

International Research Into Occupational Safety and Health Protection

**Karlheinz Meffert
Dietmar Reinert**

BG Institute for Occupational Safety and Health, Sankt Augustin, Germany

Are we doing the right thing? Are we setting the right priorities for the future in occupational safety and health research? How does BG (Institution for Statutory Accident Insurance and Prevention) research compare nationally and internationally? As a mosaic of answers to these questions, this article explores international research on priorities in occupational research and analyses these against the backdrop of the nearly 1,000 research projects conducted by 9 institutions from 8 countries in the year 2003.

research priorities occupational safety and health international comparison

1. FUTURE NEEDS AND PRIORITIES IN OSH RESEARCH

The European Agency for Safety and Health at Work has conducted two studies which yield information on the future priorities of OSH (occupational safety and health) research within the European Union (EU). In both studies, the Member States (15 at that time) were consulted by the Agency via their Focal Points¹. The first report [1], published in 1998 and primarily concerning political priorities relating to health and safety at work, described the chief areas of research over the past 10 years and for the following 3–5 years. Chemical substances were classified by 12 of the 15 countries questioned as having been principal areas of research in the past, and by 11 as being so for the future. Particular importance was attached to carcinogenic and neurotoxic substances/solvents. Whereas physical factors, traditional safety technology, and issues of methodology constituted the second most important focus of past research activity, each of these being indicated by eight countries, issues of methodology, particularly risk assessments and cost–benefit analyses, were

already named in 1998 as future foci of research by 10 countries; psychosocial factors, particularly stress, by nine countries; and organization, with particular emphasis upon new patterns of employment, older employees, and innovation at the workplace, by seven countries.

The second study conducted by the European Agency concentrated on priorities in research in the area of workplace safety and health [2]. Chemical, ergonomic, and psychosocial risk factors led the top 10 future priorities, each being named by 13 countries. These factors were also principal priorities in research. Amongst the psychosocial risks, particular attention was attached to work stress. In the area of ergonomics, the handling of loads and body posture at work were indicated as a focus. Toxic and in particular carcinogenic substances were named as the chief chemical risks. Research into risk reduction with the use of substitute chemical substances was also indicated as a particular focus. In the area of work-related diseases, the Member States identified an increased need for research into combined exposure. This was followed in the list of priorities by the area of safety risk factors, which was indicated 12 times.

Correspondence and requests for offprints should be sent to Dietmar Reinert, BG-Institute for Occupational Safety and Health, Alte Heerstraße 111, 53754 Sankt Augustin, Germany. E-mail: <dietmar.reinert@hvbg.de>.

¹The Federal Ministry of Labour and Social Affairs (BMAS) is the German Focal Point.

TABLE 1. Research Priorities in the National Occupational Research Agenda (NORA) in the USA [3]

Category	Priority Research Areas
Disease and injury	Allergic and irritant dermatitis Asthma and chronic obstructive pulmonary disease Fertility and pregnancy abnormalities Hearing loss Infectious diseases Low back disorders Musculoskeletal disorders of the upper extremities Traumatic injuries
Work environment and workforce	Emerging technologies Indoor environment Mixed exposures Organization of work Special populations at risk
Research tools and approaches	Cancer research methods Control technology and personal protective equipment Exposure assessment methods Health services research Intervention effectiveness research Risk assessment methods Social and economic consequences of workplace illness and injury Surveillance research methods

In a survey, conducted in the USA in 1996, of almost 500 organizations, 21 priority research areas in OSH were identified as future foci of research under the heading National Occupational Research Agenda (NORA) [3] (Table 1). Ergonomic and chemical risk factors are conspicuous for their particular relevance among the areas stated; this is consistent with the second survey conducted by the European Agency.

In a working paper [4] distributed in December 2004 by the European Agency and concerning priorities in OSH research in the EU (by this point, with 25 Member States), the psychosocial work environment, musculoskeletal disorders, dangerous substances, and OSH management were stated as foci. Principal priorities within the first focus were the changing world of work and its impact on health and safety; organizational interventions to improve the psychosocial work environment; and psychosocial factors influencing accident patterns and musculoskeletal disorders. For the second focus, the most

important points named were the development of tools to assess the total load/overload on the musculoskeletal system, and the assessment/evaluation methods, intervention methods, and prevention measures in relation to certain gaps in knowledge. Improvements in the assessment of exposure to dangerous chemical substances and biological agents at the workplace and exposure to nanoparticles and ultrafine dusts characterized the focus of the area of dangerous substances. The economic dimension of OSH, long-term effects of working conditions upon health, and a longitudinal survey of health at work throughout Europe were the chief priorities in the area of OSH management.

2. STUDIES OF CURRENT RESEARCH PROJECTS IN 2003

The future research priorities identified half a decade before should now be reflected in

TABLE 2 Occupational Safety and Health (OSH) Institutes Included in the Comparison

Research Facilities/ Responsible Agencies	No. of Projects [Source]	Notes
HVBG/BG	184	BG research in the BGIA, BGAG, BGFA, research funding, and at the individual BGs
BAuA	138 [5]	The largest state OSH institute in Germany; responsible for a range of subjects similar in breadth to those covered by the institutes of the HVBG
INRS	56 [6]	Research institute funded in a similar way to the HVBG institutes by the French social security system
AMI	41 [7]	Danish research institute under state responsibility; it is geared to the study of issues related to effects
HSL	43 [8]	Semi-state OSH research institute in the United Kingdom; it has a very wide scope of activities which also cover large areas of public safety
NIOSH	273 [9]	The largest national research institute in the USA
NIWL	78 [10]	The largest public institute in Sweden, with 6 sites
CIOP-PIB	128 [11]	The largest national research institute in the new European Union Member State of Poland
STAMI	49 [12]	A facility of the Ministry of Labour, and an integral part of the Norwegian OSH system

Notes. HVBG/BG—German Federation of Institutions for Statutory Accident Insurance and Prevention/Institution for Statutory Accident Insurance and Prevention, BAuA—Federal Institute for Occupational Health and Safety, INRS—National Research and Safety Institute, AMI—National Institute of Occupational Health, NIOSH—National Institute for Occupational Safety and Health, HSL—Health and Safety Laboratory, NIWL—National Institute for Working Life, CIOP-PIB—Central Institute for Labour Protection – National Research Institute, STAMI—National Institute of Occupational Health, BGIA—BG Institute for Occupational Safety and Health, BGAG—BG Institute for Work and Health, BGFA—BG Research Institute for Occupational Medicine.

current OSH research. For examination of BG² (Institution for Statutory Accident Insurance and Prevention) OSH research activities and comparison with those of other OSH institutes in Germany and elsewhere, an analysis was conducted of 988 projects pursued by nine institutions³ in eight countries. Projects conducted by

- the BG Institute for Occupational Safety and Health⁴ (BGIA),
- the BG Institute for Work and Health⁵ (BGAG),
- the BG Research Institute for Occupational Medicine⁶ (BGFA),
- German Federation of Institutions for Statutory Accident Insurance and Prevention⁷ (HVBG) research funding, and
- the individual BGs

were considered for assessment of BG research activity. The study examined 118 and 66 research projects respectively for the HVBG and the BGs which were completed or still in progress in 2003. These were compared to 804 projects conducted by other research institutes (Table 2).

The quantitative study relates to the number of projects and not to their scale, since data on the latter were not available from all institutes and could not be obtained comprehensively. Large-scale research projects, particularly those relating to medical/toxicological and epidemiological issues, are therefore generally underestimated. Given the volume of the data, however, it may be assumed that these differences are equalled out, relatively speaking, between the institutes. A random sample also showed the results of comparisons by the number of projects and by the

² Berufsgenossenschaften

³ The BG research facilities were regarded for this purpose as a single institution.

⁴ Berufsgenossenschaftliches Institut für Arbeitsschutz

⁵ Berufsgenossenschaftliches Institut Arbeit und Gesundheit

⁶ Berufsgenossenschaftliches Forschungsinstitut für Arbeitsmedizin

⁷ Hauptverband der gewerblichen Berufsgenossenschaften

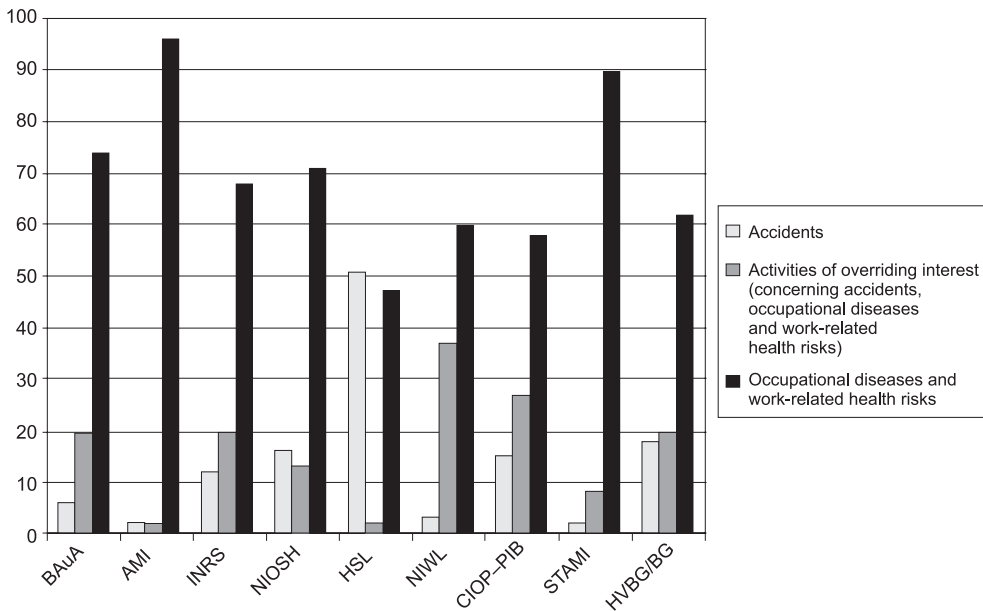


Figure 1. International comparison of research in the areas of prevention. Notes. BAuA—Federal Institute for Occupational Health and Safety (Germany), AMI—National Institute of Occupational Health (Denmark), INRS—National Research and Safety Institute (France), NIOSH—National Institute for Occupational Safety and Health (USA), HSL—Health and Safety Laboratory (United Kingdom), NIWL—National Institute for Working Life (Sweden), CIOP-PIB—Central Institute for Labour Protection – National Research Institute (Poland), STAMI—National Institute of Occupational Health (Norway), HVBG/BG—German Federation of Institutions for Statutory Accident Insurance and Prevention/Institution for Statutory Accident Insurance and Prevention.

