

Discussion Forum

Generating health and safety knowledge for innovative and sustainable workplaces: a PEROSH Perspective

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Abstract

PEROSH is the Partnership for European Research in Occupational Safety and Health (OSH). The PEROSH vision is that policymakers, workplaces and other stakeholders across Europe are inspired by, and use, knowledge generated by PEROSH in their efforts to develop innovative and sustainable workplaces which are healthy and safe. PEROSH comprises 14 national research institutes from 13 countries on the continent of Europe. Each institute plays a key national role through their affiliation to government, health and accident insurance systems, or industry and trade unions. The partnership acts collectively to: strengthen co-operation on OSH research and accelerate the generation of knowledge in key areas of OSH; and disseminate and exchange knowledge and information on OSH issues. In 2019, The International Labour Organisation identified that PEROSH has “strong national and regional [European] policy impact”. This paper gives an overview of PEROSH: an introduction to its history and strategy; governance and structure; and core activities including the PEROSH Joint Research Programme and the PEROSH international Wellbeing at Work conference series. It summarises PEROSH outreach and networking activities at national, European and global level. The paper concludes with reflections on the importance of robust scientific evidence, to underpin and inform the actions of stakeholders for a sustainable world of work which is healthy and safe.

Keywords: sustainable workplace, workplace innovation, occupational safety, occupational health, wellbeing at work, working conditions, PEROSH, international network, OSH

Introduction: PEROSH History and Strategy

In an ever-changing world of work, the promotion of the health and safety of the present and future workforce is crucial for guaranteeing a healthier, longer and more productive working life. National institutes for occupational health and safety (OSH) research in Europe play a distinctive role in anticipating, creating, and synthesising the evidence needed to underpin and inform the actions of: national policymakers; regulators; health and insurance systems; and industry and trade unions. However, workplace challenges transcend national borders. Recognising the opportunity in Europe to exploit synergies in their roles and research activities and to gear national funding through collaboration, in 2003 a group of these national institutes founded The Partnership for European Research in Occupational Safety and Health, PEROSH. The partnership operates through a formal Agreement (PEROSH, 2018). Today, PEROSH has 14 partner institutes from 13 countries on the continent of Europe. Each institute plays a key national role through their affiliation to government, health and accident insurance systems, or industry and trade unions (“social partners”.) The partnership acts collectively to: strengthen European co-operation on OSH research and accelerate the generation of knowledge in key areas of OSH; and disseminate and exchange knowledge and information on OSH issues. PEROSH builds on the success of the international ‘Sheffield Group: an informal network of directors of national research institutes for occupational OSH institutes. The network first met in 1989 at the laboratory of the UK Health and Safety Executive, HSE (at that time based in Sheffield.) Its members span four continents: North America (IRSST- Canada and NIOSH-USA); Oceania (NIOH-New Zealand); Asia (IIOSH- Israel, JNIOH-Japan, KOSHA-South Korea and WSHI-Singapore); and Europe. (Information on these institutes is at: www.irsst.qc.ca; <https://www.cdc.gov/niosh/>; www.nioh.ac.za; www.osh.org.il; www.jniosh.johas.go.jp; www.kosha.or.kr; www.wshi.gov.sg.) The annual meetings are hosted by one of the institutes on a rotating basis, and continue to be chaired by HSE. PEROSH maintains strong links with the Sheffield Group, including biennial joint meetings of the institute directors.

The PEROSH Strategy 2019-2023, Research co-operation to promote a healthy, productive and innovative workforce (PEROSH, 2019a), sets out the mission, vision, activities, outreach and ambition for the partnership. The mission of PEROSH is to create and exchange new knowledge and practice on occupational safety and health, and make it accessible to policymakers, workplaces and other stakeholders in Europe. The PEROSH vision is that policymakers, workplaces and other stakeholders across Europe are inspired by, and use, knowledge generated by PEROSH in their efforts to develop innovative and sustainable workplaces which are healthy and safe. PEROSH seeks impact and adds value through the exchange of knowledge and good practices across Europe to the benefit of all. The PEROSH strategy sets out the following activities through which the mission and vision are fulfilled: (1) We pool resources and create new knowledge through joint activities. (2) We disseminate share and exchange knowledge on OSH issues between members and within Europe to all relevant stakeholders. (3) We provide the evidence base that informs and underpins

decisions by national and European policymakers on healthy and safe working lives. (4) We identify new research challenges in the field of OSH.

The generation and exchange of knowledge for use to develop innovative and sustainable workplaces that are healthy and safe is a 'golden thread', aligning the activities of PEROSH to its vision. These activities span the ongoing challenges to health and safety in today's workplaces, and anticipating and meeting the new challenges and opportunities from technological change, disruptive innovation and the changing world of work. They include research activities in relation to: technologies, materials and equipment in the work environment; demographic change and changing employment practices; and effective work organisation and leadership to reduce occupational accidents and ill-health, while promoting wellbeing at work.

