



## Priorities for occupational safety and health research in the EU-25





# **Priorities for occupational safety and health research in the EU-25**

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Luxembourg: Office for Official Publications of the European Communities, 2005

ISBN 92-9191-168-2

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*Printed in Belgium*

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## FOREWORD

In 2004, the European Commission asked the European Agency for Safety and Health at Work to produce a short report identifying future EU research needs in the field of occupational safety and health (OSH). The Commission intended to use this report as input into its preparations for the seventh research framework programme.

Given the time constraints, the Agency agreed to prepare this short report as an update of the priorities identified in the its 2000 publication *Future occupational safety and health research needs and priorities in the Member States of the European Union* (1). This report is therefore structured around four major themes, reflecting those priorities:

- psychosocial work environment
- musculoskeletal disorders
- dangerous substances
- OSH management.

The division into these themes is primarily for ease of reference, and it is not meant to indicate fixed boundaries between topics. Many OSH problems are interrelated and, therefore, best treated in a holistic manner. This has been indicated in the report in various relevant places, for example, regarding the relationship between psychosocial factors and musculoskeletal disorders, or the issue of adapting to an ageing workforce from different perspectives. Furthermore, occupational safety and health issues are also closely related to other research areas, such as environmental protection, public health or economics. Indeed, the Commission strategy states:

'Well-being at work cannot be brought about simply by way of health and safety policy: there are strong links with the way work equipment is designed, with employment policy, with policy on disabled people, and with other policies like transport and, of course, health policy in general, whether it be preventative or curative (2).'

Although these areas are beyond the remit of this report, these 'cross-overs' should be borne in mind because they emphasise the importance of building up multidisciplinary research teams.

The four main sections are preceded by a brief consideration of global trends in OSH and the EU policy framework, in order to set these themes into the relevant scientific and policy contexts. Within the four themes, each key issue is introduced with a short description highlighting its importance as a research priority, followed by some suggestions for general and specific research questions.

### *Information resources used in the report*

The report has made use of various national and international resources. Specific sources are referenced throughout the text where necessary. An 'Additional references' section is also provided at the end of the document. The following publications were used as general background resources:

- the Agency's report on *Future occupational safety and health research needs and priorities in the Member States of the European Union* (1);
- information published by the Commission, the European Foundation, Eurostat and other relevant EU bodies;
- national reports on priorities;

(1) <http://agency.osha.eu.int/publications/reports/202/en/index.htm>

(2) 'Adapting to change in work and society: a new Community strategy on health and safety at work 2002-06': <http://europe.osha.eu.int/systems/strategies/future/#270>



- publications from international organisations and non-EU countries;
- forecast reports: physical risks and preliminary psychosocial risks (from the Topic Centre for Research), first results on emerging risks related to biological and chemical risks in the workplace;
- an expert survey carried out within the Topic Centre for New Member States.

A draft version of this report was sent for consultation to the Agency network (see Annex). The European Agency would like to thank the organisations and individuals who provided their feedback. However, as the short deadline for the report did not allow sufficient time for in-depth consultation, this document should currently be considered as a working paper.

**Hans-Horst Konkolewsky**

**European Agency for Safety and Health at Work  
May 2005**





## EXECUTIVE SUMMARY

At the European Commission's request, the European Agency has produced this report identifying the key research priorities in the field of occupational safety and health (OSH), in order to provide some input into the preparations for the seventh framework programme. The Agency wrote an initial draft based on both EU and international resources. The draft was then sent for consultation to the Agency network (see Annex). However, as the short deadline for the report did not allow sufficient time for in-depth consultation, this document should currently be considered as a **working paper**.

The report is structured around four thematic areas: psychosocial work environment, musculoskeletal disorders, dangerous substances and OSH management. Section 1 presents a list of all the major priorities identified. Section 2 contains a brief description of OSH global trends and EU policy framework, in order to set these themes into the relevant context. For example, most of the issues highlighted here are also emphasised in the Commission's strategy on health and safety at work 2002–06. The key priorities within each area (Sections 3–6) are summarised below.

### Psychosocial work environment

The far-reaching changes that have been occurring in work organisation and design, and in contractual relationships at work, are associated with the emergence or aggravation of psychosocial problems. There is growing concern for the negative effects this may have on employees' health and well-being, the quality of work, and the creativity and innovation needed by organisations in current markets. There is, therefore, a pressing need to monitor and research **the 'changing world of work' and its impact on health and safety**. At the same time, research is needed to develop and test **organisational interventions to improve the psychosocial work environment**, with a special emphasis on the prevention of work-related stress and physical and psychological violence. It is also important to investigate the role of psychosocial factors in the occurrence of **errors and accidents**, and in the reporting and aetiology of **musculoskeletal disorders (MSDs)**.

### Musculoskeletal disorders

Musculoskeletal disorders have been consistently identified as a priority for preventive action by the Member State OSH authorities. According to Eurostat, they are the most common work-related health problem, and EU working conditions surveys suggest that the problem is increasing in some respects. Reducing the musculoskeletal load of work and associated risks is part of achieving the Lisbon objective of creating **quality jobs**, by enabling workers to stay in employment, and ensuring that work and workplaces are suitable for a diverse population. Two main priorities have been identified: first, **the development of tools to assess the total load/overload on the body's musculoskeletal system**. Ergonomists currently recommend that risk assessment should consider the total load on the body, and not separate between handling heavy loads and other postural strains. There is also a need to develop assessment guides and interventions looking at MSDs combined with other risk factors, such as stress, fatigue, vibrations and cold temperatures. Second, **assessment/evaluation methods, intervention methods and prevention measures in relation to certain gaps in knowledge**, especially some overlooked MSDs (such as standing work and other static work), particular sectors (e.g. provision of care in people's homes, residential homes and hospitals, home deliveries, catering, cleaning, homeworking), evaluation methods suitable for a diverse workforce, and new sources of risk (e.g. with regard to the principles of good design for new technology such as a multi-screen workplaces, non-keyboard computer input devices and the use of handheld computers).

### Dangerous substances

A vast and increasing number of chemicals are present in workplaces, with about 100 000 different substances currently registered in the EU market. The chemical industry is Europe's third largest manufacturing industry, employing 1.7 million people directly, with up to three million jobs dependent on it. Exposure to dangerous chemicals occurs at many workplaces outside the chemical industry: for example, agricultural workers use pesticides, detergents and microbiological dusts, and construction workers commonly use



solvents and paints. According to the third European survey on working conditions (2000), 16 % of employees in the EU handle or are in contact with dangerous substances for at least one quarter of their working time. There are three main research priorities in this field: first, the **validation and improvement of models for worker exposure assessment**, including skin exposure (measuring, modelling and risk assessment). There is much information available on exposures to dangerous substances, but no overviews for particular work activities, especially for work activities traditionally carried out by women. The second area of concern is the **exposure to nanoparticles and ultrafine particles**. The rapid growth of nanotechnology (leading to the development of new materials, devices and processes) is outstripping our understanding and knowledge of the occupational health risks associated with manufacturing and using nanomaterials. Minimal information is currently available on exposure routes, potential exposure levels and toxicity. Finally, **assessment and measurement methods for workplace exposures to biological agents** are still very much at an experimental stage, and there are no limit values for occupational exposure to biological agents. It is necessary to develop a systematic mapping of workplace exposures, covering the biology of the micro-organisms involved, exposure routes, effects, mechanisms, preventive measures, medical surveillance and rehabilitation.

### OSH management

The nature and organisation of work are changing, becoming more client- and knowledge-driven. The workforce has also been changing; it is ageing, less male-dominated, more precarious and more difficult to monitor, as it has spread out into small companies. As a consequence, health issues have become more complex and we need to find new ways to improve OSH in this context of profound changes. Since the Lisbon summit, the focus has been placed on **the economic dimension of OSH**, in other words, the economic impact of health at work, and – more generally – the effects of quality of work and employment upon Europe's competitiveness in the world arena. This includes issues such as the overall cost of **social non-quality**, costs connected to conditions of work (including accidents and health-related absenteeism), and the development of management and accounting tools integrating the OSH dimension. The other major issue demanding research attention is the **long-term effect of working conditions on health**, and the specific contribution made by occupational factors to the overall burden of ill-health. European and national surveys provide a comprehensive picture of health at work and of working conditions, but there is a clear need for **a Europe-wide longitudinal survey on health at work** to allow us to design policies aimed at reducing work-related inequalities and preventing health risks in specific groups and occupations.



# 1. SUMMARY LIST OF PRIORITIES

Within each section, the issues considered as the top priorities are **highlighted in bold**.

