

# Book of Abstracts

## 4<sup>TH</sup> RESEARCH CONFERENCE

# Madrid

29-30<sup>th</sup> September 2021

Organised by

50insst  
1971 - 2021



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## Introduction

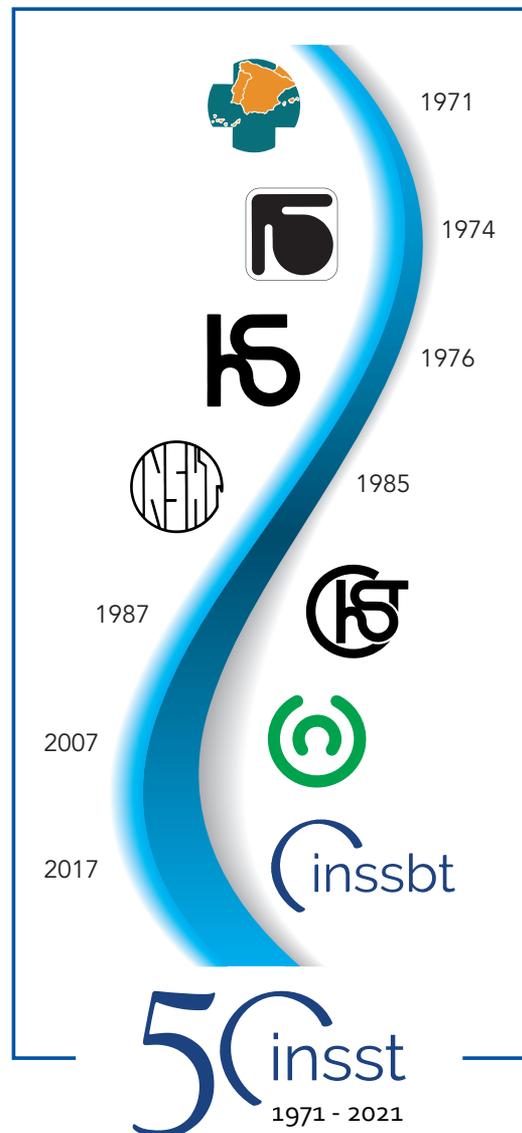
PEROSH, the Partnership for European Research in Occupational Safety and Health, organises bi-annual research conferences, exclusively for its members since 2015. The first conference was in Warsaw, Poland, followed by a second conference in Sankt Augustin, Germany. The third successful conference was held in Copenhagen, Denmark.

The main objectives of these conferences are to (a) allow both early-stage and experienced researchers to share their latest findings with colleagues from the other PEROSH institutes (b) give opportunities for networking and a platform for potential collaborations for international research projects.

The previous conferences were very successful and resulted in closer contacts between the member institutes and its researchers, development of joint projