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ORGANIZATIONAL HEALTH AND SAFETY FROM AN INTEGRATIVE PERSPECTIVE

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This paper presents a review of research in the area of organizational health and safety developed by the IPSSO (Psychosocial Research on Organisational Health and Safety) team at the University of La Laguna (Spain) within the framework of European Research Programmes. The article proposes a holistic and integrated approach to health and safety in organizations that stresses the need to link up the concepts, philosophies and strategies of safety culture and organizational culture. From this perspective, and from a conception of safety culture as an integrative concept, some psychological factors are considered, specifically safety climate, as well as behavioural and job-related factors, such as mental workload and performance. Finally, we present some conclusions and basic proposals for guiding analysis, assessment and intervention with a view to improving the prevention of risks at work.
Key words: *Organizational Health and Safety, Safety Culture and Climate, Mental Workload, Performance and Safe Behaviours.*

Este artículo presenta una revisión de la línea de investigación en el área de la salud y la seguridad en las organizaciones que viene desarrollando el equipo de Investigación Psicosocial en Salud y Seguridad Organizacional (IPSSO) de la Universidad de La Laguna, en el marco de programas de investigación europeos. Este artículo defiende un enfoque holista e integrado de la salud y la seguridad en las organizaciones que plantea la necesidad de vincular los conceptos, filosofías y estrategias de la cultura de seguridad y la cultura organizacional. Desde esta perspectiva y partiendo de la cultura de seguridad como elemento integrador, se abordan algunos factores psicológicos, específicamente el clima de seguridad, así como factores conductuales y del puesto de trabajo, como son la carga mental y el desempeño. Por último, se plantean algunas conclusiones y propuestas básicas de orientación en el análisis, evaluación e intervención para la mejora de la prevención de riesgos laborales.
Palabras clave: *Salud y Seguridad Organizacional, Cultura y Clima de seguridad, Carga Mental de Trabajo, Desempeño y Conductas seguras.*

The authors of the present article belong to the team for Psychosocial Research on Organisational Health and Safety at the University of La Laguna (ULL) in the Canary Islands, Spain. Since the early 1990s this team has participated in various national and European research projects (SCARF, SGS, ADAMS2, HILAS) focused on the area of organizational health and safety, principally in the field of aviation. Currently, we are participating in the HILAS project (Human Integration into the Lifecycle of Aviation Systems – AIP4-CT-2005-516181 – http://www.hilas.info/mambo/, 2005-2009). This is a European Union interdisciplinary research and intervention programme whose general objective is the development of a knowledge management system to help improve effectiveness and safety in different areas of aviation. There are a total of 41 participating institutions, including airlines, aeronautical component manufacturers, universities and research units from 15 countries.

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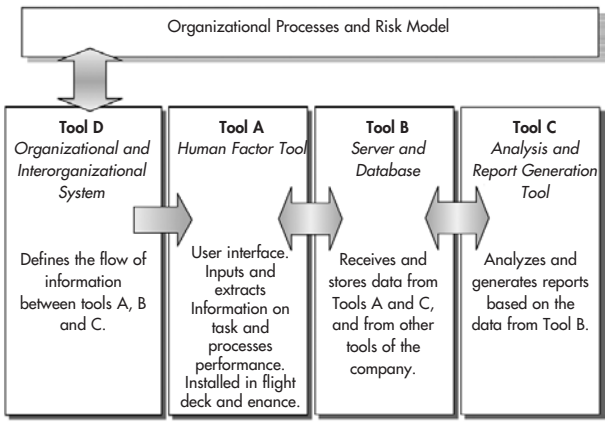
The project is developed through four lines of work: (1) integration and management of knowledge about human factors; (2) assessment and improvement of performance in flight operations; (3) assessment of new flight control technologies; and (4) assessment and improvement of aeroplane maintenance operations. This work will result in the development of a series of tools (see Figure 1) that help to improve the management and use of knowledge generated in the different areas mentioned.