## Psychosocial work environment

- **The 'changing world of work' and its impact on health and safety**
  - Work–life balance
- **Organisational interventions to improve the psychosocial work environment**
  - Focus on work-related stress
  - Focus on physical and psychological violence
- The interaction between musculoskeletal disorders and the psychosocial work environment
- The role of psychosocial and organisational factors in accidents and errors
- Improvements in work organisation and design to enhance:
  - retention of ageing workers
  - integration of workers with disabilities
  - participation of women in the labour market

## Musculoskeletal disorders

- **Developing tools to assess the total load/overload on the body's musculoskeletal system**
- **Developing assessment/evaluation methods, intervention methods and prevention measures in relation to certain gaps in knowledge:**
  - some overlooked MSDs
  - specific high-risk sectors
  - a diverse workforce
  - new sources of risk
- Developing participatory methods
- Rehabilitation interventions
- Approaches to including ergonomics in the design stage
- Evaluation of the effectiveness of existing solutions

## Dangerous substances

- **Exposure assessment for chemicals**
  - **Validation and improvement of models for worker exposure assessment**
  - Indoor air quality, including multiple low-level exposures and their effects
  - Combined effects of dangerous substances and other factors (noise, vibration), mixed exposures, toxicology of combined mixtures
- **Specific groups of chemical substances to be assessed**
  - **Exposure to nanoparticles and ultrafine particles**
  - Carcinogenic substances – burden of occupational cancer in Europe
  - Reproductive toxicants, including endocrine disruptors
- **Workplace exposure to biological agents**
  - Assessment of occupational risks related to global epidemics and identification of OSH strategies at all levels
  - **Assessment exposure to biological agents in the workplace**



### **OSH management**

- **The economic dimension of OSH**
  - Overall cost of social non-quality
  - Impact of quality of work and employment on overall economic performance
  - Development of management and accounting tools integrating the OSH dimension
- **Life expectancy and work (longitudinal research)**
  - Development of a European-wide longitudinal survey on health at work
  - Analysis of all death registers and other relevant statistical data in relation to the occupational background of the deceased
  - Assessment of the specific part of work-related diseases in overall mortality
- **Managing an ageing workforce**
  - Analysis of the relationship between age and work
  - Identification of policies aimed at preventing age-related exclusion from work
- **Strengthening the prevention culture**
  - Mainstreaming OSH
  - The role of corporate social responsibility
  - The dissemination of research findings and good practice examples



## 2. THE SCIENTIFIC AND POLICY CONTEXTS

### Main objectives

These are:

- (a) to 'translate research into practice': supporting **applied** research that develops and evaluates methods and tools for the **prevention** of ill-health and accidents;
- (b) to prevent or limit the exposure of workers to psychosocial and physical hazards in their workplaces, and reduce the number and seriousness of injuries;
- (c) to prevent the potential negative effect of new technologies, and new or emerging workplace hazards;
- (d) to develop new methods and tools for the management of occupational health and well-being;
- (e) to identify research initiatives that support the Commission's policy objectives—in particular the Lisbon employment strategy—and the Community strategy on OSH.

### Global trends

*EU: Adapting to change in work and society: a new Community strategy on health and safety at work 2002–06* <sup>(3)</sup>

'The changing way in which work is organised, and especially more flexible ways of organising working time and managing human resources on a more individual level, based more on an obligation to achieve a fixed result, are having a profound effect on problems associated with health at work or, more generally, on well-being at work.

'It is a known fact today that “emerging” illnesses such as stress, depression, anxiety, violence at work, harassment and intimidation are responsible for 18 % of all problems associated with health at work, with a quarter of them resulting in two weeks or more absence from work. These complaints ... are linked less to exposure to a specific risk than to a whole set of factors, such as work organisation, working time arrangements, hierarchical relations, transport-related fatigue, and the degree of acceptance of ethnic and cultural diversity within the firm. They need to be addressed within a global context which the ILO defines as “well-being at work” ...'

(from Section 2.3)

*ILO: Global strategy on occupational safety and health (2003)* <sup>(4)</sup>

'In addition to established measures to prevent and control hazards and risks, new strategies and solutions need to be developed and applied both for well-known hazards and risks such as those arising from **dangerous substances, machinery and tools and manual handling as well as for emerging issues, such as biological hazards, psychosocial hazards and musculoskeletal disorders!**

'... development of new instruments in the areas of **ergonomics and biological** hazards should be given the highest priority. Priority should also be given to the development of a new instrument on the guarding of machinery in the form of a code of practice. Consideration should also be given to **work-related psychosocial hazards** for further ILO activities.'

*International trends in strategic directions and priorities for OSH research (2001)* <sup>(5)</sup>

'In many of the countries with developed research strategies, the focus of research priorities is changing. **The traditional emphasis on physical, chemical and biological hazards is still important** and in many cases still accounts for the majority of research expenditure. However, in many countries the research

<sup>(3)</sup> <http://europe.osha.eu.int/systems/strategies/future/#270>

<sup>(4)</sup> [http://www.ilo.org/public/english/protection/safework/globstrat\\_e.pdf](http://www.ilo.org/public/english/protection/safework/globstrat_e.pdf)

<sup>(5)</sup> <http://www.nohsc.gov.au/ResearchCoordination/InternationalTrendssummary.htm>



focus is **shifting toward working life issues such as work organisation matters, the ageing workforce, labour market changes, and psychosocial issues**. This can be seen in the findings of the surveys undertaken [by the Dublin Foundation] and the trend is particularly noticeable in the work of Sweden's National Institute for Working Life. Work-ing life issues, although not the major focus, are becoming increasingly important in the work of national agencies in the United Kingdom, France and Finland!



## 3. PSYCHOSOCIAL WORK ENVIRONMENT

### Context

*EU: Adapting to change in work and society: a new Community strategy on health and safety at work 2002–06*

*'The increase in psychosocial problems and illnesses is posing a new challenge to health and safety at work and is compromising moves to improve well-being at work.'*

(from section 3.3.1)

### Main priority areas for research

#### 3.1. The 'changing world of work' and its impact on health and safety

The term 'changing world of work' is used to describe issues such as 'new work organisational forms, new contractual relationships and use of working time, new technologies, changes in the workforce, and changes in OSH systems'<sup>(6)</sup>. Section 2.3 of the Community strategy <sup>(7)</sup>, quoted earlier, makes specific reference to the effects of the changing organisation of work and 'emerging' psychosocial problems, such as stress, anxiety and depression. The national occupational research agenda <sup>(8)</sup> in the United States of America shows a similar concern, and features 'organisation of work' and 'emerging technologies' as two of its 21 research priorities – and several other priorities also relate to these issues.

The European Agency has already carried out some work to review the nature and effects of **emerging risks** <sup>(9)</sup>, but more research is needed to investigate the relationship between health and well-being indicators and the main aspects of the physical and psychosocial work environment and how this relationship may affect the quality of work in Europe (see the Lisbon objectives of 'more and better jobs' <sup>(10)</sup>). It is known that the interactions between the work environment, work organisation and stressors are very complex <sup>(11)</sup>, and this research field would benefit from a coordinated programme of **large-scale, longitudinal and cross-national studies**.

The NIOSH report *The changing organisation of work and the safety and health of working people – Knowledge gaps and research directions* <sup>(12)</sup> includes as its priorities:

'(1) improved surveillance mechanisms to better track how the organisation of work is changing, (2) accelerated research on safety and health implications of the changing organisation of work, (3) increased research focus on organisational interventions to protect safety and health, and (4) steps to formalise and nurture organisation of work as a distinctive field in occupational safety and health.'

These future research directions overlap with those identified in many Member States, and could perhaps be summarised in a research programme that would focus on three major interlinked elements, investigating (1) how the organisation and management of work are changing, (2) how these changes affect the workforce, and (3)

<sup>(6)</sup> See Agency report, 'Research on changing world of work': <http://agency.osha.eu.int/publications/reports/205/en/index.htm>

<sup>(7)</sup> 'Adapting to change in work and society: a new Community strategy on health and safety at work 2002–06': <http://europe.osha.eu.int/systems/strategies/future/#270>

<sup>(8)</sup> <http://www2a.cdc.gov/NORA/default.html>

<sup>(9)</sup> European Agency's feature on 'emerging risks' – psychosocial and organisational risks: <http://europe.test.osha.eu.int/research/rtopics/risks/index.php>

<sup>(10)</sup> [http://ue.eu.int/ueDocs/cms\\_Data/docs/pressData/en/ec/00100-r1.en0.htm](http://ue.eu.int/ueDocs/cms_Data/docs/pressData/en/ec/00100-r1.en0.htm)

<sup>(11)</sup> See, for example, <http://agency.osha.eu.int/publications/reports/203/en/index.htm> and <http://agency.osha.eu.int/publications/reports/309/en/index.htm>

<sup>(12)</sup> <http://www.cdc.gov/niosh/02-116pd.html>



how interventions at the organisational level can prevent negative consequences and reinforce positive effects. The ultimate aim should be the development of **evidence-based, practical intervention tools and methods** that can be used at workplace level – with special relevance to small- and medium-sized enterprises, given that they employ the majority of EU workers. Improved surveillance would also contribute to the work of the 'risk observatories' currently being established at EU and Member State level and should be combined with forecasting methods designed to identify emerging risks in order to try to prevent their negative consequences.

