

**Contract to analyse and evaluate the impact of the practical  
implementation in the workplace of national measures  
implementing Directive 98/24/EC on Chemical Agents**

**Final Report  
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**Parts of the Final Report:**

**Vol 1**

ISSUE BASED FINAL REPORT

**Vol 2**

ANNEX I: MEMBER STATE REPORTS

**Vol 3**

ANNEX II: EVALUATION OF THE SURVEY



## Table of Contents

0	Executive summary.....	1
1	Goals of the CADimple study.....	8
2	Methodology.....	10
3	The wider context of regulation and implementation of the CAD .....	18
4	General Appreciation.....	26
5	Risk Assessment (RA).....	31
6	Occupational Exposure Limits (OELs).....	40
7	Substitution .....	48
8	Risk management measures (RMM) .....	55
9	Health Surveillance (HS).....	62
10	Information Requirements .....	71
11	Training and consultation .....	76
12	Protective and Prevention Services (PPS) .....	85
13	Enforcement.....	93
14	Conclusions.....	102
15	General and specific recommendations .....	112
16	CADimple Conclusions and recommendations – Table format* .....	120
17	References.....	132



## **0 Executive summary**

This study evaluates the impact of the Chemical Agents Directive 98/24/EC in EU Member States in terms of: specific prevention approaches (e.g. technical, organisational and/or administrative measures) adopted by Member States and by private and public sector employers; and evidence of the impact of these approaches on protecting workers' health and safety from risks arising from exposure to hazardous substances. It was undertaken for the European Commission by an international consortium of researchers from four institutions: the Kooperationsstelle Hamburg (Germany), Cardiff University (UK), CIOP (Poland) and TNO (Netherlands).

The DG Employment's specifications sought information concerning successes achieved by employers in connection with the practical implementation and application of the legislation, the difficulties and challenges they encountered in this respect and any unexpected positive or negative side effects emerging from the application of the legislation. It further sought information about the degree of participation by workers and their representatives in the operation of prevention policies at the workplace and on the impact of the practical implementation of measures to address the management of hazardous substances on work organisation and competitiveness. In seeking a better understanding of all of these issues, special attention was paid to implications for employers and workers in micro, small and medium-sized enterprises (SMEs), as well as to particularities relating to age, sex and other broad groupings of workers.

The tender specifications provided some detailed guidance on what the DG Employment wished to see addressed under each of ten headings reflecting the requirements of the Chemical Agents Directive. We focused our attention on these ten areas which included risk assessment, occupational exposure limits, information requirements and sources of information, substitution, risk management measures, health surveillance, training and consultation of workers, protective and prevention services and enforcement, as well as a general appreciation of the impact of the Directive by stakeholders in the Member States

The report of the study comprises three volumes. The Main Report includes a description of our methods, a chapter contextualising the study, separate chapters on our main findings in each of the ten areas studied and our overall conclusions and recommendations. The material of the Main Report is largely drawn from each of the reports of our findings in all 27 Member States, which are presented in full in Annex 1, the second volume of the report, as well as from the results of the preliminary survey we undertook in scoping our tasks, which is presented in full in the third volume, Annex 2.

### **Methodology**

With regard to the availability and reliability of data, the huge variation in the quality of data collected on exposures to hazardous substances at workplaces across the EU means that it is simply not possible to reliably measure the impact of a regulatory measure such as the CAD on exposure over time. Nor do we have anything like complete data on the health effects of exposure in the case of known hazardous substances across all Member States. Therefore it is not possible to compare impact reliably, either in terms of outcomes in relation to overall exposures to hazardous substances or in terms of their health effects, because good data on these matters do not exist.

There is a need for regulators and enforcement ‘actors’ to have systematic screening of actual risks as well as of their development. An optimum set of quantitative data would first of all consist of long term quantitative data on:

- The production and use of chemicals, preparations and chemicals in products;
- Disease registers or aggregated data from occupational health surveillance (e.g. cancer, skin diseases, lung diseases);
- Exposure databases, job exposure matrices and aggregated data of measurements.

These statistical data could be complemented by further qualitative research. Issues covered in this research should include: prevention level in enterprises (risk assessment, basic OSH-infrastructure); effectiveness of legislation and enforcement activities; effectiveness of typical risk management measures; application and effectiveness of OELs, evaluation of education and training of OSH-practitioners; quality of health surveillance and protective and prevention services; and barriers to and promoters of substitution.

Given the substantial challenges, the approach we have taken to addressing the questions posed in the tender involved the use of investigative tools to: first seek *indicative* information concerning these matters among stakeholders and in published research and other data across all Member States; and second follow up the issues raised by this preliminary inquiry with a more detailed investigation of case studies based in a smaller number of countries. In addition, we have combined findings from both these investigative activities with evaluation of national data, research and other literature. In this way we have highlighted examples of good practice and what influences risk management of hazardous substances at work — including the role of EU Directives such as the CAD in this respect — as well as concerns about the effects of regulation and the contexts in which they occur.

The CADimple research strategy was based on four main methodological approaches:

- A scoping survey covering all Member States, based on a questionnaire / interview schedule addressed to specialists in chemical management at workplaces and those from government, social partners, OSH-practitioners, academics and insurers of occupational risks;
- Desk Research for all Member States, collecting and analysing studies, scientific articles, national surveys and statistical data in the fields of OSH and/or chemical management;
- Field Research in 9 selected Member States (Czech Republic, Finland, Germany, Spain, Greece, Italy, Poland, Romania, and the United Kingdom), collecting workplace level opinions with multiple methods (short questionnaires, seminars, group discussions, face-to-face interviews, company visits, etc.)
- Input from leading national researchers in countries in which extensive research on issues of the risk management of hazardous substances was already in evidence (Denmark, Finland, Sweden and the Netherlands) and input to some issues from specialists.

The research was undertaken in two overlapping phases. Phase 1 involved the review of the relevant literature and the scoping survey, which was supplemented with visits, interviews and group discussions where appropriate. Findings from this Phase were used to determine the selection of countries, sectors and key national observers that formed the basis for Phase 2, in which the issues identified in Phase 1 were explored in greater depth through more detailed fieldwork.



## **The wider context**

Before addressing the question of impact in the ten areas of the CAD's requirements, it is important to contextualise our analyses in somewhat wider terms. Thus, external factors, mostly outside the frame of specific legislation and the political arena of OSH, including developments in technology, the economy, other areas of legislation, the structure of enterprises, public sector spending, education, societal risk perception, communication and so on, all influence the impact of European legislation and some account needs to be taken of them when attempting an evaluation. More specifically in relation to regulating hazardous substances, it needs to be acknowledged that while the extent of exposure and its health effects are known to be substantial and significant, the precise dimensions of both remain unknown because sources of reliable data on these matters within the EU and elsewhere are underdeveloped.

Moreover, major changes have occurred in the structure and organisation of work and the nature of the labour market in most Member States since the principles detailed in the Directive were conceived. Many such changes increase the challenges for the effective implementation, operation and surveillance of regulatory measures.

In the last two decades in many countries attempts to control public sector spending have resulted in downsizing in a number of important areas for surveillance and control of safety in the use of hazardous substances. Paradoxically, during the same time, deregulation and economic restructuring in Member States have to varying degrees liberalised economic structures and increased the challenges for surveillance and control. So while changes have tended to reduce the capacities for labour inspection and enforcement, at the same time structural changes have increased the demands on these capacities. Meanwhile, perceptions articulated by both employer and employee respondents in the study suggest that, while inspection is seen as both useful and necessary, in practice for many it is a rarely experienced event.

For example the change towards a higher proportion of SMEs – which in general have many more difficulties acquiring, applying and keeping the necessary OSH-knowledge - leads to potentially greater demands for support, including inspection, guidance and advice from inspection agencies. In our study, respondents commented especially on trends towards fragmented management and smaller enterprises in which there was less internal knowledge than is found in their larger counterparts and fewer possibilities to access external knowledge, as well as on the effects of the externalisation of jobs involving hazardous substances and developments towards weaker arrangements for worker representation.

Equally, change towards increased pace and demands of work leads to more unsafe work situations and practices which in turn increase demands on these agencies. Similarly, these changes have led to labour market changes such as more temporary and casual workers whose changing work situations may lead to their greater exposure to risks they have not experienced before.

The Member States have increasingly applied strategic policy approaches to cope with these developments and with the downsizing and deregulation of the public sector in general and labour inspection capacities in particular. Inspection authorities have introduced priorities and systems for enforcement as well as monitoring strategies to control the effectiveness of their work. Most Member States now possess national strategies for OSH to support more systematic or targeted improvement of the prevention level in enterprises. Only a few of these strategies specifically tackle the reduction of the use of hazardous chemicals as a main goal. Despite the acknowledged problems of mortality and morbidity associated with occupational exposure to hazardous substances, it appears that a focus on their control is less evident in national and EU strategies on OHS than was previously the case. Although they continue to

feature in some national strategies, this seems to be the exception rather than the rule and it is notable that the most recent EU-strategy also does not mention a specific goal for hazardous substances at work.

At the same time, these challenges also have helped create awareness among specialists, peak key organisations, and other advisers, for example, of the necessity to focus more effectively on the needs of small firms, to understand these organisations and their businesses better in order to propose and implement realistic solutions to their problems.

The effects of such awareness are felt across many of the ten areas covered by the CAD. They have led to a search for more effective risk communication and information dissemination on hazardous substances, more realistic roles for exposure limits in risk assessment and risk management, improved training provisions, better focus for prevention services and health surveillance as well as improved risk assessment and management applications within firms themselves. There remains, however, considerable room for their further development.

Problems for improved risk management of hazardous substances do not only arise from structural change. Technological changes also create challenges. While the overall quantity of substances in use remains unchanged, there is a clear trend towards an increase in their variety, leading, for example, to increased use of complex preparations, for which regulation is often ill-prepared. These changes exacerbate already existing difficulties in terms of capacity and support for effective risk management of hazardous substances in many enterprises.

### **The impact of the Chemical Agents Directive**

The Chemical Agents Directive is widely acknowledged as a comprehensible and coherent regulatory measure. While there are a few areas where minor improvement could be made to wording, for example to avoid difficulties of interpretation, no essential or major changes of the text of the CAD are required.

However, this conclusion contrasts with our findings on its implementation at workplaces. It is here that our study demonstrates the main challenges lie. There are serious deficits and difficulties in the implementation of the Directive's requirements at the workplace level that are caused by problems of understanding, low awareness, the lack of specialist knowledge and weaknesses in OSH-knowledge and awareness in general. The presence of such problems varies with the pattern of chemical use, and with the size of organisations - which influence OSH capacities and knowledge - and with economic sector, which may have a similar effect.

Implementation is not consistent between Member States. Major causes of inconsistency include variations in the status and development of economic and technological structures and OSH policies. Other large differences are found in the secondary and tertiary legislation of Member States, which provide the detailed requirements for the safe use of chemicals at workplaces. There is further variation in the enforcement priorities of Member States, their monitoring and surveillance capacities and in the education and qualifications of OSH specialists and prevention services.

### **Positive impact of the CAD**

In our research we identified positive developments concerning the impact of the CAD and that of related measures. This includes our broad findings concerning a raised awareness of hazardous substances across enterprises in the EU generally, as well as the significant and substantial provision of information, training, specialist services, and support tools for risk management of hazardous substances in many countries and sectors. There is also some

evidence of the increased occurrence of risk assessment and management according to Framework Directive/CAD principles.

Many systematic approaches towards achieving risk assessment and risk management of high quality have been developed, at the enterprise level, at the level of associations and by inspection authorities and others. This leads to some positive findings concerning implementation and it appears that in many Member States a significant proportion of their enterprises have performed a risk assessment and introduced risk management measures. In workplaces where permanent or regular control of a few substances is essential for risk monitoring, OELs often play an important role and are well known tools in support of risk management.

Many suppliers acknowledge the need for substitution by the user's side. In the majority of economic sectors the greater part of chemical knowledge exists on the supplier's and not the user's side. The supply of less hazardous preparations is also increasingly seen as a good marketing strategy. Additionally it is perceived as reducing the effort and costs of OSH-measures at workplaces and is therefore increasingly conceived in terms of financial benefits and market share.

The availability of tools for the instruction of workers has improved since the adoption of the Directive. Good and comprehensive tools have been developed across the whole chain of risk communication involved with working with hazardous substances; they also include features adapting them to sector specific needs. It is further acknowledged that there is widespread provision of training at all levels, from workers engaged in the use of hazardous substances, to managers with specific responsibilities for controlling risk and professionals involved in monitoring, evaluation and control. Examples of good practice are reported at all these levels. Consultation of workers is now well established as one of the important factors supporting effective implementation. At workplaces where such consultation occurs it enhances the chances for good chemical risk management.

In some cases the trend toward outsourcing of OSH competence may have led to the use of OSH services – protective and preventions services and health surveillance services - with highly specialised qualifications and workplace knowledge that act to improve the OSH situation on hazardous substances in firms without such expertise.

In many Member States there are specific provisions – besides the CAD - to protect 'vulnerable' workers, such as pregnant workers, or those working at particular workplaces – mines, nuclear power plants etc – or those working with particular forms of hazardous substances, such as carcinogens, asthmagens and so on. In this respect, regulatory requirements in most countries in the study distinguish specific categories of chemical substance for which a different, or more detailed, approach to achieving effective risk management is applied.

### **Challenges of implementation**

It is evident from our findings that there are still far too many enterprises in which low awareness, low knowledge and inadequate risk assessment and risk reduction remain the norm in relation to hazardous substances. Indeed, despite our positive observations concerning larger enterprises, it remains the case that the greater proportion of the total number of enterprises in most Member States have never performed a risk assessment in accordance with its meaning as understood in EU Directives, or if they have, they have not introduced any risk management measures as a result.

Where it occurs, risk assessment in such situations is often little more than a formal procedure to achieve paper compliance. Many interviewees stated that there was only a weak connection between risk assessment and risk management measures. We cautiously estimate that not

more than 50% of enterprises have performed an overall OSH risk assessment. The larger the enterprise the greater is the probability that a risk assessment will be undertaken, so more than 50% of employees are likely to be covered by a general OSH risk assessment. However there are many doubts expressed concerning the quality of these risk assessments and especially whether they address the risks of hazardous substances adequately.

Also in these enterprises the basic and essential information tool for safety and hazards information of chemicals - the Safety Data Sheet (SDS) - is not effective. It is simply not understood and not used as an instrument of assessment and risk management. In such cases the obligatory labelling on containers constitutes the main information source for both employers and workers. And there are even problems of understanding here too.

Although there is a general raised consciousness that chemical substances can be hazardous and controls on their use are necessary, it remains the case that for many employers and workers, certain categories of commonly used hazardous substances are simply not perceived as 'risky'. At the same time risk perception, such as it is, often jockeys for position with other perceptions concerning, for example, the value of chemical products in terms of convenience or aesthetics which also influence their use. Moreover, in our surveys and case studies, awareness of hazards often did not appear to extend beyond that of hazardous chemical products. That is, it did not concern hazardous substances at the workplace more generally. Such difficulties may be related to the long-standing substance based focus of regulation and, if so, it is not evident that the more process based focus of the CAD has been entirely effective in addressing this problem. Nor does it seem that the title of the 'Chemical Agents Directive' is itself necessarily helpful in this respect.

In keeping with the general trends of restructuring, many enterprises have outsourced OSH-capacities. While occasionally this may lead to an improvement of the prevention level at the enterprises through the use of well-qualified specialist services, more often outsourcing results in an impairment of the prevention level, especially when only economic considerations dominate decisions concerning use.

Our findings show that substitution is rarely user driven if it is not crucial for the economic success of an enterprise (e.g. if an enterprise is highly dependent on a clean image). The CAD basically puts the responsibility to check substitution options on the employers' side, but as we have demonstrated, they frequently possess neither the will nor the capacity to perform this task adequately and, in the absence of such capacity, it seems questionable that this requirement is appropriately targeted.

Despite examples of a range of good practices, concerns expressed by respondents in the present study suggest there are a number of common failings in relation to the quality of training and its accessibility for all workers who are exposed to chemical risks, as well as concerns about the quality and availability of appropriate information on working with hazardous substances.

## **Recommendations**

As a result, we end our report with some general recommendations. Within each category of recommendations we have also presented some further specific suggestions concerning possible elements that would help in their delivery. Our recommendations relate to four broad areas and concern the need to address:

- a) Weaknesses in the evidence base concerning the extent of the problem of exposure to hazardous substances in EU workplaces;

- b) Adaptation of regulation and policies to economic and technological developments;
- c) Resolution of limitations in the implementation of regulation;
- d) Implementation of regulatory provisions and the role of voluntary approaches, intermediaries, cooperation and communication.

Our report is addressed to the European Commission. However, many recommendations apply to actions that require consideration not only at the level of the EU but at the level of the Member States, sector or individual organisation. They are all made on the basis that our conclusions warrant their consideration.

We were asked to prioritise the multitude of recommendations. If we apply as main criteria an effective and fast implementation of the CAD at those work places where a considerable number of workers is highly exposed or even overexposed to dangerous substances we would prioritise the following measures

- Support the development of sector specific guidance (printed, interactive) and support intermediaries, e.g. social partners and business associations, to address their members personally (face-to-face);
- Support enforcement strategies which strengthen and enhance the overall OSH-prevention level in enterprises and include promotional and enforcement activities;
- Use the growing need for supply chain cooperation and communication - due to REACH and general business developments - to promote good practice in risk assessment, risk management, instruction and substitution;
- Create awareness in enterprises and at the political level by highlighting and illustrating the negative long term effects of high and long term exposure to chemicals.

# 1 Goals of the CADimple study

## **Introduction**

In 2006 the European Union adopted a community programme for employment and social solidarity called PROGRESS. It combines the policy fields of employment and social issues, putting forward a set of common goals with the aim of improving the effectiveness of community law and programmes within the two fields, and creating synergistic effects between them. The Commission has a central role in achieving these goals: it must not only further the development of the programme, but also monitor progress towards its targets.

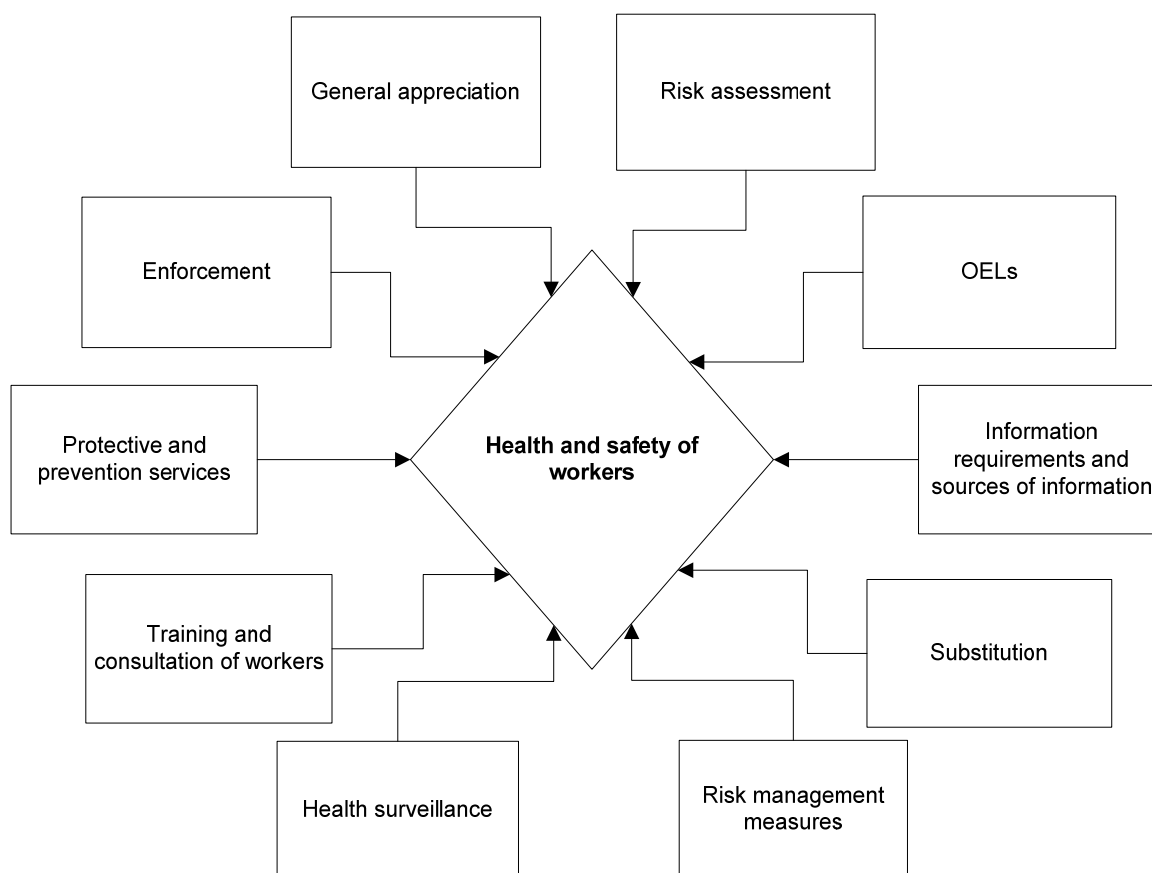
In order to gain the necessary scientific information to fulfil these tasks, the Commission has called for specific studies. In December 2007 DG Employment, Social Affairs and Equal Opportunities (DG Empl) and Kooperationsstelle Hamburg signed a ‘Contract to analyse and evaluate the impact of the practical implementation in the workplace of national measures implementing Directive 98/24/EC on Chemical Agents’, abbreviated as ‘CADimple’. This report summarises the results of the 24 month project. The research has described and analysed the major challenges of the practical implementation of the Chemical Agents Directive (CAD), which may improve the future implementation of the Directive, or be of importance in the development of new regulations.

This study examined the impact of Directive 98/24/EC on the protection of workers’ health and safety from risks related to chemical agents at work. All Member States had to implement this Directive before 5th May 2001, making it possible now both to make a first assessment of its impact and to consider the effectiveness of national measures to implement it at the workplace level.

The project consortium, which in addition to Kooperationsstelle Hamburg included Cardiff University, CIOP and TNO, was charged with evaluating the impact of the Chemical Agents Directive in EU Member States in terms of the specific prevention approaches (e.g. technical, organisational and/or administrative measures) adopted by Member States and by private and public sector employers, and the impact of these measures on protecting workers’ health and safety from risks due to exposure to hazardous substances at work. The tender specifications provided some detailed guidance on what the Commission wished to see addressed under each of ten headings reflecting the requirements of the Chemical Agents Directive, and as should be evident in the following sections, this guidance has helped form both our approach to the study and the presentation of our findings. These are shown in the Figure 1.

The Commission’s specifications also sought information concerning: successes achieved by employers in connection with the practical application of the legislation; the difficulties and the challenges they encountered in this respect; and any unexpected positive or negative side effects resulting from the practical application of the legislation. It further wished to understand something of the degree of participation by workers and their representatives in developing and implementing prevention policies at the workplace level and of the impact of the practical implementation of measures to address the management of hazardous substances at work on measures of work organisation and competitiveness. Understandably, given the present structure of production and services in the EU, in seeking a better understanding of all of these issues we were charged with paying particular attention to the implications for employers and workers in the micro, small and medium-sized enterprises (SMEs) that between them employ the greatest proportion of workers in the EU, as well as with taking into account particularities relating to age, sex or other broad groupings of workers.

*Figure 1: Areas of research interests*



The results of the CADimple analyses and evaluations should provide information allowing Member States to identify areas in which it is necessary to enforce the national provisions more effectively.

### **Structure of the report**

The report consists of three documents: one main concluding report and two annexes. Annex I comprises 27 Member State reports and is the main source for our issue based findings. Annex II is an evaluation of our CADimple survey of specialists in this field.

The main concluding report includes issue based summaries of all our findings and conclusions. It starts with a methodological description of the desk research, field studies and survey included in the project. It continues with our main findings and conclusions, which are structured following the 10 areas of research interest (see Figure 1 above). Following this is a concluding chapter, reflecting the results in a wider context. The report ends with a set of recommendations and suggestions about how to better meet the challenges of the regulation of the use of hazardous substances in workplaces.

## 2 Methodology

### **Evaluating the impact of European OSH-Directives: some cautionary words**

Before explaining the specific CADimple methodology, a reminder of the limitations to extent and meaningfulness with which it is possible to evaluate the impact of EU Directives is appropriate. Such limitations are the subject of critical discourse concerning this form of regulation and the role of ‘Europeanisation’ and there is an extensive literature addressing them. It demonstrates that uneven implementation of Community law is a well-known reality, brought about by variations between Member States in their embedded features of domestic, social and economic regulation and their influence on implementation structures and practices, as well as by differences in the perceived significance of Directives themselves. Constellations of such factors create different ‘domestic adjustments’ to Community measures, while implementation is further influenced by differences in the ‘salience’ of the issues the Directives address.

It is therefore not unreasonable to anticipate that this will also be the case with regard to the Chemical Agents Directive (CAD). This is all the more so, because both sets of factors have already been shown to impact on the domestic implementation and operation of health and safety Directives (see Versluis 2002 for examples explaining the greater impact of the Seveso Directive compared to that of the Safety Data Sheets). In the case of ‘modernising’ health and safety Directives such as the Framework Directive and its daughter Directives (of which the CAD is one), as Walters (2002) and colleagues showed, there are further difficulties in comparing the ‘intent’ of the architects of the Directive with ‘before and after’ effects found in domestic application, where in some Member States it is often difficult to distinguish the influence of a particular Directive from the independent trajectory of embedded national policy development.

In the case of hazardous substances however, these difficulties of interpretation of impact are further compounded by several additional factors, leading others to comment on the considerable variation in national responses to the requirements of the Directive. At a recent meeting a representative of the Senior Labour Inspectors Committee (SLIC) stated:

*“The SLIC has also carried out a survey in which 27 countries took part. One of the conclusions which has come out of this study is that there is an enormous difference in the way in which the Member States are attempting to respond to the requirements of the European Directive”.*

### **Quality and availability of data**

The causes of such apparent differences include both the limited availability of data on which objective assessment can be based and the inherently difficult nature of the subject matter addressed in the CAD (see as an example for these differences and the practical difficulties of harmonised data collection the European OSH-Scoreboard approach (EU-Commission, DG Employment 2009a). For example, with regard to the availability and reliability of data, the huge variation in the quality of data collected on exposure to hazardous substances at workplaces across the EU means that it is simply not possible to reliably measure the impact of a regulatory measure such as the CAD on exposure over time. Nor do we have anything like complete data on the health effects of exposure in the case of known hazardous substances across all Member States, let alone evidence of these effects in the case of the many substances for which there remains uncertainty concerning their possible health effects.



Therefore it is not possible to compare impact reliably, either in terms of outcomes in relation to overall exposures to hazardous substances or in terms of their health effects, because good data on these matters do not exist.

Ideally, an optimum set of data would consist of long term statistical data concerning:

- The production and use of chemicals, preparations and chemicals in products
- Disease registers or aggregated data from sources such as occupational health services (e.g. cancer, skin diseases, lung diseases)
- Exposure databases, aggregated data on exposure measurements

These statistical data would be complemented by qualitative research on the prevention level in enterprises, the effectiveness of legislation and enforcement activities, the evaluation of training of OSH practitioners etc. Both types of sources together would be a base from which to assess the impact of the implementation of the CAD with the best possible means.

Nowhere is there anything like complete sets of routinely collected data on any of these matters. At best, Member States have partial data sets, for example on the number of occupational diseases related to chemicals. Examples include the Czech Republic 'Register of occupational diseases' and its register 'Subjects exposed to carcinogens' or the Polish 'Labour Inspection' and 'Occupational Health' databases. Probably the most comprehensive and harmonised data sources can be found in the Nordic countries (product registers, cancer registers and disease registers, national surveys or studies on risk assessment and risk management, exposure databases such as FINJEM and also numerous research studies).

All Member States publish statistics on accidents and recognised occupational diseases. These data are of the same statistical quality and kind as the data transferred to EUROSTAT for European statistical purposes. They therefore suffer from the same weaknesses associated with such data, especially in terms of comprehensiveness and limitations imposed by definitions of what is required to be reported. Moreover, because of the latency of occupational diseases, current publications on the incidence and prevalence of such conditions refer to past exposures that predate the implementation of the CAD and are therefore not helpful in evaluating its impact.

In the majority of Member States, the relevant state authorities additionally publish annual inspection reports aggregating data on national inspection activities. In some cases these reports contain quantitative information about the level of prevention in enterprises – e.g. percentage of enterprises performing a risk assessment – or specific information about the current handling of dangerous substances. Some of these data were used in our study, for example for the assessment of enforcement activities.

Some Member States conduct national surveys on the work environment, e.g. the Netherlands, Denmark, Sweden, Finland, France, Spain and Germany. These surveys cover representative samples of the population and are in most cases based on telephone interviews and self assessments. Such surveys sometimes include estimates concerning exposure to dangerous substances or basic OSH-management features in the enterprise. These data were examined, but were mostly found to be of such a general kind that the specific questions of our study were not addressed.

A large number of Member States carry out surveys or studies which describe the OSH-situation in enterprises, e.g. data on the quality of risk assessment and risk management in enterprises. These reports and studies stem from different sources and are of different types. For example: in Romania, Hungary, other accession states and southern Europe we typically find studies from the academic world; the Nordic countries traditionally use extensive reporting of the activities of the public sector combined with studies (such as the enterprise supervision reports VOV in Denmark (Arbejdstilsynet 2007), the National Monitoring

Program for Chemicals in Finland or the many statistical data of KEMI in Sweden); and Member States like the UK and the Netherlands have a long tradition in evaluation of policies. These sources – as far as available and known – were used for all our 10 research areas.

The approach to transparency of an infrastructure and to data aggregation seems to be closely connected to the general political culture. The trend towards fewer public statistics, deregulation and downsizing, and data protection – e.g. the shift from obligatory to voluntary cancer register - is clearly a barrier for the evaluation of the situation and any trends. However, the trend towards more evaluation of the existing infrastructure, as for example the evaluation of the national strategies or the European Risk Observatory at the European Agency for Safety and Health at Work, is the source of a number of valuable surveys and studies.

As a consequence of the implementation of REACH more data on chemicals will be publicly available, exposure scenarios will be improved, the transparency of the chemical market will be higher.

When there are limitations to the use of objective indicators such as exposure data or health effects to measure impact, it is conventional to turn to proxy measures such as those concerning management and awareness. This is especially apposite in the case of the CAD since its focus is essentially on regulating management arrangements and the requirements on information, surveillance, technical support and feedback necessary to operationalise them effectively.

But here too there are problems. While there are a host of leading indicators associated with good management practice, which theoretically could be applied to study the impact of the CAD, it is important *to situate their use* and to take account of the wider contextual factors that influence them. The impact of restructuring across EU economies in general means that this is far from straightforward. It is increasingly accepted that restructuring presents enormous challenges for OHS management, including that in relation to hazardous substances. The change process makes identification and collection of appropriate data extremely problematic. The present investigation has found quantitative survey findings on OHS management measures generally, as well as those addressing hazardous substances specifically, quite limited at the European level, and the few undertaken at national level equally problematic. Moreover, such quantitative results frequently lack sufficient qualitative content to make for useful interpretation. For example, there are survey data on the extent of risk assessment practiced at workplaces in some EU countries, but what is actually meant by ‘risk assessment’ in these situations varies considerably and is often not clear even among respondents in a single survey.<sup>1</sup> The result, among other things, is that it is often difficult if not impossible to distinguish the impact of a regulatory measure such as the CAD from that of other situational factors.

Nor, in a study of this kind, is it possible to reliably distinguish the effects of the Directive in terms of measures of overall increased awareness amongst employers, employees or society at large. There are several elements that emerge from our findings that might be termed ‘awareness issues’ among employers and employees and in society more generally. The comment of a Finnish respondent who was a researcher and occupational physician is typical:

*‘The main positive impact is the message from Europe: Care for chemicals!’*

Given these limitations of the study, it would be unwise to treat these findings as anything more than indicative. However, since wider research suggests that ‘issue salience’ is an

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<sup>1</sup> The recent survey on risk management measures in EU workplaces, undertaken on behalf of the EU Agency for Health and Safety as part of its Healthy Workplaces campaign, may go some way to addressing these criticisms. Unfortunately its results are not available at the time of writing.

important influence on the nature of transposition of Directives, and in turn there is also the possibility that the Directive itself might contribute to changes in public perception of the risks of hazardous substances, it is important to have regard to aspects of these awareness issues.

Given the substantial challenges, the approach we have taken to addressing the questions posed in the tender involved the use of investigative tools to: first seek *indicative* information concerning these matters among stakeholders and in published research and other data across all Member States; and second follow up the issues raised by this preliminary inquiry with a more detailed investigation of case studies based in a smaller number of countries. In addition, we have combined findings from both these investigative activities with the evaluation of national data, research and other literature. In this way we have highlighted examples of good practice and what influences risk management of hazardous substances at work — including the role of EU Directives such as the CAD in this respect — as well as concerns about the effects of regulation and the contexts in which they occur.

### **Methodology of CADimple**

The CADimple research strategy was based on four main methodologies:

- A scoping survey covering all Member States, based on a questionnaire / interview schedule addressed to specialists in chemical management at workplaces and those from government, social partners, OSH-practitioners, academics and insurers of occupational risks;
- Desk Research for all Member States, collecting and analysing studies, scientific articles, national surveys and statistical data in the fields of OSH and/or chemical management;
- Field Research in 9 selected Member States (Czech Republic, Finland, Germany, Spain, Greece, Italy, Poland, Romania, and the United Kingdom), collecting workplace level opinions with multiple methods (short questionnaires, seminars, group discussions, face-to-face interviews, company visits, etc.)
- Input from leading national researchers in countries in which extensive research on issues of the risk management of hazardous substances was already in evidence (Denmark, Finland, Sweden and the Netherlands) and input to some issues from specialists.

The research was undertaken in two overlapping phases. Phase 1 involved a review of the relevant literature and a questionnaire based survey, supplemented with visits, interviews and group discussions where appropriate, while Phase 2 concerned more detailed field work in selected countries and more detailed discussion with key national observers in a small number of additional countries where this approach was deemed more useful. There was some overlap between the two phases with analysis of late coming questionnaires continuing into the second phase as well as on-going review of published sources. Each of the four methods adopted are outlined below. In both phases, and in relation to the four main methodologies, inquiry was directed to undertaking an issue based analysis related to the 10 areas of research interest identified in the tender specification, namely General Appreciation, Risk Assessment, Occupational Exposure Limits, Information Requirements and Sources of Information, Substitution, Risk Management Measures, Health Surveillance, Training and Consultation of Workers, Protective and Prevention Services and Enforcement.

## **The Survey**

Between September 2008 and April 2009 the consortium used a questionnaire that was developed in Phase 1 to undertake an indicative survey of experiences in relation to the implementation and operation of the CAD in all Member States. It was a comprehensive, 20 page questionnaire aimed at the specialist level. It resulted in an overview which gave some insights into the opinions of specialists in this area. A summary of the findings is presented as Annex 2 and we have also drawn on the responses to the questionnaire as one source for the report presented in the following pages.

The questionnaires were completed in different ways. During face-to-face or telephone interviews the CADimple staff went through them with respondents. In the majority of cases however, the questionnaires were completed by the respondents themselves and sent back by mail, email or fax. In a few cases a group of people filled in the questionnaire together, e.g. 32 labour inspectors from all regions of Romania. In other cases such as in Greece, Italy, Ireland, France and Cyprus the questionnaire was used as the basis for face to face group interviews and discussions with respondents. In these latter cases the numbers of respondents varied between 5-10 in different Member States and although some completed questionnaires, the total number of respondents in these countries is not reflected in the numbers of questionnaires returned, since not all participants did so.

The original proposal for this project identified six groups of respondents that would be targeted by the survey: Government, Employer, Employee, Professional Association, Chamber of Craft, and Accident Insurance Organisations. Following some preliminary investigation it was found necessary to make some modifications to these groups. There were three main reasons for this:

- certain groups do not exist in all countries (e.g. Chambers of Craft and Accident Insurance Organisations);
- other groups contain distinct sub-categories, some of which also do not exist in all countries (e.g. national and regional Government; and national and regional regulatory agencies);
- several respondents could represent more than one group – either because they completed the questionnaire with colleagues (from the same and/or other groups), or because they identify their own roles with more than one group.

Following discussions within the consortium and with DG Employment, a broader set of categories has been adopted. Table 1 shows both the main categories, used in the overview, and the sub-categories which make up these main categories.

**Table Meth 1: Main and sub-categories of respondents**

Main category	Number	%	Sub-category	Number	%
Public administration	34	22.7	Inspectorate	17	11.3
			Policy makers	17	11.3
Employers' representatives	12	8.0	Employers' associations	10	6.7
			Chamber of Commerce	1	0.7
			Chamber of Craft	0	0.0
			Individual employers	1	0.7
Employees' representatives	21	14.0	Unions	21	14.0
			Works councils	0	0.0
			Shop stewards	0	0.0
OSH practitioners	48	32.0	External OSH services	32	21.3
			Internal OSH experts	6	4.0
			Occupational physicians	4	2.7
			Representatives of Professional Associations	6	4.0
Accident Insurance	5	3.3	Accident Insurance with prev. activities	5	3.3
Academics	28	18.7	Academics & researchers	28	18.7
Other	2	1.3	Other*	2	1.3
<b>Total</b>	<b>150</b>	<b>100</b>	<b>Total</b>	<b>150</b>	<b>100</b>

\*Combined employers' and employees' associations; National specialist (safety unit researcher)

## Desk Research

The aim of the Desk Research was to review relevant data concerning the impact of the national legal requirements applied in practice in the workplace in transposing the CAD, including challenges and successes of certain groups of companies, especially SMEs, in this field. Normal literature search methods were adopted for on-line inquiry, supported by the existing knowledge of the researchers in the CADimple team and supplemented with advice received from personal contacts in the countries included. As far as possible, all available, relevant scientific literature, studies, national surveys and statistical data were reviewed in order to analyse the implementation and impact of the Directive in every EU Member State. The review covered practical implementation of the requirements of the CAD-Directive in the workplace, taking into account all 10 research areas. The literature search was limited to the time period 1990-2007, except where it was felt that earlier literature was especially significant. The consortium decided to focus mainly on English language sources but also exploited – as far as possible – sources in other national languages, especially for the nine Field Research Member States and the Netherlands (see below). Quotes and references in certain languages were used or - if reasonable - translated by members of the project team, i.e. from Czech, Danish, Dutch, Finnish, French, German, Greek, Hungarian, Polish, Romanian and Swedish.

## Field Research

Phase 1 of the research identified a number of factors that appeared to influence the impact of the Chemical Agents Directive. These were indicative findings and we make no claims for their statistical significance. However in combination with the extensive review of the relevant literature and other data sources they provided a useful guide to the issues that were considered worth exploring in greater detail during the second Phase of the research. In Phase 2, therefore, the investigation of the impact of the CAD was further developed through a more detailed dialogue with those involved, including workers, their representatives, those

responsible for implementation and operation within workplaces (including employers, health and safety managers and advisers) and regulatory inspectors in nine countries selected for this purpose (in addition to the three included in the Detailed Review mentioned above).

We undertook detailed fieldwork in the Czech Republic, Finland, Germany, Greece, Italy, Poland, Romania, Spain and the UK. Our selection and the reasons for making it are summarised in Table Meth 2. The choice was one that reflected the diversity of economic and regulatory profiles in the EU and the project partners' possibilities of access to these countries.

