a more complex way. Traditional large enterprises have fragmented: Parts of organizations may operate as semi-autonomous units and management duties are delegated downward; many companies operate on a franchise basis. Fragmentation and delegation down to the line management level, along with the reduction of middle management, often creates uncertainty about both health and safety responsibilities and decision-making responsibilities.

Working time has changed, for example, such that employers have introduced more flexible working patterns to provide services or use facilities during more hours of the day. Many organizations are faced with the challenge of planning a streamlined workforce around tight schedules and peaks in production or services. Any shift toward working around the clock will mean more people exposed to the ill health effects of shift work and night work. Research on shift work shows that particularly older workers have more difficulties adjusting to shift work.

Increased work intensity is related to the increase in the diversity of working time patterns. Some of the effects of this increased work intensity include the growing practice of weekend work, the increasing prevalence of work schedules with irregular and less predictable working hours, and the use of both very limited (involuntary part-time work) and excessively long (involuntary overtime) working hours.

The workplace has seen huge growth in the use of information and communication technology as well as rapid changes in the type of technology used, including computer networks, social and business networks, electronic data interchange and the Internet. The impact of a world where technology is increasing people's work capacity, eliminating space and time boundaries, and challenging individuals to keep up with constant, rapid change may produce negative physical and psychological health consequences. The ever-increasing rate and quantity of information that workers must manage and the elimination of time and space barriers present high potential for stress and its negative outcomes (Macik-Frey et al., 2007). Another aspect is virtual work, which describes a variety of work situations from part-time telecommuting to complete job settings in which the worker is separated from his or her coworkers and clients in terms of time, space or both. Although the benefits of virtual work are well documented both from the employer's and the employee's perspectives, virtual work may also present its own unique set of challenges from an occupational health perspective. One of the most prevalent predictions is the threat of social isolation (McQuillen, 2003).

As the workplace becomes increasingly global and the national workforce increasingly culturally diverse, there is a growing interest in the need to protect the safety, health and general welfare of a culturally heterogeneous workforce. What impact do cultural differences have on the perception of health, the impact of stressors and the ability to overcome health and safety issues? Scientists have raised concerns that our Western workplace safety and occupational health principles are not universal and need to be adapted across cultures. On the other hand, the spread of world-wide information on precarious employment and dangerous working conditions in developed and developing countries forces companies to establish better health and safety standards. Following the 2013 Savar building collapse on 24 April 2013 that resulted in over 1,100 deaths, there was wide global interest by both the consuming public and clothing retailers in establishing enforceable standards for fire and building safety in Bangladesh.

Typically Western human resource principles such as participation in decision-making, team-oriented leadership or the relationship between teamwork and psychological wellbeing tend to be culturally bound (Steers et al., 2013). Other cultural topics include the implications of cultural differences related to work values, discrimination issues, cultural awareness, and racism and their relationships to the health and wellbeing of employees (Macik-Frey et al., 2007).

The 'age wave' describes the rapid aging of the populations in developed and, increasingly, less-developed countries. Along with aging, people are living healthier lives and the expectation is that the average age of the workforce will continue to increase. These changes have significant implications for the field of occupational health, ranging from physical health to the psychological wellbeing of this older workforce. One of the trends worth exploring from an occupational health perspective is early retirement. As significant numbers of older age groups retire, the influx of younger replacement workers will be insufficient to replace those who are leaving. In addition, the transition of large numbers of older workers into retirement will put substantial pressures on Social Security, pension funding systems and public health insurance financing. Public policies will almost certainly need to evolve to encourage workers to stay on the job longer (Musich, McDonald, & Chapman, 2009).

Despite living longer and healthier lives, older workers are leaving the workforce earlier, although this is not always in their best economic or psychosocial interests. There appears to be a discontinuity in the trend toward older workers leaving the workforce earlier, either by choice or by force, and their expressed desires to remain actively engaged. Creative strategies to retain older workers are now emerging. These strategies include: (a) providing fresh assignments and challenges, usually done through lateral moves; (b) offering internal career changes within the organization; (c) putting experienced employees into mentoring and knowledge-sharing roles; (d) providing fresh training and development throughout the range of workers, not assuming that older, more experienced workers no longer need training; (e) offering sabbaticals for regeneration; and (f) expanding leadership-development programs (Macik-Frey et al., 2007). Meanwhile, there have been numerous reports of organizations beginning to implement these strategies (e.g., Morrison, Erickson and Dychtwald, 2006). The world of work will continue to change rapidly, work-site health promotion has to be adapted continuously to the emerging new challenges and horizons.

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# Controlling and Managing Occupational Safety and Health – Examples Denmark and Germany

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### The Danish OSH system

The Danish Minister for Employment is responsible for rules and regulations related to health and safety at work. The legislative framework is built on the 1999 Working Environment Act. The Minister is supported by the Working Environment Authority (Arbejdstilsynet, AT). The AT inspects worksites and has the legal power to sanction employers that do not comply with legislation. Sanctions include fines and stop-work orders. Firms can appeal decisions by the AT to a working environment appeal board that consists of representatives of social partners. The Minister for Employment is also supported by the National Institute of Occupational Health (NIOH), a government research institute that undertakes research on health and safety topics.

The current Working Environment Act was passed in 1999. Its objective is to prevent work accidents and diseases and to protect youths and young adults in the labour market. The most recent amendment to the Act was in 2004 in response to the working environment reform adopted by the Danish parliament. This reform includes an obligation on the government to inspect the worksites of all Danish enterprises within a seven year period, a duty on enterprises to seek consultancy advice, and the introduction of a program to profile the working environment within enterprises.

The main areas of the legislation cover how work is performed, workplace design, technical equipment, substances and materials, rest periods and young workers under the age of 18. The Working Environment Act emphasises the role of workplace design in protecting workers from having to leave the labour market due to erosion of physical and mental health. The Act also emphasized the continuous effect of social and technological progress on changing working conditions and required consideration of how best to minimize risks associated with such changes.

The Act is based on the principle of cooperation between employers and workers. The employer is responsible for ensuring a healthy and safe working environment. Workers are obliged to participate in health and safety activities provided by the employer, including training and proper use of protective equipment. All enterprises with ten or more workers are required to incorporate health and safety into their organizational structure, with representation from workers and managers.

Social partnerships play a key role in the Danish OSH system. Their role can range from an appointment on the working environment appeal board to involvement in policy design. Social partners can also participate in the Working Environment Council, which publishes newsletters and guidelines for workplace parties and the public.

### Disability compensation programs

All employers must purchase workers' compensation insurance covering accidents and short-term effects of exposure to hazardous substances. The insurance does not – in contrast to Germany – cover accidents occurring on journeys to or from work. All employers must also contribute to the Labour Market Occupational Diseases Fund (AES) covering work-related illness and sudden injury. Insurance also provides health care and rehabilitation expenses, wage loss benefits, compensation for permanent impairment, and compensation to families in cases of fatality. Work accident and illness claims are reviewed by the National Board of Industrial Injuries, which renders a decision on the compensability of claims and the amount of compensation received.

A modest means tested disability pension is also provided to adults between the ages 18 to 64. To qualify, workers must have at least 3 years of residency in the Denmark and their work capacity must be reduced by at least 50%. There are supplements for partial compensation for special expenditure related to physical or mental impairment. If a disability is caused by an industrial injury or occupational disease the worker and their dependants are entitled to compensation.

#### Health care financing and delivery

Health care financing and delivery are largely in the public domain. For the most part, services are free at the point of delivery, with 85% of health care expenses paid for by taxes. Health care is delivered through the public sector and those providing services are civil servants. Services are coordinated by national government departments and the local authorities.

As with the overall structure of governance, the health sector has three political and administrative levels: national, regional, and local/municipal. The national level serves the roles of coordinator, initiator and advisor. The Ministry for the Interior and Health is responsible for all legislation related to health services and provides guidelines for the running of the health service. Municipalities are responsible for district nursing, public health, school health services, and child dental care. The regions are responsible for hospital services including specialist care. Each region has the authority to organise the health service for their citizens according to regional priorities. All governmental levels are involved in preventive health measures including initiatives in the working environment. The Centre for Public Health, established in 2001, facilitates cooperation between all three levels of government, and serves as a focal point for the development and implementation of new methods for disease prevention and health promotion.

The Danish health and OSH system is in large part tax financed and embedded in the welfare system in Denmark. This is a significant difference to, for example, the German system, which is funded by employer and employee insurance fees. The Danish welfare system model is subsidized by the state, and as a result Denmark has one of the highest taxation levels in the world. In Denmark, public expenditure accounts for 26% of the total gross domestic product (GDP). The basic principle of the Danish welfare system, often referred to as the Scandinavian welfare model, is that all citizens have equal rights to social security. This again is a significant difference to the German system where medical services beyond the necessities are paid for through the insurance policy. Within the Danish welfare system a number of services such as health and education systems are available to citizens and visitors, free of charge. A number of these services are not provided by the state as such but are provided by regions, counties, and municipals.

In Denmark, the Central Person Register (CPR register) is an utmost integrated part of the welfar system. The CPR register is a unique arrangement in Denmark: all people in Denmark are automatically registered with a ten digit number; the first six referring to date of birth, e.g. 250180; the last four are random. Males are assigned an uneven enddigit and females an even one. Also, non-Danish people, when living in Denmark, receive a CPR number. It is nearly impossible to exist in Danish society without a CPR number. It is needed, for example, to open a bank account, to rent a flat, or to use the library. The register has a long history, starting in the church books in a parish when a child was born back in 1645. In 1924 the people register law came into existence, and the register was administrated by municipalities. In 1968 a law change in the people register was made, and the CPR register became a central register at the state or governmental level as we know it today. The CPR register is an important system for governmental use. Information about age, place of birth, family status, place of residence, nationality, social benefit payments status, health treatment etc. are available for each person in the register, and the data can be shown at an aggregate level as well. Here the system is superior to the German system because one of the biggest weaknesses of the German health system is that data is not exchanged between health service providers and many diagnoses are repeated several times (Schnee, 2002). The CPR register has an important part to play in OSH in Denmark. Much OSH data is stored in, and through, the CPR register: information about sickness pay, early retirement, unemployment payments, etc. is available in the system. The data is obtained at different levels of the OSH system in Denmark and is linked through the CPR register. An example is the national database under the Ministry of Employment called the DREAM (Den Registerbaserede Evaluering Af Marginaliseringsomfanget, which means the Register based Evaluation of the degree of Marginalisation (in Denmark)) database which gathers information about labour market attachment since mid 1991. The data found in DREAM is gathered from data from the Ministries of

Employment, Social Affairs, Education, Refuge Board, and AMFORA board (short for Arbejdsmarkedspolitiske foranstaltninger, which means employment political initiatives). The DREAM database has information about 3.8 million people, and given that 5.5 million people live in Denmark (recent calculation from Statistics Denmark, Oct. 2009) this number is a huge one. DREAM is an important register, alongside Statistics Denmark, for both governmental and research use. In regard to the latter, in order to get information from the database one must have admittance by a data committee (Datatilsynet, which means data control). The regulations are found in the Person Data Law. The CPR register makes it easier to link data on different levels within the systems in Denmark. For instance, if an employee is sick, the employee notifies the employer immediately, and the employer has to pay salary from the first day of sickness until the 21st day. Hereafter the municipality pays sick leave benefits as long as the employee has the right to this benefit (in total 52 weeks within in the last 18 months) (sick pay maximum 3,625 Danish crowns per week). It is moreover the municipalities which make decisions about whether sickness absenteeism over a longer a period of time has to be regarded as a disability. The disability system, such as early retirement, should be the one to take over in case of permanent working disability. If unemployed, your unemployment benefit is also taken care of by the municipal system through the general social security system (Kontanthjælp). However, if you have an unemployment insurance (Akasse), you can get a supplementary unemployment benefit from your unemployment insurance (for many almost doubling the rate). In this system, a private insurance company has to be linked with the municipal system and the job centre units. This linkage is provided by law, and data is linked through the CPR register.

From 1992 onwards it has been mandatory for each company employing people to conduct work environment evaluations – so-called APVs (Arbejdspladsvurdering). Since 2005 sickness absenteeism has to be evaluated as well. The APVs are monitored by the Danish Working Environment Authority (Arbejdstilsynet) (AT). AT is the oldest Authority under the Ministry of Employment, the only governmental working environment authority in Denmark, and is responsible for all lower level working environment data. Until 2001, the BST (Bedriftssundhedstjenesten, which These ore data providers and the data collected on different levels concerning OSH (arbeidsmiljoeimading of studied para arbeidsyladsca) in Dentunek. Keewords and kee figures for the purpose of a concret overview.

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Figure 1: The Danish health and OSH system.

means operations health service) under the Ministry of Economy was also a player in the OSH System; however, BST was discontinued in 2001.

What is by contract and what is by request is difficult to determine in the Danish system. Most data provided is provided because of legal regulations and by internal needs from within the welfare system, in order to make it function adequately. However, some data is provided in requested reports, for instance, if common data from the municipal registers has shown an increase in sickness absenteeism. AT or the National Research Institute for Working Conditions (NFA, Det Nationale Forskningscenter for Arbejdsmiljø), an independent research unit under the Ministry) might be requested to collect more data or to do more research on the matter.

Finally, Denmark has 18 Work Medical Clinics found in hospitals (15) and universities (3). They provide important research and interventions in the OSH system. However, their OSH data can for the most part be found in registers, such as the CPR register, the Statistics Denmark, and the Working and Hospital Register (EHR, Erhvervs- og Hospital registret).

Figure 1 provides a summarized overview of the Danish health and OSH system.

Selected websites on the Danish OHS system Danish Working Environment Authority: www.at.dk/sw7737.asp The Working Environment Act: www.at.dk/sw12173.asp National Board of Industry Injuries: www.ask.dk/sw505.asp Ministry of Science Technology and Innovation: www.workindenmark.dk/Industrial\_injury National Research Centre for the Working Environment: www.arbejdsmiljoforskning.dk/?lang=en Ministry of the Interior and Health: www.im.dk/publikationer/healthcare in dk/all.htm

## The German OSH system

German occupational safety and health regulation started in 1839. The Prussian military physicians discovered that new soldiers had skeletal problems which emerged from their work in coal mines as children. The Prussian regulation of 1839 aimed at preventing health problems for children at work. It was followed by several business and handcraft regulations, which became standard after Prussia became part of Germany. In 1884, the German chancellor Bismarck founded the Accident Prevention & Insurance Association (Berufsgenossenschaften). OSH was conceived to protect groups of workers which at this time were considered especially sensitive such as children and woman. Another focus was accident prevention. The German OSH developed over time to cover a much broader area. In 1924 the first hospital for occupational diseases was founded in Berlin, which was affiliated with the University in 1933. In 1974 several laws were issued, for example, the work safety laws and regulations about physicians in companies. The European worker protection law of 1989 (89/391/EWG) were adopted into German national worker protection law in 1996.

Today, all German trade, business, public, service providing, and production organizations have to be member of one insurance program; therefore, every worker in Germany is insured. According to its constitution, article 20, Germany is a federal State. It consists of one national state as a whole (Bund) and 16 federal states (Bundesländer) such as, for example, Bavaria, Hessia, and North-Rhine-Westphalia. Bund and Länder are states and share responsibilities in legislative, executive, and judiciary rights. Bund is responsible as far as necessary in all exclusive areas such as, for example, security of airports. Länder are responsible where local regulations make sense, for example, in education. With respect to OSH, both Bund and Länder have legislative competence as stipulated by article 72 of the constitution.

The OSH system in Germany is based on two basic principles which are dualism and federalism. Dualism refers to two pillars of laws and rules that are governmental OSH laws versus autonomous accident insurance and prevention regulations. The governmental pillar (1) comprises the Federal Ministry of Work and Social Affairs with its Federal Institute of Occupational Safety and Health and 16 Federal State Ministries (Federalism). In each of the 16 Länder (federal states) OSH responsibilities are assigned to a Land-Ministry which maintains labor inspectorates and OSH-Institutes. The insurance based pillar (2) of the German OSH system (Unfall-versicherungsträger) consists of four organizations concerned with OSH insurance and prevention measures:

- Deutsche Gesetzliche Unfallversicherung (DGUV/German social accident insurance)
- Gewerbliche Berufsgenossenschaften (branch specific accident institutions for the industrial sector/members of the DGUV)
- Sozialversicherung für Landwirtschaft, Forsten und Gartenbau (SVLFG/Social Insurance for Agriculture, Forestry and Horticulture)
- Landwirtschaftliche Berufsgenossenschaften (agricultural accident institutions/members of the SVLFG)

The German OSH system covers the control of work-related health risks and the prevention of occupational accidents as well as diseases. It contributes to the improvement of working conditions, prescribes worker protection, and regulates compensation in case of work-related diseases and accidents, including transportation accidents to and from work. Moreover, it also considers motivation and job satisfaction, health in restructuring, and quality management. Most recently, economic success and attractiveness as employers were topics also added to OSH research.

Larger companies usually have in-house OSH staff and systems to ensure health and safety while maintaining competitiveness. Smaller organizations usually hire OSH professionals. All companies are monitored by the German Government (labor inspectorates, pillar 1) and the Accident Prevention & Insurance Association (pillar 2).

Nearly all OSH-laws are national laws, issued by the lower house of parliament (Bundestag, directly elected). The Federal Ministry of Labor and Social Affairs prepares the laws. In some cases the upper house of parliament (Bundesrat, Länder representations) has to approve. In the preparation of the laws, stakeholders are involved, which are the OSH-Institute of the Länder, the trade unions, the employers' organization (BDA), accident insurance, and the business associations which might be affected by the new law. The most important OSH regulations according to Hotopp et al. (2008) in Germany are:

Occupational Health and Safety Acts (Arbeitsschutzgesetze) Occupational Safety Acts (Arbeitssicherheitsgesetze) Statutory Accident Insurance Regulations within the Seventh Volume of Social Laws (siebtes Sozialgesetzbuch) Ordinance on Dangerous Substances (Gefahrstoffverordnung)

State inspectorates inspect companies to enforce the commitment of employers and employees to OSH regulations. They also provide services to help employers develop tailor-made health and safety standards. Employers and every manager with staff responsible are liable for OSH in their organization. It is their daily task to implement OSH intervention, prevention, and innovation, and to monitor and develop the working conditions that might affect the OSH of their staff. For technical and medical expertise, they employ or hire safety engineers and company physicians.

Selected websites on the German OSH system
Occupational Health and Safety Information Sources for Germany: www.balticseaosh.net/germany/information.shtml
Federal Institute of Occupational Safety and Health: www.baua.de/nn\_5568/en/Homepage.html\_\_nnn=true
Occupational Safety and Health Accident Insurance: www.hvbg.de/e/pages
BG-Institute for Occupational Safety and Health: http://www.hvbg.de/e/bia

BG-Institute for Occupational Medicine: www.bgfa.ruhr-uni-bochum.de/e/index.php

In sum, the Danish and the German Occupational Safety and Health Systems are structured into various levels of authority, finance, and responsibility. These structures are highly related to political power and decision making. Both systems are in the focus of political attention, which is highly interlinked with the strong tradition of welfare systems in Germany and Denmark. Both systems also give high priority to OSH knowledge. Data sharing in the Danish society is very efficient, while at the same time data protection is secured. Data protection is strong in Germany, too, ways to facilitate data sharing in order to improve OSH still have to be found.

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# 5. Successful Management and Leadership in Occupational Safety and Health: interaction of explicit and implicit behavior management

Jochen Gurt and Gabriele Elke

## Occupational Safety and Health Management

Sustainable occupational safety and health (OSH) is founded on an integrated, preventive management approach that encompasses the entire organization. In some large companies, this approach goes far beyond legal requirements and, thus, is often called a "voluntary management system" (Frick, 2011). Nowadays, it is assumed that these types of OSH management systems (OSHMS) are practical and effective (Gallagher & Underhill, 2012; Makin & Winder, 2009). Despite this, these systems are not often being implemented in small and medium enterprises. The Joint German OSH Strategy (GDA), now in its second phase (2013–2018), is striving to improve the way occupational safety and health is organized in the workplace. It is essential to know what is at the core of a sustainable OSH management system and how it can be successfully implemented.

Hale and Borys (2013 a,b) divide the focus of current OSHMS research firstly into "Rules" as the empirical core concept and secondly into "Models 1 and 2". The models represent two principally different modes of operation, conditions or ways of managing behavior. The difference between models and the significance for safe behavior has been highlighted and described by a myriad of authors (albeit with different linguistic labels) and also empirically substantiated. Elke (2000) speaks of explicit and implicit behavior management in OSH. Explicit management refers to guiding and modifying behavior through specific rules and conditioning. Implicit management, on the other hand, is not aimed at directly changing behavior but rather its focus is on awareness and on the values and standards that guide behavior. Change and learning cannot be reduced to conditioning processes but rather they are social processes which can best be described as socialization or awareness programming. At the organizational level, behavior can be guided and coordinated explicitly by prescribed standards and structures or implicitly through an appropriate culture. DeJoy (2005) uses this difference to describe the current state of research on OSHM and talks about "Behavior change versus culture change".

## Explicit behavior management

Behavior can be managed and changed via explicit rules, for example, setting or agreeing upon goals, specifying standards, or regulating responsibilities and procedures. In many cases, explicit rules form the basis for working (and working together) efficiently in organizations, both in general terms as well as the area of OSH. Rules describe how to deal with risks in the everyday working life in order to prevent accidents and disruptions. Rules combine collected know-how and make it clear what safe behavior looks like and how we should "correctly" behave; creating a basis for working together. Rules are an effective means of guiding safe behavior which in turn helps manage risk. According to current research, the success of behavior-based safety intervention is extremely well documented and is of key significance (Cooper, 2009; Zimolong & Elke, 2006, Stajkovic & Luthans, 2003). It is important to have a system for managing rules which constantly monitors and provides feedback on how rules are being used, encouraging (rewards) the correct use of rules and discouraging (penalizes) the infringement of rules. However, this does not mean that rules can simply be left to run on their own. In everyday life, deviations from the rules can always be seen (Krause, Seymour & Sloat, 1999). This happens in different ways and for diverse reasons. (Reason, 1997; Alper & Karsh, 2009). Deviations may be due to poor rule management or it may be because of social processes and a lack of awareness (cf. Hale & Borys, 2013a p. 212). It is difficult for a person to follow safety rules when neither colleagues nor supervisors adhere to the rules and risky behavior is the norm in the workplace.

There is additional empirical evidence that risk cannot be controlled by defining explicit rules in all cases. The results of Marchand, Simard, Carpentier-Roy and Ouellet (1998) showed that not only is employee rule compliance a good predictor of accident rates but also of employee commitment to OSH. Employees are not just "reactive" users of rules but rather they influence the design and implementation of rules. As shown by Iszatt-White (2007), rules cannot control behavior in all situations. For example, the long-term negative consequences of noise and vibrations can be prevented by suitable rules, but behavior-based hazards do not require employees to comply with specific rules but rather require them to be more aware or heedful (Weick, 1993). Similarly, road workers who put up warning signs have little influence on the behavior of drivers, but this act is important to increase driver awareness. Raising awareness of risks and local (situationspecific) innovations or behavioral modifications designed to avoid dangers provide the focus for the concepts of "awareness" and of "safety awareness". The work of Loukopoulou (2008), which studied the behavior of pilots, also showed that real life does not purely reflect a set of rules. The important factor in complex situations is the mental model of the situation (Mathieu, Heffner, Goodwin, Cannon-Bowers, & Salas, 2005). Thus, implicit guidance and behavioral adjustment place the focus on safety culture and safety climate<sup>1</sup> (cf. Hale & Borys, 2013a).

#### Implicit behavior management

In most organizations, there are certain aspects that have become a matter of course over the years such as how to work together, how to deal with problems or even how to manage people. There are unspoken rules and standards in every organization. The total collection of these common values and standards, the basic underlying assumptions about the people in an organization, and the shared way of thinking, problem solving and behaving form the culture of a company. Behavior in a company is indirectly guided and coordinated by its culture. It is an implicit code of behavior that the

<sup>&</sup>lt;sup>1</sup> Both terms are used synonymously in this context.

majority of the organization's members experience and live (cf. Schein, 1990). The key question for sustainable OSH and prevention is: what value does the organization place on safety and health in its code of behavior? For example, is safety seen as relatively unimportant compared to other goals or is it assumed that there is a close connection between the safety and health of employees and their performance which ultimately contributes to the company's success? In both cases, a certain safety culture has developed, that is, a "pattern of safety-related standards and values which over time have proven themselves to be important for how an organization deals with the issue of safety; which are shared by the majority of an organization's members; and which are seen as self-evident and 'lived out' as a matter of course" (Elke, 2001, p. 171; Zimolong & Elke, 2006). This culture can either hinder or help sustainable OSH. In a meta-analysis by Christian, Bradley, Wallace, & Burke (2009), it was proven that there is a strong correlation between safety climate and the number of accidents and injuries. In addition, safety climate is a good predictor of motivation to behave safely as well as how much employees know about safety. In companies with a positive safety culture or climate, safety is as important as other performance goals. People are seen as a key resource for the success of the company. Guidelines and leadership stress the fact that safety and the promotion of good health for both employees and customers are essential for individual and company performance and thus the company's success. Zohar (2010) analyzed 30 years of research on safety climate and came to the conclusion that the significant influence of safety climate and implicit behavior management on successful occupational safety and health has clearly been empirically proven.

## First conclusion

How do you change a negative safety culture? This is where behavior management via explicit rules comes into play again. Hale and Borys (2013a, 2013b) showed that both forms of management are important depending on the demands of the work task, the way work is structured and the level of employee experience. They complement and support one another (Elke, 2000; 2001). According to Hale and Borys (2013a, 2013b), Model 1 and Model 2 are both integrated into their framework model of sustainable OSHM (see below). When following explicit rules is demanded and supported over a longer period of time, the probability is very high that employces will internalize these rules and follow them as a matter of course and in turn will act safely. Rules that are, at first, explicitly stipulated become an implicitly normal way of behaving that is recognized and shared by everyone in the company. They view these rules as obligatory and pass this behavior on to new employees.

Generally, this assumes a mutually influential, complementary and supportive mix of explicit and implicit management. What does this mean for the everyday workplace? Behavior management in the everyday workplace is a management responsibility. In addition to explicitly setting or agreeing to rules, managing means helping to implement these rules, to monitor them and to change them if necessary. Leaders, managers and supervisors not only guide behavior directly, they are also important promoters of the culture in the company. How supervisors behave, the way they deal with problems and how they speak with employees all indirectly convey what is regarded as important in the company and which values and which rules should be lived.

## Behavior management by personal leadership

Supervisor behavior has been found to be a decisive factor when it comes to whether, and how, the topic of employee health is actually "lived out" in the workplace, both in general terms (Gurt, Schwennen, Elke, 2010) as well as with specific reference to OSH (Derue, Nahrgang, Wellman, & Humphrey, 2011; Nahrgang, Morgeson, & Hofmann, 2011; Zohar & Luria, 2010). As shown in a study within the logistics sector by Koster, Stam and Balk (2011), the influence of supervisor behavior cannot be overestimated. The study showed that the way leaders behave has a significantly greater influence on objective accident numbers than the existence of a formal safety system (Hazard Reducing System, HRS).

So, what leadership style is effective in order to promote safe work? Research into personal leadership, and specifically OSH, has mostly focused on studying the two principally different and yet complementary forms of personal behavior management. These two forms are transformational and transactional leadership and closely correspond with implicit and explicit behavior management on the organizational level. Whereas transformational leadership is aimed at implicit behavior management, transactional leadership is associated with explicit behavior management.

## Implicit behavior management: transformational leadership and OSH

The main aim of transformational leadership is to change the attitudes, values and convictions of employees and as a result to achieve more appropriate behavior. In terms of safety, it means that safety represents a personal value to the employees and that they themselves develop the conviction or belief that safe behavior in the workplace is important. How can this "transformation" of employees be achieved? Transformational leaders have a certain way of behaving that can be summarized with four dimensions: Idealized Influence, Inspirational Motivation, Intellectual Stimulation and Individualized Consideration (Judge & Piccolo, 2004). These also play an important role in managing safe behavior.

Idealized influence suggests that supervisors who dominantly display this characteristic act and serve as professional and moral role-models which, as a result, earns them the respect and trust of the employees. This role-model effect occurs when supervisors make it clear which ethical values and convictions guide their leadership behavior and they stress the importance of team spirit and a common understanding of work. What does this mean for the way supervisors act in terms of workplace safety? By supervisors making it clear that safety is a core value for how work is done, employces develop trust in the management and loyalty to the company (Barling, Loughlin, & Kelloway, 2002). The important factor is not the values that are postulated by supervisors but rather the values which become apparent through the way they behave. The "true value" of safety is often seen in symbolic situations, for example, when there are time pressures or when safety can only be ensured at the expense of productivity. This generates a high degree of personal identification of employees with their supervisors and social identification with the group (Clarke, 2013).

Inspirational Motivation stresses that supervisors have an impact on employees through developing an appealing and compelling vision. At the same time, they raise hope and confidence that this vision can be realized. For example, supervisors can make it clear that each worker is not only responsible for their own safety but also responsible for improving safety for the whole group and the organization (Clarke, 2013).

Third, Intellectual Stimulation refers to leadership that is encouraging employees to come up with their own ideas and to think for themselves. Supervisors call upon their employees to come up with new ways of dealing with old problems, to develop their own creative solutions and to test each. In terms of safety, this means supervisors challenge their employees to study existing strategies ensuring safety and develop new ideas for how to improve safety in the workplace. This is especially essential in dynamically changing environments; exchanging ideas about safety is encouraged and safety communication is fostered (Barling et al., 2002).

Finally, Individualized Consideration embraces employee-focused leadership where the supervisor is seen as a coach for employees. The supervisor keeps an eye on the individual needs and strengths of the employees and systematically supports employees to help them develop. An example in OSH is when a supervisor makes it clear that safety is about the welfare of the employees and it is not enough to simply ensure prescribed standards are met even if there are remaining risks (Barling et al., 2002).

Since nearly all empirical studies show a high correlation between the four individual dimensions, analyses are mostly done on the combined higher-order factor, namely transformational leadership (Judge & Piccolo, 2004). The overall effectiveness of transformational leadership on a wide range of OSH outcome variables such as unsafe behavior, compliance, accidents and injuries has been documented many times (Conchie & Donald, 2009; Hofmann & Morgeson, 2004; Kelloway, Mullen, & Francis, 2006; Mullen & Kelloway, 2009; Wu, Chen, & Li, 2008; Zohar, 2002; Zohar & Luria, 2003). The latest meta-analysis by Clarke (2013) found the closest correlation to be with safety climate ( $\rho$ = .40) and compliance ( $\rho$ = .29); however, the correlation with the latter two were partially mediated by safety climate.
It has been shown in many studies that transformational leadership not only has a direct effect on safe behavior and safety as a whole; it also stimulates social and psychological processes which promote a positive safety culture and climate (Zohar, 2010). Another important psychological variable is the trust which develops between transformational leaders and employees (Conchie & Donald, 2009). This relationship can be explained using social exchange theory. The extra attention (individual consideration) that an employee receives from their supervisor, or inclusion in the consultation and decision-making processes (intellectual stimulation), are experienced as a show of trust which leads to a commitment to return this trust (reciprocity). This in turn leads to such things as more open communication and increased participation in OSH initiatives or other voluntary safety-related activities (Conchie & Donald, 2008). However, the important thing here is to find the right level of trust because, in the field of OSH, trust is a doubleedged sword. If employees trust management excessively, this can result in blind faith, a reduction in personal responsibility and ultimately to mistakes not being detected. This also applies to supervisors, they should keep a healthy level of functional mistrust to ensure that adhering to rules or servicing equipment continues to be monitored and checked (Conchie & Donald, 2008).

#### Explicit behavior management: transactional leadership and OSH

Transactional leadership follows the exchange principle. Typical behaviors as part of transactional leadership include contingent rewards and management-by-exception. Contingent rewards are given when managers set clear goals for employees, tell them what level of performance is expected and then reward them for work well done. In terms of OSH this means the supervisor establishes clear safety rules, emphasizes that each individual employee must comply with these rules, and promises there will be positive consequences for when safety targets are met. The supervisor also provides support when enabling safe behavior in the workplace.

Management-by-exception supplements these processes and means leaders do something when they have established there are deviations from the desired processes, for example, errors, exceptions and irregularities. The supervisor can either do this proactively, that is, actively monitor employees' behavior while trying to prevent errors before they occur (management-by-exception active, MBE-A) or remain passive and only intervene when an error occurred (management-by-exception passive, MBE-P). This difference appears to be particularly significant in OSH. Should supervisors try to prevent accidents by proactively identifying safety-related problems including near-misses while trying to find solutions with the employees or should they "leave things the way they are, as long as nothing happens"? In this case, an active approach has enormous potential to prevent accidents and risks, to deal with errors productively and to create an OSH learning culture that embodies a healthy balance between personal responsibility and learning from mistakes (Dekker, 2012). Managers and supervisors can make a difference by consistently enforcing safety regulations, even if the safety climate in the group is generally not very pronounced, as shown by a multilevel analysis by Probst (2013). This analysis found an interaction effect of safety climate and leadership behavior on the number of reported accidents. Additionally, this number decreases when there is an increase in enforcing safety regulations, particularly where there is a poor safety climate.

Finally, there is the possibility that supervisors do not assume their responsibilities at all (Laissez-fair (LF), passive; a leadership style characterized by not making decisions, trying to stay out of important issues or simply not being available. In extreme cases, this type of leader would not take on responsibility for OSH at all but always refer back to the OSH officer and delegate all responsibilities. This type of leadership style can also be seen in the everyday working life such as when a manager is confronted with employee misconduct but puts off taking appropriate action or even refuses to do this at all.

The latest meta-analysis (Judge & Piccolo, 2004) resulted in mixed findings on the effectiveness of a transactional leadership style on general leadership success. A clear positive effect was seen with the contingent reward dimension ( $\rho = .39$ ). Whereas the passive variation of management-byexception tended to be negatively correlated with leadership success ( $\rho =$ -.14), there was a slight positive correlation for the active variation ( $\rho = .12$ ).

However, there were large confidence intervals for both variations which included the null value. These results have been confirmed for the field of safety (Clarke, 2013). Although Clarke combines the dimensions of contingent reward (CR) and MBE-A into one dimension in her meta-analysis, she found consistent correlations with compliance ( $\rho = .37$ ), participation  $(\rho = .32)$  and safety climate  $(\rho = .52)$ . These findings are congruent with Cameron & Duff's (2007) conclusions on organizational intervention improving safe behavior; largely build upon the findings of behavior management (Stajkovic & Luthans, 2003) and goal-setting theory (Locke & Latham, 2002), at the interactional personal level. Supervisors who set clear safety goals and high standards, establish rules of behavior on how to reach these goals and who provide a reward when these goals are reached, achieve better results both generally and also specifically in OSH. It is important in this context that the reward is not necessarily a monetary incentive, otherwise this quickly becomes a case of "paying for safety" (Cameron & Duff, 2007). Feedback and social reinforcement in the form of such things as recognition and appreciation from the manager have proven to be as important a reward as monetary incentives (Stajkovic & Luthans, 2003). Due to the fact that Clarke (2013) combined contingent reward and MBE-A, it is not possible to determine their relative importance. However, a recent investigation of the construction sector by Hoffmeister et al. (2014) attempted to identify the relative influential weighting of the individual dimensions in transformational and transactional leadership. In terms of transformational components, idealized influence stood out with respect to all three variables (safety climate, compliance and participation) and was responsible for the largest or second largest variance (Hoffmeister et al., 2014). Overall however, there was a very heterogeneous picture in which the relative significance of the individual dimensions, as a function of the observed outcome variables and also between samples, varied significantly. Thus, it is not possible to draw definitive conclusions. Clarke (2013) reported the results of a meta-analysis by Griffin and Talati (2011) who came to the conclusion that MBE-A has a generally moderate positive correlation with leadership success (p=.16) and additional effort (p=.26), which confirms previous findings. It could be deduced that contingent reward probably has more significance than MBE-A.

Clear negative correlations ( $\rho = -.37$ ) have been found between laissezfaire (LF) and general management results (Judge & Piccolo, 2004). Surprisingly it is difficult to find studies that have examined LF in the area of safety. An exception is the study by Mullen, Kelloway and Tecd (2011) which used two samples and found a consistent negative influence of passive leadership on compliance. The effect of passive leadership was elucidated in an experiment by Musahl and Müller-Gethmann (1994) which simulated infringement of rules. The authors showed that penalizing these infringements had a positive influence on compliance; on following the rules. Even more significant was the effect that a lack of penalties had. If appropriate action is not taken when rules are breached, compliance quickly disappears. As such, a lack of negative consequences acts as negative reinforcement in the form of "successfully breaching rules". If supervisors do not put enough effort into ensuring that safety rules are kept, then new rules start forming, for example, "Violation of rules is tolerated". These are detrimental to safe behavior and lead to higher accident numbers. Why is this? Zohar states that the rules and standards which are followed in an organization always supersede those formally documented because they are a more reliable source of information for employees as they relate to the expected consequences from the type of behavior (Zohar, 2003).

#### Second conclusion

It has been shown that leaders have a significant influence on the safety behavior of employees and hence on the company's safety performance. They do this through transactional behaviors such as setting, monitoring and enforcing codes of behavior. However, it is also due to transformational behaviors such as goal-setting for the whole group, setting an example for safe thinking, and personally attending to the physical safety of each individual. With regards to practical leadership, the question is whether one style of leadership is better than the other in terms of producing better occupational safety and health. Once again the answer to this question is probably not "either/or" but rather "both". In order to achieve a high level of performance in (not only) safety, managers must be able to find a balance between the leadership styles described (Hoffmeister et al., 2014).