As suggested earlier, the relationship between these factors and economic performance or 'quality of work' is also an **important issue, especially given the impact of work organisation on knowledge management, innovation and creativity.**

### 3.1.1. Work–life balance

Workers' difficulty in achieving a balance between working and non-working time has been a growing concern. The problem is compounded by the increasing proportion of households with 'dual careers' and dependent older relatives. It is also affected by what has been termed 'atypical work': temporary agency work, part-time work or jobs with 'unsocial hours', precarious employment, low-paid work, etc.

This problem can be a contributing factor for work-related stress, and also act as a barrier to the recruitment or retention of certain groups of people into the workforce (see below). As the EU workforce becomes more diverse, it will become more important to find ways of matching the organisation of work to the changing needs of the workers throughout their lifespan. More research is needed to (1) identify the socioeconomic, cultural and policy-related factors (and company, sector, Member State and EU levels) that facilitate or hinder work-life balance, and (2) identify and share good practice at enterprise level.

## 3.2. Organisational interventions to improve the psychosocial work environment

There is very little research focused on organisational interventions to improve the psychosocial work environment<sup>(13)</sup>. Existing literature proposes an integrated approach – prevention, protection and treatment – as the most likely to succeed<sup>(14)</sup>, particularly if it involves worker participation at all stages. This is supported by current OSH legislation in the EU. The output of a research programme on organisational interventions for the improvement of the psychosocial work environment should include some form of clear and practical guidance for risk-reduction interventions. See, for example, the conclusions of the research report 'Building an evidence base for the health and safety Commission strategy to 2010 and beyond'<sup>(15)</sup>.

### 3.2.1. Focus on work-related stress

Despite the needs identified by the research community, and the legislative emphasis on prevention at source and risk assessment, there are still too few intervention studies to allow researchers to test and develop detailed, evidence-based recommendations for preventing and reducing work-related stress. The majority of research projects still focus on individual-level solutions. For example, the 2002 NIOSH review of the literature concluded that:

'the body of literature on interventions to change aspects of job design or organisational practices to reduce exposures to job hazards is small. In the job stress arena, this research base is much smaller than the body of research on individual-level intervention strategies.'<sup>(16)</sup>

<sup>(13)</sup> <http://agency.osha.eu.int/publications/reports/203/en/index.htm>

<sup>(14)</sup> <http://agency.osha.eu.int/publications/reports/203/en/index.htm>

<sup>(15)</sup> UK's Health and Safety Commission, 'Building an evidence base for the health and safety Commission strategy to 2010 and beyond: A literature review of interventions to improve health and safety compliance': <http://www.hse.gov.uk/research/rrhtm/rr196.htm>

<sup>(16)</sup> <http://www.cdc.gov/niosh/02-116pd.html>





There is a particular need for large-scale and longitudinal studies in the EU, and this is also recognised elsewhere (17). It is also essential to foster the sharing of existing knowledge, and its translation into practice. This would support current and future initiatives to develop international standards and practical implementation tools and methods.

### 3.2.2. Focus on physical and psychological violence

Although levels of knowledge and awareness still vary considerably among EU countries (18), one of the main areas of concern across the Union (and beyond (19)) is the occurrence of physical violence and, increasingly (20), 'psychological violence' – a term which includes all types of harassment, and bullying/mobbing. A preventive approach based on risk assessment is advocated for both types of violence (21), but, as indicated earlier, there is insufficient research exploring the improvements of the work organisation and management practices that may prevent or reduce the occurrence of violence. Further research is also needed to explore the culture-specific issues involved in both awareness and reporting of physical and psychological violence.

As the International Labour Organisation's code of practice indicates, it is also necessary to facilitate the transfer of existing knowledge and good practice.

'In order to achieve coherence between countries, to mobilise the social partners, and to facilitate prevention, the competent authorities should encourage evidence-based policy development. Governments should fund and support research studies, as well as identifying and publicising case studies of best practice (15).'

A first step to address this knowledge gap could involve a programme of coordinated research projects focusing on high-risk groups and sectors (15) (22). This would ensure that the most urgent needs are dealt with first, and also allow researchers to test the feasibility and effectiveness of intervention strategies in different settings (23). An added benefit of interventions aimed at preventing violence at work is that they usually have a positive effect on stress levels.

### 3.3. The interaction between musculoskeletal disorders and the psychosocial work environment

Most international and national surveys in the EU identify musculoskeletal disorders and stress as the two most frequently reported occupational health problems (24) (see also Section 4 of this document), and as being responsible for a large proportion of the working days lost due to illness. Although the exact nature of the relationship between these two problems is not entirely clear yet, there is now a considerable body of evidence – arising from both workplace and laboratory studies and epidemiological data – to suggest that they are so closely interrelated that they are best tackled together. For example, the British Health and Safety Exe-

(17) <http://www.cdc.gov/niosh/injury/traumaviolence.html> and <http://www.cdc.gov/niosh/02-116pd.html>

(18) <http://www.eurofound.ie/publications/EF02109.htm>

(19) ILO code of practice on workplace violence in services sectors and measures to combat this phenomenon: <http://www.ilo.org/public/english/dialogue/sector/techmeet/mevsws03>

(20) See, for example, the publications from the Spanish national institute for OSH: <http://www.mtas.es/insh/psier/entornopsi/relaciones.htm>

(21) <http://www.eurofound.ie/publications/EF02109.htm>

(22) Informe Randstad, 'Calidad de Trabajo en la Europa de los Quince – El acoso moral' <http://www.randstad.es/content/randstad/gabinete-de-prensa/calendario/>

(23) See, for example, the WHO and ILO 'Joint programme on workplace violence in the health sector': [http://www.who.int/violence\\_injury\\_prevention/injury/work9/en](http://www.who.int/violence_injury_prevention/injury/work9/en)

(24) See, for example, European Foundation surveys: <http://www.eurofound.ie/working/surveys/index.htm>



cutive recently published a prospective study which concluded that 'High exposure to both physical and psychosocial work risk factors resulted in the greatest likelihood of reporting musculoskeletal complaints (25).'

Both stress and MSDs are complex issues and each of them requires a specific research programme (see earlier in this section and also Section 4). However, it must be acknowledged that occupational health problems are often interrelated, and these interactions must be studied in order to provide adequate health protection. A programme of longitudinal research carried out in several Member States could measure the degree of exposure to physical work risk factors and psychosocial work risk factors, and explore the mediating or moderating effects of stress. This would help to establish the nature of the psychosocial–MSDs relationship, identify any relevant cultural differences, and create the basis for designing holistic interventions to prevent both problems.

### 3.4. The role of psychosocial and organisational factors in accidents and errors

The growing mental load placed on workers is currently one of the strongest trends in workplaces (26). Information processing demands are increasingly replacing, or adding to, physical workload, while deadlines grow even tighter. Furthermore, workers who deal with the public (customers, clients, patients, pupils, etc.) are often subjected to significant emotional stress. This combination of demands can significantly add to the risk of errors, potentially leading to accidents and injuries.

Research is needed to better understand the joint contribution of physical, psychosocial and organisational factors to the occurrence of errors that threaten the safety and health of workers, the natural environment, and the productivity and future of companies. Such research should include the psychosocial demands described above, together with characteristics of the physical work environment (e.g. poor design of human–machine interfaces, machinery or tools, which leads to fatigue or overload and potential errors) and the organisation of work (e.g. shiftwork, task content and training). In particular, there is broad consensus on the need to develop **practical tools to assess the mental or cognitive load** of different tasks and jobs.