The key aim of this exercise was to follow-up the research questions emerging from Phase 1 of the project. Because we wished to explore supports and constraints to effective application of the national measures to implement the Directive, we also needed to ensure a fair range of sector, size, ownership and hazard among the situations we chose to investigate in greater detail and – where possible – to be able to afford some degree of comparability between the economic and regulatory contexts of the experiences we discovered. At the same time, it was acknowledged that this approach also needed to be pragmatic in exploiting opportunities for research and therefore we selected a range of countries/sectors for more detailed study in which we tried to balance the representativeness of our choice with issues of access, in order to maximise participation.

It also needs to be stressed that this approach was not intended to be a systematic or comprehensive survey of the implementation of the Directive. Such a survey would require considerably greater resources than were placed at our disposal. It was, however, intended to explore experiences that would help to achieve a better qualitative understanding of the supports and constraints to the practical implementation of the requirements of the Directive in workplaces. This we felt would help improve understanding of these issues and support future policy development.

**Table Meth 2: Countries selected for Field Research**

Country	Reasons for study
Czech Republic	Medium new entrant ex-communist political economy. Strong position of industry.
Finland	Good example of a smaller Scandinavian economy. Uniquely well developed infrastructure for prevention.
Germany	Large western European country with major chemical industry. Typical central-European, 'dual regulatory system'. Well-developed support structure, major examples of co-operative initiatives to support risk management, recent regulatory reforms. Good range of features of interest
Greece	Small Mediterranean economy. Weak infrastructures and support. Major presence of small firms Possibly typical of other smaller countries
Italy	Major chemical industry. Significant role for small firms. Considerable regional variations. Some unique features of development while fairly typical larger Mediterranean economy.
Poland	Larger new entrant ex-communist political economy. Interesting transition economy and regulatory system
Romania	A former ex-communist economy joined the EU in 2007 and dominated by small firms.
Spain	Considerable regional variations. Significant role for small firms. Typical Mediterranean economy.
UK	Large western economy. Large chemical industry. Historical establishment of Anglo-American approach to occupational hygiene. Unique OHS regulator. Loosely regulated economy. Weak industry infrastructures. Well developed role for tools to support chemical risk management in national strategies

We gathered more detailed data from workers/trade union representatives and managers/health and safety professionals on our research questions by focusing on a series of ‘case studies’ of experiences in a selection of countries that were thus studied in greater depth than was possible in Phase 1. The emphasis of our inquiry in this phase was on the practical experience of the impact of the Directive at the workplace level and the supports and constraints to achieving this. Therefore we were particularly concerned to engage with workers and their representatives, OHS practitioners/professionals, labour inspectors and employers and their organisations rather than with administrative officials. At the same time we sought a range of situations representing different economic sectors, enterprise size, usage of hazardous substances and so on.

We considered the possibility of selecting a set of economic sectors and branches to be examined in countries chosen for detailed investigation, in order to enhance the possibility of cross sector/country comparisons in sectors of high concern. However, practical difficulties encountered in terms of different levels of access in different situations in different countries meant that the consistent application of such a systematic approach was not feasible, and would also have resulted in missed opportunities in some countries. Nevertheless we believe our choice of cases represents a sufficient range of workplaces, and regulatory and economic contexts to meet the aims of the study. The branches addressed in the fieldwork included: Furniture, Dry cleaning, Printing, Plastics, Car services, Hairdressing, Textiles, Metal manufacture (or general engineering), Laboratory work, Research work and Construction. A detailed description of the country specific methods used in fieldwork can be found in the Member State Reports for the countries concerned.

### **Detailed discussion and review of existing national findings with specialists and experts from countries in which substantial information and research on practice already exists**

It was strongly evident from Phase 1 of our research that there were certain countries in the EU in which there was already quite extensive work undertaken researching the issues involved in regulating the management of the risks of hazardous substances at work. Four cases in point were Denmark, Finland, Sweden and the Netherlands. It was felt to be unlikely that with the resources at our disposal we would be able to discover anything substantial or significant to add to this existing work by undertaking further field studies in these countries. However, the nature of this existing work was sufficiently important to merit detailed review and discussion with key national observers/researchers in the countries concerned. This ensured that full account was taken of the researchers’ own findings and those of other national observers in relation to the subjects of our research.

Through their co-operation we gained full access to up-to-date national research (including unpublished findings) on the issues that were of concern to us, as well as access to corroborating sources among interest groups representing workers, regulatory inspectors and prevention services. These key researchers led reference groups in their countries and provided peer review and additional national inputs (where appropriate) to our detailed review of current research in these countries, including commentary based on on-going and unpublished work where appropriate. They were also offered the opportunity to read and comment on our reports on their countries and their comments have been reflected in our revisions of these reports.

### 3 The wider context of regulation and implementation of the CAD

The practical implementation and effectiveness of the CAD depends – as does the implementation of any legislation – on many basic prerequisites and their development in previous years. They form external factors, mostly outside the frame of this specific legislation and the political arena of OSH. These developments happen in technology, the economy and also in other areas of legislation; and they are in general beyond the influence of OSH-policy and OSH-policy actors. Practical implementation is closely connected to many of these developments which influence basic prerequisites of the CAD implementation, e.g. the economy and structure of enterprises, financial restrictions in the public sector, the education of OSH-specialists, risk acceptance and communication of the society etc. In similar studies the role of such factors is mentioned as essential for any systematic evaluation (Walters ed. 2002, TNS Infratest, 2007).

#### **Hazardous substances and work-related illnesses and mortality**

One of the great difficulties in developing effective strategies concerning managing the risks of hazardous substances is that while the extent of exposure to them and their health effects is acknowledged to be substantial and significant, the precise dimensions of both remain unknown because sources of reliable data on these matters within the EU and elsewhere are underdeveloped. It is partly for this reason that the precautionary principle is widely advocated in relation to their treatment. Despite such advocacy however, it is clear that the extent of mortality and morbidity from causes such as cancer and respiratory diseases, linked to exposure to hazardous substances, remains unacceptably high and therefore it is equally clear that regulatory efforts to address the problem can, at best, claim only partial success.

The wider literature demonstrates that while there is some evidence of the occurrence of effective risk management according to Framework Directive/CAD principles, it is mainly found in firms in which there is a perception that effective management of the risks of hazardous substances is central to the business purpose of the organisation (see for example Walters and Grodzki 2006). There remain huge numbers of situations in which hazardous substances are in regular use in which the principles of the Directives are neither understood nor applied and where health-damaging exposures to hazardous substances take place. Estimates of the burden of work-related mortality attributable to hazardous substances demonstrate the consequences of this. According to Hämäläinen et al 2009:

*‘There is a rising trend in the number of fatal work-related diseases in Europe.... Problems for the future, especially in the case of work-related diseases, are increasing. Understanding how different hazardous substances and working conditions affect humans is inadequate. ....The effects of current exposures need to be carefully considered, because the potential health effects may be important but not evident for many years’*

Recent accounts suggest that of the estimated 167,000 deaths from work-related accidents and diseases occurring in the EU annually, some 74,000 may be attributed to workplace exposure to hazardous substances (Hämäläinen et al 2009, Takala 2009). Older data also indicate that among the most frequently occurring occupational diseases such as respiratory diseases, skin diseases and cancer, in each case, a large proportion is attributable to workplace exposure to hazardous substances. It is widely acknowledged that such mortality and morbidity is, in theory at least, largely preventable. Claims for the success of the CAD, or any other regulatory measure to improve risk management of hazardous substances, therefore must be evaluated in the light of the continuing extent of pain, suffering and loss that are represented by these statistics, as well as in the light of their economic consequences.



### **Major structural changes in new market economies**

The most significant challenge for the application of regulatory standards in relation to managing the risks of hazardous substances in the advanced market economies of the EU can be related to the major changes that have occurred in the structure and organisation of work of these economies in most Member States since the principles detailed in the Directive were conceived.

The wider literature points out that among the most significant and emblematic of these changes have been repeated rounds of restructuring/downsizing by large private and public sector employers and changes to staffing levels/workloads, multi-tasking, increased hours of work/presenteeism and unpaid overtime. There has been a decline in the proportion of the workforce in full-time permanent employment (especially for males) and an increase in part-time, temporary, fixed term and leased (agency) work, elaborate national/international supply chains and growing use of (multi-tiered) subcontractors and agency workers as well blurring of boundaries between work and home life. Outsourcing in the public sector has resulted in privatisation and increased use of outsourcing/subcontracting and franchising (essentially a structured form of internal subcontracting) has led to the growth of self-employment in micro businesses and in the number of small business employers.

There is also a remarkable trend towards externalisation of jobs exposed to dangerous chemicals to other service enterprises, such as cleaning or maintenance enterprises, or towards non-European suppliers. A positive impact is that there is more specialist knowledge in those enterprises that perform the ‘externalised’ jobs with chemicals. A negative impact is the decreasing knowledge on the contractor’s side as has been vividly demonstrated in France (Thebaud-Mony, 2007).

A growing trend to mobility and migration of workers can be identified in the European labour market. Often migrant workers are employed in areas with manual use of chemicals (construction, agriculture, cleaning). The language and qualification disadvantages of migrant workers pose problems concerning instruction and understanding of specific OSH regulation.

Problems also arise with regard to the co-ordination of management activities involved in controlling the risks of hazardous substances in multi-duty holder scenarios such as in supply chains or on multi-employer worksites – even when such employers themselves may be part of larger organisations. In our survey results respondents commented on these trends towards fragmented management and smaller enterprises in which there was less internal knowledge than found in their larger counterparts and fewer possibilities to access external knowledge, on the externalisation of jobs involving hazardous substances and developments towards weaker arrangements for worker representation.

### **The impact on public services**

A further aspect of restructuring concerns its impact on public services. While the so-called ‘new management’ widely adopted in European public sector administration aims at greater efficiency in these activities, it is also associated with attempts to curb public sector spending.

One consequence has been reduced resourcing for regulatory inspection in some countries and its reorganisation (and possible reorientation) in others. There is some evidence that in some countries this has resulted in lower numbers of inspectors overall, as well as poorer resourcing for inspection in relation to hazardous substances. In the latter case this has comprised a lowering of the skills base to undertake such activities as well as more limited access to the technical support required to perform them to suitable standards. While there is little hard

evidence of a tangible impact of these developments in regulatory inspection — this is partly because such evidence has not been actively sought. Meanwhile, there was a perception articulated by both employer and employee respondents in the study that, while inspection was seen as both useful and necessary, in practice for many it was a rarely experienced event.

The process of downsizing of the public sector stimulated activities to enhance the effectiveness of the remaining infrastructure. Typical strategies are prioritisation, involvement of more actors and share of responsibility with other actors. National strategies or other types of priority setting in enforcement can be allocated to these types of policies. The importance of processes, organisation and management has been stressed; with the regulator attaching less importance to detailed prescriptive regulation. What effects these changes have had on the enforcement of regulatory standards on chemical risk management that are derived from the CAD requires investigation.

### Technology changes – trend to increased number of substances in use

Problems for improved risk management of hazardous substances do not only arise from structural change. Technological changes also create challenges. While the tonnage of chemical substances on the market may not have changed, there is a clear trend towards increased numbers of substances in use. Such a development, which is driven by economic and technological considerations and decisions - such as customising of chemical products – leads to certain consequences. For example, while conventional chemical legislation is substance oriented – in practice, preparations of pure or few substances are less and less used and have been replaced by complex preparations, for which regulation is ill-prepared.

In the 1980s and 1990s as a result of well publicised ‘scandals’ certain substances were banned or their use severely restricted, e.g. asbestos, lead, mercury, cadmium, chromium VI, PCP, some chlorinated solvents, very persistent substances such as PCB and some carcinogenic multi-use chemicals such as aniline based colorants. In the same period the number of substances and chemical markets grew drastically. Quantitative figures are available from Member States with product registers such as the Nordic countries, three of them being members of the EU (Denmark, Finland and Sweden).

Sweden publishes relevant quantitative data which clearly show the trend towards more chemicals and lower amount of tons per chemical. From 1993 to 2002 the number of chemical substances on the market increased from 8,300 to 13,600. We assume that the figures show a trend for the whole of Europe, but there are no data available to confirm this because, with the exception of Finland and Denmark, no other Member States publish similar data sets.

**Table 1: Number and tonnage band of chemical products in Sweden (KEMI 2009)**

Year	< 1 t	1 - 10 t	10 -	100 -	> 1000 t	Total
			100 t	1.000 t		
1993	4165	1765	1312	657	383	8282
1995	5062	2146	1629	803	456	10096
2000	6307	2549	1852	981	540	12229
2005	7505	2606	1878	1023	583	13611
<b>Increase in % from 1993 to 2005</b>						
<b>Plus</b>	55%	68%	70%	64%	66%	61%

Similarly, KEMI’s figures on chemical products labelled as hazardous for health show changes in the proportions of these products over time, from 52% in 1990, when 60,000

products were on the market, to 39% in 2007, when 75,000 products were on the market, while the absolute number of hazardous products remained the same.

Some products contain hazardous chemicals to enable fast, effective, timesaving and less ergonomically challenging work. Typical are some products in the craft, construction and car repair sector such as fillers, foams, dryers in paints and lacquers or sealants. Additionally, they allow less skilled work, i.e. a less qualified worker or non-professional might achieve the same product quality. This partly explains the growing use of chemical in these sectors.

The management costs and efforts of handling these huge numbers of chemicals and preparations in end-user enterprises are therefore also higher, and prevention and health surveillance becomes more complicated. OELs cannot be applied easily because most chemical products are complex preparations and are no longer based on one or very few substances. More specialist knowledge and advanced instruction are required, and explanation, instruction and motivation become more challenging. Finally the connection between these multiple chemicals, sometimes in low doses, and occupational diseases is much less visible and detectable. To protect workers effectively requires a new scientific and regulatory approach from regulation of substances to regulation of combined exposures.

As our review of the relevant literature on regulating the risks of hazardous substances makes clear, all these developments contribute in one way or another to challenges to the effective regulation of risk management approaches to hazardous substances.

### **Awareness and visibility of hazards**

According to the literature - and our findings - there is a general raised consciousness that chemical substances can be hazardous and controls on their use are necessary, but it remains the case that for many employers and workers, certain categories of commonly used hazardous substances are simply not perceived as 'risky' when they are used at work. For example, flour dust in bakeries, quartz dust in craft and construction, a host of chemical products used in construction and related industries including paints, adhesives, cement and so on, materials used in cleaning, colourants and shampoos used in hairdressing and agrochemicals used in food production. At the same time there are perceptions of the value of chemical products in terms of convenience or aesthetics which influence their use, because they are regarded as more effective or desirable in these respects, such as in the case of solvents and surface coatings across a range of industrial and domestic uses in cleaning, construction, motor vehicle repair and so on.

Wider research findings on the public perception of risk suggest that reasons for this may be linked with product familiarity and with notions that if a product is commercially available it must be 'safe'.

There are several other trends that reduce the 'visibility' of hazardous chemicals for laypeople. For example the trend of increased variety in substances in use (used in preparations etc) while their overall quantity (weight) remains unchanged or even decreases. Well known hazardous chemicals are replaced by less known chemicals. Such a development, driven by economic and technological considerations and decisions – such as the customising of chemical products – contributes to a more complex situation for product information and labelling of chemical products. Not only labels but SDS are more and more needed as a reliable information source; and in addition their content becomes more and more complex. All of which may contribute to a lowering of awareness and a reduced visibility of hazards.

Conversely, for many employers and employees (as well as others in society more widely), there seems to be an ongoing conceptual difficulty with understanding the nature of

'hazardous substances' and exposure to them at the workplace. In our surveys and case studies awareness of hazards often did not appear to extend beyond that of hazardous *chemical products* and did not concern hazardous *substances* at the workplace more generally. That is, employers and employees understood the need for regulation to ensure appropriate supply of information on the hazards of products they used at work, as well as guidance in order to manage their safe use, but they were far less clear concerning what to do about the hazardous products of the work itself, such as dusts and fumes and other contaminants of the work environment. Such difficulties may be related to the long standing substance based focus of regulation and if so, it is not evident that the more process based focus of the CAD has been effective in addressing the problem. Indeed it is perhaps worthy of note here that the Directive's title itself is an example of exacerbation of this problem through oversimplified semantics. It is reassuring in this respect that at least in some Member States the notion of 'hazardous substances' as opposed to 'chemicals' is retained in regulatory approaches to controlling workplace exposures.

### **Regulatory approaches**

The problems of achieving regulatory compliance can be described in terms of the limitations of regulatory reach as well as in terms of low compliance that is influenced by technological change, organisational limitations in respect to technical understanding and know-how, managerial competence and overall capacity.

First, the limitations of state regulation concerning working conditions in the face of technological change and the restructuring of work are increasingly acknowledged. Equally, private, market driven alternatives are far from being a panacea in terms of providing reliable protection for workers exposed to the risks of the so-called 'new economy'. Solutions currently advocated in the regulatory literature suggest a mutually supportive combination of the most useful elements of both approaches as the most helpful way forward. In the case of regulating the management of the risks of hazardous substances at work, our inquiry suggests that there are already some elements of this approach in place in some Member States of the EU and some room for their further development.

Such support has led to the adoption of instruments to improve aspects of assessment and control, leading to the implementation of good practice according to the prevention principles of the Directive, but it has also helped create awareness among specialists, peak organisations, and other advisers, for example, of the requirement to focus more effectively on the needs of small firms, to understand these organisations and their businesses better in order to propose and implement realistic solutions to their problems. The effects of such awareness are felt across many of the ten areas covered by the CAD. They have led to a search for more effective risk communication and information dissemination on hazardous substances, more realistic roles for exposure limits in risk assessment and risk management, improved training provisions, better focus for prevention services and health surveillance as well as improved risk assessment and management applications within firms themselves. There are also embedded differences between EU member states in their levels of regulatory development and in their regulatory styles in relation to provisions on hazardous substances, which affect the process of implementation and its coherence and comprehensibility to employers and employees.

### **National OSH strategies**

Some of the national OSH strategies contained targets like reduction of hazardous substances or better management of chemicals. Denmark had such a strategic goal until 2005; France put

much effort into its strategic goal to replace mutagenic and carcinogenic substances. The most recent EU-strategy does not mention a specific goal for chemicals although in some MS chemicals still are the major cause of recognized occupational diseases; other risks such as musculo-skeletal disorders (MSD) or the psychosocial work environment are currently higher on the political agenda in these countries.

Most of these prioritizing or strategic activities were combined with an approach to evaluate the impact of activities and to enhance the transparency of the OSH-system as a whole. At the national level many sources note a reduction of research funding and innovation support in the area of OSH and the ‘humanisation’ of work. The funding of national programmes has been reduced or completely cut in some cases, and while some minor support programmes exist at the European level, a significant research, innovation or co-financing programme for OHS does not exist.

### **Developments in other legislative sectors**

Developments in legislative sectors such as environmental protection, public health, consumers’ rights and protection, sustainable use of resources, transport, construction or other areas might also change the patterns of safe use of hazardous chemicals.

Environmental regulations as well as safety regulations – explosion and fire protection or transport rules – also contribute to the safe use of chemicals in workplaces. Stricter waste or wastewater rules also provide some support since their existence in most cases promotes a trend towards less hazardous chemicals. Examples of more recent developments at the European Union regulatory level which may offer support include: the End-of life vehicles Directive (less heavy metals in cars), the Biocides Directive, the VOC-Directive or the ATEX-Directive on explosives. Finally, REACH will also contribute to more transparency on the European chemical market. The Chemical Safety Assessment will be improved and extended, and some very hazardous chemicals will be banned, restricted or substituted.

### **Role of external prevention services**

In all cases, the restructuring and reorganisation of business and economic activities has helped to increase the proportion of work with hazardous substances that takes place in small firms that are both quite distant from regulatory reach and at the same time without access to informed support. They further help to erode the legal nexus represented by the contract of employment and hence have eroded a range of traditional parameters of work ranging from the legal responsibilities of ‘employers’ to the possibilities for effective representation of workers’ interests. They mean that much of the externalisation of work activities has gone to smaller organisations, which possess far less adequate or sophisticated systems of risk management than their larger counterparts.

As organisations downsize, fragment, or outsource their peripheral activities, one casualty has been the provision of internal preventive services. These services — which are important sources of expertise on preventive strategies in relation to hazardous substances, as well as risk identification, evaluation and control through the deployment of professional occupational hygiene practice and health surveillance through medical intervention — have become less a feature of the internal organisation of enterprises and more commonly provided on a contract basis by external services and consultants. At the same time there has been a tendency for externalisation and privatisation of protective and prevention services (PPS) from state or public institutions to private institutes. Prominent examples of change are further seen in the shift from the obligatory use of prevention services and health surveillance in the

Netherlands and from public health surveillance to private services in Finland. In Eastern European Member States the major restructuring of the economy has often led to a complete restructuring of labour inspection or other supervising authorities to cover the demands from the new economic structures, e.g. in Hungary or Romania (EU-OSHA 2009, ILO 2006).

External prevention services meanwhile play an important role as advisors for the health and safety management of enterprises. Generally, they offer advice and service for those enterprises who are too small to have their own specialist OSH capacities or who decide to outsource this service. The fact that the SMEs often lack any internal expertise makes it all the more important for these PPS to be effective as external OSH advisors, however, the structure, quality and type of services differ widely between the EU MS. The results of the research reported here show that protective and prevention services, while present in all countries, are more or less available according to cost and organisation size, and there are important limitations to their role in supporting small firms for these reasons.

These developments have been accompanied by an intense debate about the qualification and quality of the external services. This debate has resulted in demands for certification of services, standards for training and more supervision of quality in general by the state or by appropriate associations. Some MS use certifications, licences, authorisations or guidance to enable a common minimum quality standard. Other MS have developed special measures, e.g. obligatory training, to improve the OSH-situation of the self-employed and of micro-sized or very small SMEs.

Second, such services and consultants are obliged to function in a competitive market in which, as well as deploying their expertise, they must respond to the perceived needs of clients if they are to obtain contracts and be successful businesses in their own right. This can be a problem in relation to advising on risk management for hazardous substances. As is well established, many of the risks are hidden and not perceived by employers. Preventive services/consultants may therefore not be engaged to advise on them in the first place. Preferred control solutions, according to good professional practice, are sometimes both expensive in the first instance and also require some technical knowledge in order to understand their significance compared with other options. If preventive services are engaged, their recommendations advocating such approaches may not be welcomed by cost-conscious employers who also lack technical understanding and who fail to appreciate their significance or salience.

These factors, may have further contributed to a reduction in the occupational hygiene skills base in preventive services and among independent consultants. Other factors also contributing to this change include the measurable decline in the provision of higher education in these subjects in some countries. The observed overall decline in occupational hygiene and medical support in the specific case of hazardous substances is of course also related to structural trends in which there has been a marked decline in manufacturing and heavy industry, where the presence of hazardous substances was an acknowledged problem and the supports necessary to deal with it were widely acknowledged.

### **Increasing role of management systems**

Closely connected is the increasing role of management systems (QMS, ENV, OHS) and CSR (Responsible Care, Product stewardship). Large enterprises and global players have developed standards to ensure quality in the supply chain. These standards partly substitute legislation and regulation; sometimes they are even stricter and more detailed. They are enforced by the power of the market and as such can be even more demanding than conventional enforcement of legal requirements. One crucial part of each QMS is compliance

with legal regulation; this in itself supports the responsible use of chemicals. Removal and strict regulation of chemicals are part of these approaches (see Philips 2005, Scania 2005, Akzo Nobel 2005, Ericsson 2005). Large corporate actors and global players whose businesses are especially vulnerable to negative public pressure or scandals related to chemicals in their products can and do introduce such pressure into their supply chain (Ahrens et al. 2005).

However, while there are good examples where this is the case in relation to risk management of hazardous substances discussed in our report, unfortunately research also shows that more generally, supply chain relationships involve quite a complex collection of economic and social features that mean what works to promote risk management in one situation, is neither inevitable nor necessarily transferable to another. Furthermore, largely because of the price and delivery constraints under which they operate, and the labour practices that are their consequences, as we discuss in the following section, many supply chain relationships have been demonstrated to be detrimental to the health and safety of the workers at the end of them and to be quite unhelpful in promoting good practice (Walters and James 2009).

## 4 General Appreciation

The project was charged with finding out:

- If the requirements of the Directive are comprehensible, coherent and capable of being met in practice by employers and workers?
- What is the evidence indicating the ability of employers and employees to understand their obligations under the Directive and be able to protect the health of workers from exposure to hazardous chemical substances?
- If the practical application of the requirements of the Directive are more or less similar across different employment sectors and/or geographical areas?
- Whether SMEs are able to understand and comply with the requirements of the Directive, if they have access to appropriate information on risks posed by chemical substances and know how to select and implement effective risk management measures (RMMs)?
- If the requirements of the Directive are more or less equally applied for different categories of chemical substance or whether there are specific categories of chemical substance for which a different, or more detailed, approach to achieving effective risk management may be necessary?
- If there are specific categories of workers for which the Directive has brought about significant improvements in the protection of their health and safety — and whether it is possible to identify categories of workers for whom the implementation of the Directive has not achieved effective protection e.g. young workers, pregnant workers, older workers, skilled versus less skilled, workers with pre-existing medical conditions (e.g. asthma)?

Clearly some of the answers to these general questions will be developed under others of the ten areas addressed in the following pages, such as those on information requirements, risk management measures and so on. In this section, therefore, the focus is on the broader appreciation of the matters covered in the Directive and not with specific matters of detail and practice that will be elaborated further elsewhere.

There is a fairly strong indication from the results of the initial general questionnaire-based survey, as well as from the more detailed country case studies, that the majority of respondents across the range of employers, employees, OHS specialists, inspectors and administrators feel they have an awareness of the requirements of the CAD. This does not seem to be especially limited by any particular factors, including those relating, for example, to workplace size, sector or occupation, although respondents sometimes offer opinions that particular categories, such as SMEs, are less aware than is ideal. However, when this quite positive general claim is scrutinised a little more carefully, and especially when it is compared with responses on more specific aspects of the Directive's requirements elsewhere in the study, it does not support the notion that such perceived awareness equates to adequate understanding. Nor is it entirely clear that the general awareness claimed by respondents is in fact an awareness of the requirements of the Directive as such – or whether it relates to some level of awareness of the existence of national measures on hazardous substances.

In short, there seems to be a general level of awareness among employers and employees concerning the idea that exposure to hazardous substances at the workplace can be harmful and that regulatory measures of relatively recent (and possibly EU) provenance concerning the control of hazardous substances exist to address this problem. But detailed knowledge of these matters, including that of the requirements themselves and their origins, is in fact much



more restricted. It is possessed mostly by health and safety specialists, administrators and by some of the more significant users of hazardous substances at work, whose experience in this respect has brought them into regular, direct contact with such requirements.

The question of the coherence and comprehensibility of the Directive's measures and their comprehension by employers and employees needs to be understood in the context of the national developments in chemical risk regulation during the past decade or so.

There seem to be two distinct patterns. There are a group of European countries in which discourse on the need for reform of the regulation of risk management of hazardous substances is of long standing and where national reforms along the lines of the measures found in the CAD were already in place before the CAD was transposed. In other countries transposition of the CAD has entailed the introduction of a 'new approach' to regulating chemical risk management, which has required significant reorientation.

In countries, such as the UK, the Netherlands and Sweden, a growing awareness of the failings of previous strategies on risk management in relation to hazardous substances was expressly related to reported difficulties of comprehension on the part of duty-holders, and especially on the part of those with such responsibilities in smaller firms. This led policy makers to seek to introduce more accessible requirements and various forms of support to help duty-holders better understand and use them appropriately. In the UK, for example, the introduction of the Control of Substances Hazardous to Health (which includes many of the Directive's requirements as well as a similar overall orientation) was followed by the introduction of COSHH Essentials, a tool designed to help smaller organisations implement the requirements of the Regulations. Similarly in the Netherlands, the implementation of workplace requirements of hazardous substances under the *Arbobesluit* was aided by the introduction of programmes like *SOMS* and *VASt* as well as by tools such as the *Stoffenmanager*. While in Sweden, the *KemiGuiden* serves a similar purpose. Therefore the pattern in these countries is similar. There was introduction of regulatory requirements aimed at achieving greater and more systematic management of the risks of hazardous substances, reflecting the same management principles found in the EU Framework Directive 89/391 and in the CAD (but often predating the adoption of the latter). This was followed or overlaid by recognition of problems of comprehension and application of such principles for the majority of duty-holders, which led in turn to efforts to support the ease of their application in these workplaces through various tools and strategies aimed at simplifying the achievement of regulatory compliance.

In other countries such as Germany, developments have been slower, reflecting its more complex regional, sectoral and regulatory infrastructure, but essentially the same pattern can be seen with the introduction of a new Ordinance on Hazardous Substances followed by guidance in the form of the Easy to Use Workplace Control Scheme (*Einfaches Maßnahmenkonzept*). In all of these countries, therefore, the approach to risk management of hazardous substances that is embraced by the CAD and also found in the national provisions of many Western European Member States, has had quite a long developmental history during which it has been much in evidence in national and sectoral discourse. As a consequence, not surprisingly in these countries there is a general level of awareness of the overall approach among many duty holders and within the national 'health and safety system'. But the widespread observation that such awareness does not automatically translate into good practice suggests there are further barriers to consider.

Generally then, there is little evidence to support the notion that the introduction of the CAD in these countries raised awareness or was a new policy. This was already underway as a consequence of national evaluation and reflection about existing national policies and experience.

In other countries the impact of the CAD, along with that of the Framework Directive and its other daughter Directives, has resulted in a considerable overhaul of the existing provisions. It is difficult to judge the significance of the impact of these changes on awareness among employers and employees, or indeed, to disentangle the effects of individual Directives, because we do not have reliable 'before and after' data. Two patterns are, however, evident.

In a number of southern European countries such as Italy, Greece, Spain and Portugal, as well as to some extent in Germany, the Directives resulted in major legislative changes in which there seems to have been considerable debate concerning the emerging features of the new provisions. In the case of the CAD, for example, the issue of managing risks in small firms was prominent in debates in some countries, while questions concerning the role of exposure limits, technical specifications and prevention services seem to have occupied others. A different pattern is observed in several of the so-called 'accession states', where recent membership of the EU has meant a whole-scale and more or less simultaneous adoption of a package of EU requirements in which the particular effects of the CAD are not discernable. For example respondents in Cyprus made it clear that as far as they were concerned the CAD was simply part of the package of legislative changes required under the terms of accession and as yet, there had been insufficient time or individual focus to consider its particular significance. Within this group of countries those former members of the Soviet Bloc have at the same time been subject to major change as they have remodelled their economies to market based ones. Clearly, it is extremely difficult to ascertain the precise effects on employers and workers of Directives such as the CAD in the midst of such wider reform and remodelling of economic and regulatory systems. However, its principles were already part of the package of wider reforms stimulated by the adoption of the EU Framework Directive, and as a daughter Directive, the CAD offered the opportunity to build on these elements which were introduced earlier into MS-legislation, but with specific regard to more systematic risk management in the case of hazardous substances.

Therefore, while overall there seems to be an awareness of the requirement for more systematic risk management of hazardous substances, within the framework of systematic risk management more widely, what people understand by this requirement as well as the ability of employers and employees to understand their more specific obligations under the Directive and to deliver the required practices to protect the health of workers from exposure to hazardous chemical substances, is more problematic. Our study, in keeping with other previous research, suggests this ability is subject to influence by a range of structural and organisational factors to do with workplace size, contractual arrangements, and sector. Although our study is not a comprehensive survey, it does provide strong indications of these structural effects as presented in greater detail in the following sections.

One feature of the findings is their confirmation of suggestions made in other studies that there may be a difference between the appreciation of requirements to manage the risks of hazardous substances between: a) regular users of these materials and those who regard them as central to their business purposes; and b) those for whom the use of hazardous substances is more incidental to their main activities (but who nonetheless expose workers to their use). For example, many of the employers and employees involved in our detailed case studies worked in chemical, plastics and similar firms as well as in laboratories where the regular use of hazardous substances was an acknowledged aspect of work. In these situations a relatively high level of consciousness of requirements for safety management was often (but not always<sup>2</sup>) in evidence (although there was also much criticism concerning the degree to which

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<sup>2</sup> It is also important to acknowledge that while the majority of our respondents from these types of workplaces seemed to be doing something about managing the risks of hazardous substances, this was not universal and they

they were met in practice). In contrast, workers and their managers involved in operations which were not seen as being centrally involved with hazardous substances, such as cleaning and construction, were far less aware or concerned about formal safety management procedures for working with hazardous substances. This suggests differences in the practical application of the requirements of the Directive (or more precisely, of the measures derived from them) across different sectors and branches of employment.

There was no evidence in our study to demonstrate a significant change in the situation described in many other studies concerning the problems faced by SMEs in understanding and complying with the requirements on risk management of hazardous substances. Smaller firms have poorer access to appropriate information on risks posed by chemical substances, poorer understanding of the information they are able to access, poor access to specialist support, less time and other resources available to make use of such support and consequently they know less about how to select and implement effective risk management measures than those in larger organisations. As a German respondent put it;

*'Unfortunately not everyone complies with the regulations. Adherence is more common in larger industrial and production enterprises than in SMEs (in which however we find the majority of employees who handle hazardous materials).'* (329, Germany, Representatives of Professional Associations)

There was also no evidence in our study from which we are able to conclude that there are any specific categories of workers for whom the Directive has brought about significant improvements in the protection of their health and safety. Indeed, as already noted and discussed in greater detail elsewhere, the structural and organisational changes that have taken place in work arrangements over the past two decades have meant that there are increasing number of workers — in small and micro firms, in subcontracting arrangements, in outsourced contract work and agency employment — for whom there are significant barriers to implementation of measures derived from the Directive and where there is little evidence to suggest that implementation has achieved effective protection. Moreover, some of the research we have reviewed suggests that the experience of these workers in terms of exposures and their health effects may go undetected by both regulatory inspection and health surveillance.

In many countries there are specific provisions to protect so-called 'vulnerable' workers such as pregnant workers or those working with particular forms of hazardous substances, such as carcinogens, asthmagens and so on. In this respect, regulatory requirements in most countries in the study distinguish specific categories of chemical substance for which a different, or more detailed, approach to achieving effective risk management may be necessary. Respondents in our more detailed case studies were usually aware of the existence of these requirements, although not necessarily of their detail. As far as we were able to ascertain from limited data, where such requirements applied to the work situations experienced by respondents, managers and OHS specialists generally recognised the specific requirements concerning risk management and believed themselves to be implementing them. However, trade union representatives sometimes had reservations concerning the effectiveness of the practices reported and it is important to note that there is limited robust research that evaluates the outcomes of these measures with any power or objectivity.

In sum, there was evidence in both the survey and more detailed case studies undertaken of a broad awareness of a requirement to *manage the risks of hazardous substances more*

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sometimes referred to examples of other situations in which unqualified workers and employers used hazardous chemicals without much care or knowledge.

*systematically*. This is in line with a wider awareness of the shift to more systematic approaches to managing health and safety more generally, resulting from the regulatory changes at national and European levels of which the Framework Directive 89/391 is an example.

However, it is equally clear that this awareness is far from universal, that it is strongly influenced by structural and organisational determinants and that even where it exists, it does not automatically lead to good practice. In this respect our study confirms the findings of previous studies which suggest that risk management of hazardous substances poses particular problems partly because of the specialist/technical knowledge apparently required, partly because of limited awareness of the hidden or long-term health effects involved and partly because organisations have different capacities with which to respond to the regulatory requirements. In particular, there are differences in this respect between large organisations and those in which dealing with hazardous substances is perceived to be central to the business of the organisation, and small and micro-organisations that also use or create hazardous substances.

Our findings further confirm that effective risk management requires some degree of support – not only in terms of the development of more accessible information and more useful tools for risk management, but also in terms of the support of the implementation of good practice. .

## 5 Risk Assessment (RA)

The tender specified a number of research questions: we were charged with describing the practical implementation of RA in various sectors of industry within the EU, to assess the effectiveness and cost of RA; and to provide suggestions on the best way to fulfil the RA requirement. Our findings include quantitative figures about the application of RA in enterprises. They also cover the debate about the quality of RA, as well as the relative importance of its cost and current information about the support infrastructure. This chapter closes with recommendations about how to optimise the RA requirements in the CAD.

Some methodological remarks are required in advance:

We present quantitative data about RA in enterprises, but very often these data are related to the overall RA of all OSH risks rather than a specific RA on chemicals. In theory, a RA should cover all risks including chemicals; however, in practice some OSH risks are not assessed at all or much less thoroughly assessed than others. This is often the case for chemicals because this assessment requires specific knowledge. Consequently such data tend to overestimate the number of RAs of chemicals because any type of RA is counted; this observation was confirmed by labour inspectors.

Further, numbers and percentages of RAs performed are given as percentages of enterprises, not of workers. Large enterprises - with many workers - in general comply better with the RA obligation. Thirty percent of enterprises with a RA in a Member State might mean that 60% or more of all workers are covered by a RA, depending on the structure and size of enterprises in that Member State. The counting of enterprises with RAs rather than workers covered, clearly leads to an underestimation of compliance with RA obligation.

The quality of RA varies between enterprises, branches and Member States. If 10% of enterprises perform a high quality RA this might be of more value than a much higher level of mainly formal RA with no consequent risk management measures in 30% of all enterprises in a Member State.

The conclusion is that reliable data about the number and percentage of workplaces where dangerous substances pose a risk, and where consequently a risk assessment is conducted, are not available. However, the few available statistics and studies can be used as indicators for the quantitative degree of implementation of RA of chemicals at workplaces.

### **State-of-play of RA**

RA is highlighted in legislation at both the EU and MS levels and in all relevant guidance documents as an elementary and crucial precondition for successful and effective risk reduction measures. RA was one of the major innovations in the Framework Directive 89/391. According to this 'Framework Directive' every European enterprise is obliged to perform an OSH RA. The responsibility is clearly with the employer:

*Article 9: Various obligations on employers*

*1. The employer shall: (a) be in possession of an assessment of the risks to safety and health at work.*

Obviously the Framework Directive only covers general RA and not necessarily chemical RA if there are no hazardous chemicals used at workplaces. The CAD repeats and substantiates this obligation of RA under 'EMPLOYERS' OBLIGATIONS' in Article 4:

*Determination and assessment of risk of hazardous chemical agents*

*1...., the employer shall first determine whether any hazardous chemical agents are present at the workplace. If so, he shall then assess any risk to the safety and health of workers arising from the presence of those chemical agents.*

The employer is obliged to consider the hazardous properties of any chemicals, the information on health and safety provided by the supplier (e.g. the relevant safety data sheets), the level, type and duration of any exposure, the circumstances of the work, any occupational exposure limit values, and the effect of preventive measures. Furthermore, conclusions have to be drawn from any health surveillance data.

The regulations were again substantiated in the non-binding guidance document for the CAD issued by DG Employment (EU COMMISSION, DG EMPLOYMENT, 2005).

The great relevance of RA is not only found in legislation but also in practice. Our findings corroborate this. For example, the overwhelming majority of respondents to our survey consider RA in the same way: 79% agreed that “Chemical RA is effective in improving working conditions”, while only 9% disagreed and a further 9% were neutral.

Correspondingly, national surveys, scientific studies and case study reports from enterprises show that a proficient RA is the crucial first step for qualified and appropriate risk management measures (for an overview see: EU-OSHA, Magazine 11, 2008, EU OSHA Website on RA). The European Campaign for Safety and Health at Work for 2008-09 focused on RA. This campaign also aimed to raise awareness among employers, workers and safety representatives on this issue, to provide information and practical advice, to encourage activities that have a positive impact in the workplace, and to identify and recognise good practice.

The CAD and its guidance document (EU COMMISSION, DG EMPLOYMENT, 2005) placed a systematic RA at the beginning of each systematic risk management and risk reduction process. This strict and precise wording led to changes in the legislation of some Member States, where RA previously played a less essential role in the legislation.

In some MS RA was already prioritised and precisely proscribed in the national legislation before 1998, such as in the UK (under the COSHH Regulations) and in some of the Accession States, e.g. Poland introduced RA in 1997. In other Member States quite considerable changes were needed to adapt the legislation to be in line with the CAD on RA.

### **Quantitative figures and estimates**

There are surveys and studies in a few Member States which supply information about the level of RA on chemicals at workplaces.

In the evaluation of those parts of the Danish OSH Strategy 2000 to 2005 which dealt with the reduction of risks from chemicals (‘KEMI-Visionen’), more than 90% of employers and more than 80% of employees reported that a RA has been made.<sup>3</sup> One of the goals of OSH-strategy in Denmark is to achieve a 100% level of RA, i.e. all Danish enterprises are to carry out RA by 2011. On the national labour inspection website 60 sector specific checklists are available (<http://www.at.dk/sw30543.asp>). Also, on the opening page of the central labour inspectorate (Arbejdstilsynet) the actual number of Danish enterprises with an RA is presented and updated daily, with four quality levels distinguished: a green ‘smiley’ indicates that the enterprise has no issues with the Working Environment Authority (440,000 enterprises in Denmark); a green smiley topped with a crown indicates that the enterprise holds a recognised health and safety certificate, i.e. the enterprise has made an extraordinary effort to ensure a

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<sup>3</sup> App. 1,000 persons in 500 enterprises were interviewed, see HAGELUND / POMMER 2005, 33/35

high level of health and safety (2,300 enterprises); a yellow smiley indicates that the enterprise has received a notice with a time limit or an immediate improvement notice (7,600 enterprises); and a red smiley indicates that the enterprise has received an improvement notice or a prohibition notice (1,500 enterprises).

The Polish Labour inspectorate reports a documented RA in 50% to 70% of inspected work places: *“The risk assessment has been carried out very roughly and frequently inadequately to existing working conditions in about 50% (in 2006) and 70% (in 2007) inspected workplaces by labour inspectors, where chemicals have been used.”* CADimple, PL MS REP. Similar figures are reported from Latvia and Lithuania.

In a campaign by the Swedish Work Environment Authority on hazardous substances in 2003, labour inspectors found evidence of substantial failure to undertake RA adequately in many cases. The results are shown in Table RA 1.

**Table RA 1: Companies without correct risk evaluation during an inspection campaign, Autumn 2003, Sweden (Antonsson 2007, 22)**

	Printing industries	Construction	Engineering industry	Carpentry	All
Inspected companies	124	1140	130	427	1821
Companies without risk evaluation	53	552	62	209	886
% no risk evaluation	43%	48%	48%	49%	49%
Companies with insufficient documentation of risk evaluation	66	550	68	216	900
% insufficient documentation	53%	48%	52%	51%	49%

The table suggests that nearly half of the companies inspected had either inadequate RAs or none at all. In fact, the WEA inspection campaign statistics revealed that overall, 685 of the inspected companies received at least one request to improve their chemical risk management as a result of the inspection campaign (Antonsson 2007).

In the national survey on working conditions in the Netherlands (Arbobaalans 2008) it was reported that in 2007 52% of enterprises reported carrying out a RA, and 35% of enterprises had a RA that was confirmed by an ‘Arbodienst’, an external OSH prevention service. These figures cover all types of RA in OSH.

The study “Arbo in bedrijf 2006” (Bos et al, 2006) describes the current state of working conditions (and the extent to which organisations comply with legislation) and the exposure to occupational risks in organisations (profit, non-profit and governmental organisations) in the Netherlands. The study was carried out in 2006 by the Dutch Labour Inspectorate. The inspectors visited 1,997 companies in the second half of 2006. This was a stratified sample of Dutch enterprises in order to include enough small enterprises. The final data set was weighted to make the results representative of all Dutch companies. In 2006, 50% of the organisations carried out a RA, with 36% having a verified and 14% a non-verified document. Compliance was higher in larger enterprises compared to smaller ones. In addition, 42% of the organisations with 1-4 employees had a RI&E document compared with 97% of the organisation with more than 100 employees.

A survey specifically related to chemicals was carried out within the frame of the Dutch VASSt-programme ‘Enhancement of Occupational Safety regarding Hazardous Chemicals’ (*Versterking Arbeidsomstandighedenbeleid Stoffen - VASSt*). The Ministry of Social Affairs

and Employment intended to minimize the health and safety risks of the professional use of chemical substances through this 2003 - 2007 programme. In 2007, the VASt programme finished and was evaluated by a survey using a sample of 2250 employers (see the National Report on the Netherlands for details).

According to the evaluation of the VASt program, in 68% of the enterprises where workers are exposed to hazardous substances there is a RA document (RI&E document). In 90% of these enterprises exposure to chemical substances is mentioned in the RI&E document. In 94% of these enterprises measures are taken to reduce these risks. However, 91% of enterprises in which workers are exposed to hazardous substances without a RI&E document have also taken measures (Visser et al, 2007). As an evaluation of the impact of the programme, pre-defined 'VASSt-indicators' were measured at the beginning and the end of the project. In the three years from 2004 to 2007 relevant indicators for the basics of RA and risk management improved. Table RA 2 shows these mainly positive developments.

**Table RA 2: Development of VASSt indicators between 2004 – 2007** (Source, pp)

			2004	2007	Sign. change
<b>VASSt-indicators</b>	1	Percentage of companies using a branch specific substance risk assessment tool*	7%	15%	Yes
	2	Percentage of companies that assess exposure to substances	24%	22%	No
	3	Percentage of companies that almost never receives a MSDS from suppliers	35%	25%	Yes
	4	Percentage of companies that think the branch organisation is useful in the area of substances	55%	53%	No
	5	Percentage of companies that provide working instructions to employees about safe handling of substances	54%	59%	Yes
	6	Percentage of companies that is satisfied with the available information about substances and health risks	76%	64%	Yes

It is noticeable that, even in 2007, one quarter of all enterprises never received a SDS (see the chapter on Information requirements for detailed figures on SDS).

Our CADimple survey included a question asking for quantitative figures, or at least estimates, on national risk assessment levels (Question 2.1: 'Approximately how many companies (%) working with hazardous chemicals fulfil the RA requirements?'). The responses to this question revealed a difference between the target groups: the respondents from some groups (employees' representatives and government) rates of RA as being lower, while academics and employers made more positive estimations. Fifty percent of employers responded that more than 60% of enterprises fulfil the RA requirements, but only 20% of employees and governmental groups of respondents did so.

Responses from Romania illustrate this difference, varying from:

- Less than 10% (345, Romania, Academics, Researcher) and professional OSH-staff from a large enterprise of the car industry (338, Romania, OSH Practitioners, Internal OSH expert);
- 20% to 30% (347, Romania, Trade Union representative);
- 30 to 40% (32 labour inspectors from all regions of Romania, (337, Romania, Public administration, Inspectorate));



- More than 60% (staff from the national OSH Research institute, (345, Romania, Academics, Researcher), and an OSH professional from a large petrochemical enterprise (336, Romania, OSH practitioner, Internal OSH expert).

In the national Spanish survey on working conditions the participants were asked if a RA of their workplace had been carried out during the previous year, with 25.5% of the workers stating that this was the case and 12.3% saying that they did not know. A tendency for larger companies to be more likely to conduct RAs was also evident.

A clear difference can be seen between the EU 15 and accession states. Estimates of the degree of RA in the accession states showed a wider range. More respondents from the accession reported that the number of enterprises with a RA on chemicals was below 10%, but also many more respondents from the accession states believed that the percentage of enterprises with an RA was above 60% (36% compared to 19% in the EU 15).

Summarizing the quantitative estimates from literature, it appears that approximately half of the enterprises using chemicals in the workplaces have performed a RA specifically taking chemicals into account. Both industry sector and enterprise size considerably influence these figures. In some sectors and in medium and large enterprises the figures tend to reach more than 90% or even 100%. In other sectors with a high number / percentage of SMEs the figures are much lower, often below 10%.

### **Quality of RA**

The quality of RA was a major topic of debate between the actors. OSH practitioners and trade unions criticised the quality and saw many instances of RA as a formal procedure with no impact on working conditions and risk reduction. Employers and governmental representatives in general tended to see the situation in a more positive light. The research showed that occupational RA is seen by some groups only as a fulfilment of legal duties or as a formal procedure: *“Occupational risk assessment should be effective, but in practice is not so because the possibility of risk assessment is treated formally by employers. ... Frequently employers don’t connected the results or risk assessment with improvement of working conditions. (110 Poland Inspectorate, Public administration)*

The quality of RA is connected to the knowledge and qualification of the internal OSH personnel or the external prevention service. The degree and amount of professional capacity, education and knowledge cannot be (even roughly) estimated (MENSURA 2006). In many MS most of the assessments are carried out by external prevention services, especially for SMEs. Spanish labour inspectors described this situation:

*“Most companies have risk assessments prepared by the prevention services. Documentation does exist but is frequently not very specific. Companies with internal prevention services are usually the big companies with sufficient expertise to carry out the risk assessments themselves.” (WP6:005, Spain, Labour Inspection)*

Only a few Member States foresee an accreditation, certification or evaluation procedure for prevention services. The situation is as follows according to a study from 2005 across the EU 15 Member States:

*“Evaluation of the work of external services is not very widespread in the countries studied here. Some countries entrust this evaluation to the Ministry concerned, as in Germany and Austria, however in Denmark it is the external body Danish Accreditation that annually verifies that the work required is correctly carried out by the external services. In Sweden, Finland, Italy and Portugal, the work of prevention services is not evaluated.” (MENSURA 2006)*

According to some of the survey respondents, the quality of the work of the prevention services corresponds with the price that the services charge (see chapter 9 on “External Protection and Prevention Services” for details).

The connection between RA and RMM is also a critical point. At one extreme, RA provides documentation which is actively used to reduce risks; at the other, it remains a document without any impact. While it is apparent that the full range of situations between these extremes is found in practice, we have been unable to assess their balance a quantitative way.

Many respondents affirmed the importance of RA for good risk management measures. For them, RA is not a valuable activity in itself, but rather is only of high quality if it leads to actions. Two statements from Romania and the Netherlands illustrate this opinion:

*“When a professional team uses properly the adequate method properly, technical, organizational, hygienic and sanitary measures, established on the basis of the risk assessment, this leads to an improvement in the working conditions. The real life situation is still far from the ideal. The risk assessment documents contain about 100 pages, difficult to run through and not very efficient. The measures resulted from the assessment most of the times lead to an improvement of the working conditions, however there is a certain reserve when it comes about allocating the necessary funds.”* (337 Romania, Public administration, Inspectorate)

*“Risk assessment alone is not enough. It is important to emphasis good practices and measures. The focus should be on the solutions and less on a thorough inventory”.* (7, Netherlands, Employers' associations Employers' representatives).

It appears that sometimes only the initial assessment is done, whereas revisions and follow-ups, e.g. upon changes of the use of chemicals or after the installation of technical risk management measures, are not carried out.

*“The initial assessments appear to be OK; the problem is that they are not repeated when products or the processes are changed. After some time the attention is lost and measures are applied less strictly.”* (WP6:003, Spain, Employee’s Representatives)

Main deficits of RAs have been summarised in a general way in the Finnish study on ‘Chemicals at work places’ (FIOH, 2005, p 294):

- Complete lack of systematic RA
- Inappropriate estimation of hazards
- Lack of systematic hazard determination
- Underestimation of certain hazards
- Not all chemicals being taken into consideration at RA
- RA not being based on a systematic assessment of exposure
- The impact of exposure to health not being estimated
- Safety data sheets not being provided at workplaces
- The RA process often ending after acquiring security instructions or producing a list of chemical agents in use.

We also heard from a number of actors and respondents and found in many study reports (Systemkonzept 1996, FIOH 2005) that the communication of the relevance of RA to enterprises is often not successful and that there are sectors and enterprises where the motivation of employers and workers is low, leading to an insufficient RA, a ‘bad quality RA’ with no impact on working conditions, or no RA at all.

### Costs of RA

The respondents to our survey had divergent views on the costs of RA. (To some extent this may have been caused by the wording of the question: “Cost is a significant obstacle for companies in performing chemical RA”). Nearly half stated that costs play no role, while the other half tended to the opposite opinion. Some respondents argued that it was not the costs for the RA that were significant, but rather those for the corrective measures that might result from it.

This situation can be illustrated by quotes from respondents:

*“Costs, in my opinion, are mostly not the main hindrance for the carrying out of a risk assessment, but I can't back up this claim in a detailed manner. In some companies, one does encounter fears that a comprehensive risk assessment could lead to high investment costs. Experience tends to indicate, however, that few of the necessary measures are of the cost-intensive, technical sort”* (302, Austria, OSH practitioner, External OSH service)

Other respondents also see costs not as an obstacle for RA but for the subsequent measures:

*“The cost of a deep assessment does not worry employers, but they are worried of costs for subsequent prevention actions. Employers generally prefer to keep their ignorance on the risks present in the workplace. They fear that this knowledge will push workers to keep on in the improvement. This it is not true for modern and competitive companies. They have the interest in stimulating the workers awareness and in preserving their efficiency.”* (203, Italy, OSH practitioner External OSH services)

According to respondent (139, Czech Republic, Toxicologist): *„both medium and smaller companies get used to the fact that risk assessment connected with the measurements of concentration of chemical substances at the workplace air is an inherent element of safety and health at work and thus require adequate financial resources”*.

However other respondents (138, Czech Republic, Public Administration) concluded that *„for some SMEs and physical persons, who lead economic activity usually, these costs can be inadequately high. Costs related to risk assessment are considered as “not a problem for big enterprises and problem for small and financially weak employers”* – (161, Czech Republic, OSH Specialist), *“such as micro-sized enterprises (employing no more than 5 workers)”* added (156, Czech Republic, OSH Practitioner).

*“Many companies are not able or not willing to invest in health and safety and their dominant interest is to make profits. In order to obtain it the companies prefer simple and cheap approaches”* (103, Slovakia, Public Administration).

Other respondents and sources saw the costs as a significant obstacle for companies in performing chemical RA.

In a PREVENT report on the implementation of four OSH directives in 10 European MS, respondents argued that RA is a remarkable cost burden for SMEs (French association of SMEs, ref. PREVENT 2008, p 226).

The British HSE and the Swedish Work Environment Authority (WEA) calculated the costs for risk evaluation of hazardous chemicals: HSE calculated costs of £163 per enterprise while WEA end up with costs of 180 € per enterprise to meet the provisions for RA of chemical hazards in the working environment (Swedish regulation AFS 2000:4) and the provisions on OELs and measures against air contaminants (Swedish regulation AFS 2005:17) (source: PREVENT 2008, p 227).

### **Information sources, support and guidance**

Mainly governments and authorities, but also branch and business associations, provide a large number of tools to support enterprises in performing RAs. Most of them rely on SDS as the information source. The national Dutch Internet portal on RA contains more than 500 sector specific RA tools including chemical risks in certain sectors (<http://www.rie.nl>). Austria provides an internet based RA portal with a choice of entrance points including workplaces, branches and risks ([www.eval.at](http://www.eval.at)).

Some specific and very useful interactive tools exist to support RA on chemicals. Some of them are included in OSH management software and provided by suppliers and publishers which develop and sell such software, but there are also a number of tools in the public domain.

According to the CADimple survey, safety data sheets are still the main information source for RA. They are complemented by special OSH checklists and electronic / internet tools. The respondents to our survey answered to the question: “What tools do companies use?” as follows:

<b>“What tools do companies use?”</b>	
Special OSH checklists	19 %
Electronic / internet tools	11 %
Safety data sheets	44 %
Workplace inspections	16 %
Health and Safety Management Systems	5 %
Others	4 %

The main barriers - as mentioned by many specialists and OSH practitioners - inside and outside enterprises are the motivation and knowledge to use these tools.

Sector specific online interactive RA tools can often be used without any login or release of confidential enterprise data. They contain features such as options to print out RA documents, to highlight deficits and to present practical RMM solutions. Many of them are able to automatically generate workplace instructions. Some examples of good practice include COSHH Essentials (UK), EMKG (DE), GISBAU / GISCHEM / GISMET (DE), KEMIGuiden (S) and Stoffenmanager (NL), short descriptions of which can be found in ‘References’.

### **Conclusions**

All actors see RA as a crucial and essential start to any systematic improvement of OSH. RA seems to be the area where most guidance and support is available. In many countries this is as true in relation to hazardous substances as it is in for OSH more generally. It is also easy to find good practice examples in every sector, in many enterprises, at the level of associations and intermediaries, and at the level of public OSH authorities and services. Nevertheless, risk assessment practice is not universal and most surveys demonstrate that its occurrence is related to workplace size, with greater frequency in larger workplaces.

Even if we interpret the quantitative statistics or data on risk assessment of chemicals very cautiously, they all indicate that between 10% and 50% of all workplaces dealing with chemicals perform RA.

Criticism of current practice points to an often weak connection between RA and risk management measures. Critics argue that too many enterprises carry out RA as a formality that has no impact on working conditions and risk reduction. Other critical statements suggest

that in the case of chemical hazards, RA is often not carried out properly or is not carried out at all. Concerning the costs, the respondents had divergent views, with some pointing to costs not of the risk assessment itself, but rather in introducing the control measures to which it might lead.

Therefore a somewhat mixed picture of the quantity and quality of RA of hazardous substances in Member States and enterprises emerges from the study. Major factors that influence this picture include the OSH policies of the MS, their economic structures, their legislation and enforcement priorities and the education and qualification of their OSH personnel and external prevention services.

## 6 Occupational Exposure Limits (OELs)

The tender document specified the research tasks on the use of OELs as tools in approaches to risk management. Three basic questions were framed:

- What evidence exists to indicate that employers are aware of OELs, what is their role in risk management and to what extent does exposure measurement occur in practice?
- What are the reasons why this does or does not occur?
- Identify what information is known about the costs of carrying out exposure measurements or other means of demonstrating compliance with OELs.

This chapter contains a general introduction into OELs in EU Member States. It also includes quantitative figures about the application of OELs in enterprises, the motivation of employers, supporting and hindering factors, considerations about the impact of OELs in risk reduction, and costs as an important factor for fulfilling legal requirements, before closing with some conclusions.<sup>4</sup>

### Features of OELs in the EU Member States

Occupational Exposure Limit values (OELs) are concentration limits of hazardous compounds in workplace air. OELs are one of the best known and major control instruments of exposure to chemicals. The idea and practical use of limit values of harmful concentrations exists not only in the OSH 'world', but also in other areas of daily life such as food, water, air, consumer products etc. In comparison to their related OELs, measured exposure values show in clear figures how well or badly a company's OSH system functions at certain workplaces. In other words: OELs belong among the most important tools for risk assessment and management. The legal character of OELs varies between binding, indicative, orientating or simply recommended values.

At first glance OELs look like an easy-to-understand system with a high degree of consistency between the European Member States. Some facts are common in all Member States:

- OELs are developed and set by national competent authorities and are published as a list by an authority, or by an authorised committee.
- OELs are set regularly in collaboration with a scientific committee. Some MS see it as necessary to install a national committee, others use foreign OEL lists (e.g. ACIGH), with a large proportion using the European list and referring to key documents from SCOEL. A difficulty in practice is the setting of pragmatic, non-health-based OELs.
- All OEL lists present at least eight-hour average concentrations for substances – including synthesized chemicals and other complex substance mixtures such as dust, fumes etc. In almost all cases the values are completed by short time values (15 minutes or similar).
- In general OELs address health issues and not safety issues such as flammable or explosive concentrations of substances in workplace air.

However, OELs and OEL systems differ in a significant number of aspects including the following:

- The number of substances with OELs varies broadly from a little more than 50 to

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<sup>4</sup> Main information sources for this chapter were the CADimple Member State Reports, the overview report TCWE 2007, the national OEL lists and publications and the overview article Schmitz-Felten / Lißner 2008.

more than 1,100.

- The detailed definitions vary: this holds for peak-concentrations and also in part for hour average concentrations.
- Measuring methods differ.
- Some Member States define different OEL values for the same substance.
- The notations of an OEL, such as allergic, skin affecting, carcinogenic, teratogenic etc., differ.

Other factors are important for implementation:

- The political stakeholders have a different view and opinion on the OEL system and the necessary amendments and corrections.
- The competent authorities have only scarcely evaluated the usability and efficiency of the OEL system.
- If enterprises do not stick to an OEL, it is unclear how the authorities will react to achieve compliance. The legislative and regulatory bodies have to aim for a functioning integration of OELs into the whole OSH legislation system to make them an effective risk reduction tool.
- Different levels of obligation exist, e.g. binding, orientating and recommended.

Some of these features are highly relevant for the workplace level, including the number of OEL-Values, working time and work load, and the regulation of mixed exposures.

The lists contain a between 50 substances and 1,100 substances, with the average between 200 and 600. Special OELs are dealt with in special chapters separated from the table format list, e.g. carcinogenic substances, petroleum fuels, dust, fibres, solvents, work processes. This shows a very different approach between the Member States in this respect. Obviously some Member States see it as an advantage to set OELs for a large number of substances, whilst others limit their list to the EU-List or to those substances where data are complete and adequate. It might also be that the selection of substances depends on the industrial and chemical production and use patterns of the MS. A German policy maker comments this situation:

*“The classic evaluation of exposure situations due to hazardous substances in the workplace is carried out using occupational exposure limits and is not controversial in practice. More problematic is the fact that out of the approx. 100,000 chemical substances that are used within the European domestic market, exposure limits derived from occupational medicine/toxicology have been set for only approx. 350 of them.”* (320, Germany, Policy maker, public administration)

In some MS lists there are calculation methods and examples dealing with the possible problem of working time, with an explanation of how to calculate an eight-hour exposure if the exposure is longer due to extended shifts or shorter but the OEL is exceeded.

Examples are the UK-list (UK OEL, 2005, 45-57) or the Finnish list (FINLAND OEL 2005, 40). The Finnish calculation formula is:  $C_{8h} = (C_1T_1 + C_2T_2 + C_3T_3 + \dots + C_nT_n) / 8h$ . C stands for the average exposure value of a substance and T for a certain period of time.

From a scientific point of view the effects of the combined exposure of two or more substances can only be assessed in a few cases. For some substances or substance groups, for example solvents, mixed exposures are defined in some lists. In a number of lists the problem of mixed exposures with more than one chemical with an OEL is tackled. Member States who take mixed exposures into account are the Czech Republic, Denmark, Finland, Germany, Ireland, Lithuania Poland, Spain and Sweden. In general the percentage is calculated to which the measured exposure relates to the OEL. The total exposure is calculated by the addition of

the percentages. The total may not exceed 100%. Some extremely hazardous substances are excluded from this calculation.

### **Application of OELs at work place level**

At certain types of workplaces OELs are permanently measured (24 hours / daily / weekly) and represent a crucial part of risk management. They are needed as a permanent supervision of the air concentration 24 hour per day, not only for the health and safety of workers, but to detect leaks and prevent very serious accidents. These workplaces are often characterised by critical exposures for one individual substance or at the most a few substances. Examples are the production of chemicals or other large scale production processes. Even at dangerous mobile workplaces like sewage system control work or drilling in landfills with toxic waste, a permanent measure of OELs – at least of acute toxic substances - is necessary, e.g. of hydrogen sulphur, carbon monoxide or methane.

The use of OELs is much less effective in working environments with complex exposures. Such workplaces are characterised by use of preparations, which cause mixed emissions and mixed exposures. Such situations are typical for most manually handled chemicals, e.g. in construction, cleaning or welding processes. However, also at these workplaces there are many cases where a measurement is the only way to find out how dangerous the situation really is. This is the case if not there is little experience from similar workplaces.

### **Quantitative figures**

There are not many research references dealing with the quantitative application of OELs. As mentioned elsewhere in this report, the evaluation of OSH has to struggle with significant data gaps. However, in their detailed study of the use of OELs in practice in workplaces in six EU countries Walters and Grodzki (2006, p342) concluded:

*‘There is quite clearly a theoretical role for OELs as indices against which the measurement of hazardous substances may be undertaken in risk assessment and systematic management of health and safety. However, based on our findings in all of the countries we examined, we question the extent of this role in practice’* (our italics).

The evaluation of the VAS<sub>t</sub> programme in the Netherlands indicated that in 8% of the enterprises that recognize exposure to hazardous substances as a risk in the RI&E, this document also contains an exposure evaluation. In 54% of the enterprises who performed an evaluation, this was done for all hazardous substances at the workplace, in 20% it was done for most substances and in 26% it was done for some of the hazardous substances. Most of the enterprises compared the exposure to an occupational exposure limit (MAC value 82%, company standard 11% or both 3%) (see references in the National Report on the Netherlands). Exposure to hazardous substances is highest in the agriculture, fishery and mineral extraction sector (73% of all enterprises), the construction industry (72% of all enterprises), governmental organisations (46% of all enterprises) and the hotel and catering sector (37% of all enterprises). In 27% of all enterprises workers are exposed to hazardous substances with a long term effect, 13% to carcinogenic and mutagenic substances and 10% to hazardous substances with short term effects (VAST? NL MS REP).

Assessments of exposure, either by estimation or by measurements, by the VAS<sub>t</sub> evaluation show that few companies perform measurements. The table below indicates the effect of the VAS<sub>t</sub> programme on these numbers.

#### **Table OEL 1 : Types of assessment/measurement of exposure to hazardous substances**



<b>Changes between 2004 and 2007</b>	<b>2007</b>	<b>2004</b>
	N=490 % yes	N=376 % yes
Permanent measurements on the work place	6,1%	4,4%
Periodical measurements on the work place	38,4%	38,0%
Personal air sampling	16,0%	15,4%
Blood- and/or urine measurements with groups of workers	7,0%▲	2,3%▼
Estimation of exposure	42,9%▼	63,1%▲
Other	14,6%▲	8,2%▼
Do not know	8,1%▲	1,0%▼

▼ Significantly lower (p=0.05), ▲ Significantly higher (p=0.05)

Source: Visser et al., 2007:27

Between 2004 and 2007 awareness and practical actions grew significantly. From other MS much higher figures were reported. A labour inspector from Austria states:

*“According to the experience of the Ministry of Work, exposure measurements are carried out in approx. 40-50% of all companies. The measurement requirement in Austria has been in effect since the middle of 2006. One may assume that the percentage of companies performing measurements will increase. (304 Austria, Inspectorate, Public administration)*

In Finland it is estimated that measurements of air concentrations have been conducted at about 1,000 workplaces and biomonitoring samples were analysed for about 9,000 workplaces (year 2004). The Finnish Institute of Occupational Health estimates that over 40,000 workers are exposed to concentrations over 50% of the HTP value (FIOH, 2006).

In the CADimple survey respondents felt that the extent to which exposure measurements occur in practice varied from less than 10% (17% of respondents) to over 60% (22%). Again there were some differences, with the accession countries giving much higher percentage rates of companies measuring OELs than respondents from the EU15 countries. OELs seemed to be a more accepted and practically applied tool in the Accession States. It is also important to note that none of these figures provide an indication of the quality of the measurement to which they refer.

**Table OEL 2: Answers to Q3.2: To what extent does exposure measurement occur in practice? (% of companies)**

<b>How many of all companies measure OELs</b>	<b>All answers</b>	<b>EU 15</b>	<b>Accession</b>
Lower 30%	40%	62%	21%
Between 40% and 60%	22%	13%	31%
Above 60%	22%	2%	39%

### **Awareness of employers**

Walters and Grodzki (2006:346) discuss British research undertaken in the late 1990s (see HSE 1997) which pointed to ‘the enormous levels of ignorance about OELs among users of chemical products’ at that time and they go on to argue that ‘...such concerns are amongst those responsible for causing (British) regulators to reappraise the position of OELs in regulatory strategies...’(2006: 347). We could not identify more recent literature or references dealing with the question of awareness of OELs in other countries. However, in contrast with these earlier findings 69% of respondents to the CADimple questionnaire agreed that

employers were aware of the existence of OELs and their role in the risk management of hazardous substances.

**Table OEL 3: Answers to Q3.1: Employers are aware of the existence of OELs and their role in the risk management of hazardous substances**

Response	%	EU 15	Accession
Agree	69	46 %	88 %

Opposing points of view were often made in clear and short ways as, for example, by a Belgian employer and a Dutch policy maker:

*“In general employers are not aware of the risks of exposure to chemical agents.”* (5 Belgium) or a Dutch Policy maker: *“Nearly all companies are aware of the existence of OELs and their role. In the Netherlands there is a system of public and private OELs. If public OELs are not available companies have to set safe OELs themselves. It is questionable if they do.”* (11, NL). A German OSH practitioner complained about limited knowledge: *“Only in exceptional cases do employers know the term “exposure limit” and its meaning. Most of them know neither a single current value nor the consequences of non-compliance nor have they ever called a risk assessment into question.* (329, Germany)

Many respondents highlighted the –level of knowledge inside enterprises and the size of enterprises as the two main influencing factors concerning OELs. Some respondents considered the size of the enterprise as the main reason as a Maltese Labour inspector answered: *“The awareness of employers in view of the existence of OELs and their role in the risk management of hazardous substances is restricted to mid size enterprises.”*(Malta, Inspectorate Public administration, 212); similarly, his UK-colleague argued *“In large firms with well developed health and safety systems there is a better understanding of OELs and their use. This area is less well understood in small and micro businesses* (213 UK LI); and a Cypriot trade unionist corroborated these statements: *“Employers with large companies are more aware than others with SMEs* (206, Cyprus, Union).

Other respondents saw a high level of awareness, because OELs are a well established tool used for example since the middle of the 1950s. A Polish labour inspector stated: *“MACs values in Poland are established about fifty years ago and employers have a very good knowledge about existing and their roles in chemical risk management. But not always they use of risks assessment’s results correct.”* (110, Poland, Labour Inspector) and his Romanian colleague argued in the same way: *“Generally, employers are aware of the existence of OELs simply because they have been used for a long time in Romania.”* (337, Romania, Labour Inspector).

Critical voices are therefore dominant and either the respondents do not see awareness on the employers’ side or they point to deficits in the role of OELs for risk management measures.

### **Role of OELs in RA**

OELs are often mentioned as one of the most important tools for risk assessment and management. However, the relevance of OELs as a risk management tool appears to have diminished in the last 10 years. The application and use of OELs is reduced even in MS well known for their efforts in work environment policies and chemical substances (e.g. Denmark). Costs and complexity are barriers, but so too is this sometimes weak connection to RMM.

How did our respondents see the role of OELs?

*“My basic estimation is that employers chiefly orient themselves on exposure limits (because they are the most accessible type of information for laypeople in the area of chemical working*

materials). Whether employers really understand them, however, probably depends on their own expertise or the expertise of others in the company (such as prevention experts etc.). Unfortunately, in all too many cases, (just barely) meeting the limit value is the focus of attention. (305 Austria Unions, Employees' representatives)

*“In my experience I had encountered two tendencies: 1. Employers are aware of the existence of the OELs and they understand the necessity of complying. However, they have no proper knowledge about the limitations of the concept. They perceive the numerical value as a “safe” threshold and therefore they have limited flexibility in using OELs as an effective tool of risk management. 2. Employers are aware of the existence of the OELs but they perceive the concept as a bureaucratic action. They have to perform some measurements for the record (in order to comply with the legislation) but they don’t actually use the results into an integrated risk management. (335, Romania, researcher)*

*“The significance of a measurement is often overrated; also, for the most part, only individual exposure measurements for certain chemicals are carried out. Carrying out measures and regular checks of their effectiveness is much more important.”(318, Germany, Policy makers Public administration)*

Such answers point to the fact that the connection between OELs and risk management is not perceived to be a close one. It seems to be clear for all actors that, in cases where the OEL is exceeded, preventive action has to be taken. In all other cases it is unclear which risk management measures have to be taken depending on the level of the value measured. The actions range from: no action necessary, repeated measurements, technical reduction of the exposure or PPE. In some MS the necessary preventive actions are regulated by secondary or tertiary legislation, while in others this is not the case.

On the other hand there are statements that the risk assessment role of the OEL value is overestimated when it becomes the one and only criterion for risk assessment and management.

### **Reasons for Measurements**

Asked about the reasons why exposure measurements do or do not occur, many respondents cited cost. Other reasons given included availability of local expertise, requirement from the regulatory authority, level of employers’ awareness, complaints from employees, in response to an incident, type of substance involved and size of organisation.

Some respondents commented that OELs are replaced by control banding techniques or measured at a few but representative workplaces to keep the costs low.

*“The expense to maintain regular exposure measurements and their is a tendency to opt for control banding techniques as these tend to be cheaper and simpler to maintain even though this no always sufficient.” (212, Malta, Inspectorate, Public administration)*

*“In general estimations of exposure are performed as part of the risk assessment. Measurement only occurs when employers expect the exposure is close to the OEL. Also measurements take place at representative workplace, results are generalized over more comparable places.” (8, NL, Employers' associations Employers' representatives).*

Some practitioners argued that spending the money for risk reduction can be much more effective than spending it for measurements of OELs:

*“Exposure measurement was performed a lot more 10 years ago or more. They often showed, that the limits were not exceeded. Now we have a pretty good estimate of the exposure, by analysing the process where the chemical is used. Furthermore the companies rather want to*

*use money on prevention (ex. ventilation, substitution) than on measurements. Now the substitution paragraph is more used. I agree in this priority.*” (307, Denmark, External OSH services, OSH practitioners)

Many respondents pointed out that according to their experience OELs are only measured in exceptional situations. Such situations can be extremely dangerous concentrations of substances or orders from the labour inspection: *“Exposure measurement is mainly executed for high priority dangerous substances (in surgery rooms and oncology) and as a consequence of visits of the Labour inspectorate. Usually the labour inspectorate announces the keypoints for inspection one year in advance. As a consequence the hospitals undertake action.* (10 Netherlands Employers' associations (Employers' representatives)

*“Measurements are absolutely the exception. The reasons for this are measurement costs, lack of knowledge about procedures and perceptions that they are not necessary.”*(331, Germany, External OSH services, OSH practitioners)

*“Measurements are mostly done if we (the Working Environment Authority) have ordered the companies to take of some problems. In that case measurements are often used as an argument why not to do as ordered since the results of the measurements are low.”* (306, Denmark, Policy makers, Public administration)

*“For most companies cost is not an obstacle, but they still don't do measurements without being ordered to. If measurements were free there would probably be a demand for them, especially initialized by employees.”* (315, Sweden Inspectorate, Public administration)

Only a few respondents saw the measurement of OELs as a normal process in RA: *“Employers got accustomed to the fact that measurements of chemical substances concentrations are a part of costs involved in running a plant.”*(112, Poland Inspectorate, Public administration)

The respondents pointed to some barriers, typically costs, complicated measuring process, and lack of qualified personnel or laboratories. A German representative of a professional association argued that *“The process of carrying out the measurements is too complicated”* (332 Germany, OSH practitioner), a Romanian academic mentioned *“The lack of occupational hygienists. In Romania, the development of occupational hygiene was not encouraged.”* (335 Romania). A Slovakian policy maker stated as main reasons the decreasing size of enterprises: *“The traditional big companies are used to order measurements, but the growing size of small and medium size companies means decrease in measurements in these companies. The market for measurement services is restricted by required professional competency.”* (103 Slovakia)

## **Costs**

Costs are seen as a significant obstacle to performing OEL measurements. When asked specifically about cost as an obstacle, respondents estimates of the proportion of organisations affected varied from less than 10% (14% of respondents) to over 60% (28%). In this case, fewer employees' representatives and Academics gave estimates of over 60% (7% and 16% respectively).

Respondents from many MS saw cost as an obstacle. A Slovenian policy maker stated *“Cost is a significant obstacle that the exposure measurements do not occur in all companies and/or regularly.* (104, Slovenia). A polish labour inspector did not blame **all** companies: *“Part of the employers complains about the high costs of taking measurements and the frequency of taking them, especially in cases when the concentrations are constantly much below the*

*hygienic norms*” (112 Poland).

Some MS have introduced financial subsidies or offer measurements for certain types of enterprises for free (for example Austria, partly in Germany, and a bonus system in Romania).

### **Conclusions**

OELs are one of the best known tools of risk control, although the understanding about their scientific meaning in enterprises might be limited. Knowledge, size, costs and integration into risk assessment and measurement seem to be the crucial factors for an expedient and effective use of OELs. For some enterprises the measurement of OELs is routine, while in many cases only exceptional reasons lead to measurements. The necessary expertise for measurements and the interpretation of their results is often not available inside the companies, and costs - mostly for external services - are another strong barrier. .

The quantitative statistics or data on OELs show a wide variety of the use of OEL measurements between sectors and between the EU 15 and Accession States. We cannot conclude how often and where OELs have been measured, or when their measurement would have been an obligation or necessity for a sufficient RA.

OELs have been developed for exposures against one or a few substances; many current workplaces with mixed exposures would require extensive and costly measurements if compliance with exposure limits were to be the standard of acceptable OHS in practice. Consequently, the replacement of measurements by exposure scenarios or similar techniques has been a growing trend.

Also, the orientation of regulatory authorities and OHS practitioners in some countries towards the role of OELs has changed in line with a greater focus on the needs of small firms and the acknowledgement of their limited access to scientific and technical expertise. The emergence of a greater emphasis on easy to use tools for risk management and control has resulted in a greater role for generic risk assessment, risk phrases and control banding. Guidance on such processes has replaced a reliance on exposure measurement against OELs, which, it is argued, never occurred properly in practice in small firms anyway.

## 7 Substitution

The tender specified a number of research questions. We were charged to describe: how substitution works in practice; which practical examples of effective substitution exist and which barriers to effective substitution can be identified; the motivation of employers to introduce the use of substitute substances; the drivers behind substitution (users or suppliers); and available information about the costs of substitution.

### Substitution in practice

Substitution demands of a general character are predominant in European and national legislation (KEMI 2007). Substitution has been considered and identified as the preferred risk-reduction strategy since the beginning of workers' protection legislation related to chemicals and also environmental policy and public health strategies. Many other pieces of European legislation<sup>5</sup> trigger more or less directly substitution of chemicals at work places.

Substitution requirements are, according to legislative texts, without doubt the preferred way to promote the elimination or reduction of risks posed by chemical agents to the health and safety of workers. Replacing harmful substances and processes with less harmful ones or with non-chemical alternatives is seen from the legislative perspective as one of the most effective strategies of risk reduction - a reduction of risk at source.

Wording typically in the form of: 'Substitution shall by preference be undertaken (CAD)' or 'The employer shall reduce the use of a carcinogen or mutagen at the place of work, in particular by replacing it, in so far as is technically possible... (CMD) or 'The employer must check whether substances, preparations or products with a lower health risk than those he intends to introduce are available' (German Ordinance on Hazardous Substances, first version from 1986).

In general, we found that the requirements and legal frameworks regarding substitution are relatively similar in the different Member States.

Evidence for the high relevance of substitution is not only found in legislation but also in our survey. The majority of respondents considered substitution in the same way, with 73% agreeing with our statement that "Substitution is important for improving working conditions in practice", 16% disagreeing and 10 % neutral.