This paper gives an overview of the partnership's: structure and governance; core activities including the Joint Research Programme, researcher exchange visits, biennial member research conferences, and the PEROSH international Wellbeing at Work conference series; and outreach activities at national, European and global level.

PEROSH Governance and Structure

PEROSH is governed by its Steering Committee (SC) which comprises the director general or research director of each member institute. The SC is responsible for the strategic direction and management of PEROSH, its finances, and decisions on admitting new member institutes. The SC currently meets twice yearly. Table 1 gives the 14 PEROSH member institutes. Each member institute plays a key national research role, through their affiliation to government, health and accident insurance systems, or industry and trade unions. Some national organisations are members through their OSH science and research institute or function (for instance AUVA, BAuA, HSE, TNO and Unisanté): these are represented on the SC by their OSH research director or equivalent. Decisions on new members consider, for instance, alignment to the PEROSH mission and vision, research quality, and commitment to research ethics.

Table 1. PEROSH member institutes by country in September 2020

Country	PEROSH Member Institute	
Austria	AUVA	Austrian Social Insurance for Occupational Risks (www.auva.at)
Denmark	NFA	National Research Centre for Work Environment (www.nfa.dk)
France	INRS	National Research and Safety Institute for the Prevention of Occupational Accidents and Diseases (www.inrs.fr)
Finland	FIOH	Finnish Institute of Occupational Health (www.ttl.fi)

Germany	BAuA	Federal Institute for Occupational Safety and Health (www.baua.de)
Germany	IFA	Institute for Occupational Safety and Health of the German Social Accident Insurance (www.dguv.de/ifa)
Italy	INAIL	Italian Workers Compensation Authority (www.inail.it)
Netherlands	TNO	Netherlands Organisation for Applied Scientific Research (www.tno.nl)
Norway	STAMI	National Institute of Occupational Health (www.stami.no)
Poland	CIOPIB	Central Institute for Labour Protection - National Research Institute (www.ciop.pl)
Spain	INSST	National Institute of Safety and Health at Work (www.insst.es)
Sweden	SAWEE (MYNAK)	Swedish Agency for Work Environment Expertise (www.sawee.se)
Switzerland	Unisanté	Centre for Primary Care and Public Health (www.unisante.ch)
United Kingdom	HSE	Health and Safety Executive (www.hse.gov.uk/research/)

All PEROSH strategic leadership, decision-making and governance is, so far as is possible, horizontal across the SC. To support the SC, there is a PEROSH structure beneath it as shown in Figure 1. The SC delegates responsibility for research co-ordination activities to the Scientific Steering Group, SSG. The SSG comprises the research director or head of science for each institute. Like the SC, the SSG operates on the basis of collective decision making. The SSG currently meets twice yearly, hosted on a rotating basis by the member institutes. It acts to stimulate information sharing and researcher exchanges between institutes, as well as new projects within the Joint Research Programme, and to monitor the progress, outcomes and benefits of these activities. The SC elects the SC chair and vice-chair, as well as the chair of the SSG: each role is for a 2-year period with an option for re-election subject to a maximum term of office of 4 years. The SSG chair reports to the SC meetings on the status of research activities. Each member institute pays an equal annual PEROSH subscription. This subscription is used to support the core PEROSH activities, in particular through: the appointment of part time paid officials, the Manager of International Affairs (MIA) and the secretariat; and the operation of its website (including the online repository of PEROSH publications), the PEROSH e-newsletter, and other media channels in line with the outreach ambitions in the PEROSH Strategy. The SC is supported in day-to-day operations by an Executive Committee comprising the SC chair and vice-chair, the SSG chair, and the MIA. Further working groups are appointed by the SC as necessary. The MIA reports to the SC chair and undertakes co-ordination, networking and outreach activities.

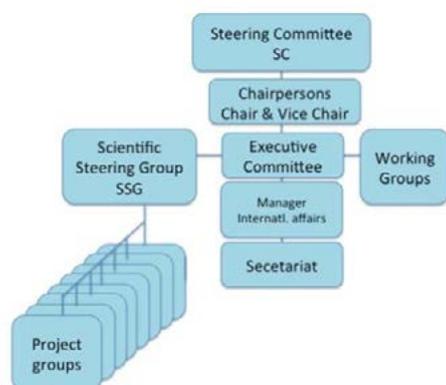


Figure 1. Structure of PEROSH under the Steering Committee of institute directors.

The International Labour Organisation, ILO (www.ilo.org) included PEROSH in a study of six OSH networks from different regions of the world: Europe, Latin America, Asia and Africa. The study aimed to understand how and why OSH agencies institutions, organisations and experts collaborate. Table 2 shows the characteristics of a successful network which ILO developed from this study. The ILO study report identifies that PEROSH has “strong national and regional policy impact” (Rantanen, 2018; ILO, 2019) and includes a detailed profile of PEROSH (*op. cit.* p151).

Table 2. ILO’s characteristics of a successful OSH professional network for a region of the world (ILO, 2019)

Characteristics of a successful OSH regional professional network (ILO, 2019)
Collectively approved mission, policy, strategy, objectives, and targets, aiming at some kind of utility or (professional) productivity.
Limited number of members sharing the same vision (social capital), or membership determined by special criteria such as research area or institutional or professional status.
Practice of inviting members to draw up interest, competence, or activity profiles.
Clear rules regarding responsibilities, conditions of operation, sharing of activities, and division of work.
Well-identified coordinating body and focal point for speaking in the collective voice of the network.
Formal status and representative role in relation to other professional networks.

Coordinator or “leader” with competencies and capacities to lead the network’s activities.

Certain degree of institutional support (for example, communication technologies), maintenance of websites, ICT platforms, data depositories, and financial resources for implementation of the above.

Genuine interest in outcome-orientation by carrying out collectively agreed-on functions, special projects, training and education events, organisation of conferences, and publishing of research results.

Annual meetings in vivo and publishing of a network newsletter or e-newsletter are considered important instruments for both cohesion and the functions of the network.

Growing emphasis given to behavioural and ethical principles in networking.

PEROSH Core Partner Activities

The core activities of the PEROSH partnership members include: identification of key research needs; the Joint Research Programme; a wide range of activities to share scientific knowledge and provide developmental opportunities for upcoming researchers; and the PEROSH international *Wellbeing at Work* conference series. These activities have developed since PEROSH began in 2003, building on the approaches found most effective to realise the partnership’s mission and vision. The activities continue to grow and evolve, most recently with the first PEROSH international conference on *Prolonging Working Life*, hosted online in May 2020 by NFA (PEROSH, Online-a).

A) PEROSH Identification of Key Research Needs

Joint identification of key OSH research needs is a core partner activity. It supports: identification of synergies in existing and planned member institute research programmes; opportunities to leverage institutes’ national funding through collaborative, co-funded research to meet common needs; awareness among policymakers and the wider research community in Europe and other stakeholders, of knowledge and evidence gaps to enable innovative and sustainable workplaces; and global research networking and activity. The distinctive research needs for each member institute are defined and agreed at national level, according to the institute’s statute and role; for instance, some institutes focus on occupational ill health and accident prevention, and others on supporting return to work after injury or ill-health.

“Sustainable workplaces of the future – European Research Challenges for occupational safety and health” (PEROSH, 2012) sets out research needs that are common to several member institutes. Examples are research to:

- A. Inform effective interventions to prevent work-related stress and musculoskeletal disorders and to support return to work of affected workers (the report notes that these are the leading conditions reported in statistics for sickness absence in Europe.)
- B. Understand and promote safety culture in European enterprises, including effective diagnostic tools, noting that: "Accidents at work continue to result in high rates of fatal and serious injuries, hospitalisation, work absence, disability and premature retirement."
- C. Understand positive factors that may improve worker wellbeing.
- D. Support sustainable employability to prolong working life, noting that in Europe: "Demographic change will lead and is already leading to ageing of the population."
- E. Anticipate the possibilities and consequences of new technology, both the potential to support OSH, for instance by real time monitoring of the working environment, and the need to "reduce risks at an early stage" in the development of new technologies.

More recently, a review of European research priorities (Gagliardi et al., 2017) was carried out by an interdisciplinary group of PEROSH researchers from member institutes, including foresight specialists, using a modified Delphi study. The authors note that it is the first published study providing, "a reliable expression of the perspective of the European OSH Research Community together with an analysis of differences between European geographical areas." The highest priorities identified include new issues such as: "OSH management in new forms of employment (eg, crowdsourcing, internships, zero hours contracts); impacts of innovation and new ways of working (ie, telework, e-work, boundary less work); health and safety in human-computer interaction and the introduction of unsafe and unhealthy work equipment following the reduction of barriers to the free movement of goods." The researchers also note the high importance attributed to two transversal priorities: translation of research results into practical and effective tools; and support for OSH implementation in micro, small and medium enterprises. Figure 2 illustrates the differences in priorities by geographical area.