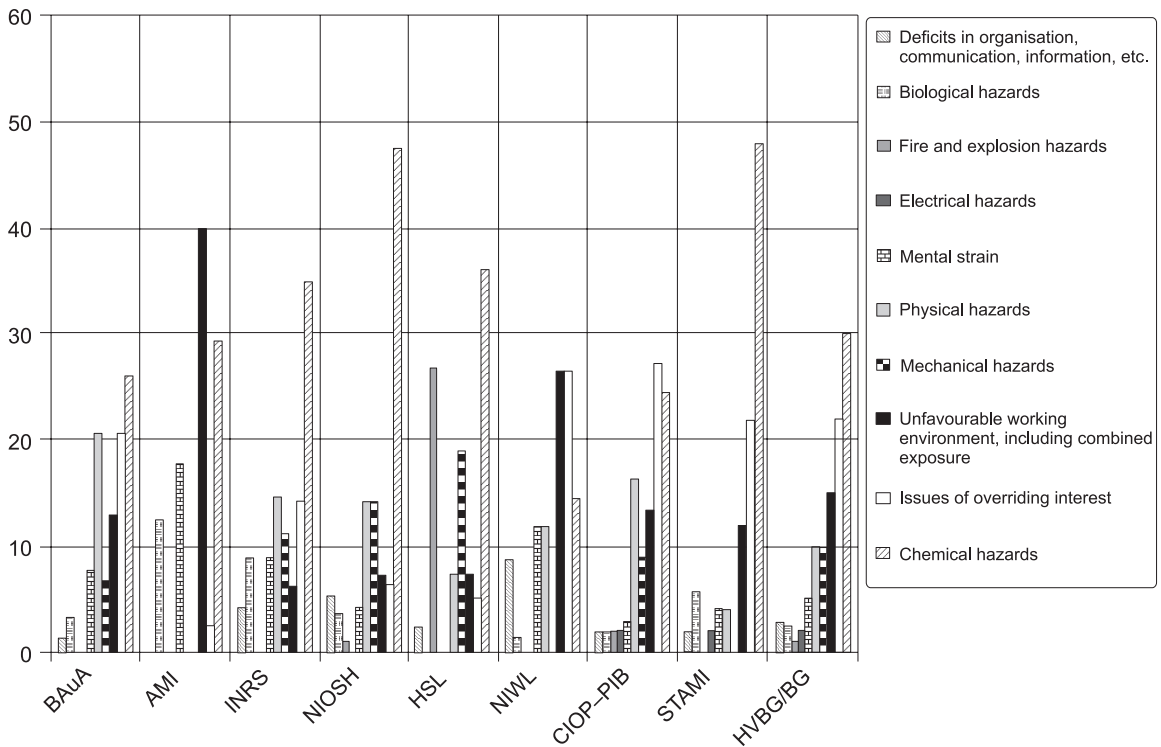


Figure 2. International research comparison, by hazard type. Notes. BAuA—Federal Institute for Occupational Health and Safety (Germany), AMI—National Institute of Occupational Health (Denmark), INRS—National Research and Safety Institute (France), NIOSH—National Institute for Occupational Safety and Health (USA), HSL—Health and Safety Laboratory (United Kingdom), NIWL—National Institute for Working Life (Sweden), CIOP-PIB—Central Institute for Labour Protection – National Research Institute (Poland), STAMI—National Institute of Occupational Health (Norway), HVBG/BG—German Federation of Institutions for Statutory Accident Insurance and Prevention/Institution for Statutory Accident Insurance and Prevention.