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<sup>5</sup> First versions of subsequently updated or revised versions are quoted:

Council Directive 75/442/EEC of 15 July 1975 on waste;

Council Directive 76/769/EEC of 27 July 1976 on the approximation of the laws, regulations and administrative provisions of the Member States relating to restrictions on the marketing and use of certain dangerous substances and preparations

Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control

Directive 98/8/EC of the European Parliament and of the Council of 16 February 1998 concerning the placing of biocidal products on the market

Council Directive 1999/13/EC of 11 March 1999 on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain activities and installations

Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of life vehicles

Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy

Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment

Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment (WEEE)

However, many respondents in our survey highlighted the limited impact of substitution in risk reduction measures at workplaces, mainly because it is rarely undertaken in a systematic and proactive way. Dutch and German OSH practitioners described their impression of the relevance of substitution in enterprises:

*“In theory it is a very good method. In practice it is hard. A lot of companies abandon this strategy because it costs too much (e.g. the whole production line should be adapted) or the appropriate products/substances are not available.”* (09 Netherlands External OSH services, OSH practitioners)

*“Substitution is without a doubt the best method for risk minimisation. However, substitution is rarely carried out in practice because economic reasons can always be found that stand in the way of an exchange or substitute for a hazardous material. So, for example, the material qualification measures are supposedly so time-consuming and cost-intensive that power stations cannot do without hydrazine use, although numerous alternatives are known; these, however, have only been certified up to now for other working materials than the one in question.”* (329 Germany, Representative of Professional Associations, OSH practitioners)

Although substitution of dangerous chemicals with less dangerous ones is seen as the ideal way to reduce risks and to overcome unavoidable deficits of control and regulation of the use of hazardous substances, substitution is considered as a highly difficult risk reduction strategy, establishing itself only sparsely within enterprises.

### **Motivation of enterprises – drivers and barriers**

The enterprise is the place where substitution eventually will or will not take place. But the decisions taken in enterprises are influenced by many external factors including legislation and its enforcement, technological development, markets, new scientific evidence and public policies and debate.

The overall scope of a “substitution measure” and the range of actors involved can vary significantly. Substitution can mean nothing more than a simple change from one chemical or preparation to another one with less hazardous properties. Many users do this without recognizing it as substitution where the changes in the composition were made by the supplier.

Substitution is also often done with full consensus among all actors with very little or no technical, economic or regulative problems. In such ‘small’ substitution cases the employer and workers of the enterprise itself are involved, supported by technicians and environmental or OSH specialists or units. On the other hand, a ‘large’ and complex substitution case means a long lasting process, possibly with conflicts inside and outside the company and including important technical changes, economic impacts and regulatory consequences. Usually, the larger the efforts necessary for substitution, the more barriers can occur (Lohse / Lissner 2003).

The way substitution is carried out ranges from pure “good luck” in the purchase situation to more systematic approaches (Koval / Visser / Jongen 2008).

Our respondents answered our question ‘What motivates employers to actively consider and introduce substitute substances?’ as follows (more than one answer was possible so the sum exceeds 100 %):

**Table SUBS 1: Motivation to substitute**

Economy: e.g. Costs, Liability, Resources, Competition	39 %
Technical function: e.g. Performance, Process integration and Product quality	18 %
Social factors: e.g. Awareness (public), communication	5 %
Risk information: e.g. RI of chemical products, RI of alternatives	8 %
Regulative frame: e.g. Legislation / Regulation, Standardisation	28 %

Costs, liability, resources and competition as economic factors were the strongest motivational factors to substitute followed by regulatory demands and technological considerations. Risk information and awareness seemed to be of less influence compared to factors such as economy, technology and regulation. This might be due to a methodological bias: our respondents obviously represented an ‘informed group’ with high awareness.

The following quotes which include pointers to typical barriers (in response to our question ‘What are the main barriers to substitution?’) illustrate these findings. Most respondents highlighted the important role of economic and technological considerations. A Belgian employers’ representative highlighted the influence of costs: *“Economical factors are most important. Substitution is not always possible, for example in the pharmaceutical industry components of drugs should be registered. Changing components has a lot of consequences. When legislation prohibits the use of certain substances, substances are substituted.”* (1, Belgium, Employers' associations, Employers' representatives)

Labour inspectors from a number of Member states argued in a similar way: *“Substitutes are expensive and cause a lot of technical limitations. The most common example are industrial troubles with substitution of asbestos seals in installations e.g. of ammonium production by non-asbestos stoppers.”* (108, Poland Inspectorate, Public Administration)

*“The key factors influencing the choice of substances needed in a particular process are how well the substances perform and their availability. Cost also plays a part but the substitute needs to be able to do the job.”*(213, UK Inspectorate, Public administration)

Other employers pointed to the positive aspects of substitution for the reputation of a company and for the health situation of the workers: *“Social factors are the most import e.g. image of employer, preventing employees to get sick, reducing sickness absenteeism, disability. But it should be possible technically. Also costs play an important role.”* (7 Netherlands, Employers' associations, Employers' representatives)

Many of the comments in our survey dealt with the technological aspects of substitution: *“Technical aspects are of importance to maintain the characteristics of a substance. Social factors concern the health of employees, prevent workers of becoming ill. Also the public opinion is playing a role in this.”* (8 Netherlands, Employers' associations, Employers' representatives)

Technological and economic factors were not always considered as barriers but also as promoters of substitution. *“Employers generally choose the substitution on technical and economical reasons, and also for marketing related reasons. The certification of the environment or health and safety management systems imposes the observance of the legal provisions regarding the substitution.”* (337, Romania, Inspectorate, Public Administration)



Some respondents pointed out that general answers are difficult to find, with each substitution being an individual case: *“It is not possible to give answers on substitution as a whole, each case is unique. In applications where there is a best alternative in all aspects barriers are low, but if not legislation can be needed.”* (315, Sweden, Inspectorate, Public Administration)

Changes in existing cost structures of enterprises often bear significant potential for innovative approaches towards substitution. Such changes can be induced in various ways, e.g. when traditional resources become more expensive, or when significant investments in equipment, staff qualification or administrative effort are required in order to maintain the traditional use of a hazardous chemical.

A German policy maker (320) stated: *“To increase the frequency of substitution of hazardous substances in workplaces, clearer and more binding legal requirements are necessary. The Directive 98/24 EC is rather unclear concerning substitution requirements. In practice, vaguely defined terminology particularly leads to problems of the sort that limit substitution obligations, such as the term ‘Zumutbarkeit’, meaning ‘reasonability’. When this is the sole assessment criterion in the decision not to carry out substitution, more precision and references to the state of technology would be desirable.”*

### **User or supplier driven substitution?**

For SMEs with very limited chemical knowledge of substitution, the replacement of hazardous substances – if it is done at all – is mainly done on the supply chain side. Highly specialised suppliers (e.g. of hair colorants or disinfectants) decide whether they provide their customers with products containing less hazardous substances or not. This supplier driven substitution is a common model in supplier-client arrangements with low or no chemical knowledge on the user’s side.

The understanding of substitution differs between these actors – users and suppliers (notes from CADimple visits to enterprises). In supplier driven substitution processes the elimination of hazardous chemicals is often not even recognized as substitution by the user. The supplier might announce a change in the composition of a product as a marketing technique, and sometimes this change is made without any further promotion. Examples are cleaning agents, inks and paints, construction chemicals or shampoos. This problem of common wording and understanding starts even earlier, because workers and employers from the users’ side see many products often even not as chemicals at all but literally as ‘inks, shampoos or cleaning agents’.

User driven substitution can be found where enterprises – often large in respect to their sector-specific market power - develop a policy of substitution and compel their suppliers to ban or reduce certain hazardous chemicals. A typical situation can be found in the car and large electrical goods industries, where suppliers are forced by their customers to use ‘black’, ‘grey’ and ‘white’ lists of chemicals (in the references see: Company Policies and Business Associations, as examples the lists of Boots, Dell, Heidelberger Druckmaschinen, Philips, Scania or the global IMDS - International Material Data System - of all major car producers).

The majority of enterprises – i.e. the medium and large enterprises – act between these extremes, depending on their knowledge, awareness and capacities.

### **Costs of substitution**

There are a number of economic aspects which are obviously extremely important for any company considering substitution of hazardous chemicals in their products and processes (Ahrens 2005, Lohse / Lissner 2003). Again, most of the respondents stated that substitution differs widely from case to case and a general opinion is difficult to give. That might be the reason for the fact that only 16 % of our respondents agreed with our statement ‘Information about the costs of substitution is available.’

A Polish labour inspector summarised some basic cost factors in his response to our survey:

*“Substitution of substances with others is often associated with additional costs. Substitutes, especially recently introduced into market are often more expensive than previously used. They also have different physico-chemical properties (viscosity, gloss, time of drying). Use of them may associate with decrease of production efficiency and a need of modernisation of machine park.” (112, Poland Inspectorate, Public administration)*

Possibly, after successful market introduction, the initially higher costs of the substitute will decrease when higher demand leads to growing production volumes and subsequent efficiency gains through economy of scales. However this can take long periods of time and it is not even certain whether the substitute will ever be cost competitive unless it receives support over a critical period of time.

Technological and economic factors are not always considered as barriers but also sometimes as promoters of substitution. Higher costs per unit can be compensated if the substitute’s performance is superior to the performance of the conventional substance or material.

To be accepted by market players, however, the superior performance must be proven beforehand. Furthermore, the level of information and understanding of potential users of the substitute and their mentality play a crucial role, and, last but not least, their financial controlling system must allow for identification of such economic gains based on a better price-performance ratio where the substitute’s direct costs are higher. When, on the other hand, substitution implies higher human labour or training costs, this will be a significant barrier even if these costs will be incurred only over a limited period of time.

Open questions with respect to liability aspects can be a strong barrier if there is concern that substitutes might not meet existing standards or might cause guarantee problems.

In cases of large companies, existing legislation and the will and need to comply with this legislation overrules the cost argument: *“Whenever a chemical product has to be substituted, it shall be substituted no matter the costs. Ex: asbestos has been banned since 2000 on Dacia platform and replaced with more expensive materials. The same was the case with the trichloroethylene. Benzene, toluene, pigments based on Chromium 6/ Lead, acetone in paints and diluters has been completely eliminated.” (338, Romania, OSH practitioners)*

### **Availability of information sources, support and guidance**

Numerous approaches for comparative assessment of substances have been developed by authorities, industrial sector associations and large enterprises (see the list of tools and good practice portals in references, Tools and Guidance). However, such tools do not always lead to an unambiguous decision, because even in the absence of any economic and technical considerations, conflicting targets and possible burden shifts (e.g. from toxicological impacts to increased energy consumption or accident risks for workers) need to be evaluated and balanced (Rossi / Geiser / Tickner 2007, Lissner 2007).

Often business associations, public authorities, research institutes or large enterprises provide such criteria lists or decision tools (see references). Such tools are - according to our discussions at the workplace level - mostly used by enterprises with a well developed OSH-infrastructure and high awareness. Due to lack of capacity and resources, most smaller companies (but also enterprises that are not affected in their core business) rely on the information given by the supplier or on easily accessible and visible tools such as classification and labelling under Directive 67/548/EEC for dangerous substances, and Directive 99/45/EC for dangerous preparations, and also the information contained in safety data sheets according to Directive 2001/58/EC. The trend towards more complex preparations containing many more than one or two substances reduces the comprehensibility and the informative value of these labelling and information instruments.

Related tools to support decisions on substitution are positive lists of preferred substances or negative lists of unwanted substances, and eco-labelling criteria as well as environmental criteria in green procurement. A German policy maker (333) argued that a positive list based on risk assessments would be helpful.

The most common method is to compare the current technology with one favourite alternative option (occasionally, with more than one) using a basic process model and a number of decision criteria (see e.g. TRGS 600).

Typically the following comparative criteria are used:

- Risks (health risks caused by chemicals, other health risks, environmental risks)
- Technical suitability (compliance with product and process specifications, which adaptations are necessary?)
- Work organisation (changes needed)
- Costs (material costs, material consumption, equipment and investment costs, energy, labour costs, organisation costs, transport costs, insurance costs, storage costs)
- Cost of different protective measures
- Waste, sewage water (disposal equipment and organisation, disposal costs)
- Other influencing factors such as corporate image, employee satisfaction, sustainability / planning reliability.
- Shift of risks, e.g. to the environment, to consumers etc.

A number of specific substitution tools (see references) are available in a few MS. Additionally there is a larger number of other chemical management tools available which partially contain substitution information (see also the tools in the Risk assessment chapter).

## **Conclusions**

We found a similar picture of substitution across all EU Member States. Every Member State sets legislative requirements for substitution and puts substitution at the top of the hierarchy of risk reduction measures.

However, practitioners and specialists mentioned many workplaces where substitution would be an easy and well functioning solution, but also many cases with serious practical difficulties. They are sceptical about general legal substitution requirements and prefer case-to-case decisions. Economic factors such as costs, liability, resources and competition are very strong motivational factors for enterprises to substitute. Further, we identified regulatory demands and technological considerations as initial triggers and supportive factors.

We identified two main substitution approaches, one that is supplier driven and another user driven approach. For enterprises with limited chemical knowledge, the replacement of hazardous substances is mainly done on the supply chain side. Specialised suppliers costs, liability, resources provide their customers with products containing less hazardous substances - or not. The users select chemical preparations using criteria such as technical properties, application properties, convenience and customer preferences. User driven substitution can be found where enterprises develop a policy of substitution and compel their suppliers to ban or reduce certain hazardous chemicals. A typical situation can be found in the car and large electrical goods industries, where suppliers are forced by their customers to use 'black', 'grey' and 'white' lists of chemicals. The majority of enterprises act between these poles.

Visits to enterprises in the CADimple field research confirmed what has been reported elsewhere — that understanding of substitution differs widely. In supplier driven substitution processes the elimination of hazardous chemicals is often not even recognized as substitution by the user. Examples are cleaning agents, inks and paints, construction chemicals or shampoos, which are often not even recognised as chemicals

Consequently, the assessment and evaluation of the motivation, drivers and barriers, costs and successes of substitution are case dependent and not uniform. This complexity and difficulty of substitution is often taken into account in the complex support tools and decision criteria which aim to support substitution.

## 8 Risk management measures (RMM)

The project was tasked with finding out:

- What knowledge exists on the use of effective risk management measures (RMMs) especially in making decisions regarding the control of risks at source versus the use of personal protective equipment (PPE)?
- What information is known concerning the costs of installing and operating control at source RMMs compared to the costs of using PPE and providing examples to demonstrate the consequences, in broad terms, of the administrative and technical burden and costs of meeting the requirements of the Directive through risk control at source and by using PPE?
- What are felt to be the most significant considerations when deciding on a control solution? For example compliance with occupational exposure limits (OELs), requirements of SDSs, costs of control or administrative and technical burden of introducing controls etc.

The concept of risk management is central to the requirements of the CAD and much of the relevant national legislation transposing them in Member States. As we have already pointed out, it is a specific application of the regulatory approach to risk management more widely which is found in the Framework Directive 89/391 and in provisions to implement it in Member States. Central to this approach is employers' overall responsibility to manage health and safety at work according to a set of 'prevention principles', critical to which are workplace (risk) assessment, employer/management competence and worker consultation. Therefore it is difficult to separate out the impact of the CAD on risk management measures without also taking account of its impact in other areas such as risk assessment, information provision, the role of prevention services and worker consultation.

More specifically in relation to the risk management of hazardous substances, a hierarchy of preference exists in terms of control solutions, which ranges from the removal of the hazard by elimination and substitution (and hence also the risk of harm), through a sequence of measures embracing design of work processes and engineering controls, the use of adequate equipment and materials, the application of collective protection measures at the source of the risk, such as adequate ventilation and appropriate organizational measures; and where exposure cannot be prevented by other means, ending with application of individual protection measures including personal protective equipment, (PPE), which does not remove the hazard and serves to control the risk in only a limited way. In between the extremes of elimination of risk and PPE therefore, there are a variety of engineering or administrative controls at source and along the pathway of contact between the hazard and the worker, which are intended to reduce the risk of harm. Generally speaking, the more effectively they do so, the higher their place in the hierarchy of preference. In practice, a combination of these control solutions forms the ideal risk management method employed. However, the technical and scientific complexity involved in this approach in relation to hazardous substances is an acknowledged problem, especially when combined with questions of cost effectiveness.

These issues are evident in the responses to our inquiry on risk management measures. Equally it needs to be recognised that sometimes simple features of the equipment used, such as tightly closed containers, are often important risk management measures, but are not recognised as such. It is clear that the use of PPE remains a popular way of addressing risk management of hazardous substances especially in small firms across the majority of countries in the survey. As the report on Germany makes clear:

*'The only measure that most SMEs recognize is PPE, as it is seemingly inexpensive and thus has little effect economically'.* (318, Policy maker, public administration)

There are several reasons for this. First, because as the report on Poland notes for example:

*'It is easier for employers to apply PPE than to analyse a whole technological process in order to identify hazards and introduce other means of protection. But in SMEs, PPE is not always used effectively'* (109, Poland, Inspectorate (Public administration))

Thus, because it is perceived to be cheap and seems easy to understand, PPE is a significant risk management measure especially in smaller firms. Despite the ease of use however, there remain basic conditions that determine suitable and sufficient use, which it seems are not always understood and therefore not met, with the result that even this relatively simple risk management measure is not always used properly. As an Austrian labour inspector commented:

*'The correct use of the PPE is however a problem. One could really say that better instruction is essential here'* (304, Austria, Inspectorate, Public administration)

Second, the perceived costs involved in introducing particular risk management methods are a significant determining factor. As the Hungarian report notes for example:

*'Costs of imposing a control solution are considered the most important factor for making a decision....'* (340, Hungary, Public Administration)

Findings from Spain suggest that the hierarchy of control is often reversed because of cost considerations, the use of PPE thus predominating with poor performance in implementing prevention the consequence:

*'The cheapest measure is chosen and which has the least consequence for the product and process'* (WP6:002, Spain, Employee's representative)

and

*'Companies tend to select the measure which is the easiest to implement and/or the cheapest. Recommendations from the risk assessment are ignored and personal protective equipment is (continued to be) applied.'* (WP6:008, Spain, OSH Practitioner)

As another respondent from Spain commented for example:

*'The hierarchy of measures does not normally play a role in the decision on which measures to implement. It is believed to be not well known. Mostly the cheaper options are selected'* (WP6:005, Spain, Labour Inspection)

Third, it is evident that while in some countries a range of tools that focus on risk management measures on hazardous substances are available, as the report on Germany makes clear, their implementation depends widely on the attitudes of employers on the one hand and on the other hand, on qualified internal or external safety experts.

In a nutshell, as with other areas of the Directive, in large organisations and in some smaller ones where significant and substantial use of hazardous substances is central to their business purposes, an appropriate response to requirements on risk management measures is feasible, taking account of the level of risk, the technical and engineering aspects and the cost-benefit. While the situation in these firms is by no means perfect, generally it is here that signs of the positive impact of the Chemical Agents Directive are most evident. It is clear for example from the case studies undertaken in the UK, Italy and Greece that there is a good understanding of the need for risk management measures in firms, regardless of size, that use or produce hazardous substances as central to their business purpose. Closer scrutiny of the practices recounted in relation to risk management in these firms sometimes reveals considerable room for improved practice. This was clear in our case studies when, for example, respondents in Italy and the UK were invited to comment in greater detail on the analysis of their initial positive responses to questions concerning risk management measures

they qualified them by indicating that while such measures existed in their workplaces there were nevertheless concerns about their quality, appropriateness, monitoring and effectiveness as well as about the extent of consultation that had occurred between employers, consultants and workers and their representatives concerning their introduction.

Nevertheless there is substantial difference between these situations and many others involving small firms in which the capacity of employers and their managers to undertake appropriate risk management measures was clearly much more limited. As a Swedish manager from a small firm quoted in Antonsson (2006) put it:

*'I have read the book (about requirements on chemical risk management) but I still don't know what to do. It is difficult for me to understand what is actually required from us.'*

Similar doubts concerning the ability of employers to respond appropriately were expressed by earlier comments from the UK Engineering Employers' Federation quoted in Walters and Grodzki (2006:168) in relation to support for risk management measures provided by *COSHH Essentials* across the range of work situations commonly encountered :

*'There are many areas where COSHH Essentials simply does not work, for example in the construction industry, for peripatetic workers and in maintenance activities'.*

These problems among smaller firms have been increasingly acknowledged and the subject of the literature on risk management measures for hazardous substances produced over the last decade. As noted elsewhere, the trajectory of thinking around regulating the management of the risks of hazardous substances developed apace with the wider focus on health and safety management more generally. Recognising the particular challenges of technical difficulty and hidden risks associated with hazardous substances the leitmotif of this discourse has been the attention it has paid to supporting simpler approaches to risk management.

As Walters (2008) has recounted, there is a clearly documented development of strategic thinking in relation to chemical risk management in countries such as the UK, the Netherlands and Germany that is particularly focused on the special relevance of the situation of small enterprises. It has caused policy makers in these countries to rethink the regulatory approach framed by the original risk management measures such as those found in Control of Substances Hazardous to Health Regulations in the UK for example, to take account of the realities of compliance among employers in general, and not only among those with strong technical capacities.

As a result, focus has gradually shifted away from occupational hygiene approaches to measuring and evaluating exposures to more predictive and generic approaches to exposure specification and control. Since the early 1990s there has been a strand of technically oriented research that underpins the development of ideas on more generic approaches to assessment and its role in determining strategies for managing chemical risk at national and EU levels (Cherrie et al., 2003; Money, 2003; Northage, 2005). Some of the more prominent models of exposure assessment, such as EASE (Estimation and Assessment of Substance Exposure - used to assess potential workplace exposures by the Health and Safety Executive in the UK (HSE)), other national regulatory agencies, and European Union regulators, as well as being distributed to a substantial number of other users, have developed as a result (Tickner et al 2005).

In the UK a significant contribution from HSE researchers and policymakers was in relation to the linked development of the supposedly 'easy to use tool', *COSHH Essentials*. Their thinking was presented in 1998 in a series of papers published in the *Annals of Occupational Hygiene* at the same time as *COSHH Essentials* was released in a trial paper version (Russell et al., 1998). Subsequently *COSHH Essentials* has been developed and applied more widely, as well as being a stimulus for the separate development of other national tools such as the

German Easy to Use Workplace Control Scheme (*Einfaches Maßnahmenkonzept*) (see Tischer et al., 2003 in Germany; Tijssen and Links, 2002 for the EU; and Jackson, 2002 on the development of the ILO Chemical Control Toolkit, based on *COSHH Essentials*).

However, while generic tools have their place in the range of instruments that may be brought to bear on *supporting* improved chemical risk management, further research indicates that they are not a panacea, and that they also have their critics. American researchers have argued, for example, that more systematic study of how small-business owners use this guidance is required (Jones & Niclas, 2005). Some indicators suggested, *COSHH Essentials* may be too complicated for many SMEs. This latter finding was borne out in more recent interviews with small firms conducted in the UK, in which respondents stressed that questions of access to these tools continued to present barriers to their use for some, while for others, despite their supposed simplicity, the level of technical knowledge they required to enable their use remained prohibitive (Walters et al 2008).



**Table RMM 1: Some examples of prominent tools used to support risk management of hazardous substances in EU Member States <sup>6</sup>**

<b>Instrument</b>	<b>Country</b>	<b>Focus</b>	<b>Effectiveness</b>
COSHH Essentials	UK but disseminated widely	Small firms. Tick box, stepped approach to risk assessment and the factors that identify a suitable control approach. Uses risk matrices to identify appropriate control. Provides general control approaches and task specific guidance. Implement the action and review	Limited evaluation. Generally regarded as useful and effective, but detractors claim limited scientific reliability and although intended for small firms its use still requires some technical understanding.
GISBAU / GISCHEM 7 GISMET	Germany and some international dissemination	Construction industry, chemical industry and metal industry. Database complemented by product codes for groups of substances. Workplace instruction sheets in multiple language versions.	Technically validated but effectiveness of use not evaluated
Column model	Germany and international	Aimed at substitution but widely used in risk management, allows a comparison of risks posed by different substances that could be used for the same task.	No published evaluation of effectiveness of uptake or use.
CLEANTOOL	Germany and international	a Europe wide interactive database for parts cleaning, metal surface cleaning, component cleaning and degreasing, based on real processes in European companies.	
Stoffenmanager	Netherlands	General. Provide information on hazards, risk assessment safe use and storage of a commonly used substances	No information on evaluation
Easy to use Workplace Control Scheme	Germany	As with COSHH Essentials	No published evaluation
KemiGuiden	Sweden	Small firms. Interactive tool. Provides tailored advice on risk assessment and control, based on answers to questions concerning company situation.	Partial evaluation, Information on uptake. ongoing.
Pimex	Sweden/Austria/Finland – international	Video-based tool designed to encourage participative approaches of OHS management in small firms	No systematic evaluation of impact and effectiveness
Gefahrstoffe im Griff	Germany	Internet portal structured access to information and support on control measures, general management and access to Komnet website	No published evaluation
Alternativas	Spain	Internet portal support of alternatives to dangerous substances	No published evaluation

<sup>6</sup> There are additional tools that address substitution and elimination of the hazard. They are not included here, but are discussed in the section on substitution.

Overall, there has been a significant and substantial growth in the provision of tools to support risk management of hazardous substances during the last decade or so in the EU. The Table above lists a few that have been among the more prominent of these, as well as the better known of the generic tools, but there are many others. Indeed, the research institute TNO has produced a catalogue of over 100 that are available in the Netherlands alone. Many, of course, are by no means complete guides to risk management, but focus on specific elements such as support for decisions on substitution, improved hazard information, risk assessment techniques or recommended control solutions. But the salient point is that there is a substantial availability of these aids to support risk management in the case of hazardous substances.

In keeping with previous findings, our survey suggests that despite the existence of this abundance of support, the knowledge, will and capacity of many employers, especially in small firms, is insufficiently developed to enable them to implement suitable and sufficient risk management strategies to control the risks of hazardous substances to an appropriate level. This is the case despite the existence of a substantial portfolio of enabling tools to achieve this. In short, it seems that while the concept of generic tools was developed to aid employers and employees in small firms with limited knowledge of hazardous substances to manage the risks of these substances more effectively, in practice the use of such tools still requires a level of knowledge that remains some way beyond that found in many of the organisations they target. As a Slovenian inspector commented:

*'Sector specific guidance on risk management measures has a positive impact on the ability of employers to implement effective measures and on workers understanding of how to use the RMMs on condition that employers and employees use them.'*

Where such tools are implemented most effectively it is often through the assistance of support from agents with some knowledge of what is required and the ability to persuade their users of their necessity. Therefore, while regulators, policy makers and health and safety specialists have become aware of this problem and a range of control solutions have been developed in several countries as a result, *there has been a somewhat lesser development of strategies to ensure their implementation.*

Most tools are reported to be successful within the limited contexts in which they are developed and used. However as Walters (2008) points out, and as is evident from the comments on a few of the more prominent ones in the Table above, few if any, have been subject to robust evaluation concerning the sustainability of their impact or its transferability. He argues that there are two important elements that are worthy of further consideration when assessing the usefulness instruments to support risk management measures. One concerns the 'usability' of the tools themselves, the extent to which they address the needs of users, including the limits of their own resources to address risk management of hazardous substances. The other concerns the supports necessary to sustain their effective use. In this respect Walters argues that the evidence strongly supports the conclusion that such tools – no matter how 'easy to use' they are - are not sustainable alone. They work best when implemented as part of a package of measures to support firms to achieve improved health and safety management practices that includes infrastructural support from the economic and social environments in which firms are embedded.

In Walters' detailed study, the most effective approaches were found, for example, within highly developed sectoral and branch level infrastructures in Germany in which experts, inspectors and social insurance organisation inspectors were able to collaborate with organisations representing the interests of small firms or their suppliers to help develop and promulgate easy to use tools and supervise their implementation in small firms in these sectors. They were embedded in strategies targeting small firms, such as the *AUVAsafe*

approach in Austria, the *VASt* programme and *Arboconvenanten* in the Netherlands. They were found in supply chain management strategies of Responsible Care in the chemical industry, and supply chain practices of some large German car manufacturers in relation to their dealer and repair franchises. They were further seen in the joint support strategies of the social partners in Sweden as well as in the role of regional safety representatives in that country. What all these examples of success have in common is a relatively ‘hands-on’ engagement between elements of the business or social environment of small firms who see it as in their interest to promote good practice in health and safety, and employers and employees in the small firms themselves. In contrast, there is little evidence to support the usefulness of tools elaborated to support risk management measures in small firms in the absence of such infrastructural support as is illustrated by the relatively limited uptake of *COSHH Essentials* by small firms in the UK.

## Conclusions

Several positive trends are evident in relation to risk management measures on hazardous substances. They have been influenced either by the CAD or by the wider framework of systematic approaches to OHS management such as are required by the EU Framework Directive 89/391, national regulations such as the UK COSHH and the German Hazardous Substances Ordinance, and are also found in most standards for OHS management systems. For example, there seems to be a heightened awareness of the need for risk management measures and as with risk assessment, there are many examples of good practice, especially in larger firms and in those firms where the use of hazardous substances is an integral part of their business activities. It is also evident that the challenges for risk management measures that are experienced especially by smaller firms have been widely recognised and a plethora of tools and other initiatives to provide support for them have been developed as a result. However, it is equally clear that the extent of good practice on risk management of hazardous substances is far from universal and some fundamental obstacles to its development are presented by the structure of the economy, the reach of regulation and the availability of and access to support.

The challenge therefore would seem to involve not simply the availability of support for duty-holders who, for whatever reason, do not have either the will or the capacity to undertake risk management of hazardous substances suitably and sufficiently. Even more significantly, it concerns how to increase the motivation of these duty-holders to perform these tasks properly. Moreover, leverage on motivation requires application in ways that are not only effective but also realistic, having in mind resource constraints, especially those that limit the possibilities of face to face contact between duty-holders and health and safety specialists – whether they are advisers, consultants, trade union representatives or inspectors. Among other things, this requires a strategic acknowledgement of the importance of taking a risk-based approach, but at the same time it needs to be recognised that such an approach is hampered in practice by limitations on availability of the evidence necessary to construct it.

Generally, research on this issue points to the likelihood of success being linked to recognition of the multifaceted nature of the problem and the corresponding need for multi-dimensional strategies to address it.

## 9 Health Surveillance (HS)

According to the tender specifications our research focused on four investigation areas. We were tasked to collect data on the degree of availability of health surveillance (HS) in the EU Member States and its usefulness in terms of its contribution to overall risk management and employee wellbeing as well as reasons for shortcomings. Furthermore, we were assigned to gather evidence of the effectiveness of HS in practice, and more specific material on surveillance of health effects of exposure, biological monitoring and activities in relation to specific substances.

The coverage of the workforce by Health Surveillance (HS) depends on various factors that are distinctive for each individual MS, including:

- Definition of HS in terms of legal provisions considering tasks and conditions for frequency, and different degrees of compulsion
- Models of organisation and affiliation of Occupational Health Services
- Education and qualification of personnel, including the number of qualified personnel

Furthermore, as for the effectiveness of HS, the following are important parameters that need to be discussed:

- Connection between HS and risk management
- Recording of individual data
- Aggregation of data and support of research
- Monitoring and evaluation of the effectiveness and quality of the national HS infrastructure

At the European level health surveillance was regulated in terms of general provisions in the Framework Directive 89/391 and was further specified in the CAD in relation to hazardous substances. Accordingly, Member States shall, in accordance with national laws and/or practice, introduce arrangements for carrying out appropriate HS of workers for whom the results of chemical risk assessment reveal a risk to health (article 10 of the CAD). There is no general obligation for overall HS in the CAD in that there is only an obligation for HS depending on the outcome of the risk assessment, and there is no specification of the frequency of carrying out HS. Thus, these quite general provisions of the EU legislation allow for highly divergent practice in the Member States including the conditions for obligation or contingency, as well as the frequency of surveillance. This is also due to the fact that there are major differences between countries in the nature of what they regard as ‘health surveillance’ as there are in what they accept to be ‘prevention services’.

The overall purpose of HS is to prevent diseases and adverse health effects originating in the working environment. This entails the tasks of: identifying these effects and their potential causes in the work environment; advising workers on how to avoid or treat such diseases; and advising employers on how to reduce or eliminate the risks, and to control the health effects of chemicals by bio-monitoring. Although HS serves by definition preventive aims, in practice very often curative services are also labelled as such.

The different national legal provisions reveal divergent objective targets and, consequently, divergent approaches, including the organisation of occupational health care services.

Throughout the EU Member States we can observe divergent approaches depending on the focus of action, from overall preventive approaches (like, for example, in Finland), to approaches focusing on specific substances and/or risks.

One example for the shift in the focus of approach is Italy, where the traditional approach to HS in relation to exposure to hazardous substances was substance specific, with many requirements for health monitoring in relation to toxic substances in use at work dating back to earlier legislative models. Subsequent to the implementation of the measures to transpose the Framework Directive and its daughter Directives, including the CAD, in line with the core approach of these directives, requirements are now more risk-based and less focused on individual substances (MS Report Italy).

National regulations differ in that they require compulsory or optional health checks or both, defining the occasions for compulsory checks by exposure to chemicals in general or to specific substances, by certain working processes involving certain chemical substances, or depending on individual risk assessment (for details concerning some European MS see Table HS 1).

**Table HS 1: Indication for occupational health checks at exposure to chemical substances<sup>7</sup>**

D	DK	Fi	Fr	UK	NL
Compulsory and optional health check	optional health check; compulsory check only in a few cases	compulsory checks	compulsory checks	compulsory checks at certain processes involving 7 groups of substances and depending on individual risk assessment	optional health check

Source: BAUA 2007b: 164

Article 14 of Framework Directive 89/391 allows that health surveillance may be provided as part of a national health system. Consequently, Member States are able to apply an overall preventive approach which follows the general purpose of preservation of working ability, also taking into account risk factors that emerge outside of the workplace, as is the case in Finland and in some of the accession countries, where occupational health care services are integrated into the Public Health system. Conversely, in many of the Member States, there is an institutional differentiation between the public health and occupational health systems, based on the argument that a more focused approach is more effective. Differentiation in terms of integration into the public health system has implications for the financing of occupational health services.

Finally, EU MS apply different size criteria to determining whether in-house OH services are required (in France, at least 2,200 employees; in Luxembourg, at least 5,000 workers, or 3,000 if 100 of them are subject to health surveillance due to working in high-risk jobs) (Vogel: 157).

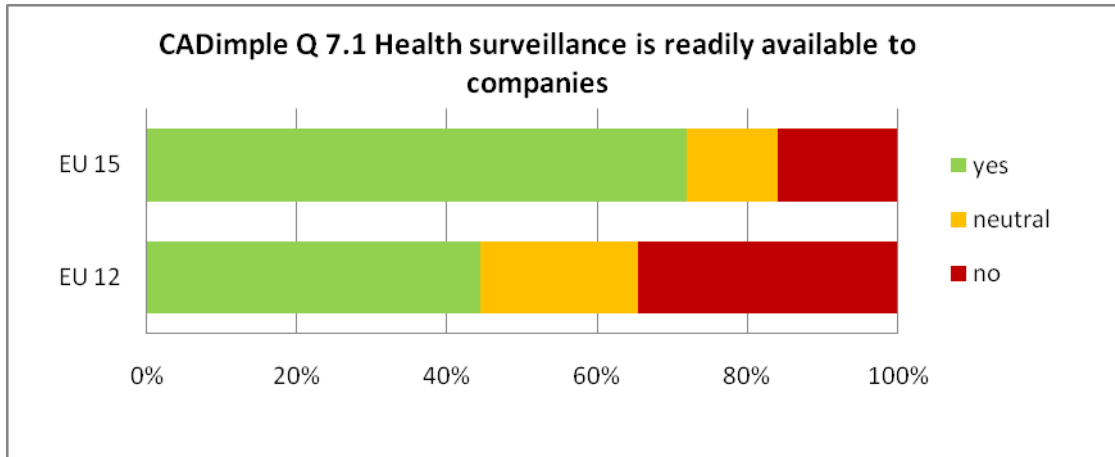
### **Coverage of OHS**

Being aware of these prerequisites concerning divergent regulative approaches in the Member States and the different perceptions of what constitutes health surveillance, it is apparent that the available data have to be interpreted cautiously.

According to experts' estimates obtained by the CADimple questionnaire survey, health surveillance does not have universal coverage. The situation seems to be more favourable in the EU 15 Member States than in the new accession states: 72%; (N=44) of the respondents of

<sup>7</sup> For activities in relation to specific substances see below / page xxx of this report.

EU15 countries reported that health surveillance was readily available to companies, compared with only 55% (N=36) of the respondents from accession countries. The percentage of those who estimated that health surveillance was not readily available for all companies was again larger in the accession countries (18, 28%) than in EU 15 (10, 16%).



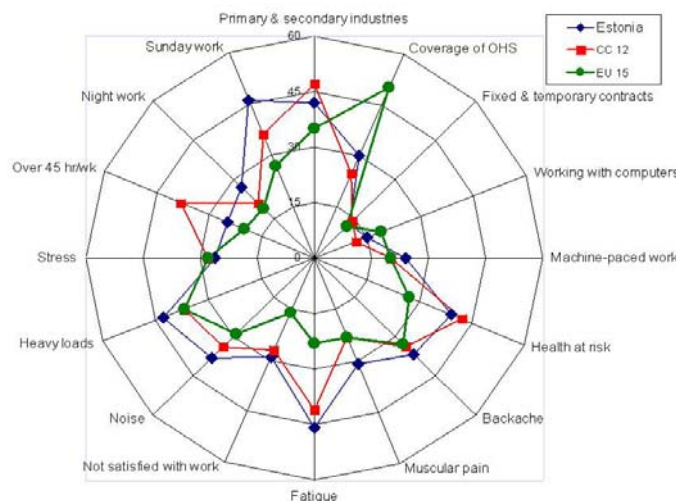
Similar proportions are quoted in other studies, for example in the study undertaken by FIOH on the Estonian Occupational Health Care system.<sup>8</sup>

These data suggest that individual responses and average figures for individual countries vary greatly.

For some Member States the CADimple survey findings indicated very similar figures to the results of the ILO study carried out in 2000 on the OH systems in Eastern Europe (ILO 2000). So for example in Estonia control checks were reported to be carried out in over 81% of the workplaces surveyed.

CADimple field research indicated similarly high figures for the Czech Republic: HS was estimated to be ensured in over 93% of the companies in the Czech Republic. Also, most of

<sup>8</sup> Occupational health services in Estonia. Estonian-Finnish Twinning Project on Occupational Health Services 2003–2004, Estonian Ministry of Social Affairs and Finnish Institute of Occupational Health; FIOH Helsinki 2004, Editor: Suvi Lehtinen; p. 88.



the respondents to the survey deemed that special care is undertaken in the case of exposure to chemicals at the workplace level. However, the Ministry admitted in its response to the CADimple survey questionnaire that the coverage of the working population with functioning occupational health services within the Czech Republic might comprise only 30-40% of all employees, numbers that correspond with the results of the ILO study.

Compared to the data of the FIOH study (FIOH 2004) it seems that these figures for the accession countries are overestimated. As an opposite extreme example we can refer to CADimple survey figures from the UK suggesting that less than 10% of workers are covered by an occupational health service.

Several of the CADimple respondents' statements suggested that "even when HS is available, it is questionable to what extent companies make use of it." (9, Netherlands, External OSH services, OSH practitioners). In particular, smaller companies were judged by several respondents not to be reached by health surveillance, confirming the findings of previous studies. The ILO study came to the conclusion that all workplaces with more than 500 employees in the Member States involved carried out health examinations, but that this figure went down to 89.7% for those workplaces with 100-500 persons, and to 72.7% for those workplaces that employed less than 50 persons (ILO 2000).