### 3.5. Improvements in work organisation and design to enhance

- retention of ageing workers,
- integration of workers with disabilities and
- participation of women in the labour market

At the Lisbon European Council in March 2000, the EU set itself a new strategic goal for the next decade: 'to become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion' (27). This strategic goal has been developed into specific employment policy targets:

'an employment rate of 50 % for older workers by 2010, and raising the average effective exit age from the labour market by five years by 2010, as requested by the Barcelona European Council.' (28)

Success in achieving these targets is likely to depend to a considerable extent on accomplishing improvements in 'quality of work' across the EU. The European Commission has specified 10 dimensions of this concept, including at least six that have a direct relevance to occupational health and safety: skills, lifelong learning and career development, gender equality, health and safety at work, inclusion and access to the labour

(25) See, for example, the recent study on stress and MSDs, 'The role of work stress and psychological factors in the development of musculoskeletal disorders': <http://www.hse.gov.uk/research/rrpdf/rr273.pdf>

(26) See, for example, European Foundation surveys: <http://www.eurofound.ie/working/surveys/index.htm>

(27) <http://ue.eu.int/presid/conclusions.htm>

(28) Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions, 'Improving quality in work: a review of recent progress' (COM(2003) 728): [http://europa.eu.int/comm/employment\\_social/employment\\_analysis/quality\\_en.htm](http://europa.eu.int/comm/employment_social/employment_analysis/quality_en.htm)



market, work organisation and work–life balance, and diversity and non-discrimination <sup>(29)</sup>. The Commission's communication itself contains a long list of quality indicators that would provide a good starting point to develop a research agenda of carefully designed evaluation studies to explore the real impact that employment policies at EU and national level have on the health and safety of the EU workforce.

A parallel research programme focused at **enterprise** level could be aimed at identifying good practice initiatives that contribute to improving the retention of ageing workers, the integration of workers with disabilities, and the participation of women in the labour market. This would more closely explore the **specific features of the design and management of work** that impede or facilitate the integration and retentions of these three groups of workers by having a positive or deleterious effect on health and well-being.

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<sup>(29)</sup> Communication, 'Employment and social policies: a framework for investing in quality' (COM(2001) 313 final), 20 June 2001: [http://europa.eu.int/comm/employment\\_social/news/2001/sep/quality\\_en.pdf](http://europa.eu.int/comm/employment_social/news/2001/sep/quality_en.pdf)



## 4. MUSCULOSKELETAL DISORDERS

### Context

#### *Musculoskeletal disorders still a major problem in the EU*

MSDs have been consistently identified as a priority by the Member State OSH authorities<sup>(30)</sup>. According to Eurostat they are the most common work-related health problem<sup>(31)</sup>. EU working conditions surveys provide more detail of the extent of the problem and suggest that the problem is increasing<sup>(32)</sup>, for example:

- from 1990 to 2000, there was an increase in the proportion of workers reporting the following problems: exposure to heavy loads: 31 to 37 %; work-related backache: 30 to 33 % (most common health problem); exposure to painful/tiring positions: 43 to 47 %;
- 28 % of workers report work-related muscular pains in the neck and shoulders;
- worker reports of fatigue and MSDs are higher in the new Member States.

#### *Supporting the Lisbon employment strategy*

The **Lisbon objectives**<sup>(33)</sup> include creating **high-quality** jobs. Reducing the musculoskeletal load of work and associated risks is part of achieving this objective, as it will:

- facilitate getting workers into employment;
- enable workers to stay in employment;
- ensure work and workplaces are suitable for a diverse population.

#### *Supporting the Community OSH strategy*<sup>(34)</sup>

Research into musculoskeletal disorders and ergonomic and work design improvements in the workplace would support several objectives in the strategy:

- enhanced prevention of occupational health: priority should go to illnesses due to asbestos, hearing loss and musculoskeletal problems (paragraph 3.1);
- prevention measures for a diverse workforce – improving adaptation of jobs to people;
- submission by the Commission of a communication on musculoskeletal complaints (paragraph 3.3.1);
- analysis of emerging risks, with special reference to the interaction between risks, such as MSDs and stress, MSDs and other agents (paragraph 3.1).

(30) European Agency 2000, State of OSH report.

(31) Eurostat, 'Work-related health problems in the EU 1998–99', *Statistics in focus*, Theme 3, 17/2001.

(32) European working conditions surveys, European Foundation.

(33) <http://ue.eu.int/presid/conclusions.htm>

(34) 'Adapting to change in work and society: a new Community strategy on health and safety at work 2002–06', <http://europe.osha.eu.int/systems/strategies/future/#270>



## Main priority areas for research

MSDs and ergonomic interventions have been consistently identified as a priority research area by the Member States <sup>(35)</sup>. To support the Community strategy, the focus should be on research that develops and evaluates methods and tools for the prevention of MSDs in the workplace and Member States have identified the need for developing innovative solutions <sup>(36)</sup>. There is a need for tools for experts and non-experts. Intervention studies can be used to develop realistic and practical guidance. From an analysis of current and future research priorities that have been identified in the Member States and worldwide <sup>(37)</sup>, the following research areas are suggested.

### 4.1. Developing tools to assess the total load/overload on the body's musculoskeletal system

Ergonomists currently recommend that risk assessment should consider the total load on the body, and not separate between handling heavy loads and other postural strains <sup>(38)</sup>. Studies are needed of the effect of a combination of musculoskeletal factors and their practical assessment. There is also evidence of the risk of MSDs being increased when there are risks present in combination with other hazards and risk factors, such as of stress, fatigue, vibrations and cold temperatures <sup>(39)</sup>. Development of assessment guides and interventions looking at MSDs combined with other risk factors are needed.

### 4.2. Developing assessment/evaluation methods, intervention methods and prevention measures in relation to certain gaps in knowledge

There are various gaps in knowledge about how to effectively assess and prevent MSDs, and what the most effective methods of intervention are <sup>(40)</sup>. The most significant gaps identified are the following.

#### 4.2.1. Some overlooked MSDs

These include lower limb disorders and standing work and other static postures. Standing work and other static work, which is more characteristic of women's work in particular, has received less attention <sup>(41)</sup>.

#### 4.2.2. Specific high-risk sectors

Interventions and practical guidance are lacking for some high-risk groups in the service sector, including provision of care in people's homes, residential homes and hospitals, home deliveries, catering, cleaning and homeworking.

#### 4.2.3. A diverse workforce

Methods for the evaluation of MSDs covering a diverse workforce are needed, including methods to include individual differences in a practical and sensitive way. Also needed are training interventions for migrant workers (including communication strategies). A further issue concerns interventions and education about MSDs at school level. Research is also required into management of the ageing workforce, in particular the need to develop improved work organisation and job design strategies.

<sup>(35)</sup> Agency report, 'Future occupational safety and health research needs and priorities in the Member States of the European Union'; Agency report, 'Priorities and strategies in occupational safety and health of the European Union'.

<sup>(36)</sup> State of OSH report, European Agency 2000.

<sup>(37)</sup> In addition to the Agency research reports cited in this section, see, for example, National Advisory Committee on Ergonomics (NACE) recommendations to OSHA from the 17 November 2004 meeting, Occupational Safety and Health Administration, USA; Health and Safety Executive strategic research outlook 2003.

<sup>(38)</sup> Agency report, 'Research on lower back disorders'.

<sup>(39)</sup> Agency report, 'Research – Work-related neck and upper limb musculoskeletal disorders'.

<sup>(40)</sup> Agency report, 'Research – Work-related neck and upper limb musculoskeletal disorders'.

<sup>(41)</sup> Agency report, 'Gender issues in occupational safety and health'.



#### 4.2.4. *New sources of risk*

Assessment and intervention methods and research into the principles of good design are needed for new technology, such as multi-screen workplaces, non-keyboard computer input devices, use of handheld computers, etc.

#### 4.3. **Developing participatory methods**

Assessing the real jobs people do and subsequent solutions through the close and effective involvement of the workforce has been identified as one of the key success factors in ergonomic designs to prevent MSDs. It is particularly important for taking account of gender issues <sup>(42)</sup>. Methods should be developed to embed good ergonomics and occupational health within organisations. This requires embedding of knowledge related to organisational design and job design, as well as the more traditional aspects of workplace design.

#### 4.4. **Rehabilitation interventions**

Special attention should be paid to multidisciplinary approaches, where the prevention side is working with the rehabilitation side. Particularly important is the role of social support in enabling workers both to return to work and subsequently to sustain employment when experiencing musculoskeletal problems.

#### 4.5. **Approaches to including ergonomics in the design stage**

Ergonomics should be included at an early stage, for example designing equipment that is easier to use or having input into the design of workplaces such as hospitals, for lifting and handling work. It should also explore the integration of ergonomics in enterprises' organisational design, job design, policies, equipment procurement, etc.

#### 4.6. **Evaluation of the effectiveness of existing solutions**

These cover a wide range of issues, such as:

- development of evaluation methodologies;
- evaluation of tools, cost–benefit analyses of interventions, etc.
- evaluation of manual handling training, including in hazard identification and avoidance, in vocational training and apprentice training;
- development of methods that assess the impact of organisational design on various jobs in terms of creating an imbalance between the physical and mental demands on workers and their ability to manage these demands.

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(42) Agency report, 'Gender issues in occupational safety and health'.



## 5. DANGEROUS SUBSTANCES

### Context

#### *Global trends*

The global production of chemicals has increased from 1 million tonnes in 1930 to 400 million tonnes today. We have about 100 000 different substances currently registered in the EU market, and the EU chemical industry is the largest in the world and Europe's third largest manufacturing industry. It employs 1.7 million people directly and up to 3 million jobs are dependent on it.