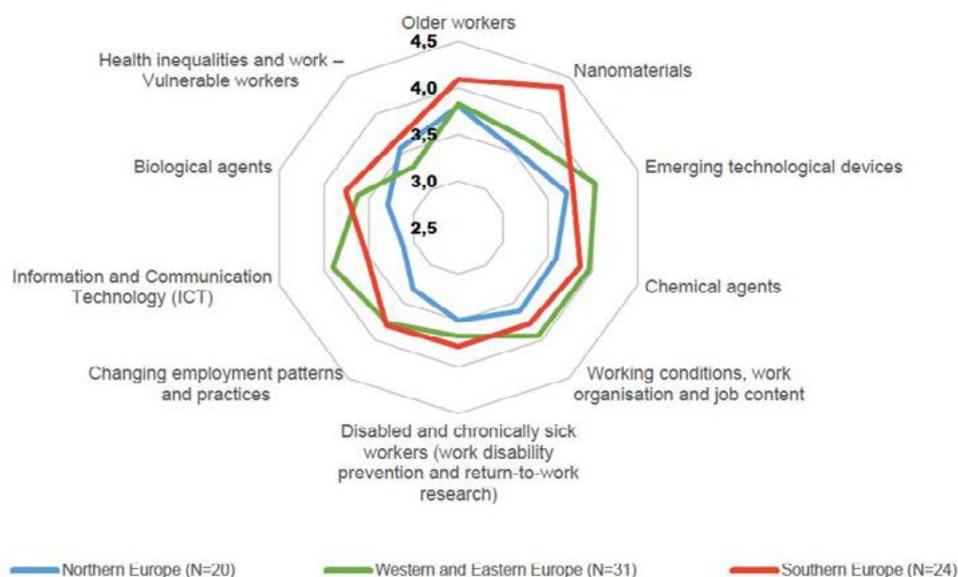


Figure 2. Research priorities by European geographical area on a scale of 5 (high) to 1 (low) from PEROSH study (Gagliardi et al., 2016)

B) PEROSH Researcher Exchange Programme

PEROSH has an active programme of researcher exchange visits. These are short visits between institutes, typically one- or two-weeks' duration, often on a reciprocal basis. The benefits include: exchange of practical knowledge on laboratory techniques; support for current research through discussion with experts at another institute; introducing the upcoming generation of researchers to how evidence from another institute is used to inform and underpin the work of national stakeholders; and promoting new collaborative projects, either bilateral or within the PEROSH Joint Research Programme. Examples of researcher exchanges that facilitated or led to collaborative research on common evidence needs are: between FIOH and BAuA on the impact of working times on wellbeing for healthcare professionals (Karhula et al., 2020); and between TNO and HSE on insights into effective interventions for occupational asthma among bakery workers (Meijester et al., 2011). An example exchange that provided support and insights from host institute experts to an upcoming researcher is a visit to NFA by a new HSE researcher, to support a review of occupational asthma in wood and furniture manufacturing (Wiggans et al., 2016).

C) PEROSH Member Research Conferences

Since PEROSH was formed in 2003, it has continued to evolve, and introduce new approaches to strengthen knowledge exchange and networking between member institutes. In 2015, the inaugural PEROSH Member Research Conference was held. These biennial conferences bring together upcoming and experienced researchers from member institutes, and include a tour of the host institute's facilities. Speakers are from PEROSH with additional invited keynote

presentations including from European industry and from OSH national research institutes outside Europe. On average there are 70 delegates and 25 speakers per conference. Common to each conference is a focus is OSH impact. This covers both: multidisciplinary solution-focused, translational research by PEROSH institutes that is taken up by policymakers, regulators, industry and other stakeholders to improve occupational safety and health; and measurement and evaluation of the impact of OSH interventions and campaigns at national level. To support outreach activities, PEROSH publishes a conference overview, for instance videos of panel discussions and keynote speakers, or a 'Book of Abstracts' (PEROSH, Online-b,c,d). Each conference focuses on three key research topics aligned to the PEROSH vision for innovative and sustainable workplaces which are healthy and safe; Table 3 gives an overview. The conferences facilitate: "exchange of information between our young researchers and experienced researchers around many of the important topics that are facing the OSH research community like additive manufacturing; the ageing workforce; and respiratory health," PEROSH SC member Professor Andrew Curran (PEROSH, 2016).

Table 3. PEROSH Member Research Conferences: themes and topics aligned to sustainable and innovative workplaces that are healthy and safe

Conference year and host institute	PEROSH Member Research Conferences: themes and topics aligned to sustainable and innovative workplaces that are healthy and safe
2015 CIOP-PIB, Warsaw, Poland	Theme: <i>Translational Research in Occupational Safety and Health</i> Topic 1) Prevention through design: approaches and applications in light of "Industry 4.0". Including: influence of machine and human autonomy; additive manufacturing; virtual reality. Topic 2) Ageing at work Translational OSH Research in the context of demographic change. Including: good practice in prolonging working life; psychological and organisational aspects. Topic 3) Tools for working environments as means of translating research into usable e-solutions. Including: promoting evidence-based ill-health management; evaluation of mental workload.
2017 IFA, Sankt Augustin, Germany	Theme: <i>Innovative solutions for occupational safety and health</i> Topic 1) Hazardous substances. Including: leading indicators to track interventions to prevent lung diseases; metalworking fluid; di-isocyanate paints; workplace monitoring methods. Topic 2) Smart industry. Including: collaborative robots; 3-D printing; impact of change and the role of leadership; anticipated futures in digitalised full-time work at home. Topic 3) Work-related musculoskeletal disorders. Including: psychosocial risk factors; workplace interventions; sedentary working; prevention potential of personal monitoring devices.
2019 NFA, Copenhagen, Denmark	Theme: <i>Innovative solutions for Occupational Safety and Health</i> Topic 1) Impact on society: How do we realise and measure the impact of our research outcomes to improve workplace health and safety? Including: evaluation of campaigns. Topic 2) Sustainable and prolonged working life: How are we tackling current and emerging challenges? Including: foresight on digitalisation; training at schools; barriers and enablers. Topic 3) Carcinogens and chemical substances: How do we deal with occupational cancer and increase awareness of chemical exposures in the workplace?

D) PEROSH Joint Research Programme

PEROSH has an active Joint Research Programme of collaborative projects between member institutes. The programme was introduced in 2009 and is growing steadily, with around six to ten projects ongoing at any given time. When PEROSH was formed in 2003, member institutes were already collaborating through a range of ad-hoc opportunities and networking. The Joint Research Programme was introduced to realise the opportunities to exploit synergies in distinctive research needs that transcend national boundaries across the European institutes that form the PEROSH partnership. The Joint Research Programme provides the opportunity for national institutes to leverage their funding through collaborative projects, and avoid unnecessary duplication of research activities. Each institute within a project team arranges its own funding. Some projects include invited national research collaborators of PEROSH member institutes.

Many projects address the need to both facilitate and undertake the synthesis of research evidence. The common driver across PEROSH is the importance of robust evidence to underpin and inform decision making and advice to workplaces by national policymakers, regulators, and other stakeholders. These projects include development of review methodologies, as well as platforms and taxonomies to enable national-level research and survey data to be captured and used systematically for transnational evidence synthesis. For example:

1. One of the first projects, initiated in 2009, developed a “Clearing-House Methodology” to locate and gather good systematic reviews of key OSH topics in one place (Verbeek *et al.*, 2015). The authors note that: “Without a proper summary of the available research, it is difficult to draw inferences from science to [OSH] practice.” The methodology includes inclusion criteria, search strategies and quality assessment. As part of the project, the team searched for, and assessed, available systematic reviews of 27 significant OSH topics. This has the added benefit of identifying to the wider research community, areas where there are research needs due to a shortage of robust studies to inform OSH practice. For instance, the PEROSH team identified that there were no systematic reviews related to occupational health and nanotechnologies. This gap was filled by the World Health Organization, WHO, (www.who.int) which set up an overarching programme of such reviews; an overview is in WHO (2017).
2. Work-related musculoskeletal disorders, MSDs, such as pain and disorders of the back, limbs and neck, are a significant concern in Europe. Many national surveys gather data on self-reported physical working conditions which are used to provide information on occupational risk factors for MSDs. A PEROSH project analysed six national surveys, and identified which physical working conditions are less well captured, including sedentary work conditions. This evidence can be used to inform updates to strengthen national surveys (Tynes *et al.*, 2014). For instance, in Denmark

it is currently being used to inform discussions on what will be included in the next national survey.

3. The “NECID” database was developed to hold research data on potential exposure to nanomaterials (Pelzer, 2013). A challenge that is often faced in synthesis and meta-analyses of data and studies from different countries and research teams is a lack of consistency in data fields. The project aim was to enable consistency in data capture through a secure platform that meets the highest ethical standards, and is for use by screened research teams. A particular benefit within PEROSH was developing understanding of the legal, ethical, logistical and IT challenges for development and use of such databases.
4. A project reviewed European research literature on ergonomics of protective clothing for firefighters, including the potential benefits of smart wearable devices. The research produced evidence that can be used to inform updates on national standards to better protect firefighters (Młynarczyk *et al.*, 2019).

Many projects identify new avenues for exploration by the wider research community to deliver common evidence needs for European countries. For instance:

5. Most European countries use national surveys that offer information on the status and trends of working conditions and health, as well as at-risk groups of workers. A PEROSH project considered what could be learned from these surveys, to better understand which psychosocial factors are recognised by national workplace health authorities, companies and trade unions. The researchers compared the psychosocial dimensions covered in six national surveys and how they relate to two scientific models. They identified significant overlap in the national surveys as well as “new” dimensions that are not in the models. They conclude that: "These 'new' dimensions could inspire the research community to further investigate their possible health and labour market effects" (Formazin *et al.*, 2014).

Another common theme is projects to develop evidence that can be used at national level to underpin advice and tools for OSH practitioners or companies on healthy and safe working practices. For example:

6. A PEROSH research team developed evidence to support actions by stakeholders to reduce work-related MSDs. They aimed to unleash the potential for knowledge exchange between institutes by generating a common framework for technical measures of physical work demands. They developed specialist technical information on assessing sedentary behaviour (Holtermann *et al.*, 2017a, b) and arm elevation (Weber *et al.*, 2017; Douwes, 2019). An indication of the outreach of this work is the ‘Best Paper Award 2017’ given by the Journal for Applied Ergonomics for the team’s practical technical guide for researchers and OSH practitioners on assessing

occupational sedentary behaviour (Holtermann et al., 2017a). It is intended that the outcome can be used to inform and support the development of national-level tools, guides and interventions. For instance, the results of this work informed the decision by the Danish Ministry of Labour to request the development and evaluation of a new technical system for measuring ergonomic work demands for use in national workplace surveillance (work now underway at NFA).