Taking into account the increasing number of contingent jobs, contracted workers and migrant workers, the actual coverage may be even lower.

The question of coverage of workers by health surveillance is strongly connected with the question of professional personnel resources. Some sources indicate that there is a lack of properly qualified occupational physicians.<sup>9</sup>

Numeric shortage also affects quality: health surveillance is not always carried out by OH doctors in, for example, Germany, Finland or Italy. In many Western European countries, the number of occupational doctors added to the system by training each year does not offset retirement losses (Vogel 2007: 154).

The question of coverage is also relevant to the binding character of health checks. In Germany the balance between compulsory and optional health checks is regarded as adequate by experts; in turn, according to the same source, there are not enough compulsory checks available for enterprises in the UK (BAUA 2007b: 154).

Taking into consideration all these findings, we can conclude, in accordance with Vogel, that "OH provision in many countries is far from being organised into services that offer universal coverage." (Vogel 2007: 154). The worst case which holds for some groups of enterprises and workers is that "either workers have no access to any form of health surveillance by specialists qualified in occupational medicine, or health surveillance is provided but does not make best use of what occupational medicine can contribute to collective prevention. On-demand access to health surveillance for workers is rarely assured in firms that do not have to

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<sup>9</sup> At a population four times bigger in France "there are about 6500-7000 occupational physicians, compared to Romania, where there are only about 330 and some 2000 general practitioners with limited competence in occupational medicine. Currently, in both countries, about 60 young specialists start working in occupational medicine every year – this will help overcome the lack of professionals in Romania within the following years. In France the prospects are however dramatic: about 1500 occupational physicians are expected to retire in the next 5 years, while only 300 young physicians will replace them and there is already a serious penury of such physicians." (<http://www.physician.ro/general/comparison-between-the-french-and-the-romanian-occupational-medicine-system/>)

provide compulsory surveillance. The requirement for surveillance, especially of workers in insecure or contingent jobs and in SMEs, is widely flouted in countries where there is no universal coverage by preventive services that include occupational medicine.” (Vogel 2007: 154).

### **Usefulness and effectiveness of HS**

Views on different aspects of health surveillance are differ widely, as is reflected in the literature and confirmed by our survey. A study on the OH systems of six European countries commissioned by BAUA illustrates the divided opinions through the results of the strength-weakness analysis applied. In many cases the same feature of an OH system was regarded as both strength and weakness.

The linkage of occupational health checks with specific risks, as well as the exigency of a rationale for compulsory checks by a previous risk assessment (the regulatory practice for example in Germany), are generally interpreted as strengths of a system<sup>10</sup> (BAUA: 148). Also according to CADimple survey responses HS was mainly perceived as useful inasmuch as being effective in detecting chemical hazards at an early stage<sup>11</sup>, provided that it is integrated as a risk management concept and is directly linked with risk assessment and consequent preventive and risk management measures. On the one hand, proper assessment of chemical risks is crucial for HS. A respondent to our survey from Italy suggested that chemical risk assessment made surveillance more specific and more focused (see MS report Italy). Consequently, *“When no RA is performed it is likely that there is no health surveillance as well.”* (see MS Report Belgium)

On the other hand, if no preventive and risk management measures defined by the risk assessment are taken, health surveillance cannot have an impact on the concrete situation. As a Romanian survey respondent put it: *“In my experience only prevention (i.e. management of the working conditions) gave noticeable results. If measures of limiting the exposure were not taken, the periodical medical examination could only count the damage. However, at macro-scale, health surveillance provides valuable data in respect with particular branches of industry and may eventually lead to an improved policy.”* (335, Romania, Academics, Researchers)

In the UK there was an interesting divergence of views concerning the usefulness of HS among the large firms where it was undertaken. Some felt that biological monitoring made a significant contribution to prevention strategies for hazardous substances, enabling greater accuracy in the assessment of exposure and identifying those at risk, especially in relation to mobile workers, in ways that environmental monitoring could not. Others argued that HS in their experience was too generic an activity, undertaken in workplaces by medical or paramedical professionals with limited understanding of occupational hygiene issues, in ways that were unhelpful to identifying or preventing the effects of exposures to hazardous substances. It seems likely that the latter experiences were the result of wider HS strategies in large firms, the aims of which did not focus on, and therefore did not address, needs perceived by occupational hygienists in relation to the biological monitoring of hazardous exposures.

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<sup>10</sup> However, the evidence from the practice is that too many from a medical point of view not indicated health checks were performed and that the concrete sample of legally prescribed health check occasions is rather non-systematic (BAUA 2007b: 151).

<sup>11</sup> As an evidence to show that health surveillance works in practice they quoted decrease in risky jobs, occupational poisoning and other occupational diseases as well as identification of health problems at the early stage (103, Slovakia, Public administration).



As a positive impact of HS respondents also saw stronger motivation for both employers and employees to promoting safe and healthy behaviour. Respondents from the Netherlands highlighted this aspect of HS as follows: *“Individual feedback to the worker is important according two respondents. Feedback should contain a behavioural component. Also visualisation of the results can help. Usually feedback only takes place at the management level. Health surveillance contributes to employee well-being when the employee is voluntarily involved.”* (see MS report Netherlands) Belgian respondents stated that the results of HS may convince employers to investigate the causes of the health problems discovered. Similarly, a respondent from Malta stated: *“The knowledge that your employer cares enough to be diligent and sends employees for health surveillance normally offers peace of mind to the employee and tends to reflect well in employee - employer relations. Even though in the first instances that such health surveillance is carried out, employees have to be well prepared as to why and how health surveillance is being carried out”.* (see MS report Malta)

Although compulsory health checks are meant to prevent possible health effects, the other side of the coin is that in case of compulsory information demanded by the employer (like for example in Finland), it can be criticised as a violation of personal rights (see for example BAUA 2007b: 148) since the data can – and, as the evidence shows, they often are – be used for the selection of workers. Also periodical, risk-independent health checks, as for example in France, are the subject of debate (BAUA 2007b: 149). Compulsory health checks are, in the opinion of experts involved in the BAUA study, only justifiable if the causality between working conditions and illnesses is proven and consequences are transparently regulated and adhered to (BAUA 2007b: 148).

We found several indications in our survey that as a consequence of the diagnosis of an occupational disease or adverse health effect, instead of implementing risk management measures, workers are often transferred to other jobs or they are even fired, as a comment from Poland confirmed: *“In one company the physician withdrew the permission to work with methanol to one of the employed women due to her allergy. Two days later the worker was fired.”* (111, Poland, Public Administration). The ILO Study on Occupational Health Systems in Eastern European countries also provides some statistical evidence: *“Transferring a worker to another job after a health examination was very common, 75% of the respondents saying that individual workers were sometimes transferred, and 32.6% that they were sometimes fired.”* (ILO Study 2000, Estonia).

Shortcomings were also observed concerning required actions after a diagnosis of an occupational disease. Even after a diagnosis of an occupational disease, RMM measures were not always taken: *“Only 38.1%% of the respondents said that improvements were made to the workplace after the results of health examinations. 45.2% said that improvements were not made and 16.7% did not know if improvements were made or not. Results of the health examinations were given to the worker concerned in 90.9% of the workplaces and to the union in 39% of the workplaces.”* (ILO Study 2000, Estonia).

It is quite obvious that such practices lead to a lack of confidence among workers, with the purpose of HS being seen not as the assurance of humane working conditions but as part of the selection of workers. So for fear of losing their jobs, many workers try to avoid medical examinations and do not cooperate with the physicians.

### **Lack of communication**

In recent years there has been a tendency to outsource health care services in larger companies for economic reasons. However, external services appear not to be as effective as internal ones since they are not familiar with the particular workplaces and processes:

*“The impact of an internal occupational practitioner is larger compared to an external practitioner because of his / her knowledge of the company-specific situation.”*(134/135 Poland, External OSH Services, OSH Practitioners)

Therefore, it was even suggested that *“There is a need to restore occupational medicine service in the factory”*. (134/135 Poland, External OSH Services, OSH Practitioners)

The ILO study (2000) revealed that, for the Czech Republic, private health professionals who conducted health examinations were less likely to check the general hygiene of the workplace or to advise workers on health issues than company doctors, nurses or occupational health services for a group of enterprises. In the Czech Republic, the physicians’ level of knowledge concerning chemicals is seen as problematic. The services are deficient in scope and lacking in quality. HS is often only a formal activity, limited to prophylactic control medical examinations. Occupational physicians are often not familiar with the workplaces and the working conditions they are supposed to take care of: *“I don’t want to generalize, but it is rather formal activity, limited to prophylactic control medical examinations. The other fields of activity, cooperation with the employer, are limited mainly because of the lack of time and inadequate qualifications of physicians, who are mainly involved in current attention”* (146, Czech Republic, OSH Practitioners, Occupational Physician).

A similar view on quality was expressed by a German respondent: *“The planned new ordinance concerning HS preventive examinations is counterproductive for risk assessments, as are the relevant specifications of the Hazardous Substances Ordinance. Cooperation between company physicians and safety specialists will not be improved in this way. Company physicians will then just carry out examinations and won't perform any inspections”* (331, OSH Practitioners, External OSH Services).

One of the major problems in many MS seems to be the lack of communication and cooperation between physicians and employers, which is identified as a main cause for low effectiveness. A respondent from Poland commented: *“Lack of the cooperation on the level of flow of information between physician and employer and not inspecting workplaces by physician are the main causes of medical supervision malfunction”* (114, Poland, Academic, Researcher).

Other Polish experts mentioned examples of shortcomings and deficits. They reported that, for example, biological monitoring of workers exposed to lead has not been carried out in 2/3 of inspected enterprises because occupational physicians did not have the appropriate information (National Report for Poland). Similar arguments were brought by a respondent from Spain:

*“The design of the health surveillance suffers from lack of information on the workplace. The physicians are not (well) informed about the workers’ tasks and the chemicals used and therefore cannot (or don’t want to) design a specific surveillance. This regards particularly exposure information, e.g. do physicians usually not have the risk assessment documents. If the medical service doing the surveillance is changed by the company (or the worker changes the company he works for), the records of the surveillance cannot be transferred to the other service, due to data protection reasons. Therefore, the monitoring can be interrupted and data is lost, which is contradicting the idea of health surveillance. Health surveillance is not at all organized as an interdisciplinary work.”* (WP6:008, Spain, Policy makers, Public administration)

A respondent from Germany attached the blame to the different professional cultures and reputations of OSH practitioners and physicians: *“Company physicians and safety specialists do not have the same position, are not regarded the same way, are not paid the same amount and do not have the same status within the enterprise. A collegial and businesslike*

*cooperation, which would benefit the employees, will only come about once these differences have been relegated to the past. Only then will the medical colleagues have to do more than just concentrate on the "nicest" part of their work - the health examinations - and they will no longer be able to stand apart from everyday company occurrences* "(329, OSH Practitioners, Professional Association).

### **Usefulness: Aggregation of data, epidemiological research and evaluation of OH system**

HS is one of the major pillars in risk assessment and management at work since the development of systematic occupational safety and health activities in the late 19<sup>th</sup> century. In a considerable number of cases, interrelations between certain diseases and the exposure to chemicals at workplaces were detected by occupational physicians; thus, their scientific and practical contribution to epidemiological research has been crucial.

A unique example of how aggregated data can be used for epidemiological research is the Finnish job-exposure matrix FINJEM, a tool constructed in the 1990s for epidemiological research, hazard surveillance and risk assessment purposes to convert information on job titles into information on occupational risk factors.

However, health surveillance results are not used systematically to support epidemiological research. A Spanish respondent pointed out: *"...health surveillance is mainly applied in our country within the individual approach, so, managing each case individually, and not with an epidemiologic finality, as it should be, as well. There is a need of an epidemiologic approach."* (357, Spain, Policy makers, Public administration). In Cyprus, a national system for reporting occupational diseases has been established recently. However, early indications of reporting suggest that only the more obvious kinds of occupational diseases and the exposures that cause them have so far been identified through this system.

Finally, the question of effectiveness can only be adequately answered if sufficient data on evaluation are available, but this is rather atypical: in most EU countries no evaluation of OH services on a broad basis is carried out. A positive instance is the study carried out on behalf of the Finnish Ministry for Social Affairs and Health (MSAH 2009), which concluded that "occupational health care units in Finland could make a more significant contribution to risk assessment and to the assessment of its significance to health. (...) The expertise of occupational health services could be utilized much more when assessing chemical and biological hazards than they are utilized for the meantime." The expertise of occupational health services as well as their knowledge on good practices to be applied in the work places is, however, assessed as being of high quality (MSAH 2009).

### **Conclusions**

HS systems are well known and long established in most of the EU Member States, although their structure and the practical regulations for their function differ widely. The organisation of health surveillance varies from MS to MS in many aspects, including task definition, coverage of the workforce, models of organisation and structure (e.g. public or private), education and qualification of personnel, connection to risk management, recording of individual data, aggregation of data, support of research and monitoring, and evaluation policies.

The positive and essential role of health surveillance in the detection of risks by medical examinations is commonly accepted and recognised. For chemicals such examinations are seen as indispensable and crucial.

The role of HS in supporting effective risk management measures is far less clear and there are many critical opinions on this topic. The trend towards external services is also regarded suspiciously because it leads to less practical knowledge about the workplaces concerned. The main reasons for shortcomings identified in the literature or by respondents to our survey can be summarised under four headings:

- a) Qualification and availability of health surveillance personnel and lack of special knowledge on chemicals.
- b) Deficits of cooperation between enterprise and health surveillance personnel; low practical knowledge of the work environment at the workplaces of the people examined. The enterprises have financial reasons to contract minimum health surveillance services, which do not include workplace inspections. Consequently, there is no systematic preventive approach, only diagnosis related activities.
- c) Workers representatives and the ILO report workers' mistrust in the purpose of medical examinations and cases of firing or transferring as a consequence of a positive diagnosis.
- d) In many MS there are no national or sectoral approaches to use health surveillance data for research.

## 10 Information Requirements

The study demonstrated that companies use a range of sources of information to undertake risk assessment and when introducing risk management measures, including that from suppliers, trade and employers' associations, regulatory agencies, social insurance bodies (in some countries), trade unions, national and local health and safety information systems with special reference to chemical hazards and so on. Some of these sources and the information they supply are discussed in greater detail in other sections of this report dealing with risk assessment, risk management measures and substitution. As the report on Finland indicates however, while there is clearly a problem concerning information, it is not found in lack of sources of information, which are extensive, rather it concerns weaknesses in the extent to which it is comprehensible to users and adequately disseminated to them in a form they can understand.

Generally the most widely used information source is the suppliers of hazardous substances, through their Safety Data Sheets (SDS). For this reason, we focus primarily on the experiences of SDS evident in our study. There remains widespread criticism of the quality of this information, especially in relation to its comprehensibility. Concerns also exist in some Member States over its availability in the appropriate national language, as well as over its accessibility to smaller companies. In Sweden for example, during an inspection campaign in 2003, inspectors inquired if Swedish SDS were available at the workplace. The results are shown in the Table below. An average of one in three companies had no access to Swedish SDS for all their chemical products with labels.

**Table IR 1: Companies without access to Swedish SDS during an inspection campaign, 2003**

SWEDEN	Sector				
	Printing industries	Construction	Engineering industry	Carpentry	All
Inspected companies	124	1140	130	427	1821
Companies without Swedish SDS	26	411	30	138	605
% without Swedish SDS	21,0	36,1	23,1	32,3	33,2

Source: Antonsson 2007

Also in Sweden, while there are clear regulatory requirements concerning labelling, safety data sheets and their use, there is strong evidence that practice falls somewhere short of meeting these requirements, especially among smaller companies. As the Table below shows, studies demonstrate many deficiencies in SDS (ECLIPS 2004).

**Table IR 2: Severity of deficiencies in the suppliers SDS – taken from ECLIPS study**

Deficiencies /seriousness	Example of deficiencies
10 % severe	Example: severe are such deficiencies that are also reported to the police. This is the case if the toxic symbol and/or the corresponding R and S-phrases are missing or when the sensitising warning is missing (R42, 43). C product not classified.
50 % middle	Example: Other R-/S-phrases missing. Xn instead of Xi, def in SDS
20 % minor	Not totally correct R-phrases, wrong names headings in SDS
20 % no deficiencies	

Source: Antonsson 2007

These results are presented here in detail because they are typical of failings generally found in EU countries, as is illustrated by the results of the ECLIPS study (CLEAN 2004), which also indicates that the extent of deficiencies identified is considerably greater in some countries. Earlier studies showed similar patterns. Most of these studies have focussed on the situation in individual EU 15 Member States. Less is reliably known concerning the situation in accession countries, but given the preponderance of small firms in their economies as well as the extent of restructuring that has taken place in many of their regulatory and economic systems more generally, it would be somewhat surprising if the situation in these Member States were an improvement on that which is better documented elsewhere.

It is not entirely clear *why* SDSs are of such poor quality. One suggestion that is frequently made is that product information sometimes conflicts with confidentiality and what producers see as ‘company-secrets’ regarding their products. It is clearly the case that in some situations commercial interests may conflict with the supply of detailed hazard information, especially in relation to product composition. But this is not new (see for example, Frankel 1976 for an early British account) and there are many ways in which this conflict can be resolved that do not lead to threats to business. However, there are relatively few accounts of the problem of the quality of SDSs and how to improve it that are written from the perspective of suppliers and there was little that came to light in the present study to alter this.

There are a few studies on how employers and employees in small companies use and understand SDS. In the UK early studies drew attention to significant problems of understanding and access experienced by small firms for example in relation to information concerning technical issues such as exposure limits (Research International 1997, Hudspith and Hay 1998, Russell et al., 1998), while later studies suggested that the ways in which users in small firms comprehend hazard and risk information need to be better taken into account in the design of this information (see for example, Briggs & Crumbie, 2000; Creely et al., 2003, John Kingston-Associates 2001, Niewohner et al., 2003, Cox et al 2003, White Queen 2005).

They point out that risk communication alone will not necessarily overcome strongly embedded practices, and to be effective it needs to be integrated with other approaches including training regimes, regulatory change, and technical innovation. In a recent study of the role of SDS undertaken in Sweden in the light of REACH, many of these earlier observations are confirmed (Salino et al 2008). The study found that in the case of good quality SDS, although small firms were able to use them as sources of information concerning basic issues such as flammability, health hazards and what to do in the event of an accident, they found the information on how to manage the risks of hazardous substances much less easy to understand, including that on product composition, limiting exposure/ensuring personal safety, physical and chemical properties, reactivity and toxicology, thus confirming the continuation of problems identified in previous research. This study also found continuing significant problems with SDS of poor quality and that overall, the firms studied ‘rarely used SDS as a source of knowledge in order to make environmentally correct decisions’ (Salino et al p5). The study concluded (Salino et al p. 5):

*“Our assessment is that the assumption that the use of good SDS will lead to conscious environmentally sound choices for the heterogeneous target group to which SDS is directed can be incorrect or over-simplified....*

*The actions of companies (in particular small companies) are to a large extent based on habits, routines and attitudes and against this background we can assume that complementary methods or channels other than SDS are needed in order to influence and support companies in their decision making process in making sound decisions on environment and working milieu in order to protect both external environment and peoples’ health.”*

The consensus that emerges from the present study, therefore, is that written sources of

suppliers' information, while in widespread use, are in practice often quite flawed and in themselves insufficient to cover the range of risk assessment needs across the spectrum of users of hazardous substances. A distinction can be made, however, between the needs of firms where there is a regular engagement with hazardous substances that is central to the processes with which the firm is involved, or in large organisations with the capacity for the technical support of health and safety management; and other smaller firms, where working with hazardous substances is peripheral to their central business purpose. In the former categories, there are more likely to be systems in place that can make best use of information supplied from a variety of sources. While any single source of such information may not always be entirely adequate to meet the needs of these users, they have the capacity to supplement it with information from other sources.

However for other firms, understanding and using such information requires additional support from the health and safety infrastructure outside the firm. Such support is available from a variety of sources, including regulatory inspectors, trades unions, insurance organisations, employers' associations and so on, but there are only limited examples of such support being organised on a national or even sectoral basis.

Any evaluation of the helpfulness of sources of information to support the management of the risks associated with hazardous substances therefore needs to take into account not only the content of the information itself but also questions of availability and access. Thus, while there are a host of problems with SDS that are associated with their relevance or technical obscurity that make them difficult to use, for many they remain the main or sole source of information. While guidance produced by the competent authorities of Member States, by industry trade associations, by trades unions, by European Commission services or by others often contains more understandable information, access to it is restricted to users that are aware of it and of how to obtain it. Such awareness and some degree of facilitation are not always available or appreciated, especially by smaller firms in which the use of hazardous substances takes place but is not central to their business. This therefore limits the usefulness of such information overall.

At the same time it needs to be acknowledged that there is a *functional* difference between the roles of different sources of information. For example, under the regulatory systems addressing the management of the risks of hazardous substances in most countries there are requirements on provision of information by suppliers and by employers which are intended to support risk assessment and safe working with hazardous substances. This *required* provision is enhanced by various *further* sources of information that essentially address matters of detail or explanation in relation to the information required of duty-holders by statute. We have addressed the experience of the use of this information in other chapters of this report. The point we would wish to stress in this chapter is that in theory these two sources should complement one another, but in practice it would appear that much of the production of further information is taken up with attempts to remedy deficiencies in the required information. This results in considerable duplication, as well as variation in access to appropriate material and significant wastage of resources. While regulators and others acknowledge this situation in some Member States, it does not seem that systematic effort to address the resulting confusion has been applied successfully anywhere.

Related to the provision of information through SDS and other sources, is that provided by labelling. Previous studies indicate that for many users of chemical products, the extent of the information they have on the safe use of such products is limited to what can be read on the labels of their containers. Older studies in several countries show variation in the understanding of the symbols used in labelling hazardous substances. As Antonsson (2006) notes in relation to Sweden, the indications are that the understanding of labels still is poor and that there are deficiencies in the basic knowledge of many workplace users concerning

the information provided on labels.

Nothing in the present study contradicts this finding and our study indicates that to assist them to comply with the requirements of the CAD generally, companies would appreciate receiving information that is both relevant to their risk management needs and in a form they can understand.

Once again, this is hardly a new finding and there are a host of previous studies pointing to inadequacies in the match between information provision and the perceived needs of its users. But it suggests that national systems still have some way to go before they meet these needs. One way in which such a match could be encouraged is through the use of workplace instruction cards such as are required by law in Germany and recommended in some other countries. There would seem to be some benefit in exploring the extent to which such instruction cards should be made obligatory in other countries/sectors.

### **Conclusions**

In summary, our case studies indicate that where the users of SDS possess some competence in the prerequisites for risk management of hazardous substances, they are able to make adequate use of many SDS but require more specific information than is provided in some. At the other extreme, for many users of hazardous substances who do not possess this competence, problems of technical understanding mean that for them the majority the SDS are of limited value. Issues concerning access to and comprehension of information on SDS remain problematic and require further attention. This is not to say that a considerable amount of attention has not already been focused on this issue.

However, simply supplying further supplementary information or improving access to it is not especially helpful overall (although it may be in specific cases), because for many users the resource constraints on their time are such that they are likely to ignore such material or the means to access it. Better coordination of information support is required. This includes a need for better understanding of structural aspects of dissemination and better co-ordination between them to enable information to reach all users in a form in which it is useful. This requires consideration of the best use of structural support networks at sectoral, national and European levels, as well as better integration of supply chain sources of information support with other information provision.

Many respondents in the present study, as well as the findings of previous research, indicate a need for greater help from competent intervention. That is, efforts to improve risk management of hazardous substances benefit most from face to face contact with 'intermediary' or 'boundary spanning' agents that are able to facilitate and advise on the proper use of information to assist appropriate risk assessment, management and control of hazardous substances at workplaces. Whether such agents are regulatory inspectors, workers' representatives, suppliers' representatives, health and safety specialists and consultants, insurance association personnel, researchers or advisers provided through trade associations, the supply chain or other intermediaries, it is the face-to-face nature of their intervention that is most valued.

Overall, what emerges from our findings is a sense of the need for a better fit between information provision and its dissemination and the needs of users. There is a clear suggestion that achieving this fit may require some degree of mediation through the intervention of other forms of support provided at sectoral, regional or company level. For example, while the content of safety data sheets could be improved there is no real consensus concerning the level of detail they should contain or the balance between hazard information and risk management methods they should achieve. It is not clear whether efforts to operationalise the



provisions of REACH in terms of exposure scenarios or more detailed information concerning risk as opposed to hazards will help in this respect.

A requirement for some degree of facilitation through intervention is a recurrent finding in relation to the successful risk management of hazardous substances in many of the ten areas covered by the Chemical Agents Directive. In the case of information provision, a more systematic, coordinated and targeted approach to such facilitation, possibly at sectoral level, taking account of issues of size, technical capacity and risk may represent a more useful way to improve the quality and accessibility of information for the full spectrum of users of hazardous substances, than the more ad hoc approaches so far tried. Finally, we note that the statutory requirement for workplace instructions such as is found in Germany, seems to be a successful means of informing workers and thought should be given to ways in which such a requirement could be applied in other countries.

## 11 Training and consultation

The project was charged with identifying the extent to which consultation, training and instruction of workers, including management and supervisory staff, takes place in practice and commenting specifically on how this contributes to effective risk management. It was further charged with providing examples of effective approaches and identifying where more effective action is required as well as providing examples of how this could be achieved in practice.

Before discussing these matters it is important to be clear what is meant by the terms that are being used to describe them.

In the case of training, there is a need to distinguish that provided to specialists from more general provision for workers and managers and that for owner/managers of micro enterprises. In addressing consultation, it is necessary to distinguish between notions of direct consultation between employers and their workers and indirect consultation between them that takes place through the medium of worker representation. While the former can be interpreted to mean almost anything from a two-way exchange between managers and individual workers to the mere supply of information or instruction from employers to their workers, the latter has a more specific interpretation. Consultation is the key term embracing activities identified in the legal rights of worker representatives (as opposed to workers appointed as safety specialists) to undertake inspections, investigate complaints and to receive training under legislation requirements in many countries. In others such arrangements are embraced in the rights granted to works councils. Provisions also often require employers to consult employee representatives ‘in good time on matters relating to their health and safety’. Such requirements carry an implication that employers should provide adequate information, listen to what workers themselves and their representatives have to say on health and safety issues and respond. These are obviously important elements that help determine the quality of exchanges between managers and workers’ representatives concerning managing the risks of hazardous substances, regardless of the industrial relations models that influence the character of the formal arrangements for consultation.

### **Worker representation and consultation**

In both the survey and the case studies respondents suggested that consultation with workers’ representatives made an effective contribution to improved practices in managing the risks of hazardous substances. While it could be assumed that direct consultation could also have a beneficial effect, the vagueness of its definition meant there was no clear evidence on this that emerged in the findings of the present research.

In Spain for example respondents said:

*‘If workers’ representatives exist, it is observed that prevention as such is valued much higher in the company and awareness is generally higher as well.’* (WP6:008, Spain, OSH Practitioners)

Generally, our survey and case studies highlighted positive examples of worker representation across the ten areas of the CAD that were investigated, including examples of consultation on risk assessment, information provision, training, exposure limits, preventive services and so on. For instance, in the detailed case studies conducted in Italy and Greece, roles for workers’ representatives were reported in best practice in risk assessment:

*‘They are informed and involved in the assessment.’* (Italy, Employer/Plant manager/Head of Prevention and Protection Department (RSPP))

*'They participate actively by supplying useful information for the quantification of the level of specific risk.'* (Italy, Head of the Prevention and Protection Department)

*'They participate in identification of the products and give information on how they work. When the risk assessment document (DVR) has been drafted it is made available to them.'* (Italy, Head of the Prevention and Protection Department (RSPP) and Head of Corporate Maintenance and Environmental Services)

*'The workers are interviewed and monitored at the handling stage and in the frequency of the use of substances. The workers' safety representative (RLS) is involved in the preventive consultation on the assessment method and in checking the result of the assessment itself.'* (Italy, Plant Manager/Head of Prevention and Protection Department (RSPP))

However, it was equally clear that such engagement did not always take place:

*'They are marginalised and never considered. Episodes of intimidation and retaliation have even occurred.'* (Italy, Plumber, Worker safety representative (RLS))

*'They know nothing about it or are not particularly bothered about it. They lack information, training and personal culture.'* (Italy, former Area Workers' Representative for Safety (RLST), currently assistant to RSPP (head of prevention and protection department) and consultant)

Such findings are consistent with wider research on worker representation on health and safety which indicates that in order to be effective, arrangements for representation and consultation at the workplace require certain preconditions, such as commitment from management to participatory approaches to health and safety, worker organisation for health and safety, and training and information for worker representatives (Walters and Nichols 2007). They are further consistent with the role that trades unions play in sectoral and national institutions for OHS — such as in Germany for example where trade unions command half of all votes in the management of the compulsory accident insurance organisations (the BGen).

Although it is encouraging to find that trades unions and worker representatives provide positive support for managing the risk of hazardous substances, and this finding is in line with wider research on the effectiveness of worker representation and consultation on health and safety in general, the possibility that the impact of such support is declining also needs to be acknowledged. It is well known that trade union membership has fallen in most advanced market economies in recent decade and this has paralleled changes in the structure and type of economic activities in these countries. In the former planned economies of Eastern Europe and the Baltic States the trends are somewhat different but such evidence that exists suggests that the extent of 'workers' voice' on health and safety matters in these countries at the present time is quite limited (Woolfson et al 2009). There is also quite strong evidence, from market economies in which it has been sought, that points to a specific decline in arrangements for representative participation in health and safety in recent decades and a parallel rise in claims for the use of direct methods of consultation.

In the UK for example, Nichols and Walters (2009) note that changes in the structure and organisation of work have resulted in a decline in patterns of representation on health and safety that is linked to the extent of trade union presence. Data from the two most recent WER surveys indicate that in 1998, 22 per cent of workplaces surveyed consulted over health and safety by means of joint committees, 25 per cent consulted by means of worker representatives and 47 per cent consulted directly (two per cent admitting to having no arrangements). In 2004, 20 per cent of workplaces in this size range consulted over health and safety by means of joint committees, 22 per cent consulted by means of worker representatives — and the majority, 57 per cent, consulted directly (Kersley et al 2006a: 204; Kersley et al 2006 b: Table 7.4). These authors suggest that 'the shift to direct consultation

was due to compositional change in the population of workplaces, not behavioural change in continuing establishments' and comment further:

*'consultation through consultative channels – joint committees or free-standing worker representatives – has declined markedly, whereas direct consultation over health and safety has become more prevalent' (Kersley 2006a: 204).*

This change may have important consequences for the quality of consultation on risk management of hazardous substances because, as Nichols and Walters (2009) argue in the UK context,

*'the term 'direct consultation' is a rag bag. It includes not only 'consultation directly with the workforce' but management chains, cascades and staff meetings and also the use of newsletters, notice boards and email. The term 'direct methods' thus contains the possibility that what takes place may not, in any meaningful sense, be consultation at all but just the more or less substantial one-way provision of information from management to employees'.*

Although the UK is unusual in the detail of its survey information on these aspects of industrial relations, given the ubiquitous nature of restructuring in advanced market economies, there is little to suggest that trends on consultation elsewhere are likely to be markedly different. Indeed as respondents from among employee representatives in Portugal suggest, the use of temporary employment contracts has a significant impact on the possibility of representation:

*'...it can be said that temporary workers, notwithstanding being included in the policy on prevention of professional risks – companies should guarantee every measure aiming at protection health and safety of every worker at their service, in spite of their type of contract – as far as the election of a health and safety at work representative is concerned, they are clearly excluded from this process'. (101, Portugal, Employers' association, Employers' representative).*

In Spain, there were concerns about inadequacies of the time available for representatives as well as the limits of their influence:

*'The representatives have 40h per month available to perform their prevention tasks. This is far too little. Investigations in cases of incidents e.g. normally take app. 20 hours.'* (WP6:004, Spain, Employee's representatives)

*'If workers' representatives exist, they are involved in the assessment of risks by the internal or external prevention services. They are usually not able or allowed to influence the way the assessment is conducted, e.g. which measurements are done and where and when sampling takes place. It is observed the workers' representatives frequently do not attend the assessment visits of the prevention services. Also the way workers are involved depends on the culture and size of the company.'* (WP6:007, Spain, Employer's Association)

In Cyprus attention seems to have been paid recently to extending regulatory requirements for worker representation and consultation. There were mixed views among the participants concerning the usefulness of this approach. Some claimed that workers were insufficiently aware of the risks associated with working with hazardous substances, while representatives of trade unions cited cases where union members had reportedly been afraid to ask their employers about possible alternatives to the hazardous substances in use at their workplaces. One example was given of a worker who had made such inquiries reporting being told by his employer, 'if you don't like it — find another job'.

As the literature maintains, there are a host of features of flexible work and work in small enterprises that all act against orthodox approaches to risk and more systematic risk management approaches, whether these are general or more specific to hazardous substances.

At the same time these features also act against traditional practices of worker representation. It is plain that if the representation of workers' collective interests in health and safety is to be achieved, and if it is to contribute to improved health and safety performance including that in relation to hazardous substances, alternative strategies need to be found.

One possible way forward for worker representation and consultation on managing the risks of hazardous substances in the face of restructuring that has been identified in previous research is through the greater involvement of schemes for regional health and safety representatives (see Frick and Walters 1998 Walters 2001, 2002 and Walters and Nichols 2007, Frick 2009). There is a strong indication that legislative provisions that specifically provide rights of access to representation on health and safety for workers in small enterprises in countries such as Sweden, Norway and Italy, have a significant impact. The Swedish experience of regional health and safety representatives for workers in small enterprises is extensive and long-standing. There have been major evaluations, first in the late 1970s and again in the 1990s (see Frick 1979, Leymann et al 1982, Frick 1996 and Frick and Walters 1998). They have concluded that regional health and safety representatives are amongst the most powerful, effective and sustainable of intermediaries for stimulating and supporting participative arrangements for health and safety in small firms (Walters 2002). Indeed the widely acknowledged success of the Swedish scheme stimulated the introduction of legislative reforms to achieve similar effects in other countries.

These initiatives to improve representation and consultation in small enterprises demonstrate considerable potential for transfer and sustainability as well as fitting well with other current strategies to improve arrangements for health and safety in small firms through the use of intermediary processes and agencies. They could easily form part of a strategy to extend the reach of the CAD to these firms, which as we have noted in other sections, remain somewhat beyond its grasp. However, largely for political reasons, policy makers in several countries have chosen to eschew a regulatory approach to achieving such engagement. The result has been that schemes that exist in countries such as the UK, France and Spain are voluntary, rely on the participation of firms that arguably already have quite good health and safety arrangements, and offer little evidence of capacity to extend their reach beyond the short-term involvement of limited numbers of such participants. Therefore, while research demonstrates the success of regional health and safety representatives in ways that are clearly relevant to improving the management of the risks of hazardous substances, it remains unclear whether the preconditions necessary for this success and the political will to support it could extend beyond the countries in which such schemes are already mandatory.

### **Training and Instruction**

Turning to training and instruction, the results of the present study paint a mixed picture of the experience of training in relation to managing the risks of hazardous substances. Information on training and instruction of workers, management and supervisory staff on aspects of the management of the risks of hazardous substances is available from most countries. But precise details on the extent of this training provision are not forthcoming. The Netherlands was exceptional in that there were some tangible measures of training provision on hazardous substances derived from the evaluation of the VASt programme. These demonstrate that in 2007, in 59% of companies surveyed employees got information on how to work with hazardous substances. The tables below show how this information is passed on both for safe working (Table T&C 1) and for the health effects of working with hazardous substances (Table T&C 2):

**Table T&C 1: Instruction and advice on safe working: work instruction. Comparison between 2004 and 2007**

	2007 N=1319	2004 N=665
Part of work processes	38,2%▲	29,9%▼
Issue during progress or toolbox meetings	19,9%	19,1%
When necessary during process or toolbox meeting	48,5%▲	24,3%▼
When changing way of working	53,0%▲	33,2%▼
Written at start of job	27,3%	28,3%
Oral communication at start of job	43,6%▲	30,7%▼
Part of internal training course	25,1%▲	17,3%▼
Other	12,6%▼	30,5%▲

▼ Significantly lower (p=0.05), ▲ Significantly higher (p=0.05)

Source: Visser, 2007, 32

**Table T&C 2: Information on the health risks of working with hazardous substances. Comparison between 2004 and 2007**

	2007 N=1476	2004 N=634
Part of work processes	20,3%	21,9%
When necessary during process or toolbox meeting	48,8%▲	30,6%▼
When changing way of working	53,1%▲	37,0%▼
Written at start of job	26,2%	24,7%
Oral communication at start of job	44,6%▲	26,7%▼
Part of internal training course	29,0%▲	9,9%▼
Other	13,2%▼	19,5%▲

▼ Significantly lower (p=0.05), ▲ Significant higher (p=0.05)

Source: Visser et al., 2007, 33

Generally the view of respondents at all levels seems to be that training is a good thing, it makes a positive contribution to risk assessment and that it takes place, but given the complexities of the subject matter of risk management in relation to hazardous substances, there is always room for more.

In Lithuania for example, a respondent pointed out there were national regulations on training, stating:

*'...internal personnel has to be trained according to Regulations on training and assessment on health and safety at work matters. Training institutions have to meet Requirements of competence for institutions rendering training services in the field of health and safety at work. There are 104 institutions training workers in the field of health and safety at work in Lithuania.'* (214, Policy maker, Public administration)

In Cyprus, respondents in general regarded training provision on health and safety as an area in which major improvements had occurred:

*Over the years we have been investing into awareness raising activities, for both employers and employees — their derogations, their rights, raising their knowledge, what is required of each one of them, raising probably their cooperation. Training. I reckon about 20 years back it was once a year, 20, 40 people, that's all. Nowadays there are about 250 seminars per year.... (see report on Cyprus)*

Some of this training involved risk management in relation to hazardous substances but respondents were unable to provide precise details. While in Portugal respondents suggested

that despite legal requirements, the provision of information, training (and consultation) was insufficient. According to employee representatives it was:

*'...well below desirability and these activities are not ensured. In fact in Portugal, in most cases the law is flouted as far as the prevention of professional risks is concerned....'* (101, Portugal, Employers' association, Employers' representative)

Similarly, in Slovenia, respondents reported:

*'Many companies don't pay enough attention to training and consultation of workers, especially as work with chemicals is critical.'* (see report on Slovenia)

and

*'The employer should be trained more often and by special programmes.'* (see report on Slovenia)

The question of access to training was raised in some countries. In follow-up discussions with respondents in Italy, for example, it was argued that precarious workers such as those on casual or temporary employment were '.....rarely trained to do the job itself, let alone given any health and safety training' as they were often only hired for short periods. The Italian respondents in these discussions also pointed out that while some form of training might occur in workplaces, the extent to which it is perceived to be useful is limited.

Respondents in Spain noted specific deficiencies in training provision:

*'Training is given in an unsystematic way. Frequently 30 minutes before the end of the working day, there is a meeting to inform about chemical or other risks. However, workers don't know before hand and are eager to leave for home so they are not very attentive and the content is not well understood. Training is mostly organised if it is asked for by the inspectors'* (WP6:001, Spain, employee's representative)

Other respondents from Spain emphasised that compliance with formal, legal requirements was a more significant motivator for training provision than the achievement of more effective risk management: *'Normally, it is more important to comply with the formal requirements (cover the documentation) than to search for effectiveness, in particular if it is carried out as consultancy'* (010.)