It is often assumed that important psychological mechanisms such as the safety climate, trust, intrinsic motivation and willingness to actively participate in the process can be mainly achieved via transformational behaviors and that compliance can be mainly achieved via exchange-based transactional behaviors. However, current research shows this polarized view is not justified (Clarke, 2013). Both aspects contribute their part via different mechanisms and thus complement one another. Conversely, this means they can also undermine one another if they are not well coordinated. A study by Mullen et al. (2011) showed the influence of safety-related transformational leadership on employee compliance is undermined by passive leadership. This appears also to be true for trust as an important mediating psychological variable. Although transformational leadership is normally viewed as the decisive factor for creating trust, Conchie and Donald (2008) found that it is important to have functional trust, which certainly includes elements of functional mistrust, so rules can be reviewed and not just "blindly" followed. The authors believe it is vital to have consistent and predictable behavior (p.98): "In terms of leadership it is very important that you get consistency and honesty from your supervisor ... If you want to trust somebody at the end of the day, they've got to be consistent with their views and the way they carry out the task." In terms of the interplay between transactional and transformational leadership, a supervisor who states that OSH is of high value to them should also monitor and enforce the observance of rules. Only then will they be perceived as having consistent behavior. In occupational safety and health, this can be especially seen in high-reliability organizations (HROs) in which it is necessary to apply both principles (Clarke, 2013). The standardization of behavior in the form of rules and compliance, together with their enforcement by supervisors, play a major role because any accident in this type of organization can have devastating consequences (e.g. a chemical disaster). Probst & Estrada (2010) showed that reporting accidents is correlated with the employees' perception that leaders also enforce safety rules (supervisory enforcement). When supervisors consistently enforce safety rules, for every reported accident there is one less unreported accident. However, if safety rules are not consistently enforced, for every reported accident there are more than three unreported

accidents. Most interesting is that the authors also looked at the reasons for not reporting accidents, this indicated the primary reasons were poor safety awareness ("I solved the problem myself", "I thought that it wasn't that important") and a perception that safety rules are not enforced ("I thought that nothing would have been done to solve the problem anyway"). Other reasons mentioned suggest behavior-based safety initiatives can also lead to counterproductive results ("I thought it would adversely affect the safety record of my group", "I didn't want to be the one who spoils our company's "Accident Free" record"). This study clearly shows that employees can experience unspoken (implicit) pressure to not report accidents. As a result, the causes of accidents will not be eliminated. There is an added danger that every unreported accident contributes to a double standard where formal rules and statistics differ more and more from the actual rules followed on site. This is especially true when the behavior is mirrored by supervisors who avoid consistently reporting accidents in order to protect "the record" (Zohar & Luria, 2003). Therefore, it is important for employees to develop a high degree of safety awareness, to anticipate problems and to interpret rules and statistics; the logic behind them and not just formal goals that have to be met. A strong safety culture which is supported by transformational leadership must be combined with rule-based transactional leadership in order to ensure systematic safety.

Ultimately, it must not be forgotten that leadership always takes place in a larger framework or context which also has an influence on the effectiveness of leader behavior. The meta-analysis by Griffin & Talati (2011) showed that MBE-A is particularly effective as a leadership style when used in a correspondingly receptive context. In simpler words, this can be applied to OSH as follows: in a company where complying with and enforcing rules is seen as positive and self-evident, a leadership style based on these principles is successful. However, if there is a lax approach to dealing with rules being broken or where the top management does not follow the rules, it will be difficult for a supervisor on their own to successfully achieve behavioral change among employees.

This indicates the mutual dependence between the leadership style of the supervisor and the organizational structure and managerial systems. On one hand, the behavior of leaders is critical at all levels for successful OSH management. On the other hand, OSH management must create the necessary conditions which not only enable leaders to successfully implement OSH but also provide support to them.

#### OSHM: vertical and horizontal integration

The results from the research on leadership emphasize that, in sustainable OSH management, there should be a focus on explicit and implicit forms of guiding safe behavior and how these work together and complement one another. A distinction can be made between two levels of managing, the personal level and the organizational level. Aligning and coordinating behavior in organizations occurs at the personal level mostly as a result of direct contact between supervisor and employee. However, this can also be done via "leadership substitutes" such as structures and systems. The substitutes are explicit, company-wide rules such as task-setting, obligations and rights in the form of organizational charts, position descriptions and work contracts. They can also be the establishment of procedures such as staff selection and assessment in the form of HR systems. As part of their study, Zimolong & Elke (2001) showed that in OSH, successful companies not only have management principles and company guidelines but also support and encourage the behavior of their leaders through appropriate assessment and incentive systems. The importance of implicit management at the team and company level via a positive safety climate and culture for everyday safe behavior has been empirically proven many times. Bleicher (2004) refers to the intertwining of behavior management across all levels as vertical integration; the need for implicit and explicit management to mutually support one another across all levels as horizontal integration.

OSHM systems mainly address different levels of managing and, thus, contribute to the alignment of behavior between different hierarchical levels. How can horizontal integration be supported? Both Hale & Borys (2013b) and Zohar (2010) have developed a process model that focuses on the intertwining of explicit and implicit management. The basis of Zohar's (2010) model is the integration of the safety climate approach and safety pyramid model by Reason (1997). The overarching concept of Hale and

Borys also has a cyclical structure with a total of 9 phases. Both models emphasize that managing explicit and implicit rules is a dynamic process of adjusting rules to the changing reality of behavior and its context.

In the model by Hale and Borys (2013b), the core processes include monitoring, feedback and evaluation of rule effectiveness. Continual monitoring of how rules are being used and feedback of the results form the basis for each learning and change process at both individual and organizational levels. They are the core elements of behavior-based safety management. At the forefront of explicit behavior management is the compliance or violation of rules, whereas in implicit behavior management the focus is on behavior variability and learning by success and mistakes. Additional core elements of the approach are processes for adjusting "old" and deriving "new" rules, training and communicating rules, implementing measures and fostering a climate where following rules is consistently encouraged, including through social feedback. Features of this approach, in all phases of the cycle, include engagement and participation, the exchange between supervisors and employees, and communication between supervisors and OSH experts. In addition to optimizing how problems in OSH are solved, these exchange processes also serve to socialize all members of the company with the aim of fostering and maintaining a sustainable safety culture.

Conclusion: It is important for companies to find the right balance for managing occupational safety and health both on the organizational and the personal level. Enforcing compliance with rules whilst also granting enough freedom is an ongoing balancing act. This is the only way a company can credibly convey the message that OSH is taken seriously and at the same time prevent employees from failing to take personal responsibility for their own safety and that of their colleagues. This should be reflected not only in the organizational framework but also in the everyday way that leaders behave. Blind trust is just as out of place as 100% control. It is much more important to find the right level in order to make use of the functional aspects of trust and mistrust and develop an effective safety culture. Coordinated transformational and transactional elements of personal leadership, implicit and explicit management mechanisms of structural leadership, and vertical and horizontal integration are the essential cornerstones of OSHM. Its success is based on a coherent and consistent approach to dealing with safety in the company.

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#### Controlling and Managing Occupational Safety and Health – a Strategic Management Approach with the Balanced Scorecard

Joachim Vogt and Pernille S. Strøbæk

Current thinking should focus on shifting the representation of occupational safety and health (OSH) to an existential part of business in times of demographic change and providing according strategic measurement and management tools. In 2003 a special issue of Applied Ergonomics was dedicated to human factors experts using business language to convince managers that ergonomics is a good investment. (Stanton and Baber, 2003). The Stanton and Baber (2003) special issue provided several cost-benefit analyses (CBA) and business cases supporting a focus on ergonomics in occupational safety and health. Chang (2008) referred to substantial financial losses caused by ergonomic problems, specifically slips and falls. Bell et al. (2008) likewise presented the implementation of a broad-scale prevention program and the subsequent significant reductions of injury claims. In the reserach that follows, Denmark and Germany are used to describe how data is used to monitor occupational safety and health with the balanced scorecard (BSC), a well-known management instruments for strategy implementation. Although the number of CBAs has increased from less than 20 (Bevis and Slade, 1970) to more than 1300 (Bevis, 2003), ergonomics still do not receive the attention of management; more evidence is needed. This being especially important in Europe due to the effects of an ageing workforce and the pressures to maintain health.

### A Balanced-Scorecard approach to occupational safety and health

In cooperation with the German health insurance AOK, Thul and Zink (2003) developed and tested OSH management systems. The basis was the EFQM model of business excellence. A business indicator set (BSC like) linked employee health to OSH activities. Three stakeholders were considered: the society, the organization, and the individual worker. In the following table, the indicator groups, their respective stakeholders, and example indicators with weights in per cent are given.

Indicator	Stakeholder	Example	Weight
Expenditures for health	society	Hospital costs; sickness pay	15
Absenteeism rate	company	sickness leaves	25
Accident rate	company and employees	accidents per 1000 employees; insurance costs	25
Employee health state	employee	general health; works stress; strain; related diseases	15
Emplayee satisfaction	company and employees	Satisfaction in general; satis- faction with collegues and superiors; workforce surveys	

Table 1. Indicator groups, examples, and their relative importance in per cent (according to Thul and Zink, 2003)

Thul and Zink (2003) found leadership, strategy and planning, management of human and other resources, a corporate health management system, and process management to be prerequisites of employee, costumer, and supplier satisfaction of corporate health and society impact. The results show that companies investing in health management were significantly more successful in reducing absenteeism and accident rate. Furthermore, employee reported health problems decreased and satisfaction increased.

Thul and Zink (2003) conclude that indicator based management tools considering employee reports as well as objective success criteria like absenteeism or accident rate, are effective (i.e. help doing the right things) and efficient (doing them well and with sustainable consumption of resources).

Soft factor management in general and OSH management in particular can be linked to business success.

The following reports the experiences of a BSC based approach linking OSH management to strategic management. The BSC is a mere framework that must include behavioural models if health and safety should be managed. The BSC (Kaplan and Norton, 1996) is a well-known and widely applied management system used to implement a strategy throughout an organization and to align all organizational units and their goals to the overall strategy. This alignment must happen as a top-down-process. It supports achieving strategic goals in the planned time. Strategic goals are clustered on the four levels of the BSC, i.e.

- 1. Finance and success
- 2. Customers and stakeholders
- 3. Processes
- 4. Knowledge and potentials

"Knowledge and potentials" may also be called "resources". Resources cover all prevailing knowledge, skill, ability, and other characteristics in people which are of value to production, service, and operations. Documented know-how in patents or handbooks are also considered resources to an organization. Levels 1 and 2 of the classic BSC may be pooled and called "outcomes" of "resources" and "processes".

Human resources are a significant part of an organization's overall resources. The outcomes largely determine the organization's performance. However, it is difficult to quantify the contribution and the interrelations between health, motivation, leadership, individual and organizational performance difficult. In order to bridge this gap, the BSC-concept can be applied to human resources in general and health in particular. The four perspectives and the facilitating relations of factors within and across these perspectives are defined with respect to health:

*Resources:* People responsible for the organization's health management; their qualifications; the quantity and quality of diagnostic, interventive, preventive tools they use.

*Processes:* Standard procedures in health management; their frequency; their quality; their documentation (e.g. how often and with what efficiency are health initiatives offered).

*Outcomes:* Assess of OSH by the stakeholders, i.e. the employees; outcomes like less absenteeism and more motivation; the organization's success like more productivity, higher quality, less problems after sale or service.

For health BSC, indicators representing health relevant human behaviors and attitudes need to be obtained in a bottom-up-process. Valid and reliable data from other sources are also useful (e.g. quality management, controlling). Within the Gamm et al. (2007) and Möller et al. (2008) study, a continuous and systematic management concept for workplace-health promotion of a German automobile manufacturer was developed and implemented. For this purpose the strategic targets of the manufacturer's health management system were defined for the different BSC levels:

- 1. Health performance (e.g. absenteeism, productivity, quality)
- 2. Health customers (e.g. staff members, their physical, psychological, and social well-being)
- 3. Health processes (e.g. medical check-ups, preventive measures)
- 4. Health potentials (e.g. knowledge, skills, abilities, resources of health managers)

With respect to the OSH BSC levels, Gamm et al. (2007) and Möller et al. (2008) conceived a questionnaire with 145 items of levels 2–4 (stakeholders, processes, potentials). Success and finance data on level 1 were requested of the financial controlling system. Across and within the four levels, statistical interrelations were analysed by means of regression analysis. Figure 1 displays some of the central findings. Most of these regressions were in line with the literature-based expectations. Details of the statistical findings can be found in the publications of Gamm et al. (2007) and Möller et al. (2008). For the purpose of this chapter it is sufficient to conclude that the BSC concept can be applied successfully to OSH.



Figure 1. Empirically found relations of health resources (bottom), processes (middle), and success (top) factors in regression analysis (modified according to Vogt et al., 2010; dashed lines represent positive relations, solid lines represent negative relations; example for a negative relation: the more social support is reported, the less rework is needed; example for a positive relation: the more health impairments are reported, the more absenteeism is registered)

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# BG RCI Side Event; XX World Congress on Safety and Health at Work, Frankfurt 2014



### 7. The New BG RCI Prevention Strategy VISION ZERO. Zero Accidents – Healthy Working!

Helmut Ehnes

#### Preamble

International competition, demographic trends, continual structural change as well as the increasing density of information present major challenges for economy, society and accident insurance in Germany regarding prevention.

In light of this and taking into account the position paper "Prevention is worth it" from the self-regulatory body for statutory accident insurance, approved by the General Meeting of the DGUV on 28/11/2008, prevention committees of the BG RCI board and meetings of representatives have addressed the future strategic focus of prevention as part of a workshop on 21 October 2013 in Gernsbach and have drafted a proposal for the new BG RCI prevention strategy.

This has been developed jointly by the self-regulatory body, by employees working in prevention and by the executive board as part of the process of optimizing the further development the BG RCI's organizational structures relating to prevention.

The new BG RCI prevention strategy builds on the experience and success of Employers Liability Insurance Associations amalgamated within the BG RCI and takes into account different underlying conditions and the resulting needs and expectations of member companies in their respective sectors. Its successful implementation depends almost entirely on close collaboration with companies and partners at an operational level. BG RCI's new prevention strategy is based on the following parameters:

#### Statutory mandate

A person's health is their most valued possession. To preserve this by all appropriate means is the primary mandate of accident insurance. The prevention mandate "... to employ all suitable means to prevent accidents at work and occupational diseases as well as work-related health hazards ... ", is enshrined in § 1 "Prevention, Rehabilitation, Compensation" of the Social Security Code VII (SGB VII) and offers the framework for all prevention measures provided by the BG RCI for their member companies.

#### Benefits of prevention

On the one hand, targeted investment in prevention by the BG RCI supports the implementation of the prevention mandate required by statute. It supports member companies in particular by fulfilling their obligation to design work in such a way that accidents and occupational diseases, and thus human suffering, is avoided.

At the same time, however, investment in prevention avoids the much greater financial outlay resulting from accidents and occupational diseases as well as downtime associated with this. In this way it contributes towards the company's sustained commercial success and to preserving jobs, which may also be a key factor in competitiveness.

#### Success in prevention

Prevention successes, illustrated by the reduction in the number and severity of accidents at work, travel accidents and occupational diseases, have a positive impact on member companies' contribution to the Employers Liability Insurance Association.

Owing to successful prevention efforts over the last ten years, it has been possible to reduce the number of accidents in companies insured with the BG RCI. This has included a 20% reduction in the number of accidents at work, a 17% reduction in the number of accidents while travelling to or from work and a 30% reduction in recognised occupational diseases. Over the same period the number of costly new pensions due to accidents at work also decreased. There has been a 42% reduction in new pensions due to accident

dents at work, a 39% reduction in new pensions due to travelling to or from work and a 20% reduction in pensions due to occupational illnesses.

With 19 reportable accidents per 1000 FTE, the BG RCI achieved the best result for Employers Liability Insurance Associations whose member companies are predominately classified within the manufacturing industry.

The new BG RCI prevention strategy



The prevention strategy, "VISION ZERO. Zero accidents – healthy working!", assumes the aim to achieve through suitable preventive measures a working environment in which nobody is injured, killed or permanently debilitated due to injury or illness. The prevention strategy, establishes objectives which appear attainable in the next ten years. It also details measures by which these prevention objectives are to be attained between 2015–2024.

"VISION ZERO. Zero accidents – healthy working!" implies "zero risk at work". As with life in general, risks at work are unavoidable - they need to be reduced, however, using suitable measures so that injuries and illnesses are mitigated.

In view of both existing and new risks, sustained investment in prevention and the implementation of effective measures on the part of BG RCI and their member companies is absolutely essential. The new prevention strategy, "VISION ZERO. Zero accidents – healthy working!", also aims to use available resources in a targeted and efficient way.

#### A Objectives:

The new prevention strategy, "VISION ZERO. Zero accidents – healthy working!", defines the objectives to be achieved by 2024.

Establishing quantitative goals is essential to convince all stakeholders and key players at an operational level of the necessity of continued efforts in the area of prevention to achieve further success.

Milestones are set along the route to achieving both the qualitative and quantitative objectives. Regular reporting helps to provide information regarding current progress and to review the achievement of the milestones.

The efficacy, customer perception and customer satisfaction of all prevention measures are to be systematically scrutinized and evaluated at regular intervals.

### Objective 1: Reduce the risk of accidents at work in member companies of the BG RCI

By 2024, the risk of sustaining a reportable accident at work (per 1000 FTE) is to be reduced by 30% through the use of suitable prevention measures.

### Objective 2: Halve the number of new retirements due to accidents at work

The number of serious accidents at work which temporarily or permanently result in bodily injury (and contribute to early retirement) is to be reduced by 50% through means of suitable prevention measures by 2024.

#### Objective 3: Halve the number of fatal accidents at work

By 2024, the number of fatal accidents at work is to be reduced by 50% through the use of suitable prevention measures.

#### Objective 4: Reduce the number of recognized occupational diseases

The number of new recognised occupational diseases that are not a result of earlier exposure in the work place due to longer latency periods, are to be further reduced by means of suitable prevention measures.<sup>1</sup>

<sup>&</sup>lt;sup>1</sup> Since annual values, in the case of occupational diseases, are dependent upon the respective legal position regarding compensation of occupational illnesses (occupational diseases lists, tecognition criteria, dose values, retroactive clauses), it is not possible to specify an intended decline in percentage terms. However, the trends in individual occupational diseases will be presented as part of annual reporting.

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#### Objective 5: Increase the number of accident free businesses

The number of businesses with no reportable accidents at work for a defined period of time is to be increased.

### Objective 6: Provide adequate prevention services and prevention measures

BG RCI's prevention services and measures include advice for companies, provision of basic and further training, prevention campaigns, events, prevention media, and services for particular target groups. All such services and measures must be:

- customer-oriented and aligned to the company requirements.
- up to date, taking into account current developments.
- tested and evaluated in terms of their effectiveness.
- clearly structured and relevant to practice.
- viable for small and medium-sized businesses.

#### Objective 7: Increase the benefit of BG RCI prevention services

The number of member companies who actively employ and use BG RCI prevention services for their operational prevention work (e.g, basic and further training provision, demonstration and business models or campaign modules) is to be increased. In addition, the number of companies with the BG RCI seal of approval is to be increased.

#### B Measures:

The following measures will be implemented step-by-step in order to achieve the objectives. This will involve adopting new approaches while continuing proven prevention measures.

#### Measure 1: Analysis and priority setting

Priorities regarding accidents and ODs which require preventative action will be regularly and systematically established while taking into account particular factors, new risks and current developments.

#### Measure 2: Customer orientation

Since the effectiveness of prevention services increases with the consideration of the needs of the member companies and insured, then customer needs and satisfaction is to be systematically scrutinized and established at regular intervals.

Member companies and insured parties are viewed as customers. Direct and prompt communication with customers and operational target groups is to be improved and intensified.

#### Measure 3: Quality of prevention services

Prevention services will be reviewed, adapted or amended on a regular basis in terms of timeliness, satisfaction and efficacy based on analyses and the needs of the customer.

In order to encourage use of prevention services, a clear and understandable provision structure is required together with successful marketing. In addition, services and measures should be tailored to the target groups taking into account the company size, workforce composition, company structure and the specific needs of the sector.

#### Measure 4: Thematic priority setting

The priorities for future prevention work result from current analysis of occupational accidents and diseases (number, rate and costs), customer needs as well as new risks.

This means, for example, that the issue of "Health at work" takes on increasing importance in order to add to proven prevention measures. This also applies to the avoidance or reduction of work-related psychological strain. Measures taken by the companies to promote health will complement BG RCI prevention services.

#### Measure 5: Priority for small and medium-sized companies

Since the occurrence of accidents is negatively correlated with the number of employees, SMEs therefore have significant challenges in the operational organization of occupational safety. A priority should be focussed on improving the situation in small and medium-sized businesses.

#### Measure 6: Qualification, competence and coordination

Employee qualifications and competencies needed for the performance of duties within BG RCI prevention are regularly reviewed, developed and adapted to current need. Personnel resources are deployed to take needs into account and achieve maximum effect.