7. A project researched the “factors that contribute to successes with promoting safety and preventing accidents in companies that have adopted a ‘Zero Accident Vision’” (Zwetsloot et al., 2015; 2017a; 2017b). The researchers undertook a survey of managers and workers in 27 companies across seven European countries (with over 8,000 respondents) as well as company interviews and national workshops. They identified, for instance, that in these companies, the approach is: creating safety rather than solely preventing accidents; seeing safety as a strategic rather than a tactical and operational challenge; and intrinsic rather than extrinsic motivation, i.e., “we want to” rather than “we have to”. The research findings have been used by the International Social Security Association, ISSA, (ISSA, 2017) to inform their global “Vision Zero” campaign (ISSA, online) which is reaching out to companies, OSH professionals, and tens of thousands of workers globally.
8. A project developed evidence to help protect workers exposed to UV and IR radiation emitted by arcs, flames and thermal radiators. Exposure of workers can damage the eyes and skin. Simple, practical, risk assessments by companies are important to decide what protective control measures are needed. However, there was a lack of scientific evidence as a basis for risk assessment for *indirect* exposures, for instance a worker in the vicinity of a welder. The outcome of the project (Bauer et al., 2015) can be used as a basis to develop advice and tools tailored to national needs. For instance, in Austria it has been used to underpin a simple online risk assessment tool for companies (AUVA, Online).

Details of new, ongoing and completed projects in the Joint Research Programme are at (PEROSH, Online-e).

E) PEROSH “Wellbeing at Work” Group and International Conference Series

The importance of wellbeing at work has become an increasing focus for policymakers and industry within many European nations and globally. In 2009, nine PEROSH member institutes held a workshop at HSE to share information and identify common research needs (Fishwick et al., 2010). Participants suggested that drivers for research include: “societal costs, governmental policy, legislative positions, altruism and moral arguments within civilised societies.” They identified that: “At the heart of the well-being debate is the paradox that ‘good work is good for you, but work can also harm your health.’” They discussed the differences in

the way “wellbeing at work” as a concept is understood and identified various themes. These include that, “wellbeing is not defined as only the lack of mental ill health, but incorporates social and physical functioning. Well-being has to be a positive, sustainable concept of optimal functioning ... with the emphasis on positive consequences for work ability and creativity.”

The research needs discussed were in five categories: “(i) defining the rationale for improving well-being, (ii) developing evidence-based approaches that facilitate improved well-being and the prevention of negative influences, (iii) developing communications systems to improve the ongoing debate on these issues; (iv) using case studies to facilitate engagement with stakeholders on the benefits of the well-being concept, and (v) filling the evidence gaps and how to share these research findings.” At the workshop, FIOH explained the plans they already had for a conference to bring together international thinking on this important emerging workplace need. Jointly, these activities led to what became the first in the series of PEROSH international Wellbeing at Work conferences (see Table 4) and the formation in 2010 of the multidisciplinary PEROSH Wellbeing Group, which continues today as the central focus of co-ordination for the series.

Table 4. PEROSH “Wellbeing at Work” international conference series

PEROSH “Wellbeing at Work” International Conference Series			
Series No.	Host Institute	Year	Location
1st	FIOH	2010	Helsinki, Finland
2nd	HSE	2012	Manchester, United Kingdom
3rd	NFA	2014	Copenhagen, Denmark
4th	TNO	2016	Amsterdam, Netherlands
5th	INRS	2019	Paris, France
6th	CIOP-PIB	Planning in progress	

An early activity by the PEROSH Wellbeing Group was to develop the PEROSH Wellbeing Tree, to help visualise and communicate about the different factors that feed into wellbeing at work. There are two versions, one for employers (see Figure 3) and one which uses more specialist language for researchers. Wellbeing Group members have used the tree in national-level engagement and articles; for instance (Lunt et al., 2014 a, b; Mockałoz et al., 2016.) Lunt et al., 2014a, note that: “The Wellbeing Tree is not intended to be an empirical, testable model: rather, it shows in an intuitive way the great variety of factors that can affect wellbeing ... The many different factors that contribute to workplace wellbeing are the roots of the tree, implying a clear relationship between investing in workforce wellbeing, and the benefits of doing so: the ‘growth’ of the tree, and the fruit it produces. The tree image also

helps to show the interdependence between the worker and the context of their work, in relation to wellbeing. The interaction of the individual and wider society can be made clear."