Specifically, the IPSSO team is responsible for the development of an implementation culture model, which is a basic strategy in the improvement of work risk prevention, and which facilitates organizational change deriving from the introduction of these tools in the participating organizations. A second principal task for the IPSSO group, within the framework of this project, is the development of a taxonomy of psychosocial behaviours for the assessment of performance in flight operations to be applied in Tool A. The projects in which the IPSSO group has taken part constitute the frame of reference on which the structure and content of this article are based.

INTRODUCTION

The field of research and intervention in work risk prevention has extensive social and scientific relevance, and is becoming increasingly important within the field of Psychology. In Spain in particular, several factors have influenced this situation, such as the boost represented by legislation on the prevention of work risks (*Ley de Prevención de Riesgos Laborales*), stimulating the study and control of health and safety, as a key factor in organizations. The historical development of this field can basically be broken down into four phases. After two initial phases, focused on technology and human error, respectively, the 1980s saw the beginning of a new phase, which could be called *socio-technical* (e.g., Reason, 1993; Wilpert, 2001). One of the principal implications of the adoption of this approach is an increase in the number of factors considered, which include not only those at the individual and technological levels, but also those at the group and organizational levels (Cabrera, Isla & Vilela, 1997; Isla Díaz & Díaz Cabrera, 1997; Díaz Cabrera & Isla, 1998; Choudhry, Fang & Mohamed, 2007; Guldenmund, 2007). This phase is mainly the result of research on a series of large accidents that occurred in diverse situations and countries involving a wide variety of complex technologies with supposedly high reliability, notable among which would be the Bhopal, Chernobyl, King's Cross, Challenger, Piper Alpha or Exxon Valdez disasters. The "system" concept, and the notion of "safety management system" derived from it, represents the basic philosophy of this approach (e.g., Glendon & McKenna, 1995). A fourth, more recent phase reflects the importance of relation among organizations, such as those between company, manufacturers, suppliers and contractors, or with public bodies responsible for developing legislation in relation to work risk prevention.

FIGURE 1
TOOLS OF THE *HILAS* SYSTEM: KNOWLEDGE INTEGRATION, RISK MANAGEMENT AND IMPROVEMENTS OF PROCESSES IN AIRLINES



This historical development has led to an emphasis on the relevant role of individual, social and organizational factors in analysis and intervention in organizational health and safety, traditionally considered as independent research lines. However, in our opinion, optimum prevention of work risks requires a holistic approach that integrates the two areas.

On the basis of a global approach that combines the promotion of health at work and that of organizational safety, we shall develop this article in a series of sections.

SAFETY CULTURE

The concept of safety culture is receiving considerable attention from theorists and professionals (e.g., Díaz Cabrera, Hernández Fernaud & Isla Díaz, 2007; Guldenmund, 2007). This concept, also commonly referred to as *prevention culture* by Spanish professionals in the field of work risk prevention, has its origins in nuclear power stations, in response to the Chernobyl disaster of 1986. Analyses of this accident revealed the involvement of more complex dynamics than those normally assumed from a traditional perspective. The new concepts proposed are controversial, complex and ambiguous, and still require a good deal of theoretical and empirical clarification (Hale, 2000; Wilpert, 2001). Divergences in relation to organizational culture as regards its central components, its visibility or invisibility, and therefore about how to assess its basic dimensions, are reflected, and even widened, in the concept of safety culture.