#### Measure 7: Presence in operation

Personnel advice and monitoring of companies remains a vital mainstay of efficient prevention. The personnel resources are deployed to take genuine needs into account.

#### Measure 8: Basic and continuing training

Targeted basic and continuing training of operational target groups in the context of high-quality training measures is vital for effective prevention. Training carried out in a company's own training establishment offers ideal conditions for this. Sufficient resources will be made available for this purpose. In order to boost the effectiveness of BG RCI provision of basic and continuing training in operational practice, companies must ensure the transfer of knowledge and deliver appropriate operational instruction.

#### Measure 9: Communication

The efficacy of efforts in the area of prevention are to be significantly improved by means of intensified, swift and targeted communication. This also necessitates the use of up-to-date electronic media.

#### Measure 10: Partnerships and key players

In order to support the efficacy of the new BG RCI prevention strategy and to motivate partners to be effective within their spheres of influence, measures will be communicated and discussed with associations, companies, unions, employee representatives and other key players. Agreement with associations and unions may clarify the common obligations and efforts, thus supporting the achievement of the objectives.

In addition, all opportunities for concerted action as provided by the Joint German Occupational Safety and Health Strategy will be used.

## 8. How Does "Health" Influence the Achievement of "Vision Zero"?

Esin Taşkan-Karamürsel

The discussion of "Vision Zero" among health and safety experts seems to be biased towards incidents and risks, while the subject of health is regarded as a product or result of hazard and injury prevention. The theme of health as a direct subject of Vision Zero is rarely mentioned.

Why is health in "Vision Zero" relevant? The subject of health allows a holistic perspective on Vision Zero. The ability of people to work is essentially dependent on their health. On the one hand, the health of workers may be affected substantially by risks and incidents due to conditions and situations at work; on the other hand, it may also be affected by the safetypromoting or health-promoting behavior of the workers themselves. Merely changing the hard facts (or conditions) at workplaces related to the prevention of incidents and hazards narrows the approaches to "Vision Zero." Analyzing work conditions through risk analysis is still important, but it does not paint the whole picture.

Today, with sufficient technical know-how and financial support workplaces can be made more secure. In this context "human behavior" still seems to be an unpredictable element. Yet it is a main factor that determines whether Vision Zero can be implemented. In addition, we are faced with the global challenge that the perception of health is also influenced by socio-cultural aspects. Given that today's world of workplace safety and health is likewise global, this paper presents a study as an example of how these topics should be considered in a more sophisticated manner in the future.

The following study shows that health perception mediates health behavior. This study is not the most recent, but has not lost its scientific value. It reveals that approaches for "Vision Zero" regarding "health" should also consider the individual worker in terms of their safety-promoting and health-promoting behavior. In this example, however, we also found a sociocultural influence as we compared two groups, German and Turkish entrepreneurs, regarding their situation at work, lifestyles, health perception, stress-symptoms and health-promoting behaviors in addition to other aspects.

Health Promotion in Small Restaurants: An Intercultural Comparison between German and Turkish Restaurateurs (Taşkan, 2005)

#### Introduction

The following qualitative study was conducted in 2004. It was a joint project between the German Social Accident Insurance Institution for the Foodstuffs and Catering Industry (BGN) and the University of Mannheim. The main three research questions were:

- What is the work situation in small restaurants?
- What is the health situation of the restaurateurs?
- How do Turkish and German restaurateurs differ from each other regarding health comprehension and health behavior?

Over the past twenty years, Turkish migrants in Germany have evolved from workers to entrepreneurs. The statistics of ten years ago showed that Turkish migrants prefer the restaurant industry for self-employment to a high degree (second among all industry sectors) (Zentrum für Türkeistudien, 2003). Ninety percent of these enterprises were small restaurants with 10 or fewer employees. Nevertheless, by this time "Döner-style" (Turkish) fast food restaurants in Germany had already outpaced McDonald's in yearly revenue.

In this study we compared Turkish and German restaurant owners (TR-R: N = 20; G-R: N = 20) with regard to their health condition, health behavior, illness, resources, psychosocial work conditions, organizational structure, working hours, recreation and leisure time activities as well as cultural influences. The following stress-strain-model was used, as can be seen in Fig. 1 below.



Figure 1: Applied stress-strain-model from statutory accidents insurance' perspective

#### Demographics

We contacted small restaurants in Cologne, Stuttgart and Mannheim for face-to-face interviews to be conducted using a questionnaire. The demographic variables are shown in Table 1 below. Turkish restaurateurs were mostly younger, married and lived together with their children. In contrast, only a quarter of Germans were married and less than half lived with their children, partly due to the higher average age. Many first-generation Turkish restaurateurs had only a primary school education. More German than Turkish restaurateurs reported vocational training and had an average of nearly 15 years of work experience.

Variables	TR	G
Subjects	20 (2♀, 18♂)	20 (9♀, 11♂)
Age*	39 yr. range: 25 – 60 yr.	46,7 yr. range: 22 – 69 yr.
Family Status**	18 married 2 unmarried	8 married 12 unmarried
Children*	16 subjects	8 subjects
Level of School Education	14 lower level 2 medium level 4 higher level	8 lower level 10 medium level 2 higher level
Professional Training**	3 cooks 17 other	12 cooks 8 other

Table 1: Demographic variables of German and Turkish restaurateurs

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#### **Experience and Ownership**

German restaurateurs typically started an independent business after years of experience in the restaurant industry, whereas Turkish restaurateurs gathered experience through their businesses, as can be seen on Fig. 2 below.



Figure 2: Years of experience compared with years of ownership among Turkish and German restaurateurs



#### Organizational Structure

Figure 3: Type of small size restaurant compared between Turkish and German restaurateurs

Turkish restaurateurs operated fast food restaurants and snack bars with pre-produced meals (standardized restaurants, many products) (see Fig.3). In contrast, German restaurateurs had simple restaurants as well as upscale restaurants with production based on customer orders (non-standardized, few products).



Figure 4: Help korn family at work compared between Turkish and German restaurateurs

Turkish restaurateurs received frequent help from their relatives. Even distant relatives were included in this work.



#### Work-specific Strain

Figure 5: Work-specific strain compared between Turkish and German restaurateurs

Both groups worked about 12 hours a day, more than 6 days a week. Compared to Turkish restaurateurs, German restaurateurs were more likely to take days of rest regularly. The largest operational strain restaurateurs in both groups mentioned was "permanent standing." Turkish entrepreneurs complained more about time pressure and heat in summer, whereas Germans complained more about alcohol- and nicotine-consuming guests. Other than that, Turkish and German restaurateurs complained to the same degree about work-specific strain.



#### Personal Resources

Figure 6: Illness behavior compared among Turkish and German restaurateurs

Turkish restaurateurs mentioned that they more often consult a doctor when ill, whereas Germans first try to help themselves with medicine from the pharmacy or other self-healing methods.



Figure 7: Recreation after work compared among Turkish and German restaurateurs

German restaurateurs engaged in leisure time activities and additionally rested from work at home. Turkish restaurateurs mostly preferred to rest at home. Only a few Turkish restaurateurs had a fixed day to rest during the week, compared with Germans (4 TR; 12 G;  $\chi^2$ :p≤.022).

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#### Stress-Symptoms



Figure 8: Stress-symptoms compared between Turkish and German restaurateurs

In general, Turkish and German entrepreneurs indicated less stress-symptoms. However, Turkish subjects noted significantly more behavioral stress-symptoms in comparison with Germans. Furthermore, Turkish restaurateurs frequently mentioned the risk of stress at work (7 TR; 1 G;  $\chi^2$ : p≤.005). In addition, they mentioned a "disciplined lifestyle" as a method to promote health significantly more (5 TR; 0 G;  $\chi^2$ : p≤.047). Additionally, German restaurateurs emphasized the importance of sleep (5-point-scale: TR=3,4; G=4,1; t-test: p≤.047), whereas Turkish restaurateurs indicated they often do not sleep well at night (5-point-scale: TR=2,5; G=1,7; t-test: p≤.063).

#### Discussion

Our results displayed the differences between Turkish and German restaurant owners, especially concerning demographic variables, organizational structure, health behavior, perceived stress, and leisure time activities. Strain at the work place seemed to occur equally in both groups.

In terms of health behavior within the two groups, it was found that German restaurateurs tended to help themselves if they got ill, while Turkish restaurateurs relied on a medical doctor more often. Stress levels for
Turkish restaurateurs seemed to be at a higher level, which may have been influenced by the age difference found in the sample. How would German restaurateurs have answered if they had been younger? Unfortunately, the sample size wasn't large enough to further analyze such questions. Nevertheless, we discovered that health perception essentially formed health behavior in both groups. The German entrepreneurs were actively engaged in shaping their health, whereas Turkish respondents took a more passive attitude towards the changeability of their health status.

The results of this study were used to foster structural and individual health promotion in the restaurant industry. It appeared that Turkish entrepreneurs needed help in stress and time management in order to maintain work-life balance. In addition, it seemed necessary to offer professional training for Turkish restaurateurs to achieve the qualification level required in the restaurant industry to secure their businesses long term. The better coping strategies and the older age of German entrepreneurs found in our sample indicated a healthy worker effect.

What do the results tell us regarding "Vision Zero"? Health measures to achieve Vision Zero need to be broken down to the workplace and individual level if we want to identify and apply ways to achieve "Zero Incidents." Once we take a closer look at health-related behavior, we realize that there is no such thing as an ideal program or ideal procedure that can be adapted among different cultures or across all individuals. We need to enable health competence, considering that different approaches may be necessary depending on the individual and his/her culture. Vision Zero is an important concept, but making it practical requires analysis of the deficits and benefits within countries, their workplaces and the individuals themselves.

To summarize, the preservation of human health is actually the first priority of Vision Zero. Therefore, in the future, health should be positioned as primary and not secondary to issues of incidents and hazards as it has been in the past. The main question of Vision Zero should be: "How do people stay healthy and accident-free?" This approach, which extends the previous deficit-oriented understanding of Vision Zero (see Antonovsky, 1979), would be greatly beneficial.

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World Congress on Safety and Health at Work, 24.-27. August 2014 - Side Event, BGRCI

# 9. Practice and Implementation on the Journey to Zero

Andreas Speh

Importance of leadership on the journey to zero

At DuPont, our commitment to SHE – Safety Health Environment – starts with line management at the top of the organization. In the early 1990s, former CEO Ed Woolard chartered a discovery team to define a path to achieve sustainable improvement in safety while building business value. One of the major outcomes of this work was the development of the DuPont Bradley Curve.



Bradley Curve Culture of Openness and Collaboration

The Bradley Curve represents the cultural maturity model for an organization and helps it understand where it is and how to improve. The Bradley Curve along with the Relative Culture Strength Index has become the leading quantitative indicator of organizational culture and is used extensively inside and outside of DuPont. This cultural maturity model is based on three major domains – Leadership, Structure, Processes & Actions. The cultural maturity journey begins with and sustains itself primarily with leadership.



# DuPont Safety Management System

Over many years, DuPont has developed and formalized safety practices that have comprised the DuPont Safety Management System. These practices foster a culture that is centered on caring for people, driven by felt leadership, and delivers operational discipline.

DuPont subscribes to the concept of "Visible Felt Leadership" for all of our core values. This means:

- Establishing a demanding, uncompromising and ever improving safety culture
- Expectations are clearly and universally understood, accepted and practiced
- Expectations are established and maintained by every leader in the organization
- Leadership engages employees in all aspects of driving core values

Felt leadership is critical to any organization because our leaders set the culture by their actions, inactions and the perceived expectations they have of the organization.



## Key aspects of Felt Leadership

Felt Leadership is demonstrated in many ways by leaders at all levels. It is particularly important at the senior leadership level.

All DuPont Senior Leaders are actively engaged with employees such that their passion and commitment for SHE are felt throughout the organization. They participate in safety meetings and audits, as well as recognition events. For example, each Business President as well as Functional Vice President has recently led their Leadership Teams in reviewing their most recent Safety Perception Survey results and designing action plans to continue the strengthening of culture. Many of our top leaders also demonstrate their commitment outside of DuPont.

In 2013, the Operating Committee of the Company in consultation with the Board of Directors decided to change our motto from the "The Goal is Zero" to "Committed to Zero." This change reflects the company's drive towards an interdependent culture and continued leadership in SHE. "Committed to Zero" goes beyond the numbers and focuses everyone's attention on living every day committed to safety and respect for others at home and at work. This reflects the company's and leadership's desire to move solidly into the "Interdependent Stage" of the Bradley Curve, going beyond managing to a number and moving toward meaningful proactive measures.



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# 10. Commentary on a Broader Understanding of the Vision Zero Strategy

Esin Taşkan-Karamürsel

The BGRCI side event at the World Congress "Navigating the uncharted territory: occupational health and safety in companies that operate, or are looking to operate, on a transatlantic scale" brought together safety and health experts from different countries to focus on the topic of "Vision Zero". The experts agreed that although the strategy is still strongly focused on the prevention of accidents and hazards at work, there has been a gradual shift towards a broader understanding in which the concept of health plays a central role and which has lead to specific prevention measures. In particular, recent developments in Germany show that new paths to ensuring the safety and health of workers are being taken. These will be described in more detail in the following.

In recent years, the WHO Charter has left its mark across the globe on institutions which deal with employee safety and health. It defines health as "a state of complete physical mental and social well-being and not merely the absence of disease or infirmity" (1946). Accordingly, Antonovsky's concept of Salutogenesis (1979), which takes into consideration not only factors that endanger health but also those that promote good health, has become one of the most popular research theories amongst OSH experts. As a result, greater importance has been attached to employee behaviour that promotes safety and good health in the workplace. The fact that this was not previously the case was sometimes because situation-based prevention is easier to specify than behaviour-based prevention. Purchasing personal protective equipment as a situation-based prevention measure seems simple at first; whereas it appears more unpredictable when OSH specialists are faced with the behavioural issue of how to get the endangered target groups to wear this equipment. Although OSH briefings are deemed to be a key behavioural preventive measure, company owners and managers complained in a recent study about the procedure for briefings: they had the characteristic of rubber-stamping, of just going through the motions – whether anything stuck in people's heads was not relevant (Taşkan-Karamürsel, 2014). It would seem that company owners and managers want additional practical tools to help raise employee awareness of correct behaviour.

When planning and implementing prevention measures, more focus should be given to using the results of research which has identified factors that impact employee health, specifically the factors that influence safe and healthy behaviour in employees (cf. Lazarus, 1966; Karasek & Theorell, 1990; Becker, 2003). A welcome development in this regard is the concept of "Behaviour Based Safety" for improving occupational safety and health (cf. Bördlein, 2009; Reinert in DGUV Jahrbuch Prävention, 2014/2015). This has gained in importance in recent years given that accident numbers and sick days stagnant at a certain point. This often applies to companies which already have a comprehensive regulatory framework and wide-ranging prevention measures to protect employee safety and health. Only when the issue of safety culture is addressed do indicators drop further. A safety culture focuses on behaviour that promotes safety and good health as well as placing more emphasis on taking responsibility for oneself and for others. None of these concepts are new. However, compared to before, health research is now more heavily promoted because there has been a significant increase in the recorded number of sick days due to mental illness in Germany in recent years (cf. BMAS/BAuA, 2013).

In addition, the health of employees in the workplace is nowadays explicitly seen as a task for OSH specialists. It can currently be seen in two work programmes of the Joint German OSH Strategy (GDA Work Programmes 2013-2018). The first of these work programmes ("MSD") aims to reduce occupational health hazards and illnesses related to musculoskeletal disorders and the second work package ("Psyche") aims to protect and improve the health of employees exposed to workplace psychological stressors. As part of the "Psyche" work programme (2013-2018), behavioural-preventive measures will be expanded and supplemented with the promotion of good health and improved resources. Whereas topics related to health were previously on the periphery of classic OSH topic, the two are now closely intertwined and of equal weighting. The Vision Zero strategy has two pillars: the first is the prevention of accidents and hazards; the second is the protection and improvement of employee health. Expressly adding the Vision Zero strategy to the central aspect of health will provide those involved in OSH with more room to manoeuvre. When developing prevention measures, topics previously considered as "soft" such as psychological well-being will be taken more into account, alongside traditional OSH topics such as dealing with hazardous materials.

Fundamentally, a Vision Zero strategy with milestones and measures which follows Locke & Latham's (1990) goal setting theory should be put in concrete terms (cf. BGRCI.magazin, 2014). Based on the broader understanding of Vision Zero in terms of health, this must be more than just lip service. Furthermore, using the Vision Zero strategy as the basis for an impact model or model of behaviour means that specific impact factors can be identified which scientifically support operational and institutional actions. Only real life will show which screws need to be adjusted so that the strategy can be further optimized. Therefore, it is advisable to think about an evaluation to determine whether, and to what extent, objectives have actually been achieved.

The question remains whether the developments mentioned apply equally to all countries that participated in the Side Event. The discussions from the event revealed differing views. Those involved in OSH in other countries still see themselves as being challenged with finding a way to do pioneering work. However, we can be certain that the experts agree what expectations they have for the future and understanding of Vision Zero. Therefore, we hope that the articles in this booklet will inspire OSH stakeholders worldwide to drive the Vision Zero strategy in their companies and institutions.

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# Robert W. Campbell Award, San Diego 2014



# 11. A Practical Approach to Effective EHS Leading Indicators: Lessons from the Best

John A. Dony and Joy Inouye

#### Introduction

The use of leading indicators and proactive metrics in the field of environmental, health, and safety (EHS) management is characterized by opposites. Leading indicator programs have gained significant traction and momentum in world-class organizations, yet the basic parameters and definitions of terms in the science remain inexact. It is acknowledged that leading indicator programs must be developed based on the unique needs of every organization, yet there is a clamor for prescriptive information on specific metrics to track. Perhaps most critically of all, many organizations recognize the need to take their indicators and metrics to the next level, yet most rely on the slow burn of experiential learning to elevate their approach.

The first section of this paper presents research being undertaken by the Campbell Institute, the global EHS center of excellence at the National Safety Council, on the best practices of its member companies with respect to leading indicator programs, including definitions, a taxonomy, and specific metrics and approaches aimed at sparking innovation in your organization. The second section takes a deeper look at the most elusive yet potentially most telling leading indicators of all – leadership and culture.

#### A Practical Approach to Leading Indicators

#### Overview

Since its inception in 2012, the Campbell Institute has focused on the sharing of best practices within and from its member companies, organizations with world-class performance in EHS and Sustainability. Chief among the topics explored by the Institute has been leading indicators; 2015 marks the third consecutive year of a longitudinal research project on metrics launched by the Institute shortly after its formation. At present, Institute membership includes 34 high-performing organizations across industry sectors and international boundaries; the research discussed below draws on the practices, approaches, and strategies of a subset of these organizations.

The first year of the Institute's research project on leading indicators focused on defining the basic parameters and ground rules of the science, then aligning these indicators within business systems. In essence, the question behind the research, as simple as it may seem, was "what is a leading indicator?" Over this first year, using a mixed-method research approach that included surveys, interviews, literature reviews, and an expert panel, the Institute developed a common language for discussing and integrating proactive metrics. This includes a definition, the critical characteristics, a taxonomy, enabler and barrier factors, and a review of the current state of leading indicators, all of which are briefly shared below.

The second year of the Institute's research project focused on refining its taxonomy and compiling a practical list of indicators used by its member companies to help other organizations learn from and implement effective metrics programs. A workgroup/conversational structure was used to capture lessons learned and best practices during this phase of the research. Key findings from both phases are summarized below.

#### Definition

Based on the consensus of a convened panel of EHS experts – leaders with hundreds of collective years of experience in the field – the Campbell Institute defines leading indicators as proactive, preventative, and predictive measures that monitor and provide current information about the effective performance, activities, and processes of an EHS management system that drive the identification and elimination or control of risks in the workplace that can cause incidents and injuries.

Although this may seem obvious, discussion among the numerous Institute members comprising the panel was proof positive that organizations struggle to find common language when discussing the core concept of a leading indicator. In short, though, it boils down to three key concepts: proactive, preventative, and predictive.

### Critical characteristics

The expert panel of Institute members additionally agreed on eight critical characteristics of robust leading indicators:

- Actionable
- Achievable
- Explainable
- Meaningful
- Timely
- Transparent
- Useful
- Valid

Although not all eight characteristics need be present in every robust leading indicator, all panel members agreed that the majority of these are likely to be present in the best of them. Even elements that may seem less meaningful, such as "explainable," were revealed to be crucial – for instance, even the best indicator in the world is not worth much if it takes complex and/or esoteric information to explain. The best indicators are those that seem obvious, can be shared in seconds, and can regularly to be tracked and acted upon.

#### Taxonomy

Taxonomies have long been helpful in classifying and demystifying complex concepts. This holds true in the case of leading indicators, and based on the panel's discussion the Campbell Institute compiled a succinct taxonomy of proactive metrics comprised of three branches:

- Behavioral relating to the actions or beliefs of a person or group of people
- Operational relating to the work processes, tools, or equipment of an organization
- Systemic relating to the management system and/or activities used to implement continuous improvement

This taxonomy was expanded on during the Institute's second year of research, resulting in a much more complex classification system that is discussed later in this paper.

### Enabler and barrier factors

With the critical work of defining and structuring a common language around EHS leading indicators complete, the Institute turned its attention to exploring the ways in which organizations aligned metrics within their business operations. Across a series of in-depth interviews and surveys, Institute research uncovered the following key enabler and barrier factors to EHS leading indicator implementation:

## Enablers

- Executive buy-in (not technical knowledge)
- Corporate-level rollup and tracking
- Predictive value communicated and understood
- Targeted collection toward specific outcomes

## Barriers

- Inability to develop consistently actionable metrics
- Lack of reliable, consistent relationship with lagging indicators
- Continued C-suite reliance on lagging indicators
- Sporadic, infrequent, non-standard benchmarking

Collectively, these enablers and barriers impart several key messages. One is the critical nature of communication – from executive buy-in to value proposition to roll up to continued leadership use of lagging metrics, clear communication is a common cause (whether in its presence or absence). Another is the need for targeted collection; not only does this help to narrow the focus to a manageable degree, but it is critical in drawing a line to outcomes after the fact. A final message lies in the lack of benchmarking and sound, vetted information. In a field that so many organizations are devoting such significant resources to, why is information and best practice sharing so hard to come by?

#### Current state review

The Institute sought to explore this question further in its survey instrument, focusing on three key pieces of information: the perceived importance of leading indicators (now and in the future), the extent to which these indicators were being used, and the source of information organizations were using to enhance their knowledge.

#### Perceived importance

Reflecting the traction gained by leading indicator programs over the past several years, 90% of Institute members surveyed responded that they found leading indicators extremely or very important, equivalent to responses of a 5 and a 4 (respectively) on a 5-point scale. Going forward, members saw an even greater perceived importance of proactive metrics, with 93% predicting increasing use of leading indicators over the next five years.

#### Extent of tracking

Despite the perceived importance of leading indicators, only 40% of members surveyed tracked mostly leading metrics at the corporate level. The remaining 60% tracked mostly (or only) lagging metrics of performance, and discussions with leadership and board-level representatives tended to focus on these outcomes more often than not.

#### Methods for enhancement

Given the disconnect between importance and tracking of leading indicators, one might expect that significant resourcing is being put behind leading indicator enhancement. Yet members surveyed responded that the predominant source of new information and practice on leading indicators came from within the organization itself – in other words, "experience" was the driver of knowledge. Unlike other areas of the science which are regularly benchmarked, leading indicator use tends to exist in an organizational vacuum.

With this final exercise in alignment complete, one finding was clear – more reliable, vetted research on leading indicators is necessary to help organizations worldwide meet their need for continuous improvement. The Institute now had a clear direction for its second year of research – a refinement of the leading indicators taxonomy it had previously developed.

### Refining - growing the taxonomy

Over its second year of research, the Institute convened a number of workgroups comprised of member organizations, partners, and other experts to grow its three-branch taxonomy into an instrument that could help organizations discuss and categorize indicators, as well as spark the imagination and creativity of organizations in developing and using new metrics. While it is beyond the scope of this paper to share the entire taxonomy, examples appear below.

#### Examples – Behavioral

- Employee engagement/participation
  - Participation rate
  - Number of on-the-job observations from employees
  - Number of off-the-job observations from employees
  - Percent of coached observations
  - Percent of employees documenting observations
  - Number and quality of comments

- Percent of job turnover
- Committee or meeting attendance
- Leadership engagement
- At-risk/safe behaviors
- Area observations/walkarounds
- Off-the-job safety

#### Examples – Operational

- Risk assessment
  - Number of assessments conducted per plan
  - Percent of assessments completed per plan
  - Ratio between/among levels of risk identified
  - Risk scoring completion
  - Number of risks communicated
  - Number of risks mitigated
  - Residual risk percentage
  - Preventative/corrective actions
  - Equipment and preventative maintenance
- Compliance
- Prevention through design
- Training
- Management of change

#### Examples – Systemic

- Hazard identification and recognition
  - Number of near miss reports
  - Number of unsafe/safe behaviors/conditions reports
  - Number of reports per inspection
  - Number of reports per employee or per time period
  - Number or percent of previously unknown hazards
  - Ratio of safe to unsafe observations
  - Number of employees trained in hazard identificatio
- Perception surveys

- Communication
- Recognition, discipline, and reinforcement
- Audits and assessments

#### Conclusion

Across two years and hundreds of discussions, surveys, workgroups, panels, and interviews, the Campbell Institute has come to understand that for all the complexities surrounding leading indicators, what is needed more than anything is a clear and consistent vocabulary, taxonomy, and framework for proactive metrics. It is only when everyone is speaking the same language that organizations will truly be able to innovate with leading indicators and use them to their fullest potential.

We've all seen the typical curve of lagging indicator performance – an exponentially decaying line toward zero that never quite gets there. If we continue to use the same metrics, we can expect the same results. In a famous ancedote, Nobel Laureate Kenneth Arrow shared his experience as a weather forecaster during World War II. Fed up with the poor quality of the reports he was asked to generate, Arrow wrote a letter to military brass. The response he received: "The Commanding General is well aware the forecasts are no good. However, he needs them for planning purposes." In many ways, this is where we find ourselves as EHS practitioners, relaying the same data to our leadership with no hope of true improvement.

With a common understanding and a renewed focus on best practice sharing and implementation, the Campbell Institute believes that we can – finally – begin to truly know which way the wind blows for our organizations.

# 12. Defining World-Class EHS: An Analysis of Leading EHS Management System Practices of Robert W. Campbell Award Winners

John Dony, Laura Fiffick, Sarah Kerper

#### Executive summary

The Robert W. Campbell Award, the most prestigious award in Environmental, Health and Safety (EHS) worldwide, recognizes organizations that achieve business excellence through the integration of environmental, health and safety management in business operations. Winners of the Award demonstrate that a well-integrated EHS Management System (EHSMS) leads to success, not only in EHS practices, but in business practices as well.

In order to be selected for the Award, an organization must show consistent improvement or sustained leading performance in EHS for a minimum of five years using performance measurements that are recognized throughout industry. In addition, an organization must demonstrate a minimum of five years of sustained sound financial management. At the time of this research, there have been 10 Campbell Award winners to date, with the most recent Award winner being UTC Fire & Security, selected in 2011.

The Campbell Institute (Institute) is the EHS Center of Excellence at the National Safety Council. A natural progression of the Robert W. Campbell Award, the Institute is built on the belief that EHS is at the core of business vitality and intrinsic to operational excellence and financial performance. The Institute helps organizations of all sizes and sectors achieve and sustain excellence.

In the fall of 2012, members of the Campbell Institute Research & Knowledge subcommittee conducted a comparative analysis of the 10 Campbell Award-winning applications in order to determine best practices of leading organizations in EHS. The comparisons made are based on the

structure of the original award criteria, including sections on leadership, integrated EHS management system, performance measurement, the linkage between EHS and business performance, and other factors, with a focus on corporate citizenship and off-the-job initiatives.

At a high level, the research found:

- Excellence in EHS hinges upon the ability of individuals throughout an
  organization from the CEO to frontline employees to contribute to
  building and sustaining an organizational culture that places EHS on
  par with business performance.
- Organizations that have successfully utilized a systems based approach to EHS management have done so by adopting and adapting existing industry standards and international guidelines to ensure that EHS is seamlessly integrated across all business functions, structures, and geographies, including consideration of contractors. World-class EHS organizations also integrate their systems across environment, health and safety, and in many cases, quality, security, and sustainability.
- Organizations with world-class EHS records rely on a combination of leading and lagging indicators to promote and monitor continuous improvement activities of EHS management systems.
- Regardless of the complexities and uncertainty of running a successful business, EHS remains firmly aligned with other organizational objectives, strategics, and values.
- In addition to striving for EHS excellence on the job, world-class organizations extend their efforts to promote the health and safety of their employees off-site, as well as investing resources in the surrounding communities and environment. Off-the-job initiatives and corporate citizenship are supported through the sponsorship of programs and events, volunteering, community outreach, and improving global issues.

Any organization can implement an EHSMS based on a variety of voluntary standards such as ISO 14001 or OSHAS 18001. However, these results indicate that not only are Campbell Award-winning organizations able to implement a successful EHSMS, but the EHSMS is implemented in a manner that specifically focuses on leadership, risk and impact reduction, and performance measurement. The Campbell Award winning organizations also design their EHSMS in a manner that is unique and tailored to their organization, with a goal of continuous improvement. Ultimately, the EHSMS of a Campbell Award winner makes a meaningful difference in the way their business performs, the lives of their employees, the communities that surround them and the environment.

From these findings, other organizations can evaluate their own EHS management strategies and compare them against those that are considered "best in class."

#### About the Campbell Award

Established in 2004 and supported by a network of 22 Global Partners across five continents, the international Robert W. Campbell Award (Campbell Award) recognizes organizations that achieve excellence through the integration of EHS management in business operations. The award is named after the first President of NSC, a noted safety pioneer who believed that the success of the safety movement would depend on educating engineers, top executives and the general public on the business benefits of EHS.

To uphold his legacy, the Award honors measureable excellence in the triple bottom line of people, planet, and profit. Utilizing a rigorous, evidence-based review process, the Campbell Award identifies and shares critical knowledge that enables current and future business leaders to enhance and sustain organizational vitality by embracing the intrinsic value of EHS. The Campbell Award honors a business, enterprise or entity that employs a management system in which EHS is well-integrated and recognized as a key business value.

The submitting organization must:

- Demonstrate that a well-integrated EHSMS leads to proven success in EHS practices and enhances the business's productivity.
- Show consistent improvement or sustained leading performance in EHS for a minimum of five years.

- Performance measurements must be established through recognized industry, national and/or international metrics.
- Show sustained, sound financial management, including at least five consecutive years of profitability or outstanding financial performance within relevant industries at the time of Award application; if a company has rated public debt, it must carry an investment grade rating.

Submitting organizations fall into two categories based on the number of employees. Organizations compete for the Award within their size category.

- Category I Organizations with more than 1,000 employees and subunits of such organizations.
- Category II Organizations with 1,000 or fewer employees and subunits of such organizations.

Criteria for both size categories are identical, however, each submittal is judged only against those in its size category. Once past the initial screening process, each submittal is evaluated during the Independent Review stage by at least three members of the International Review Panel. Submittals are judged against each of the evaluation criteria and numeric scores are assigned to each criterion; a minimum acceptable score must be achieved. A limited number of submittals advance to the Executive Review stage where finalists are selected by the Executive Review Committee for an onsite assessment visit. Onsite assessments are conducted at the finalists' headquarters and at least one operations site. Through an analysis and consensus process, a combined score is determined based on the submittal and the onsite visit results. This score determines the Robert W. Campbell Award winner.

# Background and method

This report presents the results of a comparative analysis of 10 Campbell Award-winning applications.

The Campbell Award recognizes organizations that achieve excellence through the integration of EHS management in business operations. The

Award application and selection process is rigorous, and includes a thorough review by an international panel of experts. Finalists for the Award receive an onsite assessment of their headquarters and operations, which is conducted by an experienced team of EHS auditors.

The main purpose of this research is to describe the experiences of leading organizations in achieving success by protecting their workers, eliminating health hazards, improving the environment and conserving energy and other natural resources while striving to improve business performance and increase profitability. Illustrations of such efforts are highlighted throughout the report, drawing attention not only to the organizations' concrete EHS initiatives but also, whenever possible, to their impact.

The 10 applications were submitted to compete for the Award during the eight-year period from 2004 to 2011. All of the applications describe the organizations' more recent EHS achievements and some cover decades of continuous improvement efforts, but the winners commemorate the roots and the traditions of EHS that go back generations. Furthermore, the Award winners vary a great deal in terms of many important characteristics – industry affiliation, business geographic location, company size, corporate structure, business systems, EHS organization, labor and community relations, etc. – thus creating a holistic perspective on EHS management.

In spite of their organizational and industry differences, the applications share many common traits which make them fairly comparable and enable an interesting and thoughtful review of leading EHS programs.

Data collection and analysis of these applications was completed in the fall 2012. The research design used a combination of illustrative, interpretive, and cumulative methods commonly applied in case study and multiple case study evaluations (GAO, 1990; Yin, 1989). Initially, each Award application was reviewed and analyzed separately by members of the research team. The research team included the 2011 Campbell Award Winner, United Technology Corporation; a member of the Campbell Institute Expert Portal/World Class Team Sub-Committee, General Motors; and staff of NSC and the Institute. The Expert Portal/World Class Team advises the NSC, as well as the Institute, on leading EHS systems and practices.

Information from the individual research was then consolidated, combined and examined as a whole. The themes that were designated based on the Award criteria and new themes that emerged guided further analyses. Considering (a) the qualitative nature of the research design, (b) the complexity of the issues in question, and (c) the use of Award materials as a single source of evidence, it is not advisable to make broad generalizations based on the EHS efforts of the 10 Award winners. Also, this research did not aim to capture the entire spectrum of industry standards, corporate policies, or local practices addressing EHS performance. Nonetheless, organizations with an interest in evaluating their own EHS management strategies and comparing them against those that are considered "best in class" will find this report useful.

## Principal research findings

## Leadership

Leadership is the first among the evaluation criteria of the Campbell Award. The emphasis is on the ability to exert positive influence through words and actions in order to change peoples' beliefs, attitudes, knowledge, and behavior regarding workplace safety, employee health, and environmental protection. Senior executives are expected to inspire, build, and uphold a strong organizational culture of EHS values and practices among others, but they also need to portray their own commitment to EHS by showing how management style and systems are aligned with EHS ideals and how EHS standards for leaders compare to those of other employee levels.

The 10 Campbell Award winners exemplify leadership in a variety of ways, but with common key components. These components include the following:

- Personal commitment of the CEO
- Robust and comprehensive training that equips EHS leaders, managers, and future executives
- Performance plans and associated metrics that are designed to promote EHS as a culture
- The empowerment of every employee to be a leader in EHS

These concepts are outlined below with specific examples from Campbell Award-winning applications.

Regardless of the corporate structure, EHS responsibilities must reside at the highest level within an organization. Campbell Award winners designate the Chairman, CEO and/or a C-suite executive as accountable for EHS.

Johnson & Johnson's Office of the Chairman, the highest executive level within the organization, is accountable for and committed to EHS. The Board of Directors, through its Public Policy Advisory Committee, oversees the public health programs, geared towards employee and community environmental health and safety.

Similarly, Dow Chemical's corporate EHS goals are determined by the corporate sustainability team, which is co-chaired by the Executive Vice President for Business Services and Chief Sustainability Officer. Supported by the corporate policy, assessments of the effectiveness of EHS initiatives and other matters related to corporate social responsibility fall under the purview of the EHS committee of the corporate Board of Directors.

At Alcan, the Board of Directors has an EHS Committee that is responsible for reviewing EHS objectives set by the organization. The leader of EHS programs is the vice-president of EHS and sustainability, and reports directly to the CEO.

Many of the Award winners explicitly state and exemplify that effective EHS leadership begins with a personal commitment to the organizational values of integrity, accountability, trust, and transparency. What the CEO says and does cascades throughout the organization and sets the tone for everyone else. Additionally, major business decisions by management teams set an example through consideration of EHS.

When the current corporate EHS policy was rolled out in 2002, Alcan's then President and CEO and other senior executives signed a formal commitment to make EHS an integral part of every job, program and process, to fulfill their EHS obligations, and to establish the EHS framework. The EHS Policy (EHS FIRST) was promoted by senior leaders and used as the foundation to actively and visibly promote and drive EHS excellence at work and in the community. The subsequent CEO assumed a similar allegiance to EHS FIRST, and worked to continue to demonstrate that EHS is part of the Alcan culture. Today, the organization's senior leaders also participate in management EHS observation tours and hierarchical safety inspections.

Dow Chemical's due diligence review seeks to identify significant EHS issues, such as injury and illness rates, environmental emissions, and environmental liabilities. The decision to purchase a company is affected by the results of this due diligence review. Another example of this is Dow's "Safety First, Pounds Second" policy. During the annual capital authorization process, EHS issues that need expenditures for resolution are given the highest priority.

Successful implementation of EHS programs and initiatives requires and depends on having competent managers whose role is translating the CEO's vision and corporate mission into actionable steps. Campbell Award winners invest a great deal of effort and resources into providing managers and supervisors with the knowledge and skills they need to perform their duties.

At Alcan, site managers are responsible for assessing training needs and associated EHS performance of their staff. Accordingly, the Leadership Competency Program offered at the corporate level covers three areas: strategic leadership training, site leadership training and strategic partner training. These training programs are designed to empower managers and supervisors in their role as builders of a strong EHS culture. The Leadership Competency Program incorporates elements of peer-to-peer coaching, learning and development opportunities.

Among Campbell Award winners, EHS responsibilities and metrics are integrated into the performance review process for managers and supervisors, which further identifies EHS as a core business driver in line with production and profit.

At Dow Chemical, employees, including senior executives, are required to include a personal EHS goal in their performance plans and metrics. These goals are not set against specific EHS targets such as injury rates, but focus on tasks that are demonstrated to prevent injuries such as completing safety observations and hazard assessment cards. For senior executives, EHS performance is a key factor in determining management compensation, promotions, and job assignments.

Developing EHS leaders with a solid understanding of business operations is as critical as developing business managers who possess strong safety values. Campbell Award winners develop and implement robust training

#### programs for leaders, from the C-suite to the EHS professional, that indoctrinate the leader into the EHS requirements and management system.

The Safety Training Supervisor position established by Noble allows employees on a career advancement path to gain safety experience and also encourages safety professionals to get actively involved in operations management. Nearly half of the Noble staff who has served in this role since 1996 has been promoted to various management positions within the organization. Additionally, in 1998, Noble introduced the Safety Leadership Workshop. This workshop offers leadership and safety training with a customized curriculum for crews. The workshop continues an emphasis on important leadership and safety topics such as communication, decision-making, training, coaching and counseling. The specific topics offered include leadership skills, EHSMS, personality assessments, risk management, liability insurance and claims, observation skills, stress management, behavior based safety, appraisal and coaching, and industrial relations. Since the Workshop was introduced, Noble has recorded a 71% reduction in the total recordable incident rate and an 83% reduction in the lost time incident rate.