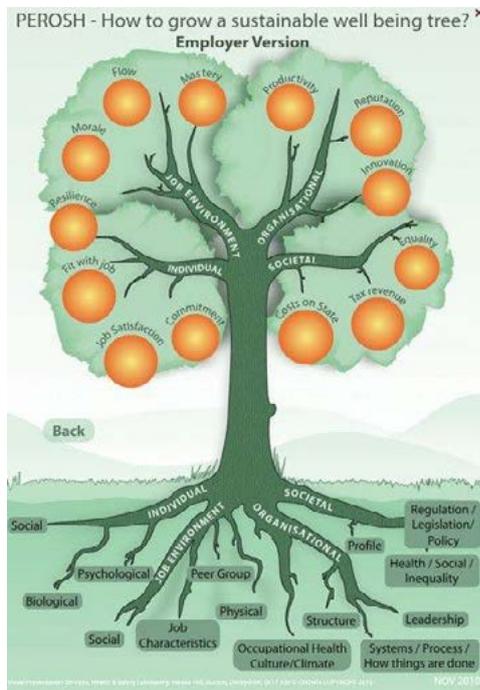


Figure 3. The PEROSH Wellbeing Tree: Employer Version.

Activities by the Wellbeing Group have included considering the impact of the changing world of work (Lunt et al., 2015), including transient working and greater flux in the job market. This identified that, "trends towards increased globalisation and technological advances could make it increasingly more difficult to maintain the classical attributes of a 'good job.'" The group has also investigated factors associated with job satisfaction in the general working population. This study used the Danish Work Environment Cohort Study with replies from 10,000 workers. In a paper called "Job satisfaction is more than a fruit basket, health checks and free exercise" (Andersen et al., 2017), the researchers identify that: "While psychosocial work factors and to some extent physical work demands are important for job satisfaction, workplace health-promotion offers appear to play a minor role." The researchers note, as the driver for their study, that: "Workers who are satisfied with their job are the cornerstones of healthy and productive companies." The group has also published a Good Practice Checklist "for workplaces that wish to do more to support everyone at work to be physically active and to reduce sedentary behavior" (Fishwick et al., 2014). The checklist's introduction for workplaces notes that: "In addition to the health benefits of increasing physical exercise, there is increasing evidence that regular sedentary behaviour can be harmful to health. Sedentary behaviour is a term used to describe prolonged sitting at work without regular active breaks."

The Wellbeing at Work conference series is providing an international platform that is building evidence to meet these research needs and facilitating cross-fertilisation of ideas and

approaches globally. Global research trends have been evident through the presentations given in the decade from the first to the most recent fifth conference. “We see a movement from very early understanding of wellbeing, pretty much risk factors... Now we’re dealing with intervention studies in workplaces... We hope that as we continue to host these conferences, we start to develop solutions which are evidence based,” David Fishwick, Chair of the PEROSH Wellbeing Group (PEROSH, 2019b).

F) PEROSH Information Sharing Workshops

Short, topic-based, Information Sharing Workshops are used by PEROSH members to exchange knowledge about priority research areas and evidence needs. In line with common priorities for PEROSH institutes, see above and (Gagliardi, 2017; PEROSH, 2012), topics include: transversal (translation of research to give impact;) sector or technology specific; specific diseases or ill-health with a high burden on workers; and cross-cutting OSH priorities spanning multiple workplaces. The topics span both current and emerging challenges to health and safety. Recent and current examples are workshops are on: “Metalworking fluid and respiratory ill-health” hosted at INRS, Paris, France, 2019; “Work-related stress and related mental-health issues” hosted at HSE, Buxton, UK, 2019; and “Health and Safety Guidelines for Intelligent Robots” to be hosted by TNO, online, in autumn 2020.

While the primary goal of each workshop is to share information, some lead to projects in the Joint Research Programme, or other activities. For instance, as noted above, the ongoing activities following the 2009 Information Sharing Workshop on “Wellbeing and Work” include the PEROSH international Wellbeing at Work conference series. All workshop topics align to the PEROSH vision for innovative and sustainable workplaces.

PEROSH Outreach Activities

The PEROSH strategy (PEROSH, 2019a) has five pillars. The first three focus on European and national outreach. The first pillar is: “*Outreach and visibility of PEROSH to European stakeholders*. PEROSH will take initiatives to reach out and contact on a regular base stakeholders in Europe. The ambition is to further raise the profile of its robust scientific evidence and foresight activities on important OSH issues in Europe.” These activities include proactive dialogue with European Union institutions including EU-OSHA (www.osha.europa.eu) and EUROFOUND (www.eurofound.europa.eu). For instance, EU-OSHA used the PEROSH articulation of common research needs (PEROSH, 2012) to inform their identification of research needs (EU-OSHA, 2013). EU-OSHA has also requested to use the 2020 PEROSH Extending Working Lives international conference as an example of good practice in its OSH Campaign Toolkit (EU-OSHA, online). The second pillar is: “*Visibility of PEROSH at the National level*. Each member will provide knowledge and experience to PEROSH, and take home to its own national level the enriched knowledge produced by this partnership. The enrichment will be based on information from joint trend analyses, joint research projects and information

sharing events, and joint identification of key research needs. All members have their specific national dissemination channels, and will use these effectively." These activities are specific to each institute, according to their national statute, mission and key stakeholders. The host institute of PEROSH events has the opportunity to invite key national stakeholders. For instance, the 2019 PEROSH Information Sharing workshop on work-related stress was attended by two HSE policymakers in an observer capacity. (HSE is a government agency and the regulator for workplace health and safety in Great Britain.)