The **UNEP Governing Council** identified a need to further develop a '**Strategic approach to international chemicals management**', with relevant intergovernmental groups and other stakeholders to review current actions, identify gaps and propose concrete projects and priorities. The strategic approach is to promote the incorporation of chemical safety issues into the development agenda <sup>(43)</sup><sup>(44)</sup>.

#### *Input to European policy*

##### **Supporting the Community OSH strategy <sup>(45)</sup> and contributing to the new European chemicals strategy**

Much of the public discussion on chemicals over the last couple of years has centred on one, or both, of the themes 'the problem of untested chemicals' and 'the problem of unassessed chemicals'. The results of a study by the European Chemicals Bureau <sup>(46)</sup> show that 14 % of the EU high production volume chemicals have data at the level of the base-set, 65 % have less than base-set and 21 % have no data. This indicates that there are more data publicly available than most previous studies have shown. However, it also shows that there are still considerable data gaps.

The **European Commission, Enterprise DG**, states that the current legislative framework for chemicals is inadequate <sup>(47)</sup>. It has not produced sufficient information about the effects of chemicals on human health and the environment and, where risks are identified, it is slow to assess them and introduce risk management measures.

Exposure to dangerous chemicals occurs at many workplaces outside the chemical industry. There are many occupations that handle a variety of chemicals as part of their work activities: for example, agricultural workers use pesticides, detergents and microbiological dusts, and construction workers commonly use solvents and paints.

(43) <http://www.chem.unep.ch/saicm/prepcom1/Default.htm>

(44) <http://www.chem.unep.ch/saicm/prepcom2/Default.htm>

(45) European Commission, Employment DG, contribution to the European Week for Safety and Health at Work 2003 on dangerous substances, available at [http://agency.osha.eu.int/publications/magazine/6/en/index\\_4.htm](http://agency.osha.eu.int/publications/magazine/6/en/index_4.htm)

(46) Allanou, R., Hansen, B. G. and van der Bilt, Y., *Public availability of data on EU high production volume chemicals*, European Commission, Joint Research Centre, Institute for Health and Consumer Protection, European Chemicals Bureau, TP 280, Ispra (VA), I-21020, available at <http://ecb.jrc.it/existing-chemicals>

(47) FAQs on REACH:

<http://europa.eu.int/rapid/pressReleasesAction.do?reference=MEMO/03/213&format=HTML&aged=1&language=EN&guiLanguage=en>



According to the third European survey on working conditions 2000, 22 % of employees report breathing in vapours, fumes, dust or dangerous substances during one quarter of their working time or more. In addition, 16 % of employees in the European Union handle or are in contact with dangerous products or substances for one quarter of their working time or more.

Workers' protection from dangerous substances is supported by a strong OSH legislation framework <sup>(48)</sup> that needs to be supported by research.

### Guiding principles

Development, management and dissemination of research knowledge related to dangerous substances should **cover the life cycle of the substances and agents, including potential uses in workplaces and unintentional exposures to waste products** and involve:

- monitoring, identifying and evaluating emerging trends in scientific knowledge with the potential to improve health;
- bringing together existing research on the selected topics with a strong focus on research surveillance, dissemination and building networks;
- feeding the overview into existing research programmes and future strategies, to make it possible to prioritise and use resources more effectively (e.g. in toxicology assessments);
- undertaking research that is transferable into OSH policy and practice <sup>(49)</sup>;
- evaluating the effectiveness of existing solutions, including substitution of dangerous substances;
- optimising the use of research outcomes in informing OSH policy and practice.

## Main priority areas for research

### 5.1. Exposure assessment for chemicals

#### 5.1.1. Validation and improvement of models for worker exposure assessment, including skin exposure: measuring, modelling and risk assessment

Exposure assessment is a rapidly evolving multidisciplinary research activity. Its purpose is to provide data that can be used to:

- identify exposure reduction needs and methods;
- define exposure-response relationships in epidemiological studies; and
- demonstrate the effectiveness of interventions and engineering <sup>(50)(51)</sup>.

(48) Jansen, B., 'A European perspective. Consolidating a culture of risk prevention', *Magazine*, 6, 2003, European Agency for Safety and Health at Work 2003: [http://agency.osha.eu.int/publications/magazine/6/en/index\\_4.htm](http://agency.osha.eu.int/publications/magazine/6/en/index_4.htm)

(49) The ILO global strategy on occupational safety and health, Conclusions adopted by the International Labour Conference at its 91st Session, 2003, identifies this as a key issue: 'In the field of OSH, adequate capacities to develop, process and disseminate knowledge that meets the needs of governments, employers and workers – be it international standards, national legislation, technical guidance, methodologies, accident and disease statistics, best practice, educational and training tools, research or hazard and risk assessment data, in whatever medium, language and format needed – are a prerequisite for identifying key priorities, developing coherent and relevant strategies, and implementing national OSH programmes': [http://www.ilo.org/public/english/protection/safework/globstrat\\_e.pdf](http://www.ilo.org/public/english/protection/safework/globstrat_e.pdf)

(50) 'Of mice men and models: future research for improving risk assessment methods', *Hum Ecol Risk Assess*, October 2002, 8(6):1195–1487: [http://www.crcjournals.com/ejournals/issues/view\\_issue.asp?asection=1055&vol=8&issue=6](http://www.crcjournals.com/ejournals/issues/view_issue.asp?asection=1055&vol=8&issue=6)  
Publication within NORA (national occupational research agenda).

(51) Exposure assessment methods – Research needs and priorities centres for disease control and prevention, NIOSH (Report produced within NORA): <http://www.cdc.gov/niosh/docs/2002-126/2002-126.pdf>





There is much information available on exposures to dangerous substances, but a complete lack of overview for particularly work activities. This is even more so for work activities traditionally carried out by female workers<sup>(52)</sup>. The OECD has attempted to draw up emission scenario documents<sup>(53)</sup> describing the sources, production processes, pathways and use patterns with the aim of quantifying the emissions (or releases) of a chemical into water, air, soil and/or solid waste. Nevertheless, the exposure situation of workers who handle these substances in the workplace are often under-represented in this kind of research.

A major source of sickness absence in the workplace is due to skin irritation and dermatitis – skin diseases belonging to the most prevalent occupational diseases in many countries in Europe. Current methodologies for assessing these dermal exposures are, however, inadequate<sup>(54)(55)</sup>. There are no limit values for skin exposure and no appropriate methods specifically for assessing the exposure to mixtures of substances.

Workplace exposure assessment cannot be reduced to being an aspect of health research or environmental research, but should provide mapping of exposure to dangerous substances in the workplace, including skin exposures, as a research area in its own right.

#### *5.1.2. Indoor air quality, including multiple low-level exposures and their effects (e.g. multiple chemical sensitivity)*

Indoor non-industrial work environments were designated a priority research area in the USA in a nationwide stakeholder process that created the national occupational research agenda. A multidisciplinary research team outlined the following priority research topics: building-influenced communicable respiratory infections, building-related asthma/allergic diseases, and non-specific building-related symptoms; indoor environmental science; and methods for increasing implementation of healthful building practices. Available data suggest that improving building environments may result in health benefits for more than 15 million of the 89 million US indoor workers, with estimated economic benefits of USD 5 billion to USD 75 billion annually. Research on these topics, requiring new collaborations and resources, offers enormous potential health and economic returns<sup>(56)</sup>.

Similar priorities are reflected in research programmes and activities in EU countries and Australia.

#### *5.1.3. Combined effects of dangerous substances and other factors (noise, vibration and psychosocial issues), mixed exposures and toxicology of combined mixtures*

Nowadays, acute poisoning by dangerous substances is not a major problem in most workplaces, but many workers are exposed to a combination of low-dose substances that interact with other occupational risks such as noise, vibration, radiation and psychosocial factors. Moreover, risks outside the workplace may have an additive or synergistic effect on occupational risks.