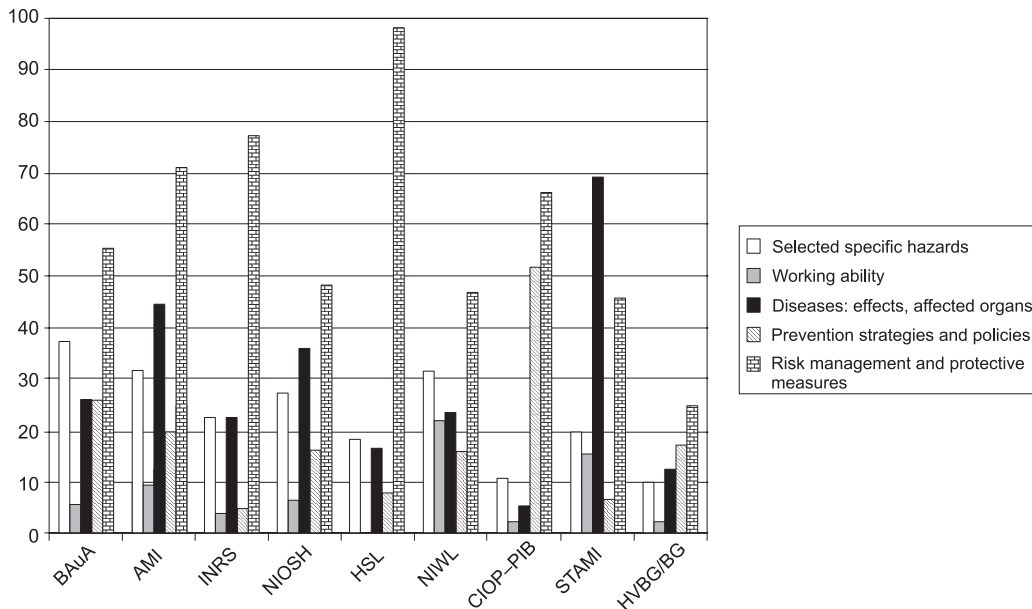


Figure 3. International comparison of research, by project content. *Notes.* BAuA—Federal Institute for Occupational Health and Safety (Germany), AMI—National Institute of Occupational Health (Denmark), INRS—National Research and Safety Institute (France), NIOSH—National Institute for Occupational Safety and Health (USA), HSL—Health and Safety Laboratory (United Kingdom), NIWL—National Institute for Working Life (Sweden), CIOP-PIB—Central Institute for Labour Protection – National Research Institute (Poland), STAMI—National Institute of Occupational Health (Norway), HVBG/BG—German Federation of Institutions for Statutory Accident Insurance and Prevention/Institution for Statutory Accident Insurance and Prevention.

financial volume to differ only relatively slightly. An interpretation of the results must also consider that the survey constitutes a snapshot, since only projects in progress in 2003 were considered⁸. A different study period may yield slightly different results.

All projects were grouped in the following prevention areas (Figure 1):

- accident prevention (including traffic safety),
- prevention of occupational diseases and work-related health risks,
- research activities on subjects of overriding interest (projects which cannot be assigned to one of the above groups alone).

A second classification was conducted by risk type (Figure 2). A third classification was conducted according to the detailed content of

the research projects (Figure 3). The work of classifying the research projects was performed for the most part by three persons; mutual consultation took place in some cases.

3. ANALYSIS OF INTERNATIONAL OSH RESEARCH

For the purpose of comparison at international level, BG research is summarized in the diagrams under the HVBG/BG heading. In their research activity, the institutes all exhibit a clear focus upon the areas of prevention of occupational diseases and work-related health risks (Figure 1). BG research is in the middle of the range in this case, at 62%. Institutes showing a substantially higher proportion in this area (Denmark's National Institute of Occupational Health⁹, AMI;

⁸ At the Central Institute for Labour Protection – National Research Institute (CIOP-PIB), projects in progress in the years 2002–2004 were considered.

⁹ Arbejdsmiljøinstituttet

Norway's National Institute of Occupational Health¹⁰, STAMI) have a mandate which is geared almost exclusively to occupational medicine, psychology, or similar issues.

In research into accident prevention, HVBG/BG is, at 18%, in the same order of magnitude as France's National Research and Safety Institute¹¹ (INRS) and Poland's Central Institute for Labour Protection – National Research Institute¹² (CIOP-PIB) (Figure 1). The United Kingdom's Health and Safety Laboratory (HSL) is responsible for issues of public safety, and is thus frequently concerned with fire and explosion hazards in large industrial installations (chemical plants, power plants) and transport facilities (e.g., the Channel Tunnel). At 51%, HSL thus reveals a substantially higher proportion of research into accident prevention. In some of the institutes (AMI; Sweden's National Institute for Working Life¹³, NIWL; STAMI), research into accident prevention is virtually insignificant. Owing to the strength of the BGAG's activities and the projects conducted by the individual BGs, the proportion of BG research activities on subjects of overriding interest is at a level comparable to that of INRS, CIOP-PIB, STAMI and Germany's Federal Institute for Occupational Health and Safety (BAuA) (Figure 1). STAMI and AMI exhibit a similar distribution, whereas NIWL shows a very high proportion of research activities of overriding interest.