Current definitions are fairly similar, and are obviously closely linked to the meaning of organizational culture. The definition by the British Advisory Committee on the Safety of Nuclear Installations (cited in Wilpert, 2001) is one of the most widely used:

> The safety culture of an organization is the product of individual and group values, attitudes, perceptions, competencies, and patterns of behaviour that determine the commitment to, and the style and proficiency of, an organization's health and safety management. (p. 10)

The recognition that it is practically impossible to develop safety norms and procedures for all possible situations that can occur in organizations obliges us to take into account the values and meanings related to commitment and identification with safety. These cultural components influence the initiatives and behaviours of the members of the organization as a whole in response to foreseen and unforeseen events. The principal theoretical developments have taken place from the posture of safety culture as a manifestation of organizational culture (e.g., Glendon & Stanton, 2000; Guldenmund, 2000; Hale, 2000; Fernández Muñiz, Montes Peón & Vásquez Ordás, 2007). Nevertheless, one of the main limitations in the majority of current models of safety culture is the lack of integration in the more global models of organizational culture (for a fuller review, see Choudhry et al., 2007, and Guldenmund, 2007). We agree with the view of these authors that we cannot separate

organizational culture from safety culture, so that its characteristics – safety structure, policy, goals, norms and standard operating procedures – are the result of a specific organizational culture.

In this line, and from an integrative perspective, Cooper (2000) defines a model of safety culture that acknowledges the reciprocal relationships between three groups of determining factors of safety. First of all, factors of a psychological or person-related nature; second, factors of a behavioural or job-related nature; and third, organizational or situation-related factors. Moreover, this conceptual framework serves as a methodological guide on suggesting, on the one hand, that shared attitudes and perceptions (person-related factors) must be assessed by means of safety climate questionnaires. On the other hand, it is argued that safety behaviours (job-related factors) should be measured using performance-assessment procedures. And finally, organizational factors (situation-related) would be assessed on the basis of methods that form part of companies' normal safety management systems.

The concept of organization that incorporates the idea of multiple metaphors and paradoxes has also influenced the concept of safety culture. This metaphorical approach rejects a unitary vision of organizations, dominated by a single theoretical perspective or research strategy. The competing values framework (e.g., Quinn, 1990; Cameron & Quinn, 1999) is probably the most important thrust of this approach, and makes it a relevant model for studying organizational culture (e.g., Van Muijen et al., 1999).

In the field of safety culture, the concepts of metaphors and paradoxes are having considerable influence, though still from a minority position (e.g., Weick, 2001; Silva, Lima & Baptista, 2004; Díaz Cabrera, Hernández Fernaud & Isla Díaz, 2007). In this regard, Weick (2001) argues that high-reliability organizations are required to be simultaneously centralized and decentralized. Thus, it is important for the members of organizations to benefit from the mutual learning that emerges from possible errors and from the alternatives developed. But at the same time there is a need for a clear centralized command chain that permits responses to the situation, without questioning the instructions.

The difficulty of designing organizations that are simultaneously centralized and decentralized requires us to consider safety culture, in line with Weick's (2001) approach, as a pre-requisite for the coordination of activities through shared values, meanings and symbols. Certainly, safety norms and procedures can also function as substitutes for centralization, imposing order; however, it is the culture that permits the degree of autonomy necessary for innovation and learning. For Weick, it is important for the organization to be first centralized before being able to be decentralized, so that people are socialized in a particular culture, and that they have similar decision premises which permit the coordination of operations in decentralized contexts. When assumptions and values are shared, supervision is not so essential to the fulfilment of norms and procedures. Moreover, neither rules nor standardization, or formalization, permit responses to emergencies for which there are no precedents.

THE DIMENSIONS OF SAFETY CULTURE

The difficulty inherent in the study of safety culture in general, and of its multiple components in particular, has led to one of the main research goals being the identification of its manifestations and its relationship to the behaviour of the organization and its members. Table 2 shows a set of components of positive safety culture common to several studies (for a review, see Guldenmund, 2007). Likewise, the table includes a series of organizational practices specific to the area of safety that are proposed as cultural manifestations.

Three critical components of a positive safety culture are: first, the organization's commitment to safety at three levels: individual, management and organizational policy (e.g., Pidgeon & O'Leary, 1994; Cox & Cheyne, 2000; Vredenburgh, 2002). In this line, the Swiss Commission for the Safety of Nuclear Plants (cited in Wilpert, 2001) identifies two principal elements of safety culture: the responsibility of management with a corporate philosophy, and the attitudes and behaviours of personnel at all levels of hierarchy.