Spanish trade union respondents said: *'A study carried out by ISTAS showed that workers receive little training by employers and of poor quality. The training that workers receive is not specific and not useful for the tasks they carry out at their work. Our training experience demonstrates that workers receive adequate information and training, protect themselves better against chemical risks and can also participate in the prevention of chemical risks in their workplaces.'* (313, Spain, Union, Employees' representative)

In a number of cases, respondents said that while there was information available concerning training on occupational health and safety generally, there was less specific information concerning training on risk management of hazardous substances. Nevertheless, as a Latvian respondent suggested, training generally contributed to the effectiveness of risk management and commented: *'the more the employer knows about the OSH system, the more eagerly he implements and improves the working conditions'* (211, Latvia, Academic, Researcher)

In some countries the organisation and delivery of training provision on managing hazardous substances is central to current prevention strategies. The report on Greece for example, indicates how the national health and safety research and information institute ELINYAE devotes significant time and resources to the delivery of a regional training programme to support company level personnel with responsibilities for risk management of hazardous substances. However, there is little in the way of serious evaluation of the effectiveness of this

strategy in Greece or, indeed, in any other country in which the role of training on chemical risk management in prevention is highlighted.

In other countries specific deficiencies in the quality and quantity of training provision in relation to hazardous substances are identified (by labour inspectors' reports in Slovenia for example, in relation to the construction industry in Slovakia and for small firms in Poland). It was further noted in some national reports (such as for example, Austria and Portugal) that both sector and type of employment contract had some influence on the extent of training provision with some sectors such as construction, and some categories of workers, such as agency employees, being in need of greater provision of training concerning the risk management of hazardous substances than was currently the case.

Despite the widespread acknowledgement that some form of training for workers, management and supervisory staff on managing the risks of hazardous substances takes place in all countries, it is generally not possible to quantify the level of its provision. There is widespread agreement, as might be anticipated, that workers and managers in larger organisations are better supported in this respect than their counterparts in smaller ones. As Antonsson (2006) comments in relation to Sweden:

*'Given the importance of knowledge, there is a huge need for education about proactive risk management, to make it work. Given the culture of small companies this does not work well enough today, due to the low prioritisation of such education by small companies.'*

She also suggests that trainers themselves often do not have sufficient specialist background in occupational health and safety to be able to address the needs of trainees adequately and suggests that because of such limitations, in practice, provision in vocational training especially, is often a 'sticking plaster' rather than an effective preventive strategy. Similar sentiments are expressed in other countries such as Italy where respondents also suggested that much training is not designed to address the actual work situations experienced by trainees and also that the medium of delivery of training failed to take into account the languages of many migrant workers. There was a further perception that economic restructuring has widened the gap in terms of access to training provision between workers directly employed by larger organisations and those working on outsourced activities.

One group of beneficiaries of training for whom there is indirect evidence of successful application are trade union health and safety representatives. As mentioned previously there is both solid evidence and widespread support for the view that health and safety representatives play a prominent and useful role in improving approaches to managing risks of hazardous substances at the workplace. Studies are in agreement concerning the role of training as one of the most important influences on their success (Walters and Nichols 2009, 2007, Walters and Kirby 2003, Walters 1996, 1997, Raulier and Walters 1995, Biggins and Holland 1995). Hazardous substances are a significant feature of many trade union training courses (see TUC 2008 for example) and as already noted there is research evidence suggesting that trained representatives are better trained and more informed regarding them than their management counterparts (see for example Research International 1997 Hudspith and Hay 1998).

Looking at more specialist expert training, some examples of respondents views concerning practice are given elsewhere, but here we note a trend that is of concern in some countries which is the perceived decline in provision of specialist training – this is mentioned in Sweden in relation to worker representatives and inspectors and in the UK and the Netherlands in relation to occupational health and safety specialists. Taking the UK as an example, there is critical commentary from the occupational hygiene profession concerning the adequacy of the skills of many advisers on chemical risk management. It is claimed that such advisers are increasingly less equipped with sufficient understanding of the science of occupational hygiene to be able to provide proper expert advice on the most effective management of the risks of



exposure to hazardous substances. It is argued that this lack of adequate competency may be related to the reduction of specialist education and training in occupational hygiene that has occurred as a result of restructuring and the demise of many of the industries in which such expertise was required in the past. It is further claimed that the approaches to simplified control solutions and risk management that characterise current prevention policies are an inadequate response to this problem.

It is certainly the case that the provision of higher education on occupational hygiene has undergone measurable decline in the UK during the past two decades and the profession itself has shrunk numerically over the same period. This can be seen from a review of the shrinking number of places available to study occupational hygiene in higher education institutions at undergraduate and postgraduate levels as well as in the decline of short course professional training. It is also reflected in declining membership numbers of the British Occupational Hygiene Society and the professionally qualified membership of the Faculty of Occupational Hygiene. Similar patterns are likely to be reflected in other countries.

### **Information**

Provision of training and information are often linked. However, in some countries, such as Germany for example, there are specific regulatory requirements on employers to provide their employees with work instructions to enable them to use hazardous substances safely. Respondents in Germany pointed to schemes in which model work instructions are made accessible through Internet portals such as Gefahrstoffe in Griff <http://www.gefahrstoffe-im-griff.de/61.htm> and through the GISBAU project <http://www.gisbau.de>

Enterprises are able to use these models as templates to which they add their workplace specific information. According to Austrian respondents firms in Austria also make some use of these models, which can be downloaded and adapted to their needs. Despite apparent agreement among respondents that these approaches represent good practice, there does not seem to have been any robust evaluation that has been undertaken concerning their impact. In other countries similar approaches are advised even though not explicitly required by law. There seems to be quite mixed experience concerning their operation. In Spain for example respondents claimed:

*'There is information available at the workplace on how to protect oneself and on the risks present at the workplace. Information is provided in the form of safety cards.'* (WP6:004, Spain, Employee's representatives)

And:

*'Workers receive instructions which are personalised and specific for their workplaces. They include descriptions of risks and how to prevent damage.'* (WP6:006, Spain, Employer's representatives)

While others said:

*'The information on chemical products is frequently missing. Workers starting a new task are not well instructed. If new products are used information is mostly not provided.'* (WP6:001, Spain, Employee's representatives)

*'Frequently workers' instructions are not specific to the workplace and products used, also if the prevention services are contracted to develop them, due to the lack of resources, safety cards are usually not very didactic, frequently not understandable and are not read by the workers.'* (WP6:008, Spain, OSH Practitioner)

## **Conclusions**

In sum, as with motherhood and apple pie, there is little dissent from the view that both consultation and training on the safe use of hazardous substances are ‘a good thing’. It is demonstrable through robust research findings that trade union supported representation and consultation are a positive support for improved health and safety outcomes. It is further clear from research findings that the involvement of trade union representatives in risk assessment and management of hazardous substances supports effective practice in these areas. It is also acknowledged that there is widespread provision of training at all levels, from workers engaged in the use of hazardous substances, to managers with specific responsibilities for controlling risk and professionals involved in monitoring, evaluation and control. Examples of good practice are also reported at all these levels.

At the same time, there is strong evidence in some countries to suggest that the preconditions shown to be necessary for effective representation and consultation on health and safety generally are less widespread now than in the past, and that worker representation is weaker as a consequence. There are no detailed studies of this effect in relation to consultation on hazardous substances specifically, but it seems unlikely that such consultation should be exceptional to the general trend. Similarly, concern about the adequacy of training provision at all levels is equally widespread. Unfortunately there appears to be no comprehensive inventory of training provision in any country that would enable an accurate measure of its extent or of the true nature of the gaps in provision.

Nevertheless despite examples of a range of good practices, the concerns expressed by respondents in the present study suggest there are a number of common failings in relation to the quality of training and its accessibility *for all kinds of workers* who are exposed to chemical risks, as well as concerns about the quality and availability of appropriate information on working with hazardous substances. In the case of more specialist training, concerns about the adequacy of its provision are bound up with change in the form of the restructuring of the economy and the decline of resources in the public sector.

## 12 Protective and Prevention Services (PPS)

The tender document contained four basic questions on protective and prevention services:

- How do PPS work in relation to facilitating the practical application of the specific requirements of the CAD?
- What are the experiences of employers in using either internal or external services for this purpose?
- Are there a sufficient number of readily accessible and cost effective protective and preventive services with appropriately qualified personnel?
- Are there suitable training courses to enable employers to designate and train internal personnel to provide part or all of this service?

This chapter is based on the descriptions of PPS-systems in our Member states reports. There are some overlaps with the chapter on health surveillance (HS); some of the findings and conclusions are similar, because HS is often one of the major service making up PPS. It has to be noted that PPS in general offer services for all or most OSH-areas, and hazardous substances are only one of many areas in their portfolio.

### **Development of PPS**

In the last twenty years many enterprises outsourced their internal OSH preventive services and contracted external PPS. At the same time there has been a tendency towards privatisation of protective and prevention services (PPS) from state or public institutions or business associations to private institutes. Well known examples of change are further seen in the shift from public health surveillance to private services in Finland and from obligatory use of PPS to voluntary use in the Netherlands. In some Member States the use of PPS is obligatory not for every enterprise but only for those over a certain size. During recent years, external PPS have undergone a change from public to private and are now in most cases completely private; still in some MS public institutions offer public external services for all or selected groups of enterprises or for specific services (Finland for HS, Austria for SMEs, mandatory OSH insurance 'BG' in Germany). In Eastern European MS the major restructuring of the economy often led to a complete restructuring of the OSH infrastructure, including the fast growth of private PPS companies (EU-OSHA 2009, ILO 2006).

External protective and prevention services play a primary role as advisors for the health and safety management of many enterprises. They offer advice and service for those enterprises who are too small to have their own specialist OSH capacities or who choose to outsource this service. The fact that the SMEs often lack any internal expertise makes it all the more important for PPS to be effective as external OSH advisors. The structure, quality and type of services differ widely between the EU MS (BAuA 2007a).

Article 7 of the Framework Directive<sup>12</sup> obliged all enterprises from all MS to use either internal or external OSH services. The intention of the legislator was to allow enterprises to use both options of safety advice and supervision: internal services – mainly in larger enterprises – or qualified external OSH services. Also some provisions and general guidelines regarding PPS were laid down in the Framework Directive (see the documents of the

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<sup>12</sup> Council Directive 89/391 EEC of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work – in this text called "Framework Directive"

*Conference on the implementation of Article 7 of the Framework Directive 89/391 EEC from 2007, BAuA 2007a).*

According to the law, the prevention services must carry out the following tasks, whilst the responsibility for the health and safety of workers still lies with the employer:

- Advise the employer about all areas of occupational health and safety
- Inspect the enterprise
- Investigate occupational accidents and sickness
- Assess the prevention measures
- Document its work
- Advise and assist the employer, the safety representatives and the works councils

The objectives and some basic features of PPS are harmonised by the Framework Directive, “... *but experience shows that it would be unthinkable to harmonise the means by which they are reached.*” (Prevent 2006a).

### **National PPS-systems**

In the CADimple Member State reports there is a short to medium description of the PPS in every Member State.

We found main differences in a number of aspects:

- Obligations to use a PPS depending on enterprise size or sector. There is a range from completely voluntary PPS (UK, Ireland) to a complete obligation for every enterprise to use PPS or have at least one qualified person in the enterprise (Germany, Austria, Finland, Spain).
- The quality control, certification, and formal requirements to run a PPS, e.g. how much technical or sector specific knowledge or sector specific qualification is required?
- Specific regulations and prescriptions on how cooperation between the PPS and the enterprise has to be organised.
- Evaluation of the effectiveness of PPS at a national level.
- Financially supported public offers of PPS for SMEs or certain high risk sectors (Austria, Finland)
- The role of employers. In some models (Spain, Germany) employers in SMEs can themselves become prevention specialists by taking a short training course.
- The role of workers’ representatives as safety representatives, (e.g. UK, Sweden, Denmark)
- Internal structure and size of PPS, e.g. small sector oriented PPS or large multidisciplinary PPS, (e.g. in Germany and Finland).

A short description of some selected national systems might illustrate the variety of national approaches.

In **Austria**, from 1999 all enterprises with more than 11 workers, and from 2000 all enterprises regardless of number of employees, must use a prevention service. Small enterprises with less than 50 employees can benefit from the comprehensive services of "AUVA sicher", the mandatory insurance against occupational accidents AUVA. Chemical risk assessment is a central part of the program (Kittel 2005, p 27). Apart from the AUVA services there are private centres specialising in occupational health and safety issues, as well as independent

occupational doctors and safety engineers, chemists, toxicologists etc. Enterprises with more than 50 employees organise their own services or have to contract external services.

In **Bulgaria** experts felt that there were enough readily accessible and cost effective protective and prevention services, with 84% of inspected enterprises covered by Occupational Health Services. However, this was qualified by the perception that there were not enough such services with appropriately qualified personnel, with a particular shortage of experts in protection from chemical agents.

In the present study participants **from Cyprus** pointed to the obligation for health and safety consultants to be approved by the Ministry of Labour. They indicated that the Ministry has currently approved about 60 such consultants. However, it was not clear how many of these, indeed if any, were competent in occupational hygiene. The point was also made that since these services are market driven, approval by the Ministry did not necessarily result in the use of consultants since it was up to employers to decide whether they were necessary, or whether the employers could undertake such activities as risk assessment by themselves.

External PPS in **Germany** can be offered by private enterprises, public institutions and also associations. The personnel must be qualified according to legal standards and qualification regulations. Employers are obliged to use PPS, or alternatively to employ internal OSH personnel or to qualify themselves. There is a legal minimum service time of OSH services. It depends on the business area and the number of workers employed, and varies – with some exceptions - between 2 hours per year / employee in areas with higher risks to 0.3 hours per year /employee in areas with lower risks, e.g. for employees in offices. The obligation for HS follows more complicated rules – mandatory, indicative or recommended – and is related to risks. For micro sized firms the so called “employer model” was developed and favoured by the statutory accident insurances for SMEs. An obligatory short training course for an employer releases the employer from the duty to contract an external service or to employ OSH personnel.

Despite a renewed regulatory focus following the implementation of the Framework Directive, in recent times in **Greece** the number of PPS decreased due to various changes, e.g. change in the political orientation, the attitude of the Ministry towards the significance of establishing PPS and regulating their standards, and a changed economic situation in which it has become increasingly uncertain that the market will support the existence of any infrastructure of PPS. As a consequence of these changes, services securing contracts of prevention services were focused on large organisations in which a good understanding of the purposes and the resources to support it exist. In the view of interviewees the result was that smaller firms, which could neither afford the costs nor understand why PPS were necessary, either received no support or obtained it from external services that were insufficiently skilled and equipped to do the work appropriately.

**Italy** has no special regulation on external services or on the qualification of the experts. There is a wide variety of services on the market. External services are regarded as identical to internal services. Enterprises must use external services if they do not have internal competencies. A company may use an internal service and in parallel use an external service. For companies with fewer than 200 employees which do not operate in the industrial sector, the employer may take on these tasks itself. It is not clear to what extent such private and commercially orientated external services operate in relation to risk assessment of hazardous substances.

In **Luxembourg** the health and safety system is organised in two strands: health and safety services for medical supervision and prevention services in general. The health services can take on the tasks of the protection and prevention services. Companies are required to set up an internal service if they have more than 5000 workers or more than 3000 workers where

100 of them are at risk in their jobs. Other enterprises have the choice between creating an internal service and joining an inter-enterprise service or the multi-sector health service (Prevent 2006). For employers which do not have an internal occupational health service or do not take part in an intercompany service, membership of the multi-sector health service is obligatory.

According to the legislation in **Poland** employers engaging more than 100 persons are obliged to form an OSH service. If enterprises engage more than 600 employees, they must create a multipersonal OSH section (one OSH expert for every 600 persons). For enterprises with up to 100 workers, the employer has to delegate the duties of OHS services to an employee who is involved in a different job in the enterprise. The employer is able to perform these duties himself if he engages up to 10 workers. Both employers and employees performing OHS services should have appropriate qualifications. Moreover, external OHS services have to be employed.

Annual reports of the Ministry of Labour and Social Policy indicate problems with the qualifications of OSH services' personnel, especially in SMEs. Taking into account the quality and need for improvement of occupational hygiene and safety services' experts, the project "Organization of OSH experts' network" was carried out under the framework of the National Programme "Adaptation of Working Conditions in Poland to European Union Standards". As a result of this project, a network of 30 experts ready to provide OSH services to SMEs and to promote technical solutions for the improvement of working conditions was established (Raport Ministerstwa 2007: 48).

In **Portugal** the responsibility for health and safety at work lies with the employer who must organize H&S activities. There are four types of external services; all must be recognised by the ISHST to be able to carry out their work. The obligation for prevention services is to have an occupational doctor and two safety engineers.

There are various ways in which the employer can use PPS. In companies with up to 10 workers and with no major risks, the employer himself or a designated worker can assume responsibility for health and safety activities, provided they have certain competencies (such as basic knowledge of occupational safety, hygiene and health, ergonomics, environmental matters and labour organization). In companies with more than 10 workers or where there are specific risks, these responsibilities must be taken on by one or more highly qualified people. Thus, small companies can enlist external services qualified to perform such activities, whereas companies with over 400 workers, or over 30 workers in sectors regarded as at risk, must in theory set up an internal service. If the company's accident figures are less than the average for enterprises from the same sector, this obligation may even be cancelled to let them call on an external service or an inter-enterprise service. In addition to these internal and external services, there are also inter-company services in Portugal. Moreover health and safety activities can be divided up and provided by separate services (Prevent, 2006).

In **Romania** in the course of the change to market economy, the privatisation trend also triggered the trend towards externalising some expertise, including the OSH services. Nowadays, both external services with a general portfolio, and services specialising in specific areas, are established. According to our survey and field research data, the existing services often do not meet the demands of the companies: there are not enough external services available and their quality is reported to be poor or fluctuant. Contracting external services for OSH issues is also a question of affordability for a huge number of enterprises.

In the debate about the quality of external services the need for more detailed regulation of the certification was formulated. (So for example, the certification diploma should specify the working area of the specific service provider, like e.g. mining, etc.) Experts claimed that in Romania, companies are used to the strict provisions of the former regulation which were

replaced by the more general provision of the CAD. The constraints to be specified again for the service companies should allow for better distinguishing of the competencies of internal and external services.

The Romanian professional association of external service companies ARSSM, founded in 2005, collaborates with a professional association in the UK and is committed to improving the quality of external services through information exchange and the setting of standards.

In **Spain** all enterprises are obliged to use internal or external PPS. The organisational structure of prevention can consist (of a combination) of five types: The employer himself in collaboration with workers' representatives (if existing), workers' representatives, an internal prevention service or a joint prevention service, or an external prevention service. External prevention services have to be accredited by the labour authorities of the autonomous regions.

During the field research the predominant role of external services, in particular for SMEs, was supported by all stakeholders, but workers' representatives showed a high level of mistrust in prevention services because both internal and external services depend on the payment of the employer and are therefore believed to be biased.

In **Sweden** since 1985 all enterprises are obliged to call on prevention services; in 1991 an internal control system was set up to make the use of prevention services widespread. PPS assumed an important role in the overall development of the "Swedish model" of the work environment and their existence was state subsidized, but during the recent years Sweden's occupational health and safety arrangements have changed. Prevention services are now private organisations. Large enterprises set up internal services and small and medium sized enterprises usually call on inter-enterprise or sector services to comply with the obligations.

In **the Netherlands** until 2005 it was mandatory to employ an external service if no internal OSH capacities were available. In 2006, 86% of the Dutch enterprises did have a contract with an OSH service or OSH expert. In some sectors there are collective contracts, like for example in the building sector with prevention services. OSH service companies have to be certified by the national organisation for the certification of OSH companies, the SBCA (Stichting Beheer Certificatie Arbodiensten).

The legal obligation to have a contract with an OSH service company conflicted with EU law, and the relevant OSH act was changed from 1<sup>st</sup> July 2005. Since then enterprises with less than 11 employees are exempted from the obligation.

In the **United Kingdom** there are significant differences to other EU countries. Preventive services are not regarded as central to occupational health and safety management, but rather as a peripheral support. UK legislation does not foresee an obligation for occupational health services and they are organized on a voluntary basis by employers who are free to assess the qualification of the staff employed. Two types of services are available: inter-enterprise occupational health services, which are private bodies, and independent health services present in larger companies; or any other type of contract with external services arranged by the employer.

A survey respondent pointed out "*Big companies have the resource but in general terms, expertise in Occupational Hygiene - where the focus is on the prevention and control - is severely limited in the UK*" (UK, 201). And for small firms generally the availability of PPS is one of the greatest problems and these firms usually do not have the resources to use such support.

### **Coverage**

The coverage of PPS varies from Member State to Member State. Our survey showed that approximately two third of respondents felt that there were enough readily available and cost

effective prevention services (67%). The proportion among employees' representatives was lower (40%) than for all other respondent groups (see survey evaluation). In some countries sufficient numbers of PPS were found (e.g. Austria, Germany, Denmark, Finland, and Netherlands), but in others a quantitative deficit of prevention services was reported (e.g. Cyprus, Czech Republic, Greece, Portugal, Estonia, Hungary, Malta).

A sufficient quantity of services is obviously a basic precondition for an influential role for PPS. However, most discussions in the public, political sphere or in the trade arena, as well as the responses to our survey and field research interviews, dealt with the quality of the existing services.

The observed differences have their background in the diverse national OSH infrastructures and the very diverse regulatory provisions. These provisions cover details of the structure and work of PPS, e.g. employer's responsibilities to use PPS, standards of inspection, legal minimum service time per enterprise. In the main, these provisions depend on the number of workers employed and the character of risks, as well as standards of qualification and competence of the personnel of the PPS itself, or in the case of some countries such as the UK and the Republic of Ireland, none of these things.

### **Quality of PPS**

The growth of external and private PPS has been accompanied by an intense debate about the qualification and quality of the external services. This debate resulted in demands for certification of services, standards for training and more quality supervision in general by the state or appropriate associations. Some MS use certificates, licences, authorisations or guidance to enable a common minimum standard of quality. Some MS have developed special measures, e.g. obligatory training, to improve the OSH situation of self-employed or of micro-sized or very small SMEs. Such training measures were the object of many critical remarks.

The debate on the quality of the work of PPS is a debate about a) qualification and b) the quality of the practical work. Both factors influence the effectiveness of risk management measures. A policy maker in Spain mentioned these two crucial areas:

*"... a) the different degree of quality among services. Even though they have to comply with the same requirements, in the practice, there are "good" and "bad" services, with great differences in the fees. b) a poor degree of integration of the prevention in the companies. The INSHT has elaborated guidelines to contribute to this integration...."* (357 Spain, Government)

Many respondents in our survey saw deficits in terms of both formal qualifications and specialised knowledge on chemicals. In our survey the answers given by the respondents differed widely range and opinions were strongly dependent on the target group. We asked "Are there enough protective and prevention services with appropriately qualified personnel?"

There was a clear bias in the answers to our survey: Respondents from the 12 Accession States, OSH practitioners, labour inspectors and workers saw major deficits in the qualification of many of the PPS. A distinction was made between appropriately qualified personnel and levels of expertise, with some suggesting that the levels of expertise are not sufficient, or may even be biased by commercial pressures.

A significant number of respondents saw the qualification of the prevention services ambiguously because there are both highly qualified and extremely unqualified consultants. In addition *in this field many courses are provided, but no quality control for those seminars or those who attend them introduced.* (331, OSH Practitioners, External OSH Services).



Regarding the availability of suitable training courses to enable employers to designate and train internal personnel to provide part or all of these services, just over half of the respondents (53%) felt that there are enough available and just over a quarter (31%) responded with “don’t know”. Fewer respondents from the EU 15 countries felt there were not enough suitable courses, and complaining about the lack of quality control for those offering the seminars or for those who attend them. Some statements from different MS illustrate this critical opinion:

*“Training courses to enable employers to designate and train internal personnel are rather expensive and time-consuming, so in small enterprises there is a lack of them”* (161 Czech Republic, external OSH practitioner)

*“There are some courses, but not very many, e.g. a branch specific training in chemical risk assessment for the metal branch (3 days)”*. (358 Finland Academic researcher)

*“Employers (with less than 50 employees) often only formally take part in training courses (frequently in the form of correspondence courses with a liability insurance association with no real learning checks) in order to avoid paying for a safety specialist. Firms do have the option to bring in external safety specialists. In the face of Technical Rules for Hazardous Substances, they mostly choose to opt out.”* (344 Germany external OSH practitioner)

*“Training courses are not compulsory for employers but only for those working on prevention and protection services. If an employers according to the law can become responsible for its service he must attend a training course, but the provisions are at present absolutely inadequate (number of hours)* (204 Italy employees representative)

*“In practice employers are not trained, however there are enough training courses available also for employers. The use is not widespread; employers do not take time for it.”* (7, 8 Netherlands, employers’ representatives:

*“Large number of trainings is available, but their quality is poor.”*(109 Poland inspectorate)

*“Generally, the courses for the occupational risk assessors are insufficient or are organized in locations different from the one the company is seated in. Moreover, employers claim that, since the costs of such courses are high, attending them its justified only in case they are to assess many workplaces. As far as chemical risk assessment is concerned, there still are few trainers and experts. There is a need of training courses for the workplace supervisors who have responsibilities on safety and health issues.”* (337 Romania Labour inspectorate)

Taking into account the many statements dealing with this topic, the quality of this training is obviously seen as a particular deficit.

### **PPS and risk management**

PPS are obliged to function in a competitive market in which, as well as deploying their expertise, they must respond to the perceived needs of clients if they are to obtain contracts and be successful businesses in their own right. This can be a problem in relation to advising on risk management for hazardous substances. As is well established, many of these risks are hidden and not perceived by employers. Preventive services/consultants may therefore not be engaged to advise on them in the first place. Preferred control solutions, according to good professional practice, are sometimes both expensive in the first instance and also require some technical knowledge in order to understand their significance compared with other options. If preventive services are engaged, their recommendations advocating such approaches may not be welcomed by cost-conscious employers, who also lack technical understanding and who fail to appreciate their significance or salience.

The respondents also saw deficits in the cooperation between enterprises and PPS. Finance is identified as the main reason for this, raising the possibility of contracting low quality PPS, to perform workplace inspections. As a second reason they see no appropriate chemical risk assessment and consequently inappropriate risk management measures may be taken or recommended.

In our survey we asked whether there is any information about the experiences of employers in using either internal or external services. A Spanish OSH practitioner answered: *“According to the statements and experiences of the workers, the best model is an internal preventive organization or a mix with a good level of integration.”* (356 Spain OSH practitioner)

*“The recent emanation of an Italian law that collects and unifies the previous laws concerning health and safety on work (Decreto Legislativo 81/2008), stressed the importance of information, formation and staff training, included to managers. There is an intense growth in demands for trainings, to be performed inside the companies; unfortunately this demand often comes from companies in which a high sensibility on these issues was already present.”* (203 Italy, OSH practitioner)

Difficulties related to the contracting services are seen in the fact that prevention is barely integrated into company management and employers do not have the competence to evaluate the quality of the prevention services on offer.

*“It is a problem that enterprises have so little knowledge that they cannot evaluate the quality of the offers of prevention services.”* (WP6:008, Spain, OSH practitioners, external prevention services). The work of prevention services is almost not controlled, as it could only be done by the enterprises: *“There are no independent institutions (not depending on the enterprise) which examine the work of prevention services (like measurements or risk evaluations). Those who are paid by the company are not trusted.”* (WP6:003, Spain, Employee’s representatives)

As a consequence of the externalisation of protective and preventive services, prevention is less integrated into company management, and furthermore employers often do not have the competence to evaluate the quality of the prevention services available. Further, the respondents to our survey saw deficits concerning the chemical management competence of PPS.

## **Conclusions**

External prevention services play an important role as advisors for the health and safety management of enterprises. In theory, they offer advice and service for those enterprises which are too small to have their own specialist OSH capacities or have decided to outsource this service. The fact that the SMEs often lack any internal expertise makes it all the more important for PPS to be effective as external OSH advisors, however, structure, quality and type of services differ widely between the EU MS. The results of the research show that protective and prevention services, while present in all countries, are more or less available according to size and cost and there are important limitations to their role in supporting small firms for these reasons.

The results of the research show that protective and prevention services are more or less available – with some important limitations and exceptions. These PPS offer – depending on the contract with an enterprise – OSH-services to comply with legislation and to support OSH implementation at the workplace. The quality and extent of their services depends on the financial investment of the enterprise paying for this service.

The infrastructure, and qualification of, and the national legal provisions for, PPS services varies significantly throughout the MS.

## 13 Enforcement

Enforcement of risk management in relation to the use of hazardous substances in workplaces involves:

- surveillance of duty holders by regulatory inspectorates, usually authorised to do so on behalf of the state;
- the practice of these inspectorates in undertaking surveillance, including the strategies they deploy to bring about the achievement of compliance with statutory standards, and increasingly, what they believe to be good management practice;
- the range of informal and formal actions they take to this end, including the legal actions for which they have statutory authorisation; the ‘softer’ approaches to achieving compliance and improved practices through guidance and advice; and
- the sanctions that national legal systems apply to duty-holders when inspectors have brought successful actions against them.

### **Differences between Member States in surveillance systems, tasks and resources**

Comparative study of enforcement practice on OHS is complicated in the EU by differences between countries in the institutional actors involved (EU-OSHA 2009) The most obvious differences occur between the Western European model of labour inspection present in most EU countries and the recently reorganised provision along these lines that is now found in former communist states. But even within Western Europe there are significant differences between Member States in their provision of labour inspection, its coverage and organisation, which have implications for its role in the surveillance of arrangements for managing the workplace risks of hazardous substances. For example, labour inspection is complemented in some countries by the additional presence of inspection by social insurance organisations, such as in Germany and Austria. In others, the activities of labour inspectorates on hazardous substances overlap with those of specialist chemical inspectors such as the Chemical Inspectorate in Sweden, or with the activities of public health inspectors such as in Italy. There are also situations in some countries where the work of central state inspectorates is shared with that of more regional and local public authorities such as in the UK. Moreover, in countries with regional autonomy, inspectorates with responsibilities for health and safety surveillance may be administered at regional level with only limited control from the national level, such as in Germany.

The tasks with which regulatory inspectorates are charged also vary, with some being focused entirely on health and safety and the work environment, while others such as in France, have more general functions, embracing issues of working conditions and even labour relations. The specialist knowledge and skills that inspectors bring to these tasks therefore also vary according to these differences.

On top of this, there is a considerable range in the resourcing of regulatory inspectorates across the 27 countries of the EU, making the time and effort inspectors are likely to be able to devote to dealing with employers’ practices involving the management of risks of hazardous substances subject to further differences between countries. There is also a range of different strategies used by regulatory inspectorates to achieve compliance with the law and to improve working conditions. They include for example, direct control, focus on supervision of the OSH-management provisions, political focus on advice and guidance and less on command and control. All such approaches form part of the regulatory inspectors’ portfolio of inspection methods, but they may vary in extent and priority in their practices in different countries, between different sectors and in relation to the different sizes and situations of the workplace.

Thus, the general picture of ‘enforcement’ of provisions to manage the risks of hazardous substances at the workplace in the EU embraces quite a complex range of procedures, practices and systems in which the skills and resources inspectorates can devote to surveillance of compliance with regulatory requirements is also subject to differences between Member States. A further problem with studying these practices is the considerable variation in the extent to which regulatory agencies themselves publish data on their enforcement practices or information on their strategies, which could form the basis of investigation. This also means that labour inspection has been studied to a far greater extent in some countries in the EU than in others. For example, the strategies and practices of the British regulatory inspection agencies have been subject to quite detailed study, from their origins in the early part of the 19<sup>th</sup> century, to modern times and the national regulatory body in the UK has routinely collected and published data on enforcement actions that enable this quite detailed scrutiny. In contrast, there are many national labour inspectorates among the 27 Member States that appear to have never been the subject of robust socio-legal research and whose collection and publication of enforcement statistics is limited and of little use in establishing an understanding of practices.

Nevertheless, there are some indications of features in common in enforcement strategies and practices in relation to hazardous substances that emerge from our survey and case studies. They need to be understood in the context of the above caveats, but at the same time they allow some tentative conclusions concerning the role of enforcement in risk management of hazardous substances. These are outlined below.

### **Resourcing inspection and national strategies on risk reduction**

Both in our general survey and in the more detailed case studies there are strong indications that respondents are aware of the limits that current resourcing of inspectorates place on the role of inspection in improving the practice of risk management in terms of hazardous substances and that many perceive a decline in the role of inspection as a result. Many comment on the slim chances of SMEs receiving a visit from inspectors. Remarks from Spanish respondents were typical:

*‘There are too few inspectors to really supervise all companies. Furthermore, they are not technical specialists (any more) and frequently lack training and understanding of the issue and cannot really judge.’* (WP6:008, Spain, OSH Practitioner, External OSH Expert)

And

*‘Too little resources to really check on the quality of prevention work.’* (WP6:007, Spain, Employer’s representative)

Spanish inspectors themselves saw difficulties in the enforcement of the implementation of the CAD for similar reasons: *‘There are far too few resources to inspect all companies and therefore priorities have to be set. Campaigns are focussing rather on reducing accidents than reducing chemical exposures.’* (WP6:005, Spain, Labour Inspection)

While Maltese respondents commented that the enforcement of the Directive was effective when the regulatory authority was able to intervene, but *‘... the issue of non-compliance arises due to the relatively low penetration into this area by the Authority due to a lack of resources in the subject of chemical agents’* (212, Malta, Inspectorate, Public administration)

Limited and declining inspection resources were especially evident in Western European states. There is no indication that legislative principles, such as those developed by the EU Framework Directive 89/391 to deliver competent risk management, which require employers to provide internal OSH personnel or to contract external expertise, have offset this decline in

any significant way. There are suggestions that the resulting limitations operate at several levels. Downsizing of labour inspection is a general trend in many Member States.<sup>13</sup> Sweden reduced the number of work environment inspectors from 866 to 578 between 2006 and 2008 (Arbetsmiljöverket 2009) with a corresponding decrease in the number of inspections. Decrease in enforcement activities has also been reported in the UK (Tombs and Whyte 2010) and in Germany the number of labour inspectors fell from 4,116 in 2003 to 3,340 in 2007, the number of inspected companies decreasing correspondingly from 190,000 in 2003 to 144,000 in 2007 (BMAS / BAUA, 2006, BMAS / BAUA, 2008). More specifically, there are indications that support for the inspection of risk management of hazardous substances has declined in a number of particular ways. There are measurable reductions in the number of specialist inspectors in some countries and decline in the extent of their support facilities in others, including provision of specialist training, instruments and laboratory facilities. In countries such as the UK, Sweden and the Netherlands, there are now fewer inspectors who are qualified in occupational hygiene than in the past, who have access to the necessary scientific equipment for identification, analysis and control of hazardous substances in the working environment, and who would know how to use it properly if they did.

It is also possible that there is a relationship between reduced resourcing and new public sector management drives attempting greater 'efficiencies' from streamlined public services that may have an influence on priorities set within the strategic plans of inspection authorities. For example, recent years have seen considerable growth of concern about employee mental health and musculo-skeletal disorders which represent a significant proportion of the burden (and costs) of work-related ill-health in the new economy. They are consequently higher on the political agenda and public performance strategies of regulatory agencies, while prominence of regulatory strategies on controlling the risks of hazardous substances has reduced. This is not universal however, and the control of some types of hazardous substances remains prominent in regulatory inspection strategies in some countries. This was the case in Denmark for example, where there was such a strategic goal until 2005; and France has put much effort into its strategic goal to replace mutagenic and carcinogenic substances during the same period. However, currently neither the most recent EU-strategy nor the majority of published national strategy statements on occupational health and safety, mention a goal specifically for controlling the risks of hazardous substances.

### **Inspection strategies**

The strategic approach of some regulatory agencies acknowledges that achievement of regulatory inspection of all workplaces is an unrealistic aim given limited resources. Moreover, it is regarded as a waste of such resources, which would be better deployed by adopting a more risk based approach that allowed greater inspection attention to be focused on workplaces deemed to be high risk while other methods of influencing good practice were used elsewhere. While the logic of such an argument is widely acknowledged by stakeholders, there is debate concerning the most appropriate means of achieving such prioritising, and in the cost-cutting environment of public administration in many countries, there are also suspicions that these approaches are used to cover-up reduced inspection overall (see for example Tombs and Whyte (2008) on the UK).

Greater focus on activities to enhance the perceived effectiveness of the regulatory agency, especially in terms of its reach, is evident in several countries. In the UK for example, policy

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<sup>13</sup> It is not universal and exceptions include Denmark as well as France and Spain, where labour inspectorate numbers appear to have increased.

pronouncements have focused on greater engagement with businesses, on education and raising awareness and on a more strategic approach to penetration through the use of intermediaries in the business environment in order to influence workplaces that are otherwise beyond the reach of inspection. Such approaches are fairly typical of those in other countries in Western Europe where greater prioritisation, involvement of more actors and a greater share of responsibility with other actors are in evidence. These are especially significant for the control of hazardous substances for several reasons. First, the relationship between suppliers and users of hazardous substances places different demands on inspection strategies to those under more conventional *workplace* inspection. Second, related to this, the new regulatory regime envisaged under REACH, in which risk communication between suppliers and down-stream users forms one key element, has implications for the ways in which inspection strategies are formulated and enacted. And third, the complexity of the technical issues involved in the risk management of hazardous substances requires considerable support for successful implementation - support which conventional inspection cannot provide to anything like the number and range of situations in which it is deemed to be necessary.

There are therefore two approaches occurring in tandem in many countries. On the one hand, there is the thrust for efficiency gains and savings in public sector spending which drives inspectorates towards more measurable and achievable performance targets but with possibly fewer resources to achieve them. One effect of this has undoubtedly been to emphasise the benefits of so-called 'soft' approaches to regulation such as those in which regulatory inspection 'provides help and/or guidance on how employers can comply with key aspects of the Directive' such as mentioned in the tender specifications. On the other hand, the importance of processes, organisation and management has been stressed in the model of regulation widely adopted to implement the Framework Directive and its daughter Directives and which was already in evidence in some countries. This means that inspection strategies are called for which focus more on management approaches to addressing the risks of hazardous substances and less on prescriptive standards. One aspect of more effective OHS management that is widely acknowledged concerns the need for more informed approaches and understandings concerning *how* to manage risks. This is especially true for hazardous substances, where scientific, technical and engineering issues often complicate risk management. As a result, inspectors seeking improvement in risk management are likely to be involved in roles involving advice and guidance in a more significant way than if they were merely enforcing prescriptive standards. As the national reports on countries such as the UK, Italy and Cyprus make clear, there is some evidence in our study that this takes place, but little in the way of robust evaluation of their impact.

There are clearly overlaps between these two approaches, one of which is aimed at efficiency gains and savings in inspection resources, while the other is aimed at re-orientating the nature of surveillance to improve OHS management outcomes. In terms of effective strategies to utilise the business environment of firms that would otherwise be hard to reach for more conventional inspection of hazardous substances, studies suggest that regulatory agencies have gone some way to utilise existing infrastructures or to create new ones to help to bring organisations closer together to identify a common purpose in improving risk management of hazardous substances. Thus, in the UK the HSE has set up a number of 'manufacturers' forums' through which awareness activities on the risks of hazardous substances can be cascaded and has reported significant successes in reaching otherwise hard to reach groups such as hairdressers and car repair firms in this way (Walters et al 2008). In Germany, various projects, involving connections between state inspectorates, the insurance associations, trade associations, trades unions and research institutes among others, have contributed to providing advice and support geared towards the needs of small firms in risk assessment and management of hazardous substances.

Therefore, unless the current restructuring and business reorientations that are taking place in modern market economies are properly taken into account, the dominant way of conceptualising the risks of hazardous substances that has mainly informed thinking about how best to manage them in occupational settings, and also how to constitute this in legal and regulatory inspection terms, may well be fated to become increasingly less relevant to a growing proportion of work situations and workers. While we found some awareness of these issues and their possible consequences among regulatory authorities and experts, we found little in the way of evidence based analysis of their effects or means to address them.

### **Inspection practices**

Although in many countries respondents were unable to provide any information on inspection practices, as mentioned above, we have accounts from inspectors in some countries concerning the approach they take towards inspection of risk management in relation to hazardous substances. Generally, they emphasised an approach in which they seek to use advice and guidance to win the trust of the duty holders they are inspecting and to encourage them to take a more holistic approach to risk management. These accounts need to be understood within the contexts provided by the strategic approaches of the agencies to which they belong and in the light of the research findings reported above – since there is little research available within the EU concerning their consequences or the effectiveness of these practices.

In Sweden, for example, as the national report describes in relation to inspection practices deployed in small companies in relation to wood dust, emphasis on achieving better control was the focus, rather than monitoring or measuring exposures. In this case the argument adopted was that serious exposures were visible and obvious, both inspectorate and employer resources were therefore better utilised by focusing on achieving engineering controls at source than on measuring exposure levels. In addition, as the report states:

*‘There was also a strong emphasis on educating employers concerning risks in the use of products and processes that generate wood-dust, since it was acknowledged that in many parts of the wood-working industry dominated by small enterprises struggling for economic survival, the general problems concerning the absence of attention to risk assessment in the purchase and installation of second hand machinery were especially acute since employers were largely ignorant of the well-established health effects of exposure to wood-dust.’*

Similarly in Greece, a case study of labour inspection activities in metal fabrication gives a sense of the way in which regulating hazardous substances is approached. It demonstrates that labour inspectors are confronted with an enormous range of health and safety issues of which dangerous substances are but one aspect. Achieving basic notions of good preventive health and safety practice are fundamental starting points for regulatory activity. The relatively low starting point in terms of awareness and good OHS practices for many enterprises means such basic notions are likely to take precedence over the relatively sophisticated questions involved in managing chemical risks. There are indications that inspection practice in this respect insists on the engagement of competent persons and subsequently requires evidence of risk assessments. Requiring sight of inventories of suppliers’ information on the risks of substances in use on the premises is a frequent starting point for chemical risk assessment. Generally, the kind of control measures that are required by inspectors, while they may apply the accepted hierarchy of preventive principles, reflect fairly basic hygiene strategies whether in terms of information, engineering or personal protection, such as can be achieved and maintained without the need for sophisticated instrumentation or techniques.

In Spain respondents noted that: *'The approach of the regional inspectors is changing to a more supportive approach, where plans are developed together with the company on how to improve'*

As the national report on Cyprus makes clear, here too the general approach taken by inspectors involves winning the trust of both employers and workers' representatives and offering them help with risk assessment, with the use of enforcement tools as a last resort.

*'The inspector will first inquire whether there is a risk assessment for that workplace. If there is a risk assessment the inspector will inquire whether the issue of chemical risk has been addressed. Also the inspector will check and ask if there are substances that affect the workplace, what measures does the employer take...?'*

In the Netherlands an interesting new development is inspection based on sector-specific descriptions of good practices, so-called OSH catalogues. After recognition by the social partners, the catalogues are the basis for the Labour Inspection for that sector. In this way, it is intended that a more dedicated way of inspection, suited for a specific sector, will develop. Another example of this approach is the recognition by the Labour Inspectorate of risk assessment done by using the risk management tool, Stoffenmanager. As is evident from the Dutch national report, generally there is a feeling in the Netherlands that inspection in companies is quite effective in triggering good chemical management, once the company is chosen for inspection. However, the problem remains that the chance for being inspected is very low.

In Finland in the frame of the National Monitoring Program for Chemicals (*Kemikaalivalvontaohjelma*) nationwide two-step control inspections (including workplace inspections and market monitoring in view of labelling and SDS) are carried out annually by the Labour Inspectorate with the involvement of all its regional districts. At workplace inspections a detailed checklist is used to investigate: chemicals risk management, PPE, training and instruction of workers, HS, first aid, stand-by for emergency duties, inspection of manufacturing sites, organisation and tidiness, and chemicals storage. On the basis of the unified checklist, the chemical safety index of a company, or sector, can be determined. After the check-ups the companies are given assignments and instructions in order to eliminate the shortcomings detected. At a second inspection the improvements after imposing the assignments and instructions are determined. The yearly monitoring campaigns of the Labour Inspectorate focus on certain sectors. In 2007 this was metal surface processing (50 companies having been controlled), and in 2008 plastic manufacturing (based on control of 64 companies). The chemical safety index determined for the sector of metal surface processing was 88% (MSAH 2007), in plastic manufacturing it was 90% (MSAH 2008).

### **Inspection outcomes**

One of the more difficult issues to address in a research study of this kind concerns the outcomes of regulatory inspection. Inadequate availability of data coupled with national differences in the structure and practice in inspection, makes meaningful assessment against objective measures of outcome very difficult and comparative analysis virtually impossible in this respect. However, in the Netherlands, for example, it is estimated that between 2001 and 2005 around 2000 infringements of OSH legislation had to do with chemical agents. As a result, chemical agents are one of the five priority issues of the labour inspectorate and their control is part of the long range plan for 2008-2011 within the industry, construction sector and service sectors (SZW 2007).

In the UK the HSE study in 2002 found the number of 'contacts' that mentioned COSHH recorded on its operational data-base between 1997 and 2000 to be an average of over 10,000



per year suggesting that the general level of inspectorate activity involving COSHH was quite high during the 1990s. But only a small proportion (between 1-3 per cent) of prosecutions taken during that period concerned COSHH. Between April 1996 and March 1999, there were 47 prosecutions covering a wide range of hazardous substances. Data on enforcement notices confirmed that regulatory action under COSHH was a significant activity for inspectors, accounting for between 12-21 per cent of all enforcement notices issued. In 1990/91 a total of 2,518 improvement notices were issued under COSHH. Their annual number declined gradually during the 1990s to 1007 in 1999/00. In 1990/91 there were 136 prohibition notices issued. The numbers issued over the next ten years fluctuated between 80 to 150 per year until 1996/97, but increased significantly after this time, reaching 278 by 1999/00.<sup>14</sup>

There are figures for inspection visits and enforcement actions available for other some other countries too, such as Germany, France, Portugal, Poland and Greece, but generally they do not distinguish those visits and actions that have focused on hazardous substances, and like the figures quoted above, they provide little sense of what these visits and actions represent in relation to the total number of workplaces in which hazardous substances are used. Nevertheless a few explanatory indicators emerge from the limited data overall.

First is the observation that in many countries a substantial part of enforcement practice in relation to hazardous substances actually takes place under the guise of the regulation of management practices more widely. British data on enforcement of regulatory requirements on hazardous substances suggest, for example, that a significant proportion of actions against employers as a result of failure to undertake proper risk assessment in relation to chemical hazards after the introduction of the Management of Health and Safety at work Regulations were in fact taken under the more general requirements on risk assessment found in these measures and not under the more specific ones of the COSHH Regulations.

Second, as also already noted, is the feeling among general inspectors that they are not sufficiently well-informed or equipped to deal with scientific and technical issues concerning control of hazardous substances. The result is that when obliged to enforce regulatory requirements, as British surveys have shown, they tend to concentrate their actions in areas with which they feel most comfortable. Thus, the HSE's investigation of enforcement actions under the COSHH Regulations in 2002 found that enforcement actions were most frequently taken initially under Regulation 6 concerning risk assessment. This was because in the early 1990s, while the Regulations were still new, the enforcement policy of the Field Operations Division (FOD) of the inspectorate focussed on risk assessments. As many employers had not yet undertaken them and issuing a notice to deal with this breach was a relatively straightforward matter, significant numbers were issued. At the time there was also considerable publicity given to the need for 'COSHH Assessments'. As time passed, there was a change in FOD policy with greater emphasis placed on control measures and their maintenance. The overall number of improvement notices issued under Regulation 6 declined significantly and there was a proportionate rise in the number of notices issued under the Regulations dealing with control and its maintenance.

As is detailed in the full report on the UK, the research in which these observations are made suggested that the confidence of inspectors that they were enforcing appropriately was an important factor in determining whether they took action. They were more likely to do so in situations in which relatively straightforward, effective and inexpensive control measures could be implemented. Planned enforcement campaigns also provided inspectors with much clearer guidance both on the level and type of enforcement required and on the technical

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<sup>14</sup> These findings are discussed in detail in Walters and Grodzki 2006 and are summarised in the national report on the UK presented in Annex 2

issues in relation to control. In routine inspections on more complex situations inspectors would be likely to be less confident. The HSE analysis of enforcement argued that in these situations, instead of taking action under Regulation 7 on control, inspectors would be more inclined to take enforcement action under Regulation 6 on risk assessment, which was simpler.

Equally important are other findings from recent studies which demonstrated that, for small firms, the influence of regulatory inspectors was positively associated with compliance with prescriptive regulatory requirements, while compliance with requirements on process based risk assessment and control activities was more influenced by economically significant clients (Fairman and Yapp 2005). This would seem to suggest that in the case of chemical risk management measures the direct influence of inspection on compliance behaviour may be limited for small firms. However, other research on the compliance behaviour of small enterprises more generally has emphasised the importance of the threat of inspection and the influence of the regulatory agency in perceptions concerning reasons for compliance amongst small businesses (Vickers et al 2003). This latter finding is not especially comforting as, during the period since the requirements of the Chemical Agents Directive were applied in the UK, numbers of regulatory inspectors and their enforcement actions have declined markedly (see Tombs and Whyte 2009).

### **The role of advice and guidance**

The tender specifications remind us that enforcement of Community legislation on safety and health at work is the responsibility of the national authorities. But they suggest that there may be a role, separate from formal enforcement, for national labour inspection organisations, or other national authority organisations, to provide help and/or guidance on how employers can comply with key aspects of the Directive and ask us to find out to what extent this occurs in practice.

It is certainly the case that policies of the regulatory agencies in many countries focus on the importance of the provision of advice and guidance. This has been a prominent feature of the national policies published by the HSE in the UK over the past decade, as several of its policy documents attest (see for example, *Revitalising Health and Safety*, 1999; *Securing Health Together* 2000; *Strategic Plan 2001-2004* and *The strategy for workplace health and safety in Great Britain to 2010 and beyond*).<sup>15</sup> It is also found in other countries. In the Czech Republic for example, respondents were aware of guidance from ‘...web sites, brochures or training available on demand’ (161, Czech Republic, OSH specialist) and one respondent added, “There is also the possibility of consultations in the hygiene departments of the Regional Sanitary Station” (162, Czech Republic, OSH specialist). However, there is no information available concerning the role of inspectors themselves in the provision of such advice and guidance

It seems therefore that the best answer it is possible to provide in response to these questions is that there are some indications of a greater orientation among individual inspectors towards the inspection of arrangements to *manage* the risks of hazardous substances. Part of this orientation involves greater focus on advice and guidance and on gaining trust and cooperation from employers and employees, such as is evidenced in the national reports on Cyprus, Italy and the UK for example. At the level of the regulatory agency, there is evidence of a broadening range of strategies intended to achieve greater penetration of their impact in the restructured economy in several countries. These include a greater focus on provision of advice and guidance and on networking arrangements to help this to reach the work situations

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<sup>15</sup> see: <http://www.hse.gov.uk/aboutus/strategiesandplans/hscplans/strategicplan0104/misc319a.pdf>

at which it is aimed. There is also some evidence to suggest that similar strategies are being developed in other advanced economies outside the EU (Quinlan et al 2009). The challenges thus encountered are acknowledged to be formidable and go far beyond merely being able to locate and identify duty-holders and their responsibilities within restructured business and work arrangements.

There is little in the way of robust evaluation of the extent or effectiveness of these strategies either at the level of the actions of individual inspectors or at that of the national regulatory agencies involved in any of the EU countries studied. While in the case of the former Eastern Bloc countries it is evident that there has been considerable reform of labour inspection in recent years, there is little firm evidence of the impact of these changes on inspection practices in relation to workplace risk management of hazardous substances. Therefore, across the EU as a whole it is not possible to gauge with any precision either the extent to which the approaches identified in the tender specification are used, or what is the measure of their impact.

### **Conclusions**

In sum, the evidence on the role of enforcement in relation to risk management of hazardous substances is limited in terms of its evaluation of the success or otherwise of current strategies. In many western European countries there are suggestions of changed practices that emphasise risk management strategies over prescriptive measures, there are also suggestions of greater use of guidance and advice on both at the level of the individual inspection of workplaces and at the level of the regulatory agency. But there is little in the way of robust data to support conclusions concerning the efficacy of these approaches. At the same time, there are wider reforms of public administration focused on efficiency and resource management in which these more specific strategies are enmeshed, which complicate the evaluation of their impact. In former communist states meanwhile, the reform of labour inspection to bring it in line with that of liberal market economies has been both rapid and recent. It is not clear from available data to what extent this has resulted in effective surveillance of arrangements to manage the risks of hazardous substances at workplaces in these countries, or to what extent inspectorates in these countries have adopted the same degree of focus on the inspection of risk management within organisations, the provision of advice and guidance or the strategies to maximise penetration of the restructured economy that are claimed in countries in Western Europe.

## 14 Conclusions

### Main Conclusions

The CADimple study has found that the Directive 98/24/EC on Chemical Agents (CAD) is **acknowledged by the majority of stakeholders**, by respondents to the CADimple survey and within the literature as **a comprehensible and coherent regulatory measure**. Our findings and the statements from many respondents lead us to the conclusion that while there are a few areas for improvement of the legislative text or its wording, mainly to avoid difficulties of interpretation (a few proposals for such changes are made in our recommendations), **no essential or major changes of the text of the CAD are required**.

However, this positive conclusion contrasts with our findings on implementation of the CAD at workplaces. It is here that our study demonstrates the main challenges lie. The CADimple research team **identified significant deficits and difficulties in the implementation** of the Directive's requirements at the workplace level. They are caused by **problems of understanding, low awareness, lack of specialist knowledge and weaknesses in OSH-knowledge and awareness in general**. The presence of such problems varies with the pattern of use of the chemicals: for example, whether hazardous substances are used in core or side processes, in open handling or closed systems, and according to whether the effects of exposure are short- or long-term, etc. They vary further with the size of organisations - which influences OSH capacities and knowledge - and with economic sector - which may have a similar effect.

The **implementation** of the CAD is **not consistent between Member States**. Major causes of these differences include variations in the status and development of economic and technological structures and OSH policies of Member States. Other large differences are found in the secondary and tertiary legislation of Member States which provide the detailed requirements for safe use of chemicals at workplaces. There is further variation in the enforcement priorities of Member States, their monitoring and surveillance capacities and in the education and qualification of both OSH and external prevention services personnel.

Since our main conclusion is that the main challenge for the current CAD is one of effective implementation, it is **questionable how far improvement at Member State level can be achieved and supported by an overarching and supranational EU-Directive**. For example, how far such EU level regulation can effectively prescribe methods of implementation in response to the weaknesses identified above is limited by the principle of subsidiarity. While other regulatory measures, such as those on safety data sheets or parts of environmental legislation dealing with large industrial installations, have resulted in the introduction of detailed and common European implementation methods, in the case of the CAD the practical implementation has largely been assigned to the Member States and it is difficult to see how changes to the Directive would lead to improved practice at this level.

### Positive impact of the CAD

Despite the evidence that there is some way to go before the approach framed by the CAD could be regarded as successful, there are **positive things that can be said concerning its impact** and that of related measures with the potential to influence the management of the risks of hazardous substances at work.

These include our broad findings of a **raised awareness** concerning hazardous substances across the EU generally as well as of **significant and substantial provision of information**,

training, specialist services, and support tools in many countries and sectors. There is also some evidence of increased occurrence of risk assessment and management of hazardous substances according to Framework Directive/CAD principles.

Many **systematic approaches towards risk assessment and risk management of high quality** have been developed, be it at enterprise level, at the level of associations or by inspection authorities. This leads to some positive findings concerning implementation and it appears that in many Member States a large proportion of their larger enterprises have performed a risk assessment and introduced risk management measures. **In workplaces where permanent or regular control of a few substances is essential for risk monitoring, OELs often play an important role** and are well known tools in risk management.

More and more **suppliers know and acknowledge the need for substitution** by the user's side. In the majority of economic sectors chemical knowledge is on the supplier's and not on the user's side. The supply of less hazardous preparations is increasingly seen and used as a good marketing argument. Additionally it is perceived as reducing effort and costs for OSH measures at the workplaces of the user enterprises. There is a trend toward outsourcing of OSH competence and the use of external health surveillance and protective and preventive services. In some cases the contracting of OSH services with high qualification and work place knowledge can act to improve the OSH situation considerably.

The **availability of tools for the instruction of workers has improved** in many cases. Very good and comprehensive tools have been developed for the whole chain of communication; they include features such as adaptation to sector specific needs. It is also acknowledged that there is **widespread provision of training at all levels**, from workers engaged in the use of hazardous substances, to managers with specific responsibilities for controlling risk and professionals involved in monitoring, evaluation and control. Examples of good practice are also reported at all these levels.

**Consultation of workers is one of the positive factors for effective implementation.** At workplaces where consultation takes place it enhances the chances for good chemical management. It is further clear from literature that the involvement of trade union representatives in risk assessment and management of hazardous substances supports effective practice in these areas.

The **Member States have increasingly applied strategic policy approaches** to cope with the downsizing and deregulation of the public sector in general and labour inspection capacities in particular. Inspection authorities have introduced priorities and systems for enforcement as well as monitoring strategies to control the effectiveness of their work. Most Member States now possess **national strategies for OSH to support more systematic or targeted improvement of the prevention level in enterprises**. Some but not all of these strategies tackle the reduction of the use of hazardous chemicals as one of their main goals.

In many Member States there are **specific provisions** – besides the CAD - **to protect 'vulnerable' workers** such as pregnant workers, young workers or those working at particular workplaces – mines, nuclear power plants etc – or with particular forms of hazardous substances, such as carcinogens, asthmagens and so on. In this respect, regulatory requirements in most countries in the study distinguish specific categories of chemical substance for which a different, or more detailed, approach to achieving effective risk management is applied.

### **Challenges of implementation**

As mentioned earlier (see chapter 2 Methodology) the **availability of statistics or quantitative figures** about exposures with chemicals at workplaces or the current level of prevention at workplaces **is very limited**. This lack of data generally prevents clear and evidence based identification of those areas of both improvement and continued deficit. Consequently, many of our conclusions are indicative and are based on the opinions of respondents, the examination of detailed case studies and support from extensive review of the research literature.

It is evident from our findings, that there are still **far too many enterprises in which there is low awareness, low knowledge and inadequate risk assessment and risk reduction**.

A **large proportion of the total of enterprises** in most Member States have **never performed a risk assessment** in accordance with its meaning as understood in EU Directives, or if they have, they have never introduced any risk management measures as a result. Where risk assessment is done it is often **merely a formal procedure to achieve paper compliance**. Many interviewees stated that there was often a **weak connection between risk assessment and risk management measures**. From our CADimple research we conclude that not more than 50% of the enterprises have performed an overall OSH risk assessment. This must be seen as a very cautious assessment (see chapter 5 'Risk assessment' for references and details). The larger the enterprise the greater the probability that a risk assessment will be performed, which means that less than 50% of the enterprises but more than 50% of the employees are covered by at least a general OSH risk assessment. However there are many doubts expressed concerning the quality of these risk assessments and whether they tackle the risks of hazardous substances adequately. On average across the 27 Member States it is likely that the proportion of enterprises that have performed a chemical risk assessment will be much lower than 50%.

In these enterprises without such a risk assessment the basic and essential information tool for safety and hazards information of chemicals - **the Safety Data Sheet SDS – cannot be effective**. SDSs are not used as an instrument of assessment and risk management or simply not understood. In such cases the obligatory labelling on containers constitutes the main information source for both employers and workers.

During the last two decades many enterprises have **outsourced OSH capacities and now employ external health and prevention services**. As already mentioned, when these services are better qualified than the (former) internal OSH personnel, this may lead to an improvement in prevention at the enterprise level. But often outsourcing results in impairment, especially when economic considerations dominate the decisions concerning their use. Often in such cases surveillance and prevention services are selected which have inadequate or low qualifications and limited workplace knowledge.

Our findings show that **substitution is rarely user driven**, if substitution of hazardous chemicals is not crucial for the economic success of an enterprise, e.g. if an enterprise is highly dependent on a clean image. And the enterprise must employ personnel which possess the necessary knowledge. The CAD basically puts the responsibility to check substitution options on the employers' side. This seems to be in very many cases an excessive demand if there is no awareness and knowledge on the employer's side.

Despite examples of a range of good practices, concerns expressed by respondents in the present study suggest there are a number of **common failings in relation to the quality of training and its accessibility for all kinds of workers** who are exposed to chemical risks, as well as concerns about the quality and availability of appropriate information on working with hazardous substances. In the case of more specialist training, concerns about the adequacy of

its provision are further bound up with changes brought about by restructuring of the economy and the decline of resources in the public sector.

In the last two decades in many countries attempts to control public sector spending have resulted in **downsizing in a number of important areas for surveillance and control of safety in the use of hazardous substances**. Paradoxically, during the same time, deregulation and economic restructuring in Member States have to varying degrees liberalised economic structures and **increased the challenges for surveillance and control**. So while changes have tended to reduce the capacities for labour inspection and enforcement, at the same time structural changes have increased the demands on these capacities. For example the change towards a higher proportion of SMEs – which in general have many more difficulties in employing and keeping the necessary OSH knowledge - lead to potentially greater demands for support, including inspection, guidance and advice from inspection agencies. Similarly, these changes have lead to labour market changes such as more temporary and casual workers whose changing work situations may lead to their greater exposure to risks they have not experienced before.

A theoretical goal of inspection authorities to be - in principle - able to inspect every enterprise regularly has been replaced or amended in nearly all Member States by more **stream-lined and prioritised inspection strategies**, to cope with these changes and with resource constraints. Besides this, a further strategy has been greater development of promotional activities, advisory services and partnerships for OSH with business associations. The large number of SMEs is mainly approached by such means of communication and awareness building. However, the success of such activities is difficult to assess, since monitoring of their impact is limited.

These challenges of reduced inspection capacity and greater numbers of hard to reach SMEs imply that **SMEs which are not responsive to promotional activities** have a small and declining chance of inspection and **having deficits of compliance addressed by means of enforcement**. At the same time, while we have noted the success of worker representation and consultation in supporting good practice in chemical risk management, surveys of the extent of arrangements for such consultation and representation show them to be reducing as a consequence of the same structural changes that present the challenges to inspection.

### **General Appreciation**

In sum, there was evidence in both the CADimple survey and field research of a broad stakeholder awareness of a requirement to **manage the risks of hazardous substances more systematically**. This corresponds to our findings of a wider awareness of the shift to more systematic approaches to managing health and safety more generally, finally resulting from the regulatory changes at national and European levels.

It is equally clear that **this awareness is far from being ubiquitous** and that it is strongly influenced by structural and organisational determinants such as workplace size and contractual positions. **Even where it exists, it does not automatically lead to sufficient implementation and good practice**. In this respect our study confirms the findings of previous studies which suggest that risk management of hazardous substances poses particular problems partly because of the specialist/technical knowledge apparently required, partly because of limited awareness of the hidden or long-term health effects involved and partly because organisations have different capacities with which to respond to the regulatory requirements.

In particular, there are differences in this respect between large organisations and those in which dealing with hazardous substances is perceived to be central to the business of the

organisation, and small and micro-organisations that also use or create hazardous substances. Our study provided no evidence to demonstrate that any significant change has taken place in the situation described by previous studies concerning the **problems faced by SMEs in dealing with hazardous substances**. With the exception of those employers and workers in firms in which there was a clear perception concerning the centrality of the use of hazardous substances in the business of the firm, smaller firms continue to have poorer access to appropriate information on risks posed by chemical substances, poorer understanding of the information they are able to access, more limited recourse to specialist support, and less time and other resources available to make use of such support. As a result they know less about how to select and implement effective risk management measures than their counterparts in larger organisations.

There was also no evidence in our study that there are any specific categories of workers for whom the Directive has brought about significant improvements in the protection of their health and safety. If anything, structural and organisational changes that have taken place in work arrangements over the past two decades have meant that there are **increasing number of vulnerable workers** — in small and micro firms, in subcontracting arrangements, in outsourced contract work and agency employment. **For these workers there are significant barriers to implementation of measures** derived from the Directive and little evidence to suggest that their implementation has achieved effective protection.

Our findings further confirm that effective **risk management requires some degree of support** – not only in terms of the development of more accessible information and more useful tools for risk management, but also in terms of the infrastructures and processes in place to support and sustain their delivery.

The Directive is European and as such **recognised by many respondents as too general** to act effectively as guidance for practical risk management activities. Some enterprises and authorities see this as chance for a flexible approach; others wish for detailed and precise guidance.

### **Risk Assessment (RA)**

Risk assessment meanwhile is recognised as a **crucial and essential starting point** of any systematic identification of risks and further improvement of OSH at workplaces.

Significant and substantial provision of information on risk assessment – by means of training, specialist services, and support tools – is available in many countries and sectors. Providers are authorities and governmental institutes, business organisations, social partners, intermediaries and associations of OSH specialists. Risk assessment seems to be the area where – in relation to the other nine CADimple research areas - **most guidance and support is available**. It requires little specialist knowledge to find generic tools – be it printed or online; it is also easy to find good practice examples in many sectors, published and disseminated by the above-mentioned groups of providers. However, it remains the case that despite this, risk assessment in the use of hazardous substances is still not performed adequately in a large proportion of workplaces.

Critical statements in the literature or from our respondents **mention the weak connection between risk assessment and the necessary risk management measures**. They point to the fact that many enterprises carry out risk assessments as a formal procedure in order to provide the necessary documents, e.g. for enforcement authorities. Such risk assessment very probably will have no impact on working conditions and risk reduction.



Another source of criticism reflects the special complexity and difficulty of risk assessment in the use of hazardous substances. It argues that risk assessment of chemical hazards requires specialist knowledge in many cases and is often not carried out properly or even at all.

Concerning costs, the literature and our respondents suggest that the costs are low and not a factor which is of crucial relevance for enterprises of any size. The main cost-related barrier to risk assessment results from the apprehension of employers that the risk assessment might lead to proposals from the workers' side or obligations from authorities to implement expensive preventive measures.

### **Occupational Exposure Limits (OELs)**

All Member States issue OEL-lists. These lists contain on average between 200 and 600 substances. Special OELs are treated in special chapters, e.g. carcinogenic substances, petroleum fuels, dust, fibres, solvents, work processes. Some Member States see it as an advantage setting OELs for a large number of substances, whilst others limit their list to the EU-List or to those substances where data are complete and adequate.

For enterprises with working operations based on the use of specific substances the measurement of **OELs is routine and a permanent, reliable and well introduced method of risk monitoring**. This particularly applies at workplaces where continuous or regular control of a few substances is essential for risk monitoring.

According to the respondents to our survey and field research the use and importance of **OELs appears to have decreased** in recent years for several reasons. Although OELs are one of the best known risk control measures, the understanding of them in enterprises continues to be limited. Knowledge and size of enterprises, measurement costs and integration into risk assessment are critical factors for an expedient and effective use of OELs.

In other cases only exceptional circumstances – such as accidents caused by temporarily or permanently exceeded exposure limits or orders from enforcement authorities - lead to the measurements of substances.

OELs have been developed for exposures against comparatively few substances, and many current workplaces with mixed exposures would require extensive measurement if comparison with exposure limits were to be routine prevention practice.

Consequently, the replacement of such measurements by the **greater use of exposure scenarios and control-banding or similar techniques** is a growing trend. OSH practitioners broadly support this trend (although there are criticisms especially among occupational hygiene specialists concerning ill-informed usage) and favour investments in risk management measures instead of routine measurement of exposure, which is regarded as both expensive and impractical.

### **Substitution**

The CAD and the respective legal acts of all Member States set legislative requirements for substitution and put substitution at the top of the hierarchy of risk reduction measures. Substitution of dangerous chemicals with less dangerous ones **is recognised as the ideal way** to reduce risks and to overcome unavoidable deficits of control and regulation of the use of hazardous substances. However, practitioners and specialists see many difficulties in the practical application of substitution at workplaces. They are sceptical about general approaches and prefer a detailed, case-by-case approach and practical support tools.

Typically, it is possible to distinguish two main substitution approaches, one that is **supplier driven and another user driven**. For SMEs with limited chemical knowledge of substitution, the replacement of hazardous substances – if it is performed at all – is mainly done on the supply chain side. Highly specialised suppliers (e.g. of hair colorants or disinfectants) decide whether they provide their customers with products containing less hazardous substances or not. This supplier driven substitution is a common model in supplier-client arrangements with low or no chemical knowledge on the user's side. The users select chemical preparations using criteria such as technical properties, application properties, convenience and customer preferences.

Visits to enterprises during the CADimple field research confirmed what has been reported elsewhere - that understanding of substitution differs between users and suppliers. **In supplier driven substitution processes the elimination of hazardous chemicals is often not even recognized as substitution by the user**. The supplier might announce a change in the composition of a product as a marketing argument, and sometimes this change is made without any further promotion. Examples are cleaning agents, inks and paints, construction chemicals or shampoos.

**User driven** substitution can be found **where large players – large in respect to their sector-specific market power – develop a policy of substitution** and compel their suppliers to ban or reduce certain hazardous chemicals. A typical situation can be found in the auto and large electrical goods industries, where suppliers are forced by their customers to use 'black', 'grey' and 'white' lists of chemicals. The majority of enterprises – e.g. the medium sized enterprises – act between these extremes, depending on their knowledge, awareness and capacities.

Consequently, the assessment and evaluation of the motivation, of the drivers and barriers, of the costs and successes of substitution seem to be similarly divergent and case dependent.

Interactive and often complex tools and decision criteria reflect these difficulties. This leads to a situation where enterprises with low capacities and scarce knowledge, primarily trust their chemicals' suppliers, whilst others use complex tools to identify and assess substitution options. As with risk assessment and control therefore, there is no lack of tools, but a lack of easily available reference cases or case study reports which can be simply used as transferable models at the enterprise or workplace level.

### **Risk management measures (RMM)**

Several positive trends are evident in relation to risk management measures on hazardous substances. Trends evident in relation to risk management measures on hazardous substances have been influenced either by the CAD or by the wider framework of systematic approaches to OHS management such as required by the EU Framework Directive 89/391, national regulations or standards for OHS management systems. **There seems to be a heightened awareness of the need for risk management measures** and as with risk assessment, there are **many examples of good practice**, especially in larger firms and in those firms where the use of hazardous substances is an integral part of their business activities.

There are a **plethora of tools and other initiatives to provide support for SMEs** that have been developed as a result of recognition of the challenges they experience in implementing risk management. Nevertheless good practice on risk management of hazardous substances is far from universal and fundamental obstacles to its development are presented by the structure of the economy, the reach of regulation and the availability of and access to support.

### **Health surveillance (HS)**

The role of health surveillance is to identify diseases or adverse health effects and their possible causes in the work environment, to give medical advice to workers how to avoid or treat such diseases, and to advise employers on how to reduce or eliminate the risks at the workplace. In a number of cases, interrelations between certain diseases and exposure to chemicals at workplaces were detected by occupational physicians. At the European level health surveillance was regulated in the Framework Directive 89/391 and was specified in the CAD in relation to hazardous substances.

The organisation of health surveillance varies from MS to MS in many aspects, such as task definition, coverage of the workforce, models of organisation and structure (e.g. public or private), education and qualification of personnel, connection to risk management, recording of individual data, aggregation of data, support of research and monitoring, and evaluation policies.

The **positive and essential role of health surveillance in the detection of risks by medical examinations is commonly accepted and recognised**. For particular chemicals such examinations are seen as indispensable and crucial. The role of health surveillance to support effective risk management measures is far less clear, with many critical opinions voiced on this topic. The trend towards external services is also seen as critical because it leads to less practical knowledge about the workplaces concerned.

The main reasons for shortcomings identified in the literature or by our respondents can be summarised under four headings:

- a) **Qualification and availability of personnel** for health surveillance and the lack of special knowledge on chemicals.
- b) **Deficits of cooperation between enterprises and health surveillance personnel**; low practical knowledge of the work environment at the workplaces of the people examined. The enterprises have financial reasons to contract minimum health surveillance service, which does not include workplace inspections. Consequently, there is no systematic preventive approach, mainly diagnosis related activities.
- c) Workers' representatives and the ILO state a **mistrust by workers** in the purpose of medical examinations and report cases of firing or transferring as a consequence of a positive diagnosis.
- d) In many MS there are **no national or sectoral approaches to the use of health surveillance data for research**.

### **Information Requirements**

Where organisations possess some competence in the prerequisites for risk management of hazardous substances, they are able to make adequate use of most safety data sheets (SDS), but may require more specific information than is provided in some. However, for many users of hazardous substances such competence is lacking and problems of technical understanding mean that for them the value of the majority of SDS is limited. Issues of access to and comprehension of such information therefore remain problematic and require continuing attention.

Many respondents confirmed findings from previous research that demonstrate that efforts to improve risk management of hazardous substances benefit most from **face to face contact with 'intermediary' or 'boundary spanning' agents** that facilitate and advise on the proper use of information, regardless of whether these agents are regulatory inspectors, worker representatives, suppliers' representatives, health and safety specialists and consultants, insurance association personnel, researchers or advisers provided through trade associations, the supply chain or other intermediaries.

### **Training and consultation**

There is little dissent from the view that education and training on the safe use of hazardous substances is ‘a good thing’. It is acknowledged that in most Member States there is **widespread provision of training at all levels**, from workers engaged in the use of hazardous substances, to managers with specific responsibilities for controlling risk and professionals involved in monitoring, evaluation and control.

At the same time, concern about the adequacy of training provision at all these levels is equally widespread. Unfortunately there appears to be no comprehensive inventory of training provision in any country that would enable an accurate measure of its extent or the nature of gaps in provision.

Despite examples of a range of good practices, the concerns expressed by respondents suggest there are a **number of common failings in relation to the quality of training** and its accessibility *for all kinds of workers* who are exposed to chemical risks. In the case of more specialist training, concerns about the adequacy of its provision are related to change in the form of the restructuring of the economy and the decline of resources in the public sector.

At the same time, there is strong evidence in some countries to suggest that the preconditions shown to be necessary for effective representation and consultation on health and safety generally are less widespread now than in the past, and that worker representation is weaker as a consequence. There are no detailed studies of this effect in relation to consultation on hazardous substances specifically, but it seems unlikely that such consultation should be exceptional to the general trend.

Nevertheless despite examples of a range of good practices, the concerns expressed by respondents in the present study suggest there are a number of common failings in relation to the quality of training and its accessibility *for all kinds of workers* who are exposed to chemical risks, as well as concerns about the quality and availability of appropriate information on working with hazardous substances. Similarly, concern about the adequacy of training provision at all levels is equally widespread. Unfortunately there appears to be no comprehensive inventory of training provision in any country that would enable an accurate measure of its extent or of the true nature of the gaps in provision.

### **Protective and Prevention Services (PPS)**

Advice and services in OSH matters are mainly provided for those enterprises who are too small to have their own specialist OSH capabilities or who have decided to outsource previously internal OSH capacities. The Structure, quality and type of these services differ widely.

External protective and prevention services **play an important and increasing role as advisors for the health and safety management of enterprises**. We found evidence that external protective and prevention services of every type and qualification level are to a greater or lesser extent available in every Member State – but there are some important limitations and exceptions concerning some Member States and especially professional expertise on chemicals. The infrastructure of PPS services and qualification, and the national legal provisions, vary significantly throughout the MS. The objectives and some basic features of PPS are harmonised by the Framework Directive, “... *but experience shows that it would be unthinkable to harmonise the means by which they are reached.*” (Prevent 2006a).

The respondents of our survey perceived several **problems with the dislocation from the client organisations**. Contracted expertise is less familiar with the work situations involved and therefore less likely to perceive significant underlying aspects of the problems they are investigating or advising on. They are also likely to spend less time at the worksite and be less

accessible to workers and managers alike. Respondents in some countries also believed external services and consultants to be far less likely than internal services to consult with workers and their representatives.

Protective and prevention services offer – depending on the contract with an enterprise – a large variety of OSH services, from medical diagnostics (see also chapter 8 on health surveillance) to advice on organisational prevention measures and technologically specialised knowledge. According to the contract the quality and extent of services can vary depending on the financial investment of the contractor.

The outsourcing of these services is accompanied by a debate about their qualifications and quality. Our respondents firmly **expressed their wish for comprehensive certification of services, standards for training and more quality supervision in general by the state or appropriate associations**. Some Member States have introduced certificates, licences, authorisations or guidance to enable a common minimum quality standard.

### **Enforcement**

In sum, the evidence on the role of enforcement in relation to risk management of hazardous substances is limited in terms of its evaluation of the success. In many Western European countries the **current enforcement profile suggests changed practices that emphasise risk management strategies over prescriptive measures**. There are also suggestions of greater use of guidance and advice at the level of individual inspection of workplaces and at the level of the regulatory agency. But there is little in the way of robust data to support conclusions concerning the efficacy of these changes. These specific strategies are enmeshed within wider reforms of public administration focused on efficiency and resource management which complicate evaluation of their specific impact.

In former communist states meanwhile, there has been rapid and recent reform of labour inspection in line with systems found in free market economies. It is not clear to what extent this has resulted in effective surveillance of arrangements to manage the risks of hazardous substances at workplaces. Nor is it clear to what extent or with what effect inspectorates in these countries have adopted the same focus on the inspection of risk management within organisations, the provision of advice and guidance or the strategies to maximise penetration of the restructured economy that are claimed in countries in Western Europe.

The SLIC inspection campaign on chemical management will start in 2010 and provide more and better data and further knowledge on the status quo of enforcement in the area of chemicals at workplaces.

## 15 General and specific recommendations

The following section presents some **general recommendations** and an outline of the reasoning behind them that emerge from the study. Within each category of recommendations we present some further **specific suggestions** concerning possible elements that would help in their delivery. The recommendations relate to four broad areas and concern the need to address:

- A) Weaknesses in the **evidence base** concerning the extent of the problem of exposure to hazardous substances in EU workplaces;
- B) **Adaptation** of regulation and policies **to economic and technological developments**;
- C) Resolution of **limitations in the implementation** of regulation;
- D) **Implementation** of regulatory provisions and the **role of voluntary approaches, intermediaries, cooperation and communication**.

These recommendations are addressed to the European Commission because our study was undertaken on behalf of the Commission. However, many apply to actions that require consideration at the level of the Member States, sectors or individual organisations. The recommendations are made on the basis that our conclusions warrant their consideration. They do not imply that the Commission has the authority to require individual Member States to carry out these actions.

### A) Addressing weaknesses in the evidence base

There is limited knowledge of the extent of workplace exposure to hazardous substances in the EU or the nature and extent of its health consequences in terms of robust and comprehensive data on these issues. There is a need for regulators and enforcement ‘actors’ to have systematic screening of actual risks as well as of their development. The spectrum of risks changes over time due to technological and economic developments. **It is recommended** that Member States and the European Commission review their **requirements and systems for the collection of data concerning production, exposure and health effects** in relation to hazardous substances in order that to develop a better evidence base on which strategic decisions to manage risks may be taken at sectoral, national and international levels.