The mixed exposures team of the US NORA programme has grouped these exposures into the following groups: 'complex mixtures (such as combustion exhausts), mixtures with identifiable composition, mixed stressor exposures (such as noise and chemicals), and mixtures associated with particular workplaces or pro-

(52) 'Gender issues in safety and health at work', European Agency for Safety and Health at Work 2003: <http://agency.osha.eu.int/publications/reports/209/en/ReportgenderEN.pdf>

(53) OECD emission scenarios for specific chemicals/uses: [http://www.oecd.org/document/46/0,2340,en\\_2649\\_34365\\_2412462\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/document/46/0,2340,en_2649_34365_2412462_1_1_1_1,00.html)

(54) OECD's database on chemical risk assessment models: <http://webdomino1.oecd.org/comnet/env/models.nsf>

(55) Compilation and evaluation of measurement data from German *Länder* authorities on worker exposure to chemical substances, BAuA, Germany: <http://www.baua.de/english/fors/1378.htm>

(56) Mendell, M. J., Fisk, W. J., Kreiss, K., Levin, H., Alexander, D., Cain, W. S., Girman, J. R., Hines, C. J., Jensen, P. A., Milton, D. K., Rexroat, L. P. and Wallingford, K. M., 'Improving the health of workers in indoor environments: Priority research needs for national occupational research agenda', *Am J Publ Health*, September 2002, 92(9):1430–1440: <http://www.ajph.org/cgi/content/full/92/9/1430>; publication within NORA (national occupational research agenda).



cesses (such as coal mine dust). Although research can be directed at various specific mixtures in each of these categories, the team is recommending that **priority** be given toward those **studies that yield a broader understanding of how mixed exposures potentiate the health response**, and to the extent possible, simultaneously carry out the **research with real-world mixtures that affect large numbers of workers'** <sup>(57)</sup><sup>(58)</sup>.

## 5.2. Specific groups of chemical substances to be assessed

Research activities in the proposed topical areas (see below) should broadly address:

- mechanisms and causes of disease and injury;
- the relevant environment and workforce (related sectors, activities and groups at risk);
- tools and approaches, including assessment, measurement and prevention measures.

### 5.2.1. Exposure to ultrafine particles <sup>(59)</sup>, that is, derived from nanotechnologies <sup>(60)</sup><sup>(61)</sup>, effects and workplace prevention

Although many nanotechnologies are still in the pre-competitive stage, nanoscale materials are increasingly being used in optoelectronic, electronic, magnetic, medical imaging, drug delivery, cosmetic, catalytic and materials applications. Nanotechnology is somewhat loosely defined, although in general terms it covers engineered structures, devices and systems that have a length scale of 0.1–100 nanometres. At these length scales, materials begin to exhibit unique properties that affect physical, chemical and biological behaviour. Researching, developing and utilizing these properties is at the heart of the new technology. Between 1997 and 2003, worldwide government investment in the field rose from USD 432 million a year to just under USD 3 billion a year, and the global impact of nanotechnology-related products is predicted to exceed USD 1 trillion by 2015. In the USA, an estimated 2 million workers are currently exposed to nanometre-diameter particles on a regular basis <sup>(62)</sup>. The rapid growth of nanotechnology is leading to the development of new materials, devices and processes that lie far beyond our current understanding of environmental and human impact. Many nanomaterials and devices are formed from nanoparticles initially produced as aerosols or colloidal suspensions.

Exposure to these materials during manufacturing and use may occur through inhalation, dermal contact and ingestion. Occupational health risks associated with manufacturing and using nanomaterials are not yet clearly understood. Minimal information is currently available on dominant exposure routes, potential exposure levels and material toxicity. What information does exist comes primarily from the study of ultrafine particles (typically defined as particles smaller than 100 nanometres) <sup>(63)</sup>. Ultrafine particles typically occur in more traditional work procedures (sanding), or other particle-generating technologies, including blazing, machining or surface abrasion of metals, plastics or wood, or mechanical and medical applications of laser technologies, as well as in combustion of fuels in car engines, i.e. traffic and diesel exhaust gases.

The European Commission has launched a wide public consultation on the future of nanotechnology in Europe, following its communication 'Towards a European strategy for nanotechnology' <sup>(64)</sup>. The European Commission has also addressed occupational risks associated with the use of nanotechnologies within its sixth framework programme <sup>(65)</sup>.

<sup>(57)</sup> <http://www.cdc.gov/niosh/00-143ff.html>—mixed exposure team related to NORA (national occupational research agenda).

<sup>(58)</sup> Agenda for public health environmental research (APHER) Agency for Toxic Substances and Disease Registry 2002–10, identifies as issues for exposure assessment: 'Improve methods to measure and characterise human exposures to odorous and hazardous substances in the air' and 'Determine total human exposure from exposure to hazardous substances from all pathways using new approaches': <http://www.atsdr.cdc.gov/science/resagenda.html>

<sup>(59)</sup> Inhaled Particles IX—a multidisciplinary symposium held at Robinson College, Cambridge, United Kingdom, from 2 to 6 September 2001: <http://www.abdn.ac.uk/~oem148/inhpartixreport.htm>

<sup>(60)</sup> Nanotechnology guides from hazards and TUC: <http://www.hazards.org/nanotech>

<sup>(61)</sup> Nanotechnology & workplace safety and health: <http://www.cdc.gov/niosh/docs/2004-175/pdfs/2004-175.pdf>

<sup>(62)</sup> Based on year 2000 national industry-specific occupational employment estimates by the US Department of Labour.

<sup>(63)</sup> 'Nanomaterials—A risk to health at work?' First International Symposium on Occupational Health Implications of Nanomaterials: <http://www.hsl.gov.uk/news/nanosymp.htm>

<sup>(64)</sup> [ftp://ftp.cordis.lu/pub/nanotechnology/docs/nano\\_com\\_en.pdf](ftp://ftp.cordis.lu/pub/nanotechnology/docs/nano_com_en.pdf)

<sup>(65)</sup> nanoSAFE, Safe production of nanomaterials: <http://www.nanosafe.org>



### 5.2.2. Carcinogenic substances – burden of occupational cancer in Europe

Carcinogens, mutagens and substances toxic to reproduction are of great concern because of the harm that they can cause to workers. At the end of the 20th century, almost 2.8 million new cases and 1.9 million deaths from cancer were being observed each year throughout Europe, placing cancer diseases as the second cause of death. When the comparisons are restricted to people aged 45–64, the relative frequency increases to 45–50 % for both sexes in almost all countries, placing cancer diseases as the first cause of premature deaths <sup>(66)</sup>.

In the early 1990s, about 32 million workers in EU countries were exposed to occupational carcinogens. The most common exposures were environmental tobacco smoke, crystalline silica, diesel exhaust, radon, wood dust and benzene. Between 35 000 and 45 000 cancer deaths per year are due to exposures occurring in the workplace. One occupational death from cancer costs an average of USD 2.14 million and the cost of such deaths across the European Union is over USD 70 billion per year <sup>(67)</sup>. According to the Institut de veille sanitaire (InVS, a public body of scientific expertise), at least 4 % of all cases of cancer are occupational in origin, or 10 000 of some 250 000 new cases which occur in France each year. These figures are a far cry from the number of recognised cases of occupational cancer (around 900 in 1999) <sup>(68)</sup>.

The recognition of substances as carcinogenic has wide-ranging consequences for their use in the workplace. An example is crystalline silica (SiO<sub>2</sub>), which has been identified as carcinogenic in the recent years. Crystalline silica is unavoidable in some occupations, such as mining or construction. Prevention measures to be applied are wide-ranging, and include the design of machinery. For example, tools for construction workers should be tested and better designed to avoid exposure as far as possible.

Accurate mapping of workplace exposures to carcinogens and assessment of the burden of occupational cancer is essential for focusing such prevention measures.

### 5.2.3. Reproductive toxicants <sup>(69)</sup><sup>(70)</sup> – including endocrine disruptors

There is significant public health concern about the potential effects of occupational exposure to toxic substances on reproductive outcomes. Several toxicants with reported reproductive and developmental effects are still in regular commercial or therapeutic use and thus present potential exposure to workers. Examples of these include heavy metals, organic solvents, pesticides and herbicides, and sterilants, anaesthetic gases, and anti-cancer drugs used in healthcare. Many other substances are suspected of producing reproductive or developmental toxicity but lack sufficient data. Progress has been limited in identifying hazards and quantifying their potencies and in separating the contribution of these hazards from other aetiological factors. Identifying the causative agents, mechanisms by which they act, and any potential target populations, present the opportunity to intervene and protect the reproductive health of workers <sup>(71)</sup>.

<sup>(66)</sup> Sancho-Garnier et al., 'Europe's cancer burden', *UICC Handbook for Europe*, International Union Against Cancer 2004: [http://www.uicc.org/fileadmin/user\\_upload/UICC/Main\\_Site/Publications/5Burden.pdf](http://www.uicc.org/fileadmin/user_upload/UICC/Main_Site/Publications/5Burden.pdf)

<sup>(67)</sup> <http://europa.eu.int/rapid/pressReleasesAction.do?reference=IP/04/391&format=HTML&aged=0&language=EN&guiLanguage=en>

<sup>(68)</sup> Valat-Taddei, 'The importance of an information system on occupational diseases independent of insurance institutions', Monitoring of occupational safety and health in the European Union, Workshop 30 September to 1 October 2002: <http://europe.osha.eu.int/systems/osm/proceedings/index.stm>

<sup>(69)</sup> <http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?DARTETIC>

<sup>(70)</sup> <http://reprotox.org/>

<sup>(71)</sup> Lawson, C. C. et al., 'An occupational reproductive research agenda for the third millennium', *Environ Health Perspect*, April 2003, 111(4), 584–592. Publication within NORA (national occupational research agenda).