TABLE 1
COMPONENTS OF SAFETY CULTURE AND RELATED ORGANIZATIONAL PRACTICES

Components of a positive safety culture	- Collective commitment to safety. - Responsibility for safety. - Attitudes and beliefs about safety. - Shared values and meaning in relation to safety. - Shared goals and targets. - Culture of learning and innovation. - Group and organizational trust.
Organizational practices related to safety culture	- Safety policy, goals and structure. - Safety norms and procedures. - Professionalism of human resources: Training programmes. - Data-gathering systems for accidents and incidents. - Flexible communication channels based on mutual trust. - Feedback of information. - Systems of participation, level of autonomy and decision-making. - Leadership and management styles. - Motivational patterns and reward systems not based on punishment. - Systems of performance assessment. - Systems of correction of unsafe behaviours. - Continual review of work procedures.

Second, the existence of adequate, realistic and flexible *safety goals, norms and procedures*, both explicit and tacit, which constitute a fundamental requirement for promoting strategic responsibility, in parallel to the generation of beliefs and attitudes related to the consequences of risks.

And third, the organization's *capacity for reflection and learning*, or culture of learning (e.g., Reason, 2003). Capacity for learning in matters of organizational safety requires the existence of adequate systems for gathering information on accidents and incidents that facilitate the identification and analysis of dangerous situations or risks, the feedback of this information and the continual generation and review of intervention and control measures. The use of these strategies demands the availability of flexible and open communication channels and systems, not based on punishment for inadequate performance, and which promote the exchange of information, a condition necessary for developing a philosophy of continuous innovation, development and learning in organizations (Moray, 2001; Vassie & Lucas, 2001).

TABLE 2
SAFETY CLIMATE DIMENSIONS

Authors	Dimensions
Glendon & Staton (2000)	- Communication and support - Suitability of procedures - Work pressure - Personal protection team - Safety norms - Relations
Cooper & Philips (2004)	- Attitudes, risk level, importance of training - Effects of safe behaviour on promotion, status of safety personnel
Seo et al. (2004)	- Commitment of management - Support from supervisor - Support from coworkers - Employee participation - Level of competence
Lu & Shang (2005)	- Safety of supervisor - Safety of job - Safety of coworkers - Safety management - Safety training - Safety norms - Job pressure
Nielsen et al. (in press)	- Safety leadership - Leadership of immediate supervisor - Safety instructions - Commitment to safety - Safety violations
Evans, Glendon & Creed (2007)	- Management commitment and communication - Safety training - Team and maintenance

In the same line, Reason (2003) proposes the co-existence of a culture of fairness (as opposed to a culture of punishment), a culture of learning and a culture of information. These three elements together facilitate the development of an organizational memory that permits learning and dealing with risks through both proactive and reactive interventions. This *organizational memory* is currently focused from the development of effective systems of knowledge management, a perspective that is gaining ground in this field, constituting the core of the HILAS system. These knowledge management systems revolve around facilitating the sequence of transformation of data – systems of information on incidents and accidents – into information, and finally into knowledge (see De Long & Fahey, 2000; Choy, Lee & Cheung, 2005, for a review).

In sum, we consider that: (1) Safety culture is an integral part of organizational culture; (2) Values and beliefs are a crucial part of safety culture, but also, and importantly, the orientation of the company's systems of safety management; (3) From the view that organizations *are* culture rather than that they *have* culture, it is necessary to develop approaches to culture that unite and relate its different elements. In this line, based on Cooper's (2007) three-dimensional model as an integrative framework, we shall now briefly consider some of the areas of research on safety. Specifically, we shall explore aspects relative to safety climate, mental workload and performance of safe behaviours.

SAFETY CLIMATE

Since 1980, when Zohar highlighted the importance of safety climate as a specific facet of organizational climate in the functioning of organizations, numerous studies have been carried out in the field of the prevention of work risks and organizational safety with a view to clarifying this multidimensional concept. Research has concentrated on analyzing the dimensions underlying climate, and their relationships with individual, group and organizational variables

The definition of the concept has not changed substantially since Zohar (1980), who defined safety climate as workers' shared perceptions about safety-related aspects in their work environment, with special emphasis on the attitudes and behaviours of supervisors and managers. In a much more recent article the same author introduces another aspect –the importance of perceptions about the organization's safety policies, procedures and practices (Zohar, in press).

In research carried out in the 1990s there was consensus on a limited set of safety climate dimensions (see Diaz Cabrera & Isla, 1998), but this is not the case today, as Table 2 shows. Thus, depending on the type of company, the sample used and the culture or country in which the study was carried out, the dimensions of safety climate vary (see Seo, Torabi, Blair & Ellis,

2004, for a review). Even when the same instrument is applied in two organizations from the same culture and with the same organizational activity there is no guarantee that similar dimensions will be isolated (Coyle, Sleeman & Adams, 1995).

With regard to the large number of measurement instruments developed, the questionnaire is the most widely used method. Some tools have been adapted from the questionnaire drawn up by Zohar (1980), whilst others have been designed specifically for research in various industrial sectors, such as chemicals, energy, transport or construction (see Flin, Mearns, O'Connor & Bryden, 2000, for a review).

Likewise, the results of diverse studies indicate important links, on the one hand, between safety climate and individual-level variables, such as attitudes toward safety (e.g., Isla, Cabrera & Díaz, 1998), causal attributions of safety (e.g., Rolo, Villegas, Isla, Díaz Cabrera & Suárez, 2002), safe behaviours (e.g., Díaz Cabrera, Isla, Sánchez & Rolo, 2003; Cooper & Phillips, 2004; Lu & Shan, 2005) or proportion of accidents (e.g., Nielsen, Rassmussen, Glasscok & Spangenberg, in press). Nevertheless, with regard to the relationship between safety climate and level of safe behaviours, it is necessary to consider the moderating effect of other variables, such as level of risk to which workers are exposed in their job (Smith, Huang, Ho & Chen, 2006) or leadership style exercised by supervisors (Zohar, 2002; Zohar & Luria, 2004). And on the other hand, research has explored the relation between safety climate and psychosocial factors at the organizational level, such as leadership style (e.g., Zohar, 2002) or safety culture (e.g., Cooper, 2000). Similarly, relations have been found with level of organizational safety (e.g., Isla Díaz & Díaz Cabrera, 1997).

The multiplicity of relationships between variables associated with safety climate has given rise to the development of a model based on a multi-level perspective (Zohar, in press), supporting the notion of the coexistence in organizations of an organizational safety climate and a group safety climate, with different but complementary characteristics, which opens up novel and interesting research perspectives.

MENTAL WORKLOAD

In research on safety, health and efficiency in the work context it is of crucial importance to consider the concept of mental workload. This concept is particularly relevant if we are to avoid the effects of multiple (overload) or scarce (underload) mental demands that can be the cause of low performance levels, fatigue, boredom and oversight or memory lapse in employees, and even of errors with serious consequences for workers, teams and organizations (Pickup, Wilson, Norris, Mitchell & Morrisroe, 2005).

Despite the importance of this concept and its application to different areas of work, there is still no generally accepted definition of mental workload, even though it has been conceptualized in various ways (Gopher & Donchin, 1986; Gaillard, 2001).

The majority of the conceptions fail when it comes to establishing an empirical definition of the construct as a consequence of proposing different dimensions or sources of mental workload on the basis of assumptions defined a priori (Wickens, 1984), instead of using statistical analysis results as a basis. There is, however, some degree of consensus in descriptions of mainly its subjective side, and in relation to three dimensions: time pressure of the task; processing resources demanded by the task; and aspects of an emotional nature.

From the above it can be deduced, on the one hand, that the concept has a multidimensional character (O'Donnell & Eggemeier, 1986); and on the other, that mental workload is defined according to the discrepancy between the individual's capacities and the task demands.

The different models that conceptualize mental workload can be classified in two broad and complementary approaches (Hacker, 2001; Cañas, 2004). A first set of models consider mental workload in terms of **interaction between the task demands and the person's resources**. In this line, what are relevant are endogenous factors, referring to the cognitive processes involved in the detection and treatment of information or decision-making processes. A second approach considers the mental workload concept in terms of **task demands**, that is, as a set of exogenous factors deriving from the difficulty and characteristics of the task that workers must perform effectively. Moreover, contextual factors are taken into account, which would include: physical-environmental conditions and job-design variables (e.g., acoustic conditions); psychosocial and organizational factors (e.g., organizational culture and climate); individual characteristics (knowledge and experience); and social factors (e.g., responsibility for health).

The complexity of the concept, combined with the lack of clear operationalization, has led to the development of a wide range of techniques for the prediction and assessment of mental workload. Some of the assessment techniques developed have been used in the research field with a view to obtaining more solid theoretical models (see Table 3).

However, physiological and behavioural techniques are often intrusive in real working situations, and may be rejected by workers. This has led to the development of subjective rating scales of mental workload, many of which have emerged in specific contexts and situations, making it difficult or even impossible to generalize their application and use across all contexts (see, for a review, Rubio, Díaz, Martín & Puente, 2004).

Also, some variables related to mental workload have been included in tools whose objective is to measure and assess more general aspects, such as instruments for analyzing working conditions, which tend to be well accepted in the applied

context, and which often take advantage of this to incorporate a unidimensional measure of mental workload (see Table 4).

In an effort to integrate the operationalization proposals referred to above, the IPSSO team has developed a subjective scale for the assessment of mental workload. Through this scale it is possible to obtain both a general measurement and specific scores for each of the mental workload dimensions, related to job performance: cognitive demands, time organization, effects on the individual, difficulties and interferences, feedback and support from third parties, and responsibility for work done. The results from two studies (Rolo, Díaz Cabrera & Hernández Fernaud, 2003; Hernández Fernaud, Díaz Cabrera & Rolo González, 2004) reveal the psychometric properties of the instrument and indicate that mental workload is higher in jobs that demand more cognitive resources and greater responsibility from the holder of the post.

TABLE 3
TECHNIQUES FOR ASSESSMENT OF MENTAL WORKLOAD

Physiological Heart rate	Pulsometer
Electroencephalogram	EEG Recording, Evoked Potentials
Electrooculogram	Pupil diameter, eye movements, blink frequency
Behavioural Performance	Simple Task, Multiple Task
Subjective Unidimensional scales	- Cooper-Harper (1969, cited in González, Moreno & Garrosa, 2005)
Multidimensional scales	- Modified Cooper-Harper Scale – MCH (Wierwille & Casali, 1983) - SWAT (Subjective Workload Assessment Technique) (Reid & Nygren, 1988) - NASA-TLX (Task Load Index) (Hart & Staveland, 1988) - Workload Profile (Tsang & Velazquez, 1996) - Guide for the assessment of mental workload in hospital work (Nogareda-Cuixart, 1991) - Subjective Scale for the Evaluation of Mental Workload (Rolo-González, Díaz-Cabrera, & Hernández-Fernaud, 2003)

TABLE 4
METHODS OF ANALYSIS OF WORK CONDITIONS

LEST - Laboratorio de Economía y Sociología del Trabajo (*Laboratory of Work Economics and Sociology*)
RNUR - Régie National d'Usines Renault (*National Corporation of Renault Factories*)
ANACT - Agencia Nacional para la Mejora de las Condiciones de Trabajo (*National Agency for the Improvement of Working Conditions*)
EWA - Análisis Ergonómico del Puesto de Trabajo. Instituto Finés de Salud Ocupacional. (*Ergonomic Job Analysis. Finnish Institute of Occupational Health*)
INSHT- Método de Evaluación de los Factores Psicosociales (*Method for the Assessment of Psychosocial Factors*)