The 10 organizations that are the subject of this research clearly show that empowering workers to take control of the EHS aspects of their jobs is critical to building and sustaining a strong organizational culture. Thus, many Campbell Award winners have a right to stop work program.

The notion of worker empowerment was strongly embraced by Fluor Hanford's management and staff and supported by several corporate initiatives. The Union Safety Representative Program assigned EHS representatives to major projects in order to create an open communication channel and facilitate the identification and resolution of EHS concerns. Fluor Hanford, an organization of about 3,600 permanent staff and contractors, also established 50 Employee Zero Accident Councils. These Councils operated under a charter and were responsible for proactively working together on safety concerns and opportunities for improvement. Moreover, the Worker Safety and Health Program Description included a comprehensive list of guaranteed rights for employees, including job planning, hazard analysis, pre-project safety briefing, post-project feedback and stop work responsibilities. Fluor Hanford's Stop Work policy was noteworthy because it called for getting the employees involved, not only in identifying hazardous conditions, but also in finding ways to eliminate them.

One of the most important demonstrations of EHS leadership is actively encouraging and supporting a strong EHS culture. Campbell Award-winning companies facilitate this culture through a variety of mechanisms, but they also gauge the culture by conducting employee perception surveys focused on EHS.

10 DM Petroleum Operations employees have been trained and serve as Special Government Employees (SGE) in support of the OSHA Voluntary Protection Program (VPP), which involves mentoring other organizations interested in joining the VPP program. The seemingly small number of trained SGEs is not insignificant, considering that the organization has a total of about 300 employees. DM also strategically allocates funding to support employee professional development through attending and presenting at EHS conferences, symposia, training workshops, and similar events. In the annual employee satisfaction survey conducted by an independent research firm, approximately 95% of employees said that DM was a safe place to work and most employees believed in management's commitment, particularly in the area of EHS. The employee survey is yet another example of leadership commitment creating a culture of inclusiveness, transparency, and accountability. The results of the survey are incorporated into the strategic planning process, ensuring that employee concerns are considered.

#### Leadership - summary

This comparative analysis of the Campbell Award winning applications demonstrates that EHS leadership is universally understood to apply to everyone within an organization who has a personal stake in addressing the EHS challenges facing that organization. Some EHS leaders occupy executive offices and hold a global perspective on EHS. Their personal vision and commitment serve as the basis for articulating corporate EHS policies, which in turn guide the development and implementation of EHS practices that are meant to be undertaken at the local level. Other, less visible EHS leaders work on or near the assembly line and their leadership qualities shine through in their contribution to hazard recognition, communication, peerto-peer education and creative problem solving. No matter the job grade level, it is the individual skills, knowledge, attitude, actions, and ability to inspire and influence the actions of others that define true leaders in EHS.

## Integrated EHS management system

Integrated EHS Management System is the second category of evaluation criteria for the Award. A typical EHSMS is designed around a continuous improvement cycle – plan, do, check, act – that encourages organizations to start by identifying concerns, setting clear and measureable goals and establishing and communicating a plan of action. This is followed by translating plans into action, assessing what is and what is not working as intended, concentrating on areas in need of improvement, and starting a new cycle either by setting more challenging goals or by expanding the scope of the entire effort.

A number of voluntary frameworks for implementing safety and health management systems have been established, including the Occupational Health and Safety Assessment Series of the British Standards Institute (OHSAS 18001) and the Occupational Health and Safety Management Systems standard of the American National Standards Institute and American Industrial Hygiene Association (ANSI/AIHA Z10). In the United States, the Voluntary Protection Program of the Occupational Safety & Health Administration as well as the National Safety Council also strongly supports effective occupational safety and health management systems. The International Organization for Standardization based in Switzerland has published a set of standards for adopting environmental management systems (ISO 14001), as well as quality management systems (ISO 9001). The EHSMS design among virtually all Campbell Award winners incorporates the elements of one or more of these guidelines with an emphasis on leadership commitment, employee participation, communication, hazard recognition and control, workplace design, implementation and operation, performance measurement, and training. Most of the Award winners also seek third party verification of voluntary standards.

A successful EHSMS depends largely on the assimilation of system elements into a process of continuous improvement that is integrated into the daily performance of the organization. Management is one of the most significant contributors to this implementation: by clearly defining the EHS policy and objectives, ensuring periodic reviews of the system, securing sufficient resources, and holding managers and supervisors accountable for EHS training and practice, they ensure the successful execution of integration activities. An important component of this active leadership is promoting a high level of communication about EHS throughout all levels of the organization. As a result of this open dialogue, employees involved with the EHSMS should feel empowered and benefit from performance improvements, thereby increasing acceptance and support of policies. Employees who are engaged in EHS efforts may derive more out of competency and skill development activities, which can have a positive impact on on- and off-the-job EHS activities.

The interpersonal processes involved in the integration of the EHSMS must coincide with more formal procedures that assess EHS performance. In addition to accurate documentation for measuring continuous improvement, assessments and audits can objectively evaluate compliance with and any gaps in policies and procedures. Furthermore, a continuous process of identification, analysis, planning, and evaluation is expected for the reduction of risks and hazard control. Workplace design and engineering can also contribute to the prevention of workplace risks, environmental impacts, and associated hazards. Lastly, an EHSMS can help meet compliance with regulatory standards across sites, both nationally and internationally, by implementing programs and tracking changes involved in the revision of EHS information, practices and procedures.

Integrated and robust management systems, focused on continuous improvement, are the foundation of Campbell Award winners. Campbell Award-winning organizations provide excellent EHSMS models that are utilized to guide the process of overall EHS planning, strategic development and alignment, communication, decision making, information management, program implementation, and evaluation. Many Campbell Awardwinning companies utilize and are certified by the above-referenced international standards. Key elements of Campbell Award-winning organizations' integrated EHSMS include:

- Management that demonstrates a strong commitment and remains heavily involved in the EHSMS
- Integration of EHSMS components, not only across EHS procedures and policies, but also in business operational systems
- A robust audit program in place to identify system successes and weakness, with an external verification function
- An EHSMS in which cultural challenges are anticipated and solutions are incorporated
- Substantial consideration of contractors, suppliers and vendors in the EHSMS

These concepts are outlined below with specific examples from Campbell Award-winning applications.

As stated in the Campbell Award submission guidelines, organizational management must demonstrate a strong, genuine, continuous, and personal commitment to the EHSMS and its elements. These responsibilities are generally assigned to an individual, who is supported by a cross functional team.

At BAPCO, the leadership and direction for the EHSMS is provided by the Industrial Safety Committee, which is chaired by the Deputy Chief Executive and includes all corporate division managers. Since 1983, members of the Committee have been meeting monthly to ensure the successful implementation and sustainability of the corporate EHSMS and programs.

Corporate EHS improvement initiatives, supported by an EHSMS, require strong leadership commitment from all organizational levels, particularly in organizations with a global presence. EHSMS initiatives at Johnson & Johnson (more than 100,000 employees in 57 countries) are typically assigned a member of the corporate Executive Committee who serves as a Worldwide Champion for the program. Worldwide Champions are expected to be actively involved in leading, motivating, and monitoring the initiative in a highly visible way.

One significant accomplishment shared by Campbell Award winners is the extent to which they have been able to superimpose and integrate EHS with their business structure and operating procedures, as well as integration of all EHSMS. This includes everything from business strategy development to metric tracking and reporting.

DM Petroleum Operations has succeeded in aligning EHS planning with budget development to ensure that EHS initiatives have access to resources whenever necessary. All new projects competing for funding are rated and prioritized, with EHS projects placed at the top of the list. Business expansion proposals typically include an estimate of environmental impact, regulatory requirements, and other EHS-related factors. In addition, DM is the only federal government prime contractor to have received the prestigious Malcolm Baldrige Quality Award (2005), perhaps the highest honor for quality and business performance excellence. As a result of the adoption of a Baldrige-based business management model married with an ISO 14001-based EHSMS, and the OSHA Voluntary Protection Program, DM continuously improves their EHSMS performance. The management team is certain that these management systems complement and support each other, leading to world-class business performance.

Noble's EHSMS integrates policies and procedures including: corporate policy development and implementation, compliance with regulatory and client requirements, goal setting, performance measurement and continuous improvement. Their corporate policy, for example, is supported by local EHS Management System procedures and documentation.

At Schneider Electric North America, the corporate production system's purpose is to standardize the manufacturing process across all work sites and locations. It is also being used to integrate business, safety and environmental processes. The system currently combines elements of Lean Manufacturing, Short Interval Management, Six Sigma, Process Architecture, Process Engineering and Logistics. At the date of their application, Schneider Electric was working to integrate quality (ISO 9000), environment (ISO 14001-2004), and safety (OHSAS 18001-2007) management components into a single system so that all three processes are treated equally.

Dow Chemical's Operating Discipline Management System (ODMS) integrates policies and requirements for Manufacturing, Quality, Environment and Health & Safety. The ODMS also ensures that the components of the management system are implemented consistently across the

organization, as well as outlining requirements and procedures around community awareness, emergency preparedness and response, distribution safety, process safety, security and product stewardship.

GPIC provides another example of a fully integrated EHSMS that combines safety and health with environmental and quality components. As a result, in 2007, the GPIC system met the requirements of a fully integrated management system under the British Standards Institute's Publicly Available Specification PAS 99.

Effective EHS management is impossible without a systems-based approach, but any formal EHSMS will itself become a liability if its design does not include a robust audit process. Most Campbell Award winners seek third party verification of their integrated management systems and/or utilize external auditors to ensure the EHSMS is high-functioning and continuously providing organizational value.

Alcan carries out regular assessments of its EHSMS by requiring each site to conduct a comprehensive audit at least once every three years. As a result of the audit, non-conformances are identified and investigated, and corrective action is implemented. The results of these audits are reported to the business unit and ultimately up to senior management. The lessons learned from these assessments are used to continuously improve the EHSMS and to help develop a strategic plan for the following five years.

At Schneider Electric North America, there are four major audit processes, including a team assessment, a scorecard, a critical focus checklist and a safety diagnostic. The team assessment process is an integrated and comprehensive three day audit conducted every three years by a team of EHS professionals. The scope of the audit includes safety, security, health, wellness and environmental issues. Each audit assigns the facility a score of one to 100. Improvement goals are established based on the score and weaknesses identified.

Operating worldwide in both well-established and emerging markets generates its own distinct business challenges, such as language and cultural barriers, political instability, corruption and transparency issues, poverty, disease and human rights violations. Campbell Award winners actively recognize, incorporate and address these challenges throughout their EHSMS.
Alcan's uniform EHS policy and management system serve as a common denominator for instilling a culture of EHS excellence, integrity and collaboration among approximately 65,000 employees from 59 countries around the globe. The EHSMS, EHS FIRST, addresses business challenges on a global scale that have potential to affect both the company and its employees. Specifically, to accommodate language barriers that may have arisen due to Alcan's expansive and diverse sites, the company made available EHS FIRST manuals in English, French and several other languages in an online version, so managers and EHS specialists at every Alcan site would be able to fully comprehend the structure of its management system. Another example of this global approach involves Alcan's response to the Avian Flu pandemic. In response to the threat of disease, the company rolled out a Medical Preparedness and Crisis Plan for the entire organization, proactively protecting its employees and relations with others. This mindset paves the way for world-class EHS performance by applying the same high standards across the board, regardless of how little local law or regulation may demand.

Steady leadership from top-level executives is often necessary to build and sustain an effective system for strategic EHS management. Dow Chemical has created an orientation process for new business leaders to demonstrate the importance of EHS issues to the organization. When an executive takes on a new leadership role, the orientation process ensures that the individual is aware of the pertinent EHS process, safety, sustainability issues and opportunities for the business within the context of prior decisions and commitments. Following the orientation these new business leaders are required to make a presentation (following a checklist of items to cover) to senior EHS leaders to review their findings from the orientation and discuss any concerns or issues. New plant leaders also perform a similar safety orientation and review. In addition to consistency in EHS leadership, Dow also makes a minimum set of EHS standards applicable to sites in any geographical setting and meets the principles of Responsible Care. Standards are adaptable and are implemented according to stringency of local regulations; however, the Dow EHS core standards such as ensuring standard care at all Dow plants across the globe are continuously applied. Due to the reliability of such standards, Dow has joined forces with various

international establishments, including the United Nations Environment Program and China's Ministry of Environmental Protection, to help implement the company's principles of care in countries throughout the world.

Integrating the EHS performance of contractors, suppliers, and vendors into the corporate EHSMS is a final key area that has received close attention among Campbell Award winners.

UTCFS identifies and selects contractors that excel in business and operational practices, as well as environmental stewardship. The standard practice for contractor management includes a risk assessment of the work to be performed, communication of adequate controls and inspections to ensure those controls are in place. UTCFS EHS training and audit practices are also extended to UTCFS contractors worldwide, as UTCFS believes that contractor performance is tied directly to customer satisfaction. The supply chain at UTCFS is also integrated into the EHSMS. For example, key suppliers are audited to the same EHS requirements as UTCFS sites. Selected suppliers are required to conduct an initial self-assessment, which is evaluated on-site by UTCFS assessors. Each supplier must meet UTCFS expectations within 18 months of conducting the self-assessment. At that time, the supplier can be nominated for the UTCFS preferred supplier program (about 160 preferred suppliers worldwide).

At GPIC, contractors are included in employee engagement activities, as well as community events. On an annual basis, GPIC hosts an EHS week and family evening. Not only are GPIC employees and their families invited to attend and participate in EHS week, invitations are also extended to GPIC contractors and their families. The EHS week includes painting and children's essays, but also provides the opportunity for contractors to set up demonstrations and exhibitions. GPIC uses the EHS week as an opportunity to demonstrate to contractors their commitment to EHS, while expanding community engagement opportunities.

#### Integrated EHS management system - summary

The comparative analysis of the Campbell Award-winning applications indicates that these organizations have seamlessly integrated elements of

their EHSMS into the daily performance of their operations. In addition to meeting regulatory and voluntary standards and guidelines, the assimilation of EHSMS across all business functions is supplemented by the high visibility of management involvement with and implementation of all aspects of EHS, the organization's treatment of cultural issues, utilization of external audits to ensure superior functioning and value, and attention to the EHS of all company contractors, vendors and other partners. Ultimately, the finesse in which these elements are integrated within the EHSMS enhances its cycle of continuous improvement and substantially contributes to organizations' abilities to address head-on the business challenges they encounter on a day-to-day basis.

### Performance measurements

As reflected in two evaluation criteria of the Campbell Award, measuring EHS performance and using EHS-related information linked directly to business operations receive a great deal of visibility and resources among Campbell Award winners. In the Award criteria, emphasis is placed on the intersection of EHS performance with business excellence, and while the complementary use of both leading and lagging indicators is suggested, the importance and quality of leading indicators is highlighted.

In order to successfully utilize and analyze these measures, data collection and reporting methods must be accurate. The information generated from the performance indicators should be meaningful, usable, and most importantly, easily accessible by all personnel throughout levels of the organization. If the measures tracked globally by the organization meet this criteria, they can then be used to benchmark against other organizations' data and ultimately showcase how EHS affects the triple bottom line by improving not only the organization itself, but communities and the environment as well.

Campbell Winners are consistent across many key components of performance measurement, including:

• Identification, accurate measurement, and tracking of both leading and lagging indicators in order to not only reduce risks and impacts, but to improve the overall EHSMS

- Benchmarking against other company-owned facilities, as well as with other organizations that lead with EHS, both within and across industries
- Undertaking in-depth studies on EHS issues of concern, which can lead to a better understanding of EHS risks and their associated metrics
- Building on EHS to achieve sustainability

These concepts are outlined below with specific examples from Campbell Award-winning applications.

As part of their commitment to continuous EHS improvement, all Campbell Award winners, with no exception, track both leading and lagging indicators to assess the quality and impact of EHSMS and programs. Leading indicators are used because of their power to predict and prevent undesirable events. Additionally, Campbell Award winners utilize their indicators to benchmark against their industry, as well as leaders in EHS across the globe.

Noble uses a combination of leading and lagging performance indicators to establish baselines, track performance and identify trends and opportunities. Additional measurements include audits and Job Safety Analyses (JSA) of specific tasks. As one result of tracking leading indicators, Noble's EHS staff identified hand and finger injuries as an area for improvement and implemented a pilot program intended to eliminate this type of injury. The pilot was so successful that a formal policy was put into effect for the entire organization.

BAPCO's EHS Key Performance Indicators (KPI) emerge from the corporate mission, vision and strategic objectives and include both leading and lagging indicators to measure and highlight the strengths and weak-nesses of the company-wide EHS management practices. BAPCO refers to their leading indicators as "proactive." A proprietary data management system is in place to track performance metrics related to the quality of accident investigation reports, adherence to personal protective equipment procedures and frequency and quality of safety inspections, safety meetings and follow-up actions. The "reactive" EHS performance is measured using the traditional lagging EHS metrics (e.g., injury/illness rates, lost days of work, environmental violations, and other similar losses). BAPCO utilizes inter-

nationally accepted standards to enable benchmarking with other refineries around the world.

The above-mentioned lagging and leading indicators are consistent with those tracked by many Campbell Award-winning organizations and are merely a sample of a diverse spectrum of metrics.

Using leading and lagging indicators to track EHS performance is essential for an EHSMS focused on continuous improvement. Equally important is setting, measuring and benchmarking EHS goals to learn from others and drive continuous improvements. Additionally, many Campbell Award winners proactively identify and study areas that will allow for more effective EHS programs and associated metrics, that reduce EHS risks.

Schneider Electric North America, for example, uses a safety and environmental scorecard to report and track progress in six categories, including Management Committee, Employee Training and Awareness, Employee Involvement, Communication and Recognition, ISO 14001/OSHAS 18001 implementation and MIR/LTA/Excursions. The scorecard is used to not only monitor improvement but also to benchmark facilities against each other. The benchmarking process is used to identify best practices from leading facilities and share these best practices in order to improve across the entire organization.

At BAPCO, studies on air quality, soil and groundwater and the marine environment have been conducted. For example, air dispersion modeling studies have determined the potential impact of refinery operations on the environment. In collaboration with university researchers, BAPCO also seeks to understand the trends in the ecosystem through regular marine studies. The organization uses both sources of this vital information to continuously improve the EHS goals that are set, as well as the associated metrics that are used to determine continuous improvement.

Most Campbell Award winners not only strive for continuous improvement in their performance indicators, but in sustainability as well. Many Campbell Award winners utilize both their EHSMS and their performance indicators to set and achieve sustainability goals.

When their 2015 Sustainability Goals were announced in 2006, Dow broadened its commitment beyond the traditional EHSMS scope. In setting the goals, Dow considered how the company could use science and technology to make ambitious contributions to stakeholders, to the chemical industry and to the world. The 2015 Sustainability Goals include: Local Protection of Human Health and the Environment, Product Safety Leadership, Sustainable Chemistry, Breakthroughs to World Challenges, Energy Efficiency, Addressing Climate Change and Contributing to Community Success. Dow has made significant improvements as a result. As reported in the Dow Campbell Award application, in 2009, as compared to 2005, the Injury/Illness rate at was 0.29 per 200,000 hours worked - a 40% reduction from 2005 injury rates. In addition, the injury severity rate dropped by 50%. The number of process safety incidents dropped by 50% and the 2009 severe motor-vehicle crash rate of 0.26 per million miles driven was already less than the 2015 goal of 0.28 per million miles driven. For environmental metrics, the number of LOPC incidents was reduced by 65% and transportation LOPCs were reduced by 45%. Absolute greenhouse emissions were reduced every year since 2006 and 2009 emissions were 17% less than 2005 emissions.