More references for endocrine disruptors are provided by the European Commission, who has identified this as a top priority area <sup>(72)</sup><sup>(73)</sup><sup>(74)</sup>.

### 5.3. Workplace exposure to biological agents

#### 5.3.1. Assessment of occupational risks related to global epidemics and identification of OSH strategies at all levels <sup>(75)</sup><sup>(76)</sup>

There is an urgent need to protect workers, in all sorts of workplaces, from a new risk to their health from new occupational hazards in the healthcare sector or in the travel industry. A strategic approach to these problems needs to take into account the unique property of global contamination combined with the difficulties in finding adequate treatment for some of the diseases related to exposure to some of these diseases. Clarifying the boundary and interactions between public health and occupational health is of utmost importance. This is why particular attention should be given to systematic prevention and new ways of cooperation and effective use and sharing of research are to be found.

#### 5.3.2. Exposure assessment to biological agents in the workplace

Biological hazards in the work environment have received increasing attention recently due to a number of emerging issues such as bioterrorism, e.g. utilisation of anthrax, threat caused by HIV-contaminated needles to the healthcare personnel, epidemics of treatment resistant tuberculosis in some European countries, as well as an increasing importance of meticillin resistant *Staphylococcus Aureus* (MRSA) in hospital environments, or the occurrence of bovine spongiform encephalopathy (BSE) and consequently possible exposures to workers in meat processing, and the use of genetically modified micro-organisms. Large-scale use of biological agents has been made possible by technological achievements and encouraged by important improvement in quality of products such as drugs, detergents or cosmetics. At least 15 % of all new cases of cancer worldwide can be attributed to infections with viruses, bacteria or parasites <sup>(77)</sup>.

Exposure to biological agents also occurs in traditional workplace settings or due to changes in work technologies. As an example, in the construction industry unexpected problems of new building and insulation techniques and technologies result from moisture in relatively new buildings, associated with serious health problems in those individuals who work in such work environments, in construction or maintenance activities, or even as office workers. Similar exposures to micro-organisms are involved with recycling and processing of waste, in agriculture, laboratories dealing with animals or the food industry, whether intentionally or unintentionally <sup>(78)</sup>.

Assessment as well as measurement methods for workplace exposures of this kind are still very much at an experimental stage. There are no limit values for occupational exposure to biological agents. There is an urgent need to focus research to biological agents related to workplace exposures. A systematic mapping of these workplaces, encompassing the biology of the micro-organisms involved, exposure routes, effects and mechanisms, preventive measures, medical surveillance and rehabilitation proves necessary.

<sup>(72)</sup> Community strategy for endocrine disruptors: <http://europa.eu.int/comm/environment/docum/99706sm.htm>

<sup>(73)</sup> Communication from the Commission to the Council and the European Parliament on the implementation of the Community strategy for endocrine disruptors - a range of substances suspected of interfering with the hormone systems of humans and wildlife [http://europa.eu.int/comm/environment/docum/01262\\_en.htm](http://europa.eu.int/comm/environment/docum/01262_en.htm)

<sup>(74)</sup> Towards the establishment of a priority list of substances for further evaluation of their role in endocrine disruption, European Commission, Environment DG, 2000. [http://europa.eu.int/comm/environment/docum/bkh\\_main.pdf](http://europa.eu.int/comm/environment/docum/bkh_main.pdf)

<sup>(75)</sup> SARS - Practical and administrative responses to an infectious disease in the workplace, information provided by the ILO: <http://www.ilo.org/public/english/protection/safework/accidis/sars.pdf>

<sup>(76)</sup> HSE strategic research outlook 2003: <http://www.hse.gov.uk/research/opps/sro2003.pdf> - identifies as one of the priority topics for a priority sector, within research objectives and innovation strategy 'To establish the prevalence, causal agents and routes of transmission of work acquired infections to healthcare workers', within new and emerging areas of interest.

<sup>(77)</sup> 'Infections', Bosch, F. X. et al., UICC Handbook for Europe, International Union Against Cancer 2004: [http://www.uicc.org/fileadmin/user\\_upload/UICC/Main\\_Site/Publications/9.6Infections.pdf](http://www.uicc.org/fileadmin/user_upload/UICC/Main_Site/Publications/9.6Infections.pdf)

<sup>(78)</sup> 'Managing biological hazards in the workplace. Biological agents: their nature, their implications and how to handle them', A. Kolk, Magazine 6, European Agency for Safety and Health at Work: [http://agency.osha.eu.int/publications/magazine/6/en/index\\_17.htm](http://agency.osha.eu.int/publications/magazine/6/en/index_17.htm)



## 6. OSH MANAGEMENT

### Context

#### *Finding new ways to improve OSH in a context of profound changes*

The nature of work itself (and its organisation) has changed, becoming more client-driven and more knowledge-driven. As a consequence, health issues have become more complex. The workforce has also been changing; it is ageing and less male-dominated. Finally, the workforce has become more precarious and more difficult to control as it has spread out into small companies. In this context, adapting existing prevention structures and finding new ways to improve OSH have become an urgent necessity.

#### *Improving the monitoring of OSH and the identification of risk factors*

In this context – and as reflected by the initiatives of a number of organisations such as the ILO, WHO and NIOSH – the issue of monitoring has become paramount. Indicators and instruments need to be adapted to the new complexities of work so as to provide better support to policy-makers.

### Main priorities for research

#### 6.1. The economic dimension of OSH

Since the Lisbon summit, the focus has been placed on the economic impact of health at work, and more generally of quality of work and employment. These should contribute to Europe's competitiveness in the world arena. The Commission's strategy on health and safety at work 2002–06 also emphasises this issue by stating that we need to 'improve the fund of knowledge on the economic and social cost of occupational accidents and illnesses'. Available information indicates that the economic costs of work-related illnesses and accidents are high.

So far, little progress has been made in this area: economic analysis remains mainly focused on the costs of registered occupational accidents and diseases. While this is useful, it only considers the tip of the iceberg. The economic analysis needs not only to be broadened to include other issues of working conditions (and other areas such as the environmental implications of poor occupational safety), but also integrated into corporate accounting systems so as to make more easily visible the costs of low quality and the returns of investing in high quality, thus creating a real incentive for companies to act.

New research could target the following issues:

- the **overall cost of social low quality**: costs connected to conditions of work (including accidents, health-related absenteeism), image of the company;
- the **impact of quality of work and employment on overall economic performance**;
- the **development of management and accounting tools integrating the OSH dimension**.

#### 6.2. Life expectancy and work (longitudinal research)

There begins to be a large stock of data on the state of quality of work in Europe. A number of European surveys and national surveys do provide a comprehensive picture of health at work and of working conditions at large. The same surveys also provide time series, thus enabling monitoring of the directions of change.

The main weakness of these otherwise useful instruments is the lack of longitudinal data. Health problems can be connected to current conditions of work but the causal influence of past work activities may not be evident. Research indicates that some exposures (such as asbestos and other cancers) can have long-term health con-



sequences. It would therefore be necessary to relate health outcomes to professional past. There are also indications that life expectancy is closely related to occupations and that there are strong inequalities between various occupational groups. Measures such as the quality-adjusted life year (QALY), adopted by the World Health Organisation<sup>(79)</sup>, could also be useful to explore the impact of working conditions on health and quality of life. It is also important to remember health conditions such as chronic illnesses that are sometimes 'hidden' (i.e. not as visible as other disabilities), but which are affected by working conditions and, in turn, have a negative impact on quality of life.

Research in these areas and the development of longitudinal surveys would provide important support for policies aimed at reducing work-related inequalities and preventing health risks in specific groups and occupations. New research could target the following issues:

- the **development of a Europe-wide longitudinal survey on health at work;**
- an **analysis of all death registers and other relevant statistical data in relation to the occupational background of the deceased;**
- an **assessment of the specific part of work-related diseases in overall mortality.**

It would also be important to assess the importance of **occupational risk factors to which a remarkable share of major diseases of public health importance can be attributed** (risks attributable to the work environment, i.e. the aetiological fraction of the work environment in various important diseases, or mortality in such diseases). As the Commission strategy on OSH indicates, 'health at work should be recognised as an important determinant of the population's general state of health' <sup>(80)</sup>.

### 6.3. Managing an ageing workforce

Following the overall demographic trend, the workforce is ageing. At the same time, work demands are increasing. The gap between workers' capacities and job demands is therefore widening and leading to exclusion from work for health reasons. Companies need to retain experienced workers, and pension systems – if they are to maintain equilibrium – require workers to retire at a later age. It is therefore becoming essential to adapt workplaces to the needs and characteristics of ageing workers.