PERFORMANCE ASSESSMENT AND SAFE BEHAVIOURS

Performance plays a significant role in organizational safety. As early as the 1930s, Heinrich (1931) claimed that human behaviour was the cause of 85% of accidents at work. Thus, in the field of organizational safety the occurrence of incidents and accidents has been associated with inappropriate behaviours, and hence with inadequate performance (Schraeder, Becton and Portis, 2007). Therefore, performance assessment constitutes a key element for improving organizational efficacy, performance and individual motivation, on providing employees with feedback.

The methodology most commonly used for performance assessment in the area of safety involves Behavioural-Based Safety (BBS) programmes that include positive feedback and reinforcement – for increasing appropriate behaviours – and corrective feedback – for reducing inappropriate behaviours. The basic goal of such programmes is the improvement of performance and the management of safety, through behavioural strategies based on the analysis of accidents and incidents. However, the success or failure of the implementation of this type of methodology will depend on the extent of employees' involvement in the process (DePasquale & Geller, 1999; Oliver, Cheyne, Thomas & Cox, 2002; Paul & Maiti, 2007).

It should be stressed, moreover, that the aim of behavioural-based safety is not to replace traditional systems of safety management, of proven effectiveness in the reduction and elimination of accidents. On the contrary, it is more effective to operate a global safety system, integrating behavioural programmes as a complement to traditional systems (Montero, 2003).

Currently, within the framework of the HILAS Project, the IPSSO team has developed an instrument for assessing the relationship between psychosocial factors and performance in commercial airline pilots, based on a review of the literature, on individual and group interviews with a sample of pilots, and on observation of the tasks they carry out in the flight deck.

CONCLUSIONS

Health at work, as well as accidents, are the product of multiple factors: person, job, organizational factors and inter-organizational aspects. It is these last two elements that are currently receiving most attention, probably due to the fact that they relate to newer concepts which still need greater

clarification with a view to developing effective programmes for intervention in the prevention of work risks. Thus, assessment and intervention in this area require an integrative approach that takes into account and relates to one another all the different relevant factors. In this regard, safety culture could act as a basic element linking these factors and the relevant facets of organizational culture for health and safety, such as the culture of learning and information and the role of the implementation culture in processes of organizational change.

Thus, from what has been described here we can draw a series of conclusions that serve, in turn, as a guide for both research and intervention in organizational safety.

- The assessment of safety culture should, on the one hand, take into account psychosocial variables such as shared values, beliefs and meanings, together with the components of the safety management system. On the other hand, it is necessary to employ a dual perspective that combines measures based on perceptions with objective measures such as organizational practices and policies.
- The importance of safety climate resides, on the one hand, in its direct link with organizational results such as accident rates or the development of safe behaviours; and on the other, in its utility for detecting defective areas of safety within an organization.
- Performance is a multidimensional concept that includes aspects ranging from workers' capacity to carry out formal job tasks to those behaviours and activities that could be called "complementary", though necessary, which serve as support for the organizational, social and psychological environment in which the company's goals are achieved.
- Effective changes in the performance of safe behaviours are the result of the implementation of behavioural programmes, which basically lead to a reduction in accidents and incidents in the organizational context.
- Mental workload is determined by a set of interrelated factors such as cognitive demands, time pressure and pace of the job, and the consequences of errors in the performance of tasks. All of these must be taken into account for obtaining a valid and reliable measure of mental workload.
- The immediate consequence of mental overload is fatigue, which must be assessed using both physiological and subjective indicators with the aim of obtaining as accurate a measure of the workload as possible.
- The joint assessment of, among other aspects, safety culture, perceived climate, mental workload and job performance, will contribute to the design of highly effective programmes for the improvement of safety.

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