The analysis by hazard type (Figure 2) reveals certain differences which are also a function of particularly national aspects. In the majority of institutes (except for AMI, NIWL and CIOP-PIB), the proportion of projects in the area of chemical hazards is high to very high, lying between 24 and 48% (HVBG/BG: 25%). Research activity into issues of overriding interest is, overall, in the second place; together with BAuA, NIWL, CIOP-PIB and STAMI, HVBG/BG exhibits the greatest number of activities in this area, at 21%.

Unfavourable working conditions, including combined exposure, are conspicuously the focus of NIWL's and AMI's activities; at 15%, HVBG/BG research is in the same order of magnitude as that of almost all other institutes. At 11%, HVBG/BG are among the institutes with the greatest proportions of research into mechanical hazards, together with INRS, HSL, the USA's National Institute for Occupational Safety and Health (NIOSH) (19%) and CIOP-PIB. This area of prevention is virtually irrelevant in the research activities of AMI and NIWL; conversely, these two institutes are among those with the highest proportions of research projects into mental strain, at 17 and 12% respectively. At 5%, the research activities of HVBG/BG in this area are in the order of magnitude of other comparable institutes. This example clearly shows the differences between the institutes' fundamental orientation. The number of research projects into electrical hazards, and fire and explosion hazards is low at almost all institutions; the only exception in this case is HSL, with a figure of 26% in the area of fire and explosion hazards (see previous paragraph). Where biological hazards are concerned, the greatest number of research projects is to be found at AMI, INRS and STAMI; for research into the subjects of organization/information, etc., NIWL (9%), NIOSH (5%) and INRS (4%) occupy the leading places. HVBG/BG research accounts for a proportion of 2 to 3% in these last areas.

If the research projects are compared by content (Figure 3¹⁴), all other institutes with the exception of STAMI are found to place the emphasis upon risk management and protective measures. The foci within this area exhibit a similar distribution to those of BG research, i.e., they are to be found in exposure measurement, risk analysis/risk assessment, technical protective measures, and the development of testing and analysis methods. At NIOSH and CIOP-PIB, the subject

¹⁰ Statens arbeidsmiljøinstitutt

¹¹ Institut National de Recherche et de Sécurité

¹² Centralny Instytut Ochrony Pracy – Państwowy Instytut Badawczy

¹³ Arbetslivsinstitutet

¹⁴ A detailed analysis was conducted of the content; the broader categories are shown in Figure 3. Projects may be assigned to more than one category, with the result that the values in Figure 3 generally exceed 100% for each institute.

of personal protective equipment also accounts for a significant proportion of the activity; at NIWL, ergonomics is a further area of greater significance. Further foci in project content can be found in the categories of “Prevention strategies and policies”, “Diseases: effects, affected organs”, and “Selected specific hazards”. Closer analysis reveals that in the “Prevention strategies and policies” category, the subjects of communication, information and campaigns, legislation, regulations, standards and certification (the latter a focus at CIOP-PIB) are particularly prominent, besides the subjects particularly conspicuous in BG research, namely those of qualification, basic training, didactics, economic aspects, effectiveness of prevention, OSH management and quality assurance. At 51%, the proportion of projects in this category is notably higher at CIOP-PIB than at any other institute. CIOP-PIB is the national research institute in Poland, and has principal responsibility for the scheme to adapt working conditions in Poland to EU standards. In the “Diseases: effects, affected organs” category, priority is generally assigned by institutes to respiratory diseases, musculoskeletal diseases, and carcinogenic, mutagenic and reprotoxic effects, and by some institutes (NIWL, BG, NIOSH only) also to skin diseases, whereas in the “Selected specific hazards” category, the subjects of dusts, fibres, particles, and physical effects are particularly prominent. Sector-specific foci are found at NIWL as well as in BG research. Comparison of project content in particular shows that the focus of BG research activity is reflected very closely in the international distribution of research.

As regards the lowest, single-digit percentages of research activity, it must be remembered that the data are subject to considerable uncertainty and are strongly dependent upon the time at which the survey was conducted. Nevertheless, the comparison permits a sufficiently accurate quantitative overview of the foci of research activity in the various institutes.

5. DISCUSSION OF THE RESULTS, FUTURE PROSPECTS

With regard to the prognoses made 5 years ago, the importance of chemical effects and in particular that of carcinogenic substances is confirmed by the present analysis of current research projects. Although of some relevance, the proportion nationally and internationally of physical effects and also of organization and information is generally in the order of single-digit percentage points. These subjects have grown significantly in importance since the 1990s. Altogether, however, the shift in focus appears to be progressing more slowly than predicted in the surveys. Differences exist between the countries in the focus of their OSH research activity; broadly speaking, however, the focus is relatively similar.

Observation and analysis of the specific research projects will remain necessary in the future, in order for the significance of international trends in OSH research to be identified at an early stage. A detailed comparison between the research projects shows that in some cases, different institutes are conducting similar projects simultaneously. Closer international co-operation would enable synergy effects to be exploited in such cases. Stronger funding of OSH research activity at international and in particular European level would be desirable for this purpose.

The comparison presented here was conducted for a number of projects and on the basis of the project descriptions. For the future, the objective should be a comparison of the actual scale of research, e.g., of the projects concluded within a given period of time.

REFERENCES

1. Politische Prioritäten und Strategien in den Mitgliedsstaaten der Europäischen Union zur Verbesserung des Gesundheitsschutzes und der Sicherheit am Arbeitsplatz. Bilbao, Spain: European Agency for Safety and Health at Work; 1998.
2. Future occupational safety and health research needs and priorities in the member

- states of the European Union. Bilbao, Spain: European Agency for Safety and Health at Work; 2000.
3. National Occupational Research Agenda. U.S. Department of Health and Human Services, National Institute for Occupational Safety and Health, 1996. Retrieved September 8, 2006, from: <http://www.cdc.gov/niosh/nora.html#contents>
 4. Report on the priorities for occupational safety and health research in the EU25. Working paper. Bilbao, Spain: European Agency for Safety and Health at Work; 2004.
 5. Research projects. Bundesanstalt für Arbeitsschutz und Arbeitsmedizin, Dortmund 2003. Retrieved September 8, 2006, from: http://web.archive.org/web/20040103123316/www.baua.de/english/fors/i_fors7_e.htm
 6. Research programmes. New studies 2003. Volume 10 No. 10 (ED 3076 Scientific Department). Nancy, France: Institut National de Recherche et de Sécurité (INRS); 2003. In French.
 7. Projects. Arbejdsmiljøinstituttet, Copenhagen 2003. Retrieved September 8, 2006, from: <http://www.ami.dk/Aktuel%20forskning.aspx>
 8. Health and Safety Laboratory (HSL). Current research projects 2003 and beyond [internal information]; November 2003.
 9. National Occupational Research Agenda 2002. NIOSH Research Projects May 2003. Retrieved May 5, 2003, from: <http://www.cdc.gov/niosh/docs/2003-143>
 10. National Institute for Working Life. Projects within the institute. Retrieved September 8, 2006, from <http://projekt.arbetslivsinstitutet.se/SearchPage.aspx?lang=en>
 11. List of research projects 2002–2004 and list of tasks related to state services 2002–2004 [internal publication]. Warszawa, Poland. Central Institute for Labour Protection – National Research Institute; 2003. In Polish.
 12. Projects at NIOH 2003. Retrieved September 8, 2006, from: http://web.archive.org/web/20031018081126/http://www.stami.no/English_pages/Research/Projects_2003/