Such a review also needs to take account of issues of transparency, comparability and availability of data and the means of its communication.

All specific recommendations under a) are directed to EU institutions or national governments. References and links to detailed examples can be found in the issue-based sectors of the report and the reports on individual Member States.

### A 1) Optimum set of quantitative data

An optimum set of quantitative data would first of all consist of long term statistical data on:

- **Production and use** of chemicals, preparations and chemicals in products;
- **Disease registers** or aggregated data from occupational health surveillance (e.g. cancer, skin diseases, lung diseases);
- **Exposure databases**, job exposure matrices and aggregated data of measurements.

Each of these data sets has a value of its own. Integration and aggregation of data would further provide the best overview of the extent and consequences of exposure which would better inform the development of evidence based strategies on the management of chemical risks than is presently the case. One example: only a few Member States aggregate the measurement data from authorities or other sources into overarching statistics or a database. Such databases would be a very efficient tool for epidemiological research or reliable data sources on individual cases of occupational diseases. Further data from HS can be aggregated to support research and epidemiological studies. This is extremely relevant for chemicals because in this case often years or even decades might pass before a disease will become evident.

### A 2) Further qualitative research

These statistical data could be complemented by further **qualitative research**. Issues covered in this research should include: the prevention level in enterprises, covering the quality of risk assessment and the organisation of OSH

- effectiveness of legislation and enforcement activities,
- application and effectiveness of OELs,
- evaluation of training of OSH practitioners,
- effectiveness and quality of health surveillance and protective and prevention services,
- effectiveness of typical risk management measures,
- substitution barriers and promoters etc.

Only in a few Member States we could find reliable evaluation systems that are able to identify and monitor the practical implementation and impact of OSH policies and legislation. Such evaluation strategies were developed in the course of the development and evaluation of national OSH strategies. Certain indicators are needed to measure the impact of strategies, programmes, policies and legislation. For chemical risks the evaluation of the impact of REACH and of the new extended Safety Data Sheets on risk management would be of particular interest. Together, both types of evidence would form a reliable base from which to assess the degree of implementation of the impact of the CAD and related OSH Directives with the best possible means.

### **B) Adaptation of regulation and policies to economic and technological developments**

While it seems clear that the basic premise of current regulation concerning the management of exposure to risk in working with existing hazardous substances is well-founded, it is less clear that it is being most effectively implemented.

The European Commission and national authorities in the Member States need to explore ways in which a better understanding of the **current context and the current mechanism of implementation** of the CAD may be achieved. This requires an enhanced acknowledgement of the **impact of restructuring of the economy** (growth of number of SMEs, accelerated and

growing migration of workers and outsourcing). This also requires a better acknowledgement of **technological developments** and their impact on regulation Such as customising of chemicals, growth of the number of chemical mixtures and decline of the quantitative amounts of production and use per substance.

It is therefore recommended that **national and EU strategies (programmes / plans)** for improving the management of the risks of hazardous substances in all workplaces in which their use or production imposes an identifiable risk to the health of workers or others affected by work should be a priority in all Member States. It also includes the development of **regulatory answers to resource constraints** of labour inspections and other supervising authorities, e.g. strategic approaches to achieving regulatory objectives – with consideration given to the most appropriate and effective balance of deployment of information, advice, guidance, surveillance and enforcement. This further requires more rigorous evaluation of the effects of strategies/programmes and the development of further, evidence based implementation strategies as a consequence.

The specific recommendations under b) are directed to national governments or the EU:

### **B 1) Develop EU and national plans and policies aimed at the reduction of the use of hazardous chemicals**

Include ‘Chemicals’ in the next European Strategy addressing OHS.

Encourage and support the development of national programmes on risk management of hazardous substances in all Member States, using successful models of good practice such as represented by the Dutch VASt, such as found in the Danish OSH Strategy 1995 to 2005 (goals on CMR and solvents), French OSH Strategy (goals on CMR), Swedish Environmental Goals - subgoal ‘Non Toxic Environment.

### **B 2) Introduce OSH programmes and policies including enforcement priorities**

Some Member States have introduced programmes and policies to raise the quantity and quality of risk assessment via motivation, communication and supervision. They emphasise working with intermediaries, or are targeted via regional governmental branches, e.g. regional labour inspections. These should be properly evaluated and if found to be successful should be extended and developed in other Member States where they are currently absent.

Further there is also an urgent need to develop more support programmes to target vulnerable work groups such as those with low knowledge and high risks, e.g. cleaning, maintenance and repair, and construction.

## **C) Resolution of limitations of the implementation of regulation**

Concepts of **employers’ responsibility, precautionary principles, hierarchy of control, systematic management of risk and its regulatory surveillance** are all sound **principles** and they assume that if responsibilities are properly understood and actions are competent, supported and carried out in consultation with workers and their representatives, they will lead to improvements. These principles were undoubtedly successful in the case of many large workplaces and in relation to firms in which the management of the risks of hazardous substances is perceived to be central to business interest.



However, **this not the case for workplaces** where major conditions for a sound implementation of these principles, such as awareness, basic OSH infrastructures or specific knowledge, are missing

Section C) contains those recommendations which aim **to improve the identified limitations of the application and applicability** of the CAD Directive.

### Specific recommendations for C)

#### C 1) Adapt the name and wording of the CAD

In case of a revision of the Directive, the opportunity to rename the CAD the ‘Hazardous Substances Directive’ should be taken. **‘Chemical’ is too narrow a term**, and does not support the application of the CAD at many workplaces. This would be a small step towards changing attitudes and risk behaviour at the workplace level, e.g. in ways that help the recognition that preparations with very common names (cleaners, shampoos), or substances which are not synthesised chemicals (such as dusts, naturally grown substances like flour, fumes from welding or combustion processes, aerosols and some heavy metals) are all also sometimes hazardous and may require the application of risk management principles.

#### C 2) Remove restrictions in the classification and SDS Directive to enable a proper risk assessment

CAD and risk assessment of chemical exposure at workplaces depend on the assessments provided and regulated in accordance with the classification and labelling Directives. The concentration limit that makes labelling obligatory, and, respectively, the substance to be disclosed in the SDS, is usually 0.1%. This **limit is much too high for substances like allergens** or industrial enzymes. At workplaces where exposure to these groups of substances is relevant, those involved should be aware of this information in order to be able to apply effective preventive measures. It is therefore necessary to introduce lower threshold values for the communication of the presence of these substances in mixtures in the respective legal frameworks.

#### C 3) Improve the practice of substitution

In addition to existing strategies to regulate the risk management of hazardous substances, greater focus should be given **to strategies to remove the need for such risk management by promoting and incentivising the development and use of safer alternatives**. Substitution may be the first principle of the hierarchy of control but it remains an underdeveloped concept for many users of hazardous substances, who are yet to be convinced of its value. Therefore it is recommended that:

1. *For governments and associations:* **Further guidance and decision tools to support substitution are developed. They should be sector specific and suited** to the information needs of the enterprises. Information seems to be best disseminated when reference cases and case studies are presented.
2. *For governments:* The **financial risks of substitution** – loss of quality, technical difficulties and the related liability problems – are one of the main barriers to substitution. Incentives to start more complex substitution processes in enterprises should be explored.
3. *For governments:* Governments should improve and develop ways to **promote the**

**substitution of dangerous substances, with objectives and timelines**, supported by national plans. Such clear goals are a kind of orientation for all stakeholders. More support of Research and Development (R&D) is necessary to find solutions for complex substitution challenges.

#### C 4) Risk Assessment and Risk Management

1. *For governments and associations*: National portals run by large associations or tripartite consortia, such as in Austria, **support easy access to all guidance documents**. Sector specific online based (anonymous) interactive risk assessment tools including features such as the option of printing out risk assessment documents, can highlight deficits and present options for improvement tailored for the specific workplace. Furthermore, they facilitate generating instruction sheets automatically. Paper versions of SDS and instruction sheets are still necessary for workplaces without internet access, like for example construction sites.
2. *For EU institutions*: The development of further support for **European exchange of practical knowledge** should be considered. In other areas of European Social Policy European platforms have shown that such an exchange contributes to the enhancement and strengthening of national activities.
3. *For governments and associations*: **Financial support to conduct risk assessment** might be helpful in particular cases, e.g. **for certain types of SMEs**. In some Member States like Austria and Finland SMEs can apply for a risk assessment carried out by state institutions free of charge, or a financially supported risk assessment.

#### C 5) OELs

Nothing in these OEL recommendations should imply a reduction in the scientific integrity of exposure monitoring in relation to exposure limits. It is recognised that there are situations in which complex exposures require the highest level of scientific expertise and resource to adequately monitor, assess and manage risks. There are however many other situations in which simpler solutions may be possible.

1. *For enterprises, governments and standardisation bodies*: OELs are well known risk assessment tools. **Main barriers** for a more frequent and regular use of OELs are the **costs and the specialist knowledge required to measure and interpret** the results. Where possible, such as for example in standard situations, OEL measurements could be replaced by **expert assessments or exposure scenarios**. In some MS OEL technical rules or ordinances exist enabling the employer to replace measurements with **expert assessments of the exposure based on long standing experience** and derived from a large number of observations and measurements of similar working processes.
2. *For researchers and standardisation bodies*: Many exposure assessments do not require high-level expensive measurement. **Less expensive equipment and less specialised personnel can also be sufficient to identify critical exposure situations**. This would require the development and introduction of simpler but still valid measurement methods.

3. *For governments and associations:* In our research we frequently found the opinion that there is a need to **clarify the connection between OEL measurement results and the obligation for risk management measures**. It has to be made very clear in guidance or legislation that keeping to the limit value does not mean being free of any RMM.

## C6) Information requirements

1. *For enterprises:* SDS can be used to produce use **one-page instruction sheets available at each workplace** in the language of the worker. Such short instruction sheets are provided automatically by some electronic tools (e.g. GISBAU, Stoffenmanager).
2. Labelling remains one of the major practical information sources at workplaces. There is a strong demand to **ensure labelling of every container**.

## C 7) Health surveillance and protective and prevention services

1. *For governments:* In some Member States we found a need to **define precisely the details of HS** for chemically exposed workers in national secondary legislation. Details on, and frequency of, the specific medical examinations which are part of health surveillance have to be established in national secondary legislation. This might also include well defined certification criteria for protective and prevention services.
2. *For governments and enterprises:* In our survey we found evidence for **insufficient cooperation between physicians / occupational hygienists from external services and OSH practitioners, employers and workers** at workplaces. Communication and co-operation between external services and enterprises needs to be improved. This could be achieved for example by contracting, one option would be to contract services that visit and inspect workplaces.
3. *For governments and enterprises:* Health surveillance must contribute to the initiation or improvement RMM-measures. **RMM should be clearly the prime outcome of health surveillance** to avoid a climate of mistrust and the reported high numbers of transferred or fired workers.

## C 8) Training and consultation

1. *For enterprises:* Achieve greater involvement of workers and workers' representatives in arrangements for OHS management, including improved representation and consultation on the management of hazardous substances.
2. *For governments:* Review regulatory arrangements on worker representation to explore ways of preventing further decline of representation and consultation.

## C 9) Enforcement

1. *For governments and enforcement authorities:* There are monitoring systems available to measure the quality of chemical management at the enterprise level and to assess **the level of compliance with legislation** per enterprise in a harmonised way (e.g. in Sweden, Finland and Denmark). Such instruments can be a useful way to assess the status of chemical management in a region or sector.

## **D) Implementation and the role of voluntary approaches, intermediaries, cooperation and communication**

There is increasing recognition in national policies on improving health and safety management more generally, that there is a need to make better use of intermediary actors and processes in the social and economic environment of the work situations acknowledged to be 'hard to reach' by conventional means. There seems no reason why more effective risk management of hazardous substances could not also be achieved in this way.

Greater attention should be paid to the potential role of intermediary actors and processes in present and future regulatory and voluntary strategies to improve risk management of hazardous substances at European, national, sectoral and organisational levels. Such actors and processes that have a role to play must be more systematically identified, and their contributions better evaluated.

It is clear that discussion of regulation and the supply chain cannot proceed very far without involving REACH. Although the relationship between REACH and the CAD was beyond the brief of the present study, it is evident there is such a relationship and that it has both synergies and difficulties within it as SLIC has already pointed out (SLIC 2009). REACH is especially concerned with risk communication in the supply chain. It acknowledges the significance of the relationship between suppliers and users and also the strategies to promote good practices on risk communication and control. However, how the regulation will operate in practice in these respects remains uncertain.

### **Specific recommendations for D)**

#### **D 1) Examine the regulatory framework**

It is recommended that the **regulatory framework around such relationships is examined** to consider whether there are ways in which current voluntary practices such as found for example in the chemical and car industries could be applied effectively elsewhere, possibly through some kind of regulatory obligations akin to those that apply to the heads of supply chains in sectors such as construction in the EU, and in transport and the textiles industries in some other countries.

#### **D 2) Support intermediary actors and voluntary initiatives**

*For EU institutions:* It would be useful **to enhance the existing fora** e.g. at EU-OSHA to facilitate the exchange between intermediary actors. Such fora can also provide an overview on good practice and effective voluntary initiatives.

#### **D3) Strengthen the supply chain cooperation**

*For enterprises and associations:* There is a need for **more supply chain communication and cooperation**. Tools for such cooperation are fora for suppliers and users to discuss e.g. substitution options. Governments should support such supply chain co-operation by financial funding or other promotional means. It is also recommended that greater and more systematic attention is paid to understanding how these factors can be put to better use under the combined requirements of the CAD and REACH in the future.

#### **D 4) Clarify the connections between REACH and CAD**

*For EU institutions:* Provide guidance and messages to clarify the relationship between these regulations. A proper co-ordination should be developed between the operation of the requirements of these provisions. Such a co-ordinated approach must also be clear to all who have to implement, operate and enforce it.

*For governments:* In future there will be a demand from the OSH authorities to get more access rights to REACH data than the public. This requires clarifying the access rights to REACH data for labour inspections, enterprises and the public.

#### **Summary and prioritising of recommendations**

All these recommendations have been created, developed and fine-tuned to shape a better framework for an improved management of chemical risks and an enhanced implementation of the CAD at workplaces. They are directed to all actors and institutions that play a role in the area of management of chemicals at workplaces: EU-institutions and Member States, enterprises, business and professional associations, social partners, OSH specialists and practitioners and other intermediary organisations.

The CADimple research consortium is aware of the fact that this quite extensive list of recommendations might appear to be excessive demands. There is a need to prioritise the recommendations, as far as this is possible. However, such a complex challenge as the issue of safe handling of chemicals at workplaces requires a broad approach covering all major influential factors in all relevant areas from risk assessment to risk management. These factors are awareness, prevention culture, knowledge and communication at the enterprise level, reliable data, indicators and support policies at the governmental level and supportive competence at the intermediary level.

We were asked to prioritise this multitude of recommendations. It is a difficult exercise to identify key areas where action is most urgent and most needed. If we apply as main criteria an effective and fast implementation of the CAD at those workplaces where a considerable number of workers is highly exposed or even overexposed to dangerous substances we would prioritise the following measures:

- support the development of sector specific guidance (printed, interactive) and support intermediaries such as social partners and business associations to address their members personally;
- support enforcement strategies which strengthen and enhance the overall prevention level and include promotional *and* enforcement activities;
- use the growing need for supply chain cooperation and communication - due to REACH and general business developments - to promote good practice in risk assessment, risk management, instruction and substitution;
- create awareness at enterprises and on the political level by highlighting and illustrating the negative long-term effects of high and long-term exposure to chemicals.

## 16 CADimple Conclusions and recommendations – Table format\*

EVIDENCE	WHAT WORKS! Successes	GOOD PRACTICE and REASONS	WHAT DOESN'T WORK! Challenges	INSUFFICIENT PRACTICE and REASONS	RECOMMENDATIONS
<b>EVIDENCE BASE</b>					
<b>Availability and quality of data on production and use of chemicals</b>	National aggregated, statistical and obligatory data	Nordic Product Registers' Reason: High transparency even concerning work environment	No national data available in many MS.	Few reliable data outside Nordic MS Monitoring of work environment is obviously not seen as ambitious public task but as private matter	Provide long term statistical data on: - Production and use of chemicals, preparations and chemicals in products;
<b>Disease registers or aggregated data from occupational health surveillance</b>	National aggregated, statistical and obligatory data	Cancer and Disease Registers in Northern and Eastern Member States	No national data available in many MS.		Provide long term statistical data on: - Disease registers or aggregated data from occupational health surveillance (e.g. cancer, skin and lung diseases);
<b>Exposure databases, job exposure matrices and aggregated data of measurements</b>	National aggregated, statistical and obligatory data	Public or partly public exposure and measurement databases in some MS, e.g. Finland, France, Germany, Poland, Romania, etc.	No national data available in many MS.		Provide long term statistical data on: - Exposure databases, job exposure matrices and aggregated data of measurements.
<b>OSH in general – Quantitative data and overall descriptions of systems</b>	Surveys and Observatories	EU Dublin Foundation EU OSHA Risk Observatory European Scoreboard ILO – Surveys on Trade Union Experience; FIOH-WHO - Work and health country profiles of 22 European Countries.  Large number of national studies, only a minor part available in English e.g. DK; F, ES, NL and DE	Often very general data  No surveys available in many MS.		More specific data on practices and exposure at workplaces

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\*The text in this table format is unavoidably of a catchword style and cannot replace the reading of the continuous text in the respective chapters.

<u>EVIDENCE</u>	<u>WHAT WORKS! Successes</u>	<u>GOOD PRACTICE and REASONS</u>	<u>WHAT DOESN'T WORK! Challenges</u>	<u>INSUFFICIENT PRACTICE and REASONS</u>	<u>RECOMMENDATIONS</u>
<b>Evidence Base</b>					
<b>Strategy or policy evaluation</b>	Studies evaluating aspects of national OSH strategies	‘KEMI-Visionen’, Evaluation of the ‘Chemical goals’ of the OSH Strategy 200 to 2005, Denmark VAST-evaluation Evaluation of the governmental program VAST on ‘Enhancement of Occupational Safety regarding Chemicals’, Netherlands			Evaluation on issues such as e.g.: - prevention level in enterprises - effectiveness of legislation and enforcement activities, - application and effectiveness of OELs, - substitution barriers and promoters etc
<b>Studies</b>	Scientific studies covering the national situation or the situation in some selected MS	‘Kemikaalit ja työ’ (‘Chemicals and work’), Finland ‘Arbeitsmedizinische Vorsorge in sechs Ländern der Europäischen Union’ (Occupational Health Care in six EU Member States), Germany ‘Policy overview of occupational exposure limits’, Topic Centre Work Environment of the EU-OSHA			Research on issues such as e.g.: - prevention level and chemical management in enterprises (quality of risk assessment, organisation of OSH) - effectiveness of legislation and enforcement activities, - application and effectiveness of OELs, - evaluation of training of OSH-practitioners, - effectiveness and quality of health surveillance and protective and prevention services, - effectiveness of typical RMM, - substitution barriers and promoters etc.

<b><u>CADimple</u> <u>ISSUE</u></b>	<b><u>WHAT WORKS!</u> <u>Successes</u></b>	<b><u>GOOD</u> <u>PRACTICE and</u> <u>REASONS</u></b>	<b><u>WHAT DOESN'T</u> <u>WORK!</u> <u>Challenges</u></b>	<b><u>INSUFFICIENT</u> <u>PRACTICE and</u> <u>REASONS</u></b>	<b><u>RECOMMENDATIONS</u></b>
<b>GENERAL APPRECIATION</b>					
<b>Overall appreciation</b>	CAD induced positive changes of legislation or – if only minor changes were necessary – at least raised the awareness conc. the importance of chemicals at WP	Majority of statements: Few critics related to legislation, but difficulties with implementation	Too general, not enough detailed regulation. Gaps and tensions with national tertiary and secondary legislation, especially in Accession MS	Main statements from respondents from accession MS	Make the EU-CAD-guidance better known.
<b>Comprehensiveness and coherency</b>	CAD covers in an understandable way the standard provisions for protection of workers.				Make the EU-CAD-EU-guidance better known.
<b>Understandability</b>			Hazardous substances – dust, fumes, natural allergens etc. - are often not understood as being regulated like chemicals.		Adapt the name of the CAD: In case of a revision of the directive rename the CAD the 'Hazardous Substances Directive'. 'Chemical agent' is too narrow a term.
<b>Application and effectiveness</b>	Appreciated by enterprises and practitioners who prefer a general approach and flexible adoption of legislation. In general awareness and knowledge over average.		Implementation at WP with low knowledge and low awareness problematic. General approach even more problematic than specific prescriptions.		
<b>Effective application of the CAD for specific categories of</b> - Chemicals - Workers - Areas / Sectors	CAD covers the most relevant standard provisions for protection of workers.		Specific work environment situations.	Other pieces of legislation are more specific and in these cases more effective and often easier to apply. E.g., protection of pregnant women or young workers, prot against CMR	



<b><u>CADimple ISSUE</u></b>	<b><u>WHAT WORKS! Successes</u></b>	<b><u>GOOD PRACTICE and REASONS</u></b>	<b><u>WHAT DOESN'T WORK! Challenges</u></b>	<b><u>INSUFFICIENT PRACTICE and REASONS</u></b>	<b><u>RECOMMENDATIONS</u></b>
<b>RISK ASSESSMENT (RA)</b>					
<b>Application of RA in enterprises and its role in risk identification and assessment</b>	<p>RA in many enterprises, also in SMEs where chemicals play a major role for the business.</p> <p>In many MS there are well developed support capacities for enterprises, run by governments, business associations or social partners</p>	<p>Quantitative figures: Around 50% of enterprises have performed an RA.</p> <p>Many tools and support activities (see list of tools in references)</p> <p>RA in every enterprise by 2011 - Denmark</p>	RA in SME or enterprises with low OSH capacities and knowledge.	Low awareness and knowledge. Concern to trigger expensive RMM.	<p>- Guidance, sector specific and suited to the needs combined with personal advice or financial support for SMEs. Paper and online versions needed.</p> <p>Sector specific online based interactive risk assessment tools including options such as printing out the obligatory risk assessment documents, highlighting deficits, presenting options for improvement and automatically generating instruction sheets.</p> <p>Enforcement strategy on RA (Denmark)</p>
<b>Quality of RA</b>	High quality RA is achieved in enterprises with well developed OSH capacities or extensive external support.	Many good tools and guidance documents	Many critical statements arguing that high quality RAs are an exception.		Certification or quality control systems for external services Quality check by authorities.
<b>Costs</b>	Low costs of standard RA (Swedish and UK figures)		High quality or non-standardized RA can be expensive.		
<b>Connection of RA and RMM</b>	Good connection between RA and RMM, if enterprises apply OSH management or similar organizational systems.		RA is often seen as unavoidable legal requirement and results only in formal documentation	Many critical statements from respondents from all MS: 'RA only paper-work with no practical consequences'	

<b><u>CADimple ISSUE</u></b>	<b><u>WHAT WORKS! Successes</u></b>	<b><u>GOOD PRACTICE and REASONS</u></b>	<b><u>WHAT DOESN'T WORK! Challenges</u></b>	<b><u>INSUFFICIENT PRACTICE and REASONS</u></b>	<b><u>RECOMMENDATIONS</u></b>
<b>OEL</b>					
<b>OEL and its effective application and use as relevant important tool for RA and RMM</b>	OELs are effectively applied at workplaces with continuous exposure against a few and easy to measure substances (hydrogen sulphide, carbon monoxide, styrene, perchloroethylene, lead)	Permanent monitoring in large enterprises manufacturing or using large amounts of relatively few hazardous substances	OELs are not effectively applied at workplaces with complex preparations and difficult and expensive measurement procedures, such as e.g. at workplaces with complex preparations like paints, cutting fluids, cleaning agents etc. Measurement results below the OEL stop further RMM		Clarify the connection to risk management measures. Develop and introduce simple valid measurement methods.
<b>OEL - alternative approaches</b>	In some MS technical rules or ordinances exist that enable the employer to replace measurements by expert assessments of the exposure referring to process and substance related criteria	VSK			Use not only OEL-measurements but also expert assessments or exposure scenarios.
<b>OEL as source for aggregated monitoring of the exposure to chemicals in the work environment</b>	Very few MS aggregate the measurement data from authorities or other sources into a database.	Finland, (Germany)			Transparency and aggregation of measurement data.

<b><u>CADimple TASKS</u></b>	<b><u>WHAT WORKS! Successes</u></b>	<b><u>GOOD PRACTICE and REASONS</u></b>	<b><u>WHAT DOESN'T WORK! Challenges</u></b>	<b><u>INSUFFICIENT PRACTICE and REASONS</u></b>	<b><u>RECOMMENDATIONS</u></b>
<b>INFORMATION REQUIREMENTS</b>					
<b>Sources used and found helpful</b>	SDS in enterprises with knowledge		SDS in enterprises <b>without</b> knowledge	Too much knowledge required very 'chemical' and technical, very long, not available, not up-to-date, not precise in RMM	Further guidance and decision tools. These tools should be sector specific and suited to the information needs of the enterprises. Information seems to be best disseminated when reference cases and case studies are presented.
<b>Sources used and found helpful</b>	Workplace instruction sheets	Shorter form of SDS (1 Page) available at each workplace in the language of the worker			
<b>Sources used and found helpful</b>	Labeling according to European or international legislation	Main source of information at workplace level	Labeling according to European or international legislation	Connection to practical RMM. Sentences not always understood. Filling in unlabeled containers.	

<b><u>CADimple</u> <u>ISSUE</u></b>	<b><u>WHAT WORKS!</u> <u>Successes</u></b>	<b><u>GOOD PRACTICE</u> <u>and REASONS</u></b>	<b><u>WHAT DOESN'T</u> <u>WORK!</u> <u>Challenges</u></b>	<b><u>INSUFFICIENT</u> <u>PRACTICE and</u> <u>REASONS</u></b>	<b><u>RECOMMENDATIONS</u></b>
<b>SUBSTITUTION</b>					
<b>Application of substitution as RMM in enterprises – barriers and promoters</b>	<p>Substitution by suppliers for enterprises with low chemical knowledge</p> <p>Substitution where reference cases exist</p> <p>Simple replacement without relevant organisational or technological changes</p>		<p>Substitution obligation is too advanced a demand for users. Few cases of substitution performed by users of chemicals (employers) from enterprises without chemical knowledge</p> <p>Substitution can require relevant technological changes. This leads to uncertainties about the technological and economic consequences and to a shift of risks.</p>	Low awareness and knowledge, fear to provoke expensive RMM	Further guidance and decision tools. These tools should be sector specific and suited to the information needs of the enterprises. Information seems to be best disseminated when reference cases and case studies are presented.
<b>Support</b>	Support in the form of guidance or tertiary legislation for easy or standardised cases	Many tools and support activities (see list of tools in references)	Liability risk remains with the enterprise.		Incentives to start more complex substitution processes in enterprises.
<b>R &amp; D</b>			Support in form of R&D		Strengthen support of substitution in R&D to find solutions for complex substitution challenges.
<b>National strategies</b>	Clear phase out scenarios	PRIO-List Sweden REACH-authorisation	Uncertainty about the future of some substances		Promote the substitution of dangerous substances, with objectives and timelines, supported by national or European plans.

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<b>RISK MANAGEMENT MEASURES (RMM)</b>					
<b>Awareness</b>	Awareness campaigns successful for certain 'scandalized' chemicals and chemicals in consumer products		Awareness raising in certain sectors with low knowledge and low overall OSH awareness		Create awareness at enterprise level by highlighting and illustrating the negative long term effects of high and long term exposure to chemicals.
<b>Connection between RA and RMM</b>	Systematic follow up of OSH RA results Quality management systems				Sector specific or work process related reference cases and good practice examples Monitoring of the implementation of the practical outcome of RA
<b>Guidance</b>	Sector related guidance				Guidance, sector specific and suited to their needs, combined with personal advice or financial support for SMEs. Paper and online versions needed.
<b>Easy access to all guidance documents</b>	National portals on RA and RMM	Standardised good practice solutions			National portals run by large associations or tripartite consortia, such as e.g. in Austria, support an easy access.
<b>Exchange of good practice on national or European level</b>					Develop further support for European exchange of practical knowledge

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<b>HEALTH SURVEILLANCE (HS)</b>					
<b>HS and its effective application and its role in risk identification and assessment</b>	Support of internal OSH in general and risk assessment capacities in particular	Good knowledge of work environment, exposure and health effects	Low knowledge of chemicals, no practical knowledge of the workplace situation, only medical diagnosis of the health situation of the individual worker	Many critical statements from respondents from all Member States	Define precisely the details of HS for chemically exposed workers in national secondary legislation. Details on, and frequencies of, the specific medical examinations which are part of health surveillance have to be established in national secondary legislation.
<b>Deficits of knowledge of workplaces and cooperation between HS services and enterprises</b>	Enterprises employ external HS services who visit the workplaces.	Positive examples from respondents or literature from all Member States	Many enterprises employ external HS services which only make medical diagnoses and do not visit the workplaces.	Many critical statements from respondents from all Member States	Strengthen the connection between medical examination and RMM at workplaces. - Employ services which visit and inspect workplaces. - Improve cooperation between physicians /occupational hygienists and OSH practitioners in enterprises in RA and RMM - Provide exposure data to HS services.
<b>Qualification and quality</b>	Formal demands for external HS services.		Unregulated market in many MS. Low qualification of personnel regarding chemicals	Many critical statements from respondents from all Member States	Certification or quality control systems
<b>Use of data for epidemiological research</b>	Very few MS aggregate the measurement data from authorities or other sources into a database.	Finland			Support of epidemiological research. Data from HS should be aggregated to support research and epidemiological studies. This is extremely relevant for chemicals due to the long latency periods of many chemically induced diseases.
<b>Use of results and mistrust by workers</b>		Data protection		ILO study shows bad examples from some Acc.States	Prioritisation of RMM-measures instead of transfer or firing of workers.

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<b>TRAINING AND CONSULTATION OF WORKERS</b>					
<b>Quality of training</b>	Certification or minimum standards		No standards or certificates for training institutes	Many critical statements from respondents from all Member States	Ensure good quality of training by selecting good quality training institutions. - Governments should set minimum standards
<b>Consultation of workers</b>	Consultation of workers' representatives mainly in larger enterprises	Many positive statements from workers' representatives from all Member States		Many critical statements from workers' representatives from all Member States	Involvement of workers and workers' representatives to considerably improve the impact of the enterprises' OSH efforts.

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<b>PROTECTIVE AND PREVENTION SERVICES (PPS)</b>					
<b>PPS and its effective application and role in risk identification and assessment</b>	Support of internal OSH in general capacities	Good knowledge of work environment, exposure and effective risk management measures	Many enterprises employ external PPS which only support the enterprise to fulfill the lowest possible standards and the legal needs for documentation (risk assessment)	Many critical statements from respondents from all Member States	Enterprises contract PPS which offer good standards and include in their services workplace visits, risk assessment plus proposals for risk management measures, consultation with workers and monitoring of progress.
<b>Deficits of knowledge of workplaces and cooperation between PPS services and enterprises</b>	Enterprises employ external HS services which visit workplaces and have the necessary specialist knowledge	Positive examples from respondents or literature from all Member States	Many enterprises employ external HS services which only make medical diagnoses and do not visit workplaces.	Many critical statements from respondents from all Member States	See recommendation in line 1
<b>Qualification and quality</b>	High quality services exist in all MS and can be contracted Authorities issue certificates or standards and apply formal demands for external PPS services.		Unregulated market in many MS. Low qualification of personnel regarding chemicals	Many critical statements from respondents from all Member States	Certification or quality control systems.



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<b>ENFORCEMENT</b>					
<b>Coverage and quality of enforcement</b>	A mixture of promotional activities, networking with stakeholders and enforcement	Partnerships, guidance documents	Full enforcement in every enterprise No enforcement at all	Too few capacities of authorities in all MS	Promotional activities, networking with stakeholders and enforcement
<b>Monitoring of success</b>	National, regional or sectoral data	Checklist on compliance (Finnish Labour Inspection)	No self evaluation, reporting and monitoring	Very formal reporting systems, which do not allow determination of the prevention level in enterprises	Introduce systems to evaluate the prevention level

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BOOTS: Boots Chemical Report 2005, <http://www.boots-csr.com/main.asp?pid=636>

DELL: Restricted Materials Guidance Document; Dell's Chemical Use Policy; Dell's Reach Statement; Dell's Brominated Flame Retardant Position  
<http://www.dell.com/content/topics/global.aspx/corp/environment/en/index?c=us&amp;l=en&amp;s=corp>

ERICSSON (2005): Ericsson Sustainability Report 2004. Bridging the digital divide with communication for all and: : The Ericsson lists of banned and restricted substances 2003-06-12

HEIDELBERGER DRUCKMASCHINEN AG (2009): List of Prohibited Substances with worldwide validity for suppliers. The Declaration List of Notifiable, Critical Substances contains all substances which are likely to be banned due to legal prohibitions or restrictions. Suppliers have to declare these substances if they are contained within the supplied parts of products.  
[http://heidelberg.com/www/html/en/content/articles/about\\_us/environment/hei\\_eco/banned\\_critical\\_substances](http://heidelberg.com/www/html/en/content/articles/about_us/environment/hei_eco/banned_critical_substances)

IMDS (International Material Data System) (GLOBAL)

The IMDS is the automotive industry material data system. It is a joint development of Audi, BMW, Daimler, Ford, Opel, Porsche, VW and the Swedish firm Volvo. In the IMDS, all materials used for car manufacture are archived and maintained. Only in this way is it possible to meet the obligations placed on car manufacturers, and thus on their suppliers, by national and international standards, laws and regulations.  
<http://www.mdssystem.com/index.jsp>

PHILIPS (2005): Dedicated to sustainability - Philips Sustainability Report 2004, Eindhoven

SCANIA (2005): Standard STD 4186 - Substitutes for Hazardous Chemical Substances - Scania White List, Version 15.08.2002. and: Chemical substances which shall not be used - Scania Black list, Version 19.12. 2005. and: Chemical substances with limited use - Scania Grey list, Version 19.12. 2005.

## **TOOLS AND GUIDANCE**

### AFFSET (F)

A tool for all professional actors in the area of substitution. It is especially designed to replace CMR-substances of category 1 and 2. <http://www.substitution-cmr.fr/>

### ALTERNATIVAS

Database on the assessment of chemicals and the selection and assessment of alternatives, Different entrance points are provided as substances, occupations sector or reference cases. <http://www.istas.net/web/abreenlace.asp?idenlace=3912>

### BASTA (S)

BASTA is a database of the Swedish construction industry to accelerate the phasing out of hazardous construction products. <http://www.bastaonline.se/>

### BGIA - Column Model (DE)

The “column model” (Spaltenmodell), was developed by the Institute of Occupational Safety of the Liability Insurance Associations (Berufsgenossenschaftliches Institut für Arbeitsschutz – BGIA). It employs a scheme based on six parameters comprising the classification of the chemicals, of their emission potential and of certain characteristics of the task itself which are to be compared separately for the chemicals in question (BGIA 2006).

### CATSUB (DK)

This web site is a catalogue of examples of substitution of hazardous chemicals - case stories describing successful substitutions with less hazardous chemicals. The case stories primarily come from companies, occupational health services and the Danish Working Environment Authority <http://www.catsub.dk/>

### CLEANTOOL (DE)

CLEANTOOL is a Europe wide interactive database for parts cleaning, metal surface cleaning, component cleaning and degreasing, based on real processes in numerous European companies. <http://www.cleantool.org>

### COSHH Essentials (HSE, UK)

COSHH Essentials provides advice on controlling the use of chemicals for a range of common tasks, e.g. mixing, or drying (provider HSE) <http://www.coshh-essentials.org.uk/>. Used also in other language versions.

### Danish Working Environment Authority:

Workplace assessment, WEA Guidelines D.1.1, Danish Working Environment Authority, 2002 <http://www.at.dk/sw12485.asp>

### EMKG (BAuA, DE)

Einfaches Maßnahmenkonzept Gefahrstoffe provides advice on controlling the use of chemicals (Provider: Bundesanstalt für Arbeitsschutz und Arbeitsmedizin) [http://www.baua.de/de/Themen-von-A-Z/Gefahrstoffe/EMKG/EMKG\\_\\_content.html](http://www.baua.de/de/Themen-von-A-Z/Gefahrstoffe/EMKG/EMKG__content.html)

### EU-OSHA Dangerous Substances website (EU)

This website provides background information and case studies,, including substitution cases  
<http://osha.europa.eu/en/topics/ds>

Federale Overheidsdienst Werkgelegenheid, Arbeid en Sociaal Overleg 2006: De risico-analyse, 2006

<http://www.werk.belgie.be/publicationDefault.aspx?id=3732>

GISBAU / GISCHEM / GISMET (DE)

GISBAU / GISCHEM / GISMET provide interactive access to OSH safety data and instructions for more than 30.000 substances for the construction, chemical and metal and chemical industry [www.gisbau.de](http://www.gisbau.de) [www.gischem.de](http://www.gischem.de) [www.gismet.de](http://www.gismet.de)

IFCS (Intergovernmental Forum on Chemical Safety) (WHO)

Forum Standing Committee, Working Group 'Substitution and Alternatives' Case studies, Examples and Tools

<http://www.who.int/ifcs/documents/standingcommittee/substitution/en/index.html>

HSE 2006: Five steps to risk assessment, HSE, INDG 163, 06/2006

[www.hse.gov.uk/pubns/indg163.pdf](http://www.hse.gov.uk/pubns/indg163.pdf)

INSHT: Technical Guide for the Evaluation and Prevention of Risks related to Chemical Agents present in Places of Work, INSHT,

[http://www.mtas.es/insht/en/practice/g\\_AQ\\_en.htm](http://www.mtas.es/insht/en/practice/g_AQ_en.htm)

ISTAS - Gadea, R, Romano, D Tatiana Santos T (2007): Sustitución de sustancias disolventes peligrosas. Guía para delegados y delegadas de prevención. ISTAS, Madrid.

IPPC/BREF (EU)

(Integrated Pollution and Prevention Control/ Best Available Technology Reference Documents) (EU)

BREF's - Best Available Technology Reference Documents – are sector oriented descriptions of BATs and available via the website of the European Integrated Pollution and Prevention Bureau under 'Activities' <http://eippcb.jrc.es/reference/>

KEMIGUIDEN (SE)

Kemiguident is Swedish interactive support tool for SME to facilitate an easy achievement of compliance with legislation

<http://www.prevent.se/kemiguident/>

SOLUZIONI (IT)

A solution database, provided by the national Italian OSH institute ISPESL.

<http://www.ispesl.it/soluzioni/listaSoluz.asp>

STOFFENMANAGER (NL)

Stoffenmanager is an interactive support tool for Dutch SMEs to facilitate an easy achievement of compliance with legislation

<http://www.stoffenmanager.nl/>

Swedish Work Environment Authority, 2003: Systematic Work Environment Management – Guidelines, <http://www.av.se/dokument/inenglish/books/h367eng.pdf>

TRGS 600 'Substitution' (DE)

(TRGS = Technical Rules for Dangerous Substances, Germany) Published by AGS, (Committee on Hazardous Substances). The TRGS 600 is intended to support the employer in decisions, to replace hazardous substances by substances, preparations or processes which are not hazardous or less so.

[www.baua.de](http://www.baua.de) [http://www.baua.de/nn\\_78960/en/Topics-from-A-to-Z/Hazardous-Substances/TRGS/TRGS-600.html?nnn=true](http://www.baua.de/nn_78960/en/Topics-from-A-to-Z/Hazardous-Substances/TRGS/TRGS-600.html?nnn=true)