#### Performance measurement - Summary

The comparative analysis of the Campbell Award-winning applications reveals that these organizations not only identify, measure, and track a thoughtful and uniformly reported suite of leading and lagging indicators, but utilize these indicators broadly in internal, industry-wide, and crossindustry benchmarking efforts. As a result of these benchmarking efforts and the consistent tracking of progress, Campbell Award winners are able to use the indicators they have developed to meaningfully affect change within their organizations and drive continuous improvement within their EHSMS. At the highest levels of performance, Campbell Award-winning organizations seek to move beyond the traditional focus of an EHSMS and drive sustainability across their organization and industry, with an ultimate goal of improvements for the world at large.

# Linkage between EHS and business performance

The next section of evaluation criteria for the Campbell Award is the linkage between EHS and Business Performance. As a core value of the organization, with management as responsible for EHS performance as they are for business operations, EHS can be fully integrated into and function as a business process. If the entire organization embraces EHS principles that are aligned with corporate objectives and strategies, EHS will then address changes in other organizational functions and, through performance measures, provide feedback on the success or failure of different programs. In essence, the complementary nature between EHS and business performance excellence should ultimately result in improvements in efficiency, productivity, quality, profitability, and in the end, solid financial returns.

Key components in creating a linkage between EHS and business performance for the Campbell Award winners include:

- Using successful business process in the design and implementation of the EHSMS Integration of the EHSMS during the acquisition process, as well as onboarding of new facilities and staff
- Conducting a EHS cost benefit analyses
- Utilizing the EHSMS for operational readiness in unexpected situations

These concepts are outlined below with specific examples from Campbell Award-winning applications.

Campbell Award winners utilize successful business management strategies in order to improve their EHSMS. These strategies can include recognition and rewards for achievement of EHSMS goals, strategic planning and operational reporting, including EHS, and utilization of business efficiency processes to improve EHS results.

At Noble, operations managers are accountable for the financial, operational and safety record of their units. Noble has created a bonus program (5–75% of annual salary) that rewards employees for reaching specific financial and operational targets that improve shareholder value. Safety results carry the highest weight – 50% – in the formula used to calculate bonus payouts, thus demonstrating that working safely is the most impor-

tant action an employee can take to receive recognition for their performance on the job. At the company-wide level, a centralized database accessible to all management personnel is maintained to house information about drilling operations with daily updates on safety-critical events that may affect operational readiness and financial performance (e.g., lost time incidents, recordable incidents, near misses). A database has also been developed to identify hazards by gathering specific information on every job, task and chemical. Employees participate in the data collection and review process in order for them to assist in improvement of work methods. Noble's worldwide weekly conference call includes all business units and always starts with a report on EHS progress. Other agenda items typically include operating results, market opportunities and corporate financial performance. In addition to the conference call, the corporate EHS committee meets quarterly to present results, assess goals and performance and raise concerns. In addition to the Chairman and CEO, senior management from operations, risk management, human resources, engineering and other functions attend committee meetings in recognition of the strategic importance of EHS to Noble's business.

Noble has also employed the Lean Six Sigma process to improve operations, but also to experience improvement in EHS. At the Brazilian operation in 2003, the use of Lean Six Sigma resulted in a 20% reduction in downtime, a 46% reduction in lost-time injuries and a 54% reduction in recordable incidents. Noble reported that the use of Lean Six Sigma not only improves efficiency but also raises employee awareness, which leads to an increased focus on EHS.

Evaluation of potential environmental liabilities is a critical component in the consideration of acquisitions. Campbell Award-winning companies proceed with acquisitions not only after review of liabilities, but after their efficient use of their EHSMS to guide the process. Planning for and integrating the EHSMS is of the highest priority in order to expedite the creation of a cohesive organization, to save lives, prevent injuries and improve the environment.

At UTCFS, the EHSMS is essential in the integration of new acquisitions and the EHS staff always participates, along with legal, human resources and business development staff, among others. The staff and management at the acquired organization quickly learn that EHS is a core business value. The first step in the process is to introduce the EHS Cardinal rules, a set of rules that keep employees, customers, contractors and communities safe. Another key component is measuring EHS performance through Achieving Competitive Excellence (ACE). ACE is a quality and efficiency program that also includes progress on EHS targets. Sites can achieve different levels of certification on EHS metrics, audits scores and implementation of EHSMS. If these

EHS goals are not met, the site cannot advance to the next level regardless of their operational metrics. New acquisitions are introduced to ACE and EHSMS concurrently. New acquisitions also quickly receive

EHS Leadership Training for management. This training exposes management to the corporate EHS philosophy, objectives and the EHSMS. Progress on the EHSMS implementation by the acquisition is evaluated through a gap assessment process. The gap assessment is conducted by a team of EHS professionals and identifies EHSMS gaps, strengths and weaknesses. A year after the gap assessment, and every five years thereafter, a review is conducted and a score is given. UTCFS has improved these scores every year since the first one was conducted in 2005.

The effectiveness of Dow's EHS processes is also demonstrated by the improvements in the performance of acquired companies. In 2001, Dow acquired the Union Carbide Corporation, which was one of the largest chemical companies in the world at the time. In 2009, the injury rate had decreased at one facility by 85%, and Loss of Primary Containment incidents decreased by 64%. In 2009, Dow acquired the Rohm and Haas company, another large chemical company. Following the acquisition, the 2009 injury/illness rate decreased 26% from the 2008 rate to a record low of 0.54 per 200,000 hours worked.

A cost benefit analysis is an important, key business decision-making tool and includes a process for calculating and comparing the benefits and costs of a project, decision or policy. Campbell Award-winning companies also use a cost benefit analysis in making EHS decisions, but it is conducted in a manner to include both hard and soft costs, as well as an emphasis on worker health and safety, innovation, community and competitive advantage. Dow conducted a cost-benefit analysis of the operational and management changes that were made to meet their 2005 EHS goals. The result of the analysis showed that the \$1 billion in improvements to reduce energy usage, wastewater and chemical emissions resulted in an overall value to the company of more than \$5 billion. Additionally, improvements made in process safety, personal safety, environmental releases and transportation incidents produced an additional \$950 million in savings. Between 2005 and 2010, Dow continued to experience savings totaling more than \$4 billion in the areas of energy use, wastewater and chemicals emissions. An additional \$100 million in savings resulted from fewer injuries, LOPCs and process safety incidents. Projects to reduce and reuse waste returned a Net Present Value of more than \$2 billion per year.

In the face of adverse and sometimes unexpected events, such as a natural disaster, an organization's business performance is often determined by the state of and its ability to rely on EHS. Campbell Award-winning companies display operational readiness which allows their business processes to not only continue to function, but respond to crises and thrive in times of uncertainty.

DM Petroleum Operations' response to Hurricanes Katrina and Rita speaks volumes about the organizational culture, the relationship between the management and employees and the ease in which the organization performs in dire situations. Despite the disastrous emergency situation, DM's employees were determined to persevere. It was decided that the corporate operations center would be transferred to a temporary site with Katrina's landfall imminent and, when that community was overwhelmed by evacuees from surrounding areas, the operations center was moved again. The workforce stayed on to keep the sites operational while they were facing their own personal losses. Two weeks later, Hurricane Rita landed on the Gulf Coast, and the operations center had to be relocated for a third time. When the Presidential Order to distribute crude oil to refineries was received, DM was able to start pumping oil five days after being hit by two major hurricanes. Despite the many struggles and damage to facilities, there were no employee injuries or environmental releases during or after these two hurricanes. DM believes these heroic efforts may have been impossible had EHS not been a core corporate value.

### Linkage between EHS and business performance - Summary

The comparative analysis shows that collectively there is a significant relationship between EHS and business performance that is prevalent throughout the 10 Campbell Award-winning applications. Although the nature of running a successful business is complicated and at times problematic, management strategies can be successfully integrated into an organization's EHSMS in order to reflect strategic objectives and organizational values. These strategies can include recognition and rewards for achievement of EHSMS goals, strategic planning and operational reporting, the utilization of efficient business processes to improve EHS results, conducting a cost benefit analysis, using the EHSMS in acquisitions and integrating and utilizing the EHSMS for operational readiness in unexpected situations. As a direct result of the linkage between EHS and business performance, organizations benefit from improvements in efficiency, productivity, quality, profitability and in the end, solid EHS and financial returns.

# Corporate citizenship & off-the-job initiatives

The last common theme to emerge from the comparative analysis of the 10 Campbell Award applications was the organizations' corporate citizenship and involvement in off-the-job EHS initiatives. As important stakeholders in the communities in which they operate, organizations are expected to interact with and contribute to local, regional, national and global communities in regards to EHS issues.

Management should demonstrate a certain degree of social responsibility, encouraging the development of corporate social partnerships throughout the organization and beyond. Similarly, by recognizing the organizations' potential to impact EHS issues externally, programs geared toward advocating EHS off-the-job in the lives of employees and their families should be prominent in their focus on health and wellness. This section highlights the efforts undertaken by Campbell Award-winning organizations in corporate citizenship and off-the-job EHS. Key components of the corporate citizenship and off-the-job programs of the Campbell Award winners include:

- Corporate sponsorship of community programs which return multiple benefits to the organization
- Employee participation in corporate programs, both in terms of volunteer hours and dollars, which solidify the EHSMS culture throughout the organization
- Active partnership with communities on EHS issues which save lives, prevent injuries, and improve the environment in an effective and efficient manner
- The availability of holistic health and wellness programs that are readily accessible and convenient
- Recognition on an individual basis of employees who demonstrate citizenship and off-the-job excellence

These concepts are outlined below with specific examples from Campbell Award-winning applications.

Many of the Campbell Award-winning organizations contribute to community or global programs and events through corporate sponsorship. These programs often flourish through the investments of the organization and the visibility of the sponsors' association with a specific cause.

A prime example of this is BAPCO's long standing history of supporting the development and programs of various community organizations, events and initiatives. From the mid-1930s onward, BAPCO has been a proud supporter of numerous community efforts in the Kingdom of Bahrain involving the welfare of the population. The organization has invested \$5 million in training for Bahraini jobseekers, provided technical assistance by making firefighting equipment available and donated funds to the Bahrain Defense Force hospital. BAPCO's environmental efforts include support of EnviroArabia 2007, a regional conference dedicated to environmental protection issues in the petrochemical industry and becoming a founder of the Regional Clean Sea Organization, a consortium of national oil and shipping companies in the Persian Gulf region. The organization has shown interest and financial support for the advancement of science by investing in and hosting research conferences, exhibitions and symposia. Other examples of corporate sponsorship are geared towards the improvement of EHS issues on a global scale. Dow Chemical's efforts to raise awareness through athletic events are apparent through the organization's support of the Blue Planet Run in 2007 and the Dow Live Earth Run for Water in 2010. Both events were focused on raising funds to bring clean and safe drinking water to people and communities in need. The Dow Live Earth Run for Water was the largest solutions-based initiative in history aimed at solving the global water crisis. Held over the course of 24 hours, the run consisted of a series of 6 km runs/walks, which is the average distance many women and children walk every day to get drinking water.

Corporate donations are not the only noteworthy form of support for the community. Employee contributions – through investments in both time and money – serve to demonstrate the commitment to local efforts that permeates world-class organizations at all levels. In many cases, the internal principles of the organization lead to corporate citizenship efforts.

Nowhere was this truer than at the Fluor Hanford site. By 2008, employees had contributed \$8.7 million, including a 50% corporate match, to the local United Way chapter. In addition, employees contributed more than 2,500 volunteer hours a year to over 20 community projects on their own time. Company representatives also participated in local community interest groups and presented "Safety Minute" messages on a local radio station. All these community involvement efforts combined present evidence of how a corporate partner's time and active participation can be as important as monetary support in a community.

Another example is UTCFS's unique approach to corporate citizenship and active participation throughout the company. Instead of implementing an organization-wide plan, UTCFS takes into consideration the diverse nature of each site and facility by encouraging each business to partner with local organizations that could benefit from their specified resources and abilities. For instance, employees at Kidde de Mexico have donated both their time and toys to the Michou y Mau Foundation in order to help severely burned children. At a Brazilian facility employees volunteer and donate supplies to the Center for Educational Rehabilitation of Vinhedo, an organization that assists physically and mentally disabled adolescents. Finally, employees from Chubb Fire & Security educate young people by leading fire safety demonstrations that help over 60,000 participating Scouts across the United Kingdom earn a Fire Safety Badge.

By applying organization-wide principles to community outreach, organizations can address local EHS issues. Because of the fact that in some regions, organizations may have more resources available to them than those living in the surrounding areas, involving the community with the organization is the most efficient way to promote meaningful partnership.

BAPCO holds an EHS Week every 18 months in order to increase safety awareness among employees, contractors and the surrounding community by providing visitors with informational booklets,DVDs and posters regarding EHS.

GPIC has also devoted considerable resources and taken responsibility for addressing the most relevant environmental issues by developing projects embraced by the GPIC workforce and community residents. The GPIC Charity Garden produces about 14 tons of fruits and vegetables that are donated to charities and families in need. Local students and researchers have been granted access to a garden with a wide variety of herbal and medicinal plant species. A fish farm was erected to replenish dwindling fish reserves in local waters. Lastly, a bird sanctuary, consisting of two man-made islands and artificial ponds, has offered a safe haven for indigenous and migrating birds.

In addition to supporting local communities, some organizations apply resources to creating an impact on a global scale. For example, Johnson and Johnson employees in Vietnam, where motorbikes and bicycles are a main form of transportation, began distributing helmets to their children, which eventually led the organization to sponsor a regional helmet distribution program in collaboration with a non-profit organization. This effort in personal safety led to the distribution of helmets to over 6,000 children in just two years. Johnson and Johnson's global corporate citizenship has also extended to environmental initiatives. The company implemented a recycling program at a Brazilian facility that previously sent over 3,800 tons of manufacturing waste to landfills per year. By viewing the waste as a resource, the facility turned the waste into usable products such as insoles for shoes, brake lining and plastic wood. This ultimately reduced the amount of waste sent to landfills to 20%. Another area of environmental impact for Johnson and Johnson is storm water management and recycling practices. Facilities in the United States and Belgium have been able to significantly reduce the use of pesticides and fertilizers and increase the level of wastewater and rainwater recycling.

UTCFS has taken a similar approach to waste elimination and re-use opportunities. By identifying local companies that can use UTCFS's materials in their products, the organization contributes to regional economic and environmental sustainability. For example, fire hose that is not being utilized at Kidde Brazil is given to a local manufacturer to be transformed into furniture support structures. This scrap material is also recycled into industrial netting by facilities in other parts of the world. In addition, Chubb Fire in the United Kingdom takes back any brand of fire extinguishers from their customers to recycle and reuse the parts in refurbishing extinguishers at another location.

Similar to their holistic approach to corporate citizenship, Campbell Award-winning organizations realize their responsibility for extending EHS beyond the workplace. In the assessment of the 10 Award applications, it was found that companies who lead in EHS excellence do so both on and, just as importantly, off the job. By implementing programs that highlight ways employees can engage in safe and healthy lifestyles in all aspects of their lives, Campbell Award winners promote another side of corporate citizenship.

Fluor Hanford's continuous approach to EHS is evident in their Safety Matters 24/7 and Safe Decisions for Life programs. Safety Matters 24/7 is an online mechanism for employees to share their safety concerns and solutions, providing a forum for discussion and a resource for increasing the visibility of issues related to off-the-job safety. Safe Decisions for Life, meanwhile, focuses on hand safety and fall prevention at both work and home, emphasizing the ease with which employees can apply safety guidelines outside of work.

Another commonality among Campbell Award applicants and their offthe-job initiatives is the provision of programs targeted at improving health and wellness. Employee wellness promotion has long been known to produce tangible benefits through improved worker productivity, decreased absenteeism and lower costs associated with lost time, as well as through increased job satisfaction, improved employee morale and lower turnover. In other words, companies' stakes in their employees' health can result in positive outcomes for all parties involved.

Johnson & Johnson's CareConnect program aims to promote healthy lifestyles by providing a multitude of resources for their employees. The program focuses on fitness, weight loss, nutrition, cholesterol reduction, blood pressure management, smoking cessation, mental health and cancer prevention by providing employees with access to health professionals, online resources and preventative screening. Such a multi-faceted program offers convenience that encourages its use and applicability across all levels of the workforce.

Another winning company that illustrates this mindset in particular is Dow Chemical. The Dow Health Strategy recognizes that investing in the health of the Dow workforce is essential to the long-term sustainability of the company. Dow has a Healthy Workplace Index in place to measure performance and to ensure that sites worldwide are providing resources for employees to maintain a healthy lifestyle. This includes smoking cessation support and exercise programs, healthy nutrition habits and food choices, case management following injuries or illnesses, reducing hazards in the workplace, stress management, and medical surveillance examinations and health surveillance and screening exams.

Having an employee recognition program in place goes a long way in reinforcing the importance of off-the-job safety in the minds of employees. Additionally, recognition programs can increase the visibility of safe actions and highlight organizational standards that are embraced beyond the workplace.

Fluor Hanford's Heroic and Life-Saving Awards recognized employees who were identified as good Samaritans by saving lives on and off the job. In conjunction with "Spot Awards" given to employees, who displayed safe practices on the job, these awards served to raise awareness, support and commitment to safety 24 hours a day, 7 days a week and 365 days a year.

#### Corporate citizenship & off-the-job initiatives - summary

The comparative analysis of the 10 Campbell Award applicants demonstrates that corporate citizenship and attention to off-the-job issues are important attributes of organizations that excel in EHS. By extending resources, not only to their employees outside of the workplace, but also to communities both near and far, and by accepting responsibility for improving the quality of EHS in the world at large, these companies' actions exceedingly surpass expectations of external organizational involvement. The organizations' approaches to investment in and promotion of worthwhile causes, company-wide volunteering of employees throughout all levels of the organization, nurturing of corporate social partnerships and application of off-the-job programs, company-wide standards and employee recognition serve to illustrate the dynamic relationship between the implementation of EHS initiatives beyond the scope of the workplace and the benefits seen by the organizations. In the end, these benefits are wide-ranging and include gains at the bottom line, as well as improvements for the people and places that are actively involved in the outreach efforts.

### Conclusion

Campbell Institute researchers conducted content review of the applications and highlighted some of the common themes as well as the unique practices among Campbell Award winners in a way that is aimed at enabling EHS and business leaders and other interested parties to leverage the experience, knowledge, and practical tools developed by those considered "the best of the best" in EHS. The overarching objective of this research was the identification, dissemination and, ultimately, broad-based adoption of best practices in EHS management. The Institute's hope is that the research will inform the EHS and business decisions thousands of small and large employers around the globe make every day, impacting millions of employees on- and off-the-job.

The research set out to identify what can be gleaned from the collective experience of these organizations in pursing EHS excellence with an empha-

sis on supporting theoretical principles with real-life examples and evidence of achievement linked to measureable performance outcomes and associated risk reduction. The results of the study show that Campbell Award winning companies integrate their EHS and business management systems, with a particular focus on leadership, risk and impact reduction, performance measurement, and continuous improvement.

This research reflects five areas that the Institute believes are critical to organizations of all types who wish to achieve world-class performance and create healthy and high-performing workplaces and workforces worldwide. These statements also represent areas in which much more research regarding EHS is urgently needed – Leadership, Management Systems, Performance Measurement, Links and Impact on Business Performance, and Corporate Citizenship. By synthesizing the lessons learned from this study, the Campbell Institute is poised to continue pursuing scientific inquiry on these essential EHS topics.