Research is still scarce on this issue, and more generally on the relationship between age and OSH. New research could target the following issues:

- **analysis of the relationship between age and work** (in particular with a better understanding of age-related selection processes in work);
- **identification of policies aimed at preventing age-related exclusion from work** (in particular the development of corporate management tools and indicators aimed at anticipating future inadequacies between job demands and workers' capacities/abilities).

### 6.4. Strengthening the prevention culture

The strengthening of a prevention culture both within enterprises and in society at large is a stated policy aim of both the European Commission <sup>(81)</sup> and many Member States. Further research is required to determine what factors (at all levels) facilitate or hinder the creation of a successful and sustainable prevention culture.

<sup>(79)</sup> See, for example, [http://www.who.int/quantifying\\_ehimpacts/publications/en/9241546204chap3.pdf](http://www.who.int/quantifying_ehimpacts/publications/en/9241546204chap3.pdf)

<sup>(80)</sup> Community strategy, Section 3.3.3: <http://europe.osha.eu.int/systems/strategies/future/#270>

<sup>(81)</sup> Community strategy, Section 3.2: <http://europe.osha.eu.int/systems/strategies/future/#270>



The following may be some questions to be answered.

- Mainstreaming OSH: how can the education and vocational training systems contribute to the strengthening of a prevention culture (inside enterprises, at sector and national levels, etc.) <sup>(82)</sup>?
- What is the role of corporate social responsibility <sup>(83)</sup> initiatives in this respect?
- How can research findings and good practice examples be disseminated for best results?

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(82) See, for example, the Agency's report on 'Mainstreaming OSH into education':  
<http://agency.osha.eu.int/publications/reports/313/en/index.htm>

(83) Community strategy, p. 16: <http://europe.osha.eu.int/systems/strategies/future/#270>



## 7. ADDITIONAL REFERENCES

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- International trends in strategic directions and priorities for OSH research (2001)  
<http://www.nohsc.gov.au/ResearchCoordination/InternationalTrendssummary.htm>

### **Musculoskeletal disorders**

- NIOSH national occupational research agenda for MSDs: next decade of research  
DHHS (NIOSH) publication No 2001-117 (January 2001)
- NIOSH national occupational research agenda (NORA) priority research area: lower back disorders
- NIOSH national occupational research agenda (NORA) priority research areas: musculoskeletal disorders of the upper extremities
- National OSH research action plan, National Occupational Health and Safety Commission (NOHSC), Australia
- HSC/E strategic research outlook 2003

### ***Dangerous substances***

- <http://www.heriox.org>  
Research on human exposure to hazardous substances, provides European information related to exposure to carcinogens, dermal exposure assessment, development of analytical methods and exposure modelling research as well as access to databases of workplace exposure measurements. List of current European research projects investigating human exposure to chemicals
- National Institute for Working Life, Sweden. Overview of projects chemistry and biology  
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## ANNEX – LIST OF ORGANISATIONS INVITED TO COMMENT ON THE DRAFT REPORT

### Topic Centre on Research

France – Institut National de Recherche et de Sécurité (\*)  
 Denmark – National Institute of Occupational Health/Arbejdsmiljøinstituttet (\*)  
 Germany – Bundesanstalt für Arbeitsschutz und Arbeitsmedizin  
 Germany – Berufsgenossenschaftliches Institut für Arbeitsschutz (\*)  
 Finland – Finnish Institute of Occupational Health (\*)  
 United Kingdom – Health and Safety Laboratory  
 Spain – Instituto Nacional de Seguridad e Higiene en el Trabajo (\*)  
 Italy – Istituto Superiore per la Prevenzione e la Sicurezza del Lavoro (\*)  
 Belgium – PREVENT (\*)  
 Netherlands – TNO Work and Employment

### Topic Centre Good Practice, Systems and Programmes

Finland – Finnish Institute of Occupational Health (\*)  
 Denmark – National Institute of Occupational Health/Arbejdsmiljøinstituttet (\*)  
 Germany – Bundesanstalt für Arbeitsschutz und Arbeitsmedizin  
 Greece – Hellenic Institute for Safety and Health at Work  
 France – Groupement de l'Institution Prévention de la Sécurité Sociale pour l'Europe  
 Portugal – Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa  
 United Kingdom – Health and Safety Laboratory  
 Italy – Istituto Superiore per la Prevenzione e la Sicurezza del Lavoro (\*)  
 Spain – Instituto Sindical de Trabajo, Ambiente y Salud  
 United Kingdom – Institute of Work, Health and Organisations (\*)  
 Germany – Kooperationsstelle Hamburg  
 Belgium – PREVENT (\*)  
 United Kingdom – Robens Centre for Health Ergonomics (\*)

### Topic Centre New Member States

Poland – Central Institute for Labour Protection – National Research Institute (\*)  
 Poland – Central Mining Institute  
 Cyprus – Cyprus Chamber of Commerce and Industry  
 Cyprus – Cyprus Worker's Confederation  
 Slovenia – Institute of Occupational Safety  
 Lithuania – Lithuanian University of Agriculture, Department of Occupational Safety and Engineering Management (\*)  
 Hungary – Public Foundation for Research on Occupational Safety (\*)  
 Czech Republic – Technical University of Ostrava, Faculty of Safety Engineering  
 Slovak Republic – Technical University of Kosice, Institute of Safety, Quality and Environment

(\*) indicates those who provided some feedback.



### **Focal Points of the EU Member States**

Austria – Bundesministerium für Wirtschaft und Arbeit (\*)  
Belgium – Federal Public Service Employment, Labour and Social Dialogue  
Cyprus – Department of Labour Inspection, Ministry of Labour and Social Insurance (\*)  
Czech Republic – Department of Occupational Safety and Labour Environment, Ministry of Labour and Social Affairs (\*)  
Denmark – Arbejdstilsynet  
Estonia – Labour Department, Ministry of Social Affairs  
Finland – Ministry of Social Affairs and Health, Department for Occupational Safety and Health  
France – Ministère de l'emploi, du travail et de la cohésion sociale  
Germany – Bundesministerium für Wirtschaft und Arbeit  
Greece – Ministry of Labour and Social Affairs, General Directorate of Working Conditions and Health  
Hungary – OMMF-Hungarian Labour Inspectorate  
Ireland – Health and Safety Authority  
Italy – Istituto Superiore per la Prevenzione e Sicurezza del Lavoro (\*)  
Latvia – State Labour Inspectorate of the Republic of Latvia  
Lithuania – State Labour Inspectorate of the Republic of Lithuania  
Luxembourg – Inspection du Travail et des Mines  
Malta – Occupational Health and Safety Authority  
Netherlands – Dutch OSH Platform (Arbo Platform Nederland)  
Poland – Central Institute for Labour Protection - National Research Institute (\*)  
Portugal – Instituto de Desenvolvimento e Inspeção das Condições de Trabalho  
Slovakia – National Labour Inspectorate  
Slovenia – Ministry of Labour, Family and Social Affairs, Department for Health and Safety at Work  
Spain – Instituto Nacional de Seguridad e Higiene en el Trabajo (\*)  
Sweden – Arbetsmiljöverket  
United Kingdom – Health and Safety Executive

### **Focal Points of the EFTA Countries**

Iceland – Administration of Occupational Safety and Health  
Liechtenstein – Amt für Volkswirtschaft  
Norway – Directorate of Labour Inspection  
Switzerland – SECO-Staatssekretariat für Wirtschaft (\*)

### **Focal Points of the Candidate Countries**

Bulgaria – Ministry of Labour and Social Policy, Department "Safety and Health at Work"  
Romania – National Research Institute for Labour Protection 5(\*)  
Turkey – Ministry of Labour and Social Security, General Directorate of Occupational Health and Safety

### **EU Social partners**

European Trade Union Confederation's Trade Union Technical Bureau for Health and Safety (TUTB)  
Union des Industries de la Communauté européenne (UNICE)

### **International Organisations**

Switzerland, Geneva – World Health Organization: Occupational Health Team (\*)

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(\*) indicates those who provided some feedback.



European Agency for Safety and Health at Work

**Priorities for occupational safety and health research in the EU-25**

Luxembourg: Office for Official Publications of the European Communities

2005 – 32 pp. – 21 x 29.7 cm

ISBN 92-9191-168-2

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In order to improve the working environment, as regards the protection of the safety and health of workers as provided for in the Treaty and successive Community strategies and action programmes concerning health and safety at the workplace, the aim of the Agency shall be to provide the Community bodies, the Member States, the social partners and those involved in the field with the technical, scientific and economic information of use in the field of safety and health at work.

European Agency for Safety and Health at Work

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