The third pillar is: "*PEROSH in Europe*. PEROSH was founded because workplace challenges in a globalised world transcend national borders. Sharing of knowledge and joint research activities by PEROSH members realises significant benefits. Therefore, research institutes in other European countries will actively be offered membership, if they have a national role and are willing to commit to the PEROSH mission, vision, activities and ambitions." Recent PEROSH outreach in Europe has included activities from 2016 to connect with the Swedish OSH research community, through attendance at meetings and conferences. In parallel with these activities, some individual PEROSH member institutes collaborated with the "Swedish Platform for sustainable work as a resource for health, innovation and growth in EU's Horizon 2020" (Sustainable Work 2020, Online). Although this collaboration was not a PEROSH activity, it was facilitated by the existing networking between PEROSH member institutes. In 2018, The Swedish Agency for Work Environment Expertise, SAWEE (MYNAK), was formed under the Ministry of Labour and Employment. Sweden does not have a national research institute. Therefore in 2020, building on the earlier outreach activities, SAWEE became a PEROSH member for an initial year, to explore a research partnership model in the Swedish context.

The fourth PEROSH outreach pillar moves beyond Europe: "*PEROSH in the world*. PEROSH is willing to share its knowledge, good practice and lessons-learned with similar OSH research organisations and networks across the globe. PEROSH maintains contacts with global players in the world of OSH research." Contact with global players encompasses a wide range of activities led by the members of the PEROSH Steering Committee, SC. These include: biennial joint meetings with the international Sheffield Group; engagement with the International Labour Organisation, ILO, the International Social Security Association, ISSA, and the World Health Organisation, WHO; an invitation to the newly formed OSHAfrica (www.oshafrica.africa) to attend an SC meeting hosted by IFA; and engagement with the International Commission on Occupational Health, ICOH (www.icohweb.org). The ICOH engagement is facilitated through PEROSH SC members who are, or have been, ICOH officials or board members. Similarly, the WHO engagement is facilitated through PEROSH member institutes that are WHO Collaborating Centres.

The fifth pillar is: "*PEROSH impact*. PEROSH will focus on the societal impact of its research results. The ambition is to demonstrate the added value of PEROSH research on occupational safety and health carried out by its members. PEROSH will endeavour to develop methodologies, and share approaches to measure and evaluate the benefits of OSH research results for policymakers, workplaces, insurance systems, and other stakeholders." This is an

ongoing strategic activity for PEROSH. The most recent PEROSH member conference took this as a key topic (see Table 3) and further sharing of approaches and good practice from across the partnership is planned.

Discussion and Outlook

The ongoing challenge for health and safety systems in Europe is to tackle the burden on workers, their families and society of life-changing workplace injuries, occupational diseases and ill health, and deaths at work: the loved ones who will never again come home at the end of the working day. The world of work continues to change. There are potential benefits and risks to workers from new technologies, materials and equipment, and disruptive innovation. Net Zero technologies, advanced manufacturing, smart sensors and the Internet of Things, cobotics and machine learning (“AI”) are among the drivers for change. There are challenges and opportunities from demographic change and longer working lives, globalisation, deglobalisation, and changing employment practices including the gig economy and digitalisation. Robust work organisation and leadership is important to effectively control risks to health and safety while promoting wellbeing at work.

Today, the COVID-19 pandemic is fundamentally affecting work and society. Multitudes of scientists globally are developing evidence to combat the impact of the virus. Among them are scientists from PEROSH institutes, working according to their institute’s national role or as part of national task forces. For instance they are: providing advice on suitability of personal protective equipment (PPE) for healthcare workers; investigating methods for PPE decontamination and reuse as a last resort if supplies fail; developing evidence to inform effective measures to control the risk of workplace transmission, and to identify its contribution to total transmission; and informing advice by government ministries to support the health of those working from home (CIOP, 2020; Marinaccio et al., 2020; SAGE-EMG, 2020; MvSZW, 2020; Vernez et al., in press). Foresight specialists are developing possible futures scenarios to support debate and decision making (Héry and Malenfour, 2020).

The ongoing challenge for national occupational safety and health research institutes is to develop, synthesise and translate robust evidence on current and emerging challenges, to anticipate future evidence needs for the changing world of work, and to transfer this knowledge to the health and safety system. Though PEROSH, 14 national institutes in 13 European countries are acting collectively to: strengthen co-operation on research, accelerate the generation of knowledge in key areas; and disseminate and exchange knowledge and information. Their common vision is that policymakers, workplaces and other stakeholders across Europe are inspired by and use knowledge generated by PEROSH in their efforts to develop innovative and sustainable workplaces which are healthy and safe. Since its inception in 2003, the partnership has continued to develop and strengthen its activities and outreach.

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