Moving forward, the Institute will undertake – and encourages further global research on – the issues addressed in this paper. There is a broad need for more rigorous research methods applied at the individual, organizational, and systems level; an approach that combines multiple disciplines to arrive at a shared understanding of some of the key concepts in EHS (e.g., organizational safety culture and climate, impact of corporate EHS practices on community); and participatory research incorporating input from many stakeholders (e.g., industry, government, non-governmental organizations, academia, community members).

The Institute looks forward to collaborating with organizations worldwide to drive this and other leading practice research in the future.

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# 13. Building Operating Dexterity

Mei-Li Lin

Operational risks related to workers' safety and health or the environment can significantly impact an organization's financial success. Financial decisions can also create operational opportunities or risks, and the Environmental Health & Safety (EHS) profession can benefit greatly from the lessons learned from the financial world. Leadership attributes that are critical for business successes often are applicable and required when building a sound safety culture. By addressing the four principles of operating discipline – risk sensitivity, the ability to make decisions in real time, and a learning-minded and enabling culture in a very synergistic manner – organizations can achieve optimal levels of alignment and agility, brace themselves for unexpected threats, and take advantage of opportunities that may have otherwise gone unnoticed. Recognizing the interconnectivities of threats and opportunities across the business functions, this brief chapter introduces operating dexterity to look holistically at risks and business sustainability.

### Introduction

In leadership today, most discussions will invariably include the words *"complexity"* and *"change"* – both of which have been challenging leaders for as long as leadership itself has been exercised. Because these topics present themselves in the everyday lives of leaders – and because the speed of change, scale of change, and impact of change require a great deal of diligence, knowledge, and insights – both complexity and change remain at the fore-front of leadership-centered discussions. By addressing the four principles of operating discipline, risk sensitivity, the ability to make decisions in real time, and a learning-minded and enabling culture in a very synergistic manner, organizations can achieve optimal levels of alignment and agility, brace

themselves for unexpected threats, and take advantage of opportunities that may have otherwise gone unnoticed.

*Risk – the uncertainty of meeting objectives* (ISO, 2009) best describes the threats posed by complexity and change in today's business world. In essence, leaders are tasked with optimizing the balance between risk and value in a way that creates and sustains profitability. True to the nature of complexity and change, risks are multi-tier and multidimensional in nature. Internally, leaders face financial risks, strategic risks, and operational risks – all of which interact with external factors such as regulations, currency policies, geopolitical uncertainties, climate change, local context, speed of technological innovations, and so forth. Leaders must keep those risks at bay while optimizing their organizations' operational efficiency and reliability. More importantly, leaders who learn to manage risk well often enhance their ability to cultivate new opportunities and innovate in the ever-shifting competitive landscape.

Consider the financial sector, for example. There, leaders and financial experts make every deliberate effort to mitigate risks in order to secure financial gains. Within the operational space, leaders must also make a deliberate effort to mitigate risks in order to minimize loss and, in turn, optimize operational value. To overcome the challenges presented by internal and external forces, and to effectively navigate risk in the changing operational environment, leaders must inspire individuals within their organizations to be sensitive to the risk dynamics and mindful of the interconnectivity among the various functions, operations, and layers of their organizations.

An operational excellence-minded organization is one in which every individual engages in the quest to strive for higher performance, higher reliability, higher agility, and absolute integrity. To accomplish this, leaders must not only articulate the organization's long-term vision and the ultimate business objectives that every individual in the organization will embrace and own, but they must also chart strategic roadmaps to navigate changes in their operating environments. This requires two fundamental focuses: 1. Alignment and cohesiveness: This ingredient enables the organization to operate as one entity that has a clear sense of purpose. It explains why, as an organization embarks on its operational excellence journey, it will soon realize the need to establish a set of key performance metrics to ensure alignment. Then, the organization must consistently apply systematic, integrated, and methodical measures to relentlessly achieve its collective business objectives. To ensure alignment and cohesiveness, many companies have also developed integrated management systems on how things work, how things interconnect and work together, who is responsible and accountable, and what the expectations are. There is no universal set of elements that a management system should include; rather, those management systems vary depending on an organization's operational focuses and objectives and its progression on the operational excellence journey.

2. The ability to adapt: This ability allows an organization to continue to renew itself, create additional values, and avoid being weakened or broken by the forces of change. This requires the ability to anticipate and use agility to react to internal and external forces and changes. Conklin (2012) offers a very concise definition of being adaptive as "being able to make decisions and execute them in real-time based on information readily at hand in in order to produce the best outcome at the time." In the context of complexity and change, the cornerstone attribute of an operational excellence organization is *its ability to adapt* while maintaining organizational alignment and cohesiveness.



Figure 1: Achieving operational excellence

# Introducing operating dexterity

Lin (2012) describes an organization's ability to adapt as operating dexterity, or "an increasingly necessary organizational characteristic for resilience, which represents a wide range of organizational capabilities and mindsets critical to sustaining performance during turbulences and to avoiding major adverse events." Lin uses the term "dexterity" to emphasize that adaptability can be learned and exercised to improve. Covey (1989) states that "we function best as innovators when we understand, and work toward, the role of interdependence – which recognizes that any decision or action by any individual affects related individuals and systems." Operating dexterity is a product of the complex interdependent relationship and day-to-day interactions between the individuals and the organizational and operational factors. It characterizes an individual's and the organization's collective ability and capacity to navigate through complex environments, unexpected operational storms, and even uncharted territories – all while continuing to adjust, align, interconnect, and operate with speed and agility.

As operating systems become more complex, and as the pace of change increases rapidly, there is less tolerance for errors, inefficiencies, or rigidness. Studies have shown that most severe losses occur when changes are involved, non-routine work is performed, or when compilations of normal operations create abnormal outcomes. These are the very situations in which predefined rules and procedures may fall short, and it's why in addition to sound management systems, standard procedures, and performance metrics, decision-making and execution based on real-time available information is critical. The following diagram illustrates the four main ingredients in developing operating dexterity for achieving sustainable performance: operating discipline, risk sensitivity, ability to make decisions in real-time, and a learning-minded and enabling culture. Many articles and books have been written on each of these elements. For the brevity of this chapter, the discussion will be focused on integrating the four components (rather than on the individual topics).



Lin (2012) Tales of the Unexpected. Safety and Health Practitioners, 2012

Figure 2: The four main ingredients in developing operational dexterity

### Strong operating disciplines

Strong operating discipline establishes an important foundation in controlling risks. In particular, it addresses visible risks that have been addressed through rigorous assessment and mitigation efforts. Strong operating discipline reflects the collective effect of leadership, management, technology, processes, and organizational culture. It also reflects on individual mastery of the operating environment, processes, and the ability to consistently carry out tasks based on sound and standard procedures. Finally, strong operating discipline creates sound operational habits and allows an individual to perform the tasks under the most stressful situations. It is important to keep in mind that operating discipline is not a fault-finding exercise, but rather a mindset and approach to optimize executions. Poor operating discipline is a risk in and of itself and it causes inefficiency, deviations, waste, and possibly severe losses in the long run.

## A Critical point: risk sensitivity

Risk sensitivity is particularly critical in dealing with unexpected situations, new hazards, sudden changes of outcomes, hidden risks, and other situations where a strong operating discipline may fall short. Risk sensitivity consists of two basic elements: the ability to sense hidden risks or weak signals and the ability to discern risk potential.



Source: Adopted from Lin (2012) Tale of the Unexpected, Safety and Health Practitioners, May, 2012, pp. 37-40.

Figure 3: Discerning risk potential

It takes persistent effort, great technical expertise, thorough understanding of the operation, and a strong inner sense of responsibility to anticipate and discern risks. In addressing risks, it is helpful to understand what factors influence our perceptions toward risks. Some influencers are:

#### Sensing and filtering

Our perception toward risk is often filtered by our experiences; a familiar pattern forms a dominant image. Similarly, a familiar scenario is likely to trigger a familiar or predetermined set of emotions or responses. As a result, variations to a familiar scenario, setting or pattern may go unnoticed and deviation and complacency gradually creep in. After all, it is human nature to become habituated to patterns and routines in our surroundings and experiences (Rock, 2009; Dale, 2010). We filter out the details (and the weak signals) and become less sensitive to latent errors or creeping risks. When nothing happens, our perceptions and reliance toward those familiar patterns are reinforced. Furthermore, people may observe each other and drift together. Engaging in multidisciplinary, cross-functional, teambased activities can help individuals break out of the confining "filtering" mode. And while drift can happen accidentally, some people may intentionally act outside of norms/rules that seem unreasonable. It is helpful to engage both grassroots leaders and randomly selected individuals in learning-based conversations in order to discover risks that are buried deep within design, processes, culture, and/or relations.

#### Risks versus rewards (or threat)

Risk perception is contextual, and organizational and individual risk tolerance or risk appetite may change according to the associated rewards or threats. As risk represents the uncertainty in meeting objectives, when the rewards are perceived as adding greater value in achieving the objectives, risk taking may not seem as forbidding (Duhigg, 2012). We have seen such behaviors in the financial world as well as within the safety sector. In both instances, organizations that have conflicting priorities – either due to miscommunication or inconsistency between "talks" and "actions" – not only suffer misalignment and inefficiency, but are particularly vulnerable to fluctuating risk tolerance and susceptible to unexpected risk-taking behaviors (Dekker, 2006).

### Ability to make decisions in real-time

The most critical capability in dealing with unexpected events and sudden changes is the ability to make right decisions in real-time using information available at hand. In fact, this can be the very moment that a catastrophic event is stopped or created. While technology and system advancements have provided great risk control aids and helped alleviate some burdens in error detection, such advancements have also become so complex that decision-making can be extremely challenging and impactful. This is not only a matter of expertise, but also the ability to concurrently synthesize real-time information at hand, anticipate the potential consequences, identify control measures, envision "what-if" scenarios, and chart courses of action. To complicate matters further, high impact real-time decisions are often made when an individual is under a tremendous amount of pressure, which limits the human brain's information processing capacity (Rock, 2009).

Making good decisions in real-time is often limited by the scope and methodologies used in traditional training. Such training tends to be instructive in nature and focused on building knowledge and skills around "how to do things the right way" versus "What are the right things to do?" Building real-time decision-making capability, however, requires a dynamic and blended-learning strategy that also discusses "why" things are done in certain ways, "what" the alternatives and possible outcomes are, "why" specific steps should be taken (or avoided) and under what situations, and the pros and cons of different decisions and actions.

For example, in addition to knowledge-based training, an organization may consider adopting an experiential learning methodology that includes job shadowing, on-the-job coaching, and interactive, scenario-based, decision-driven simulations that provide clear and timely feedback. Many engineering-oriented organizations capture lessons learned by revising their operating policies and standards. For the purpose of learning, however, case studies with clear scenario stories and progressive decision points are more effective in engaging human minds. These case stories paint clear pictures in our minds. They trigger creative thinking and help leverage human's nature ability to process and synthesize complex (and often messy) story-based information, as opposed to well-packaged information that comes with a clear set of decision-making parameters. This proves the point that building real-time decision-making capability and confidence requires both practices and experiences.

Human relations play a prominent role in real-time decision-making (Vaughan, 1996). Often, the true experts may not be the leaders who have to make the decisions. And, a decision made without the trust and confidence of the execution team will not work. What it takes to produce the right decision at the most critical moment are the leader's understanding of the team members and his or her ability to bring the team together, synthesize the situation, gather crucial information, and prepare the team to support and execute. Such a culture of trust and sense of belonging is not established overnight, but rather it is built through the everyday interactions and operations (DeJoy, 2005).

## A learning-minded and enabling culture

Regardless of the approach used to control risks or improve performance, the fundamental layer of defense is the individual's ability and determination to actively engage his or her mind to detect weak signals of potential failures or opportunities. Even more importantly, people must be able to sharpen their ability, leverage their knowledge, and speak up when a risk or opportunity is detected. In fact, in a survey of more than 150 executives of organizations across a wide spectrum of performances, over 90% of the executives rated "people will speak up" as the most important ingredient in preventing loss and for continuous improvements (Lin, 2013).

In a learning-minded culture, people observe not from a fault-finding perspective, but from lessons or successes. They are eager to see how something happened and are curious about how solutions work and what make them work. Unlike training, learning requires active participation from the learners themselves. In fact, the term "learning-minded" is used here to emphasize the mindset and thus the "lens" that each case scenario – be it a failure or a success – is examined and thus reacted to. A learning mindset can serve as a trigger point of culture transformation and is an essential ingredient for driving continuous improvement in safety , quality, efficiency, security... and thus, operational excellence.

In some organizations, the "learning" step is deliberately called out or added to the plan-do-check-act cycle in each business process. This ensures that the learning is fully embraced and integrated. A learning-minded approach can literally change conversations and even the languages and tones used in investigations. A learning-minded culture promotes partnership and not defensiveness. When the learning team comes together to capture valuable lessons, it does not stop at sending out alerts and memos. Instead, it thinks through how to engage the intended learners, tell the stories so the lessons are best learned and practiced, and invite inputs and continuously improve.

An enabling culture encourages people to share their ideas, exercise what they learned, and make decisions based on best judgments. Such cultures invest in learning, allow mistakes to be discussed, recognize good practices, embrace transparency, challenge assumptions, offer tangible support, encourage innovation, and instill trust and a sense of belonging. These characteristics are interdependent; they collectively make up an enabling culture that fuels the inner drive for an individual to stay vigilant. This culture takes away fear, clears organizational noises, and allows an individual to focus on decision-making and execution. Conversely, a lack of any of these characteristics undermines the organization's ability to perform at its best and to compete. Building an enabling culture arguably is the most important task of any leader (Baker, 2007).

# Operating dexterity: synergy of the four elements

In the rapidly evolving business environment, sustaining business vitality and operational excellence requires alignment and agility for managing unexpected threats and opportunities, particularly in those rare events that may result in great growth potentials or severe consequences. The objective of this chapter is to introduce and emphasize how the four elements - operating discipline, risk sensitivity, ability to make decisions in real-time, and a learning-minded and enabling culture – work interdependently and synergistically to develop operating dexterity, which enables an organization to navigate through uncharted territories with great speed and success. Because those elements are interdependent, when one of them is weakened, the collective strength of the four is weakened as well. In an attempt to engage organizations to further explore this topic, the following table illustrates the various dimensions of operating dexterity and explains each of the dimensions through practical attributes (Reasons, 1997; Keller and Price, 2006).

	Descriptions	The Supporting Attributes and Practices
Dimensions Mindfulness	Acute awareness of present reality leading to heightened sensitivity to signals from the environment and ability to distance oneself from assump- tions and prejudice in order to anticipate the unexpected.	<ul> <li>Building peoples' ability to anticipate and discern risks</li> <li>Building peoples' ability to sense weak signals</li> <li>Rewarding people for reporting risk</li> <li>Encouraging learning-minded investigations</li> <li>Instilling a sense of vulnerability to operating as well as business risks (e.g., energy risks, changes in regulations and economic climates) and a sense of urgency in addressing them</li> </ul>
Openness and Trust	Natural interest in people and generosity in sharing informa- tion and observations without fear.	<ul> <li>Tailoring communications to make sure they are relevant and purposeful</li> <li>Encouraging honest and open dialogues to challenge operational assumptions</li> <li>Using objective analysis</li> <li>Fostering open discussion of misalignment or other concerns</li> <li>Actively identifying and removing commu- nication barriers</li> </ul>
Learning and Development	Innate curiosity and joy in dis- covery supported by the need to challenge oneself and deve- lop new knowledge and skills.	<ul> <li>Setting strategically-aligned career-driven individual learning and development plans</li> <li>Developing peoples' knowledge and skills by offering tailored learning methodologies and relevant content</li> </ul>

Table 1: Operating dexterity - dimensions, attributes and practices

		<ul> <li>Offering challenging assignments as opportunities</li> <li>Promoting learning-oriented consequence analyses</li> <li>Capturing formal and informal reflection on experiences</li> <li>Seeking internal and external lessens and successes for learning</li> </ul>
Flexibility	Ability to understand and adapt to changes at work or in the larger business environ- ment. Confidence in ability to absorb and benefit from change.	<ul> <li>Respecting frontline knowledge and technical expertise rather than relying on a chain of commands</li> <li>Encouraging clear, fact-based decision making</li> <li>Building cross-functional/level working teams</li> <li>Fostering knowledge continuity</li> <li>Providing a helicopter view on operational interconnectivities and dynamics</li> <li>Establishing agile and precise change processes</li> </ul>
Innovation	Natural tendency to see possi- bilities to think laterally. Attraction to new, different ideas that stretch the imagina- tion and expand strategic growth potential.	<ul> <li>Enabling people to take calculated risks by empowering them with strategic clarity</li> <li>Nurturing professional curiosity</li> <li>Rewarding the development and sharing of new ideas</li> <li>Engaging people in the exploration and implementation of viable new ideas</li> <li>Fostering exchanges of ideas that are outside of the norm of thinking</li> <li>Respecting and seeking new ways to adopt external tested practices and technologies</li> </ul>
Leadership and Engagement	Ability to align, engage, and enthuse people to work for a common cause.	<ul> <li>Articulating the fundamental value and beliefs of the organization</li> <li>Setting clear long-term business direction and formulating a compelling strategy</li> <li>Engaging and helping people envision the organization's future and how they may contribute to and benefit from that vision</li> <li>Inspiring people to excel by setting challenging performance goals</li> <li>Building a positive social environment at work</li> <li>Instilling a sense of ownership and pride</li> </ul>

Competency and Discipline	Having the ability and inter- nal self-discipline for a clear understanding (or to make the right decision on) what needs to be done and what efficient and deliberate actions should be taken to achieve results.	<ul> <li>Embedding critical operating principles in clearly articulated policies and rules</li> <li>Embedding capabilities in codified methods and standardized procedures</li> <li>Setting explicit performance and behavior expectations</li> <li>Monitoring and enforcing compliance to policies, rules, procedures and</li> <li>Embracing high professional standards</li> <li>Emphasizing continuous improvement mindset</li> <li>Resisting the tendency to compromise, tolerate defeats, or normalize deviations to operating principles</li> </ul>
Alignment and Integrity	Alignment of value between the individuals and the organi- zation. Systems, structures, practices, designs, investment decisions, individual develop- ment are mutually supportive and work seamlessly to drive the organizational strategy. Willing to make personal con- cessions to achieve common goals.	<ul> <li>Ensuring vision, value, action, and beliefs alignment</li> <li>Translating business strategy into capital investment priorities, resource allocation plans, and talent management strategies</li> <li>Aligning individual responsibilities and accountabilities with strategic goals and objectives</li> <li>Reinforcing accountability by providing supporting operating management systems, organizational structure, and adequate resources</li> <li>Aligning performance goals with clear financial and non-financial rewards and recognitions</li> <li>Building a collaborative environment for correcting misalignments and clearing alignment barriers</li> </ul>

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In August 2014, occupational safety and health experts from around the world met in Frankfurt for the 20th World Congress for Safety and Health at Work. The theme was "Our Vision: Designing Sustainable Prevention":

- 1. Prevention Culture Prevention Strategy Vision Zero
- 2. Challenges for health at work
- 3. Diversity in the working world

The first of these points is as: "Vision Zero – a world in which people work safely and in good health, and where they are protected from serious accidents. This requires all continents to be involved in a prevention culture of safety and health at work as well as sustainable strategies for the well-being of humans and the benefit of economic and social systems."

The experts involved in these discussions come from many sources. Some took part in the ancillary event organized by the BG RCI during the World Congress for Safety and Health in Frankfurt on 24 August 2014. Some attended the Executive Summit of the Campbell Institute on 15 September 2014 in San Diego. Some are global partners of the Robert W. Campbell Award family. Others were asked by the publishers to contribute an article because they are recognized experts in the field of occupational safety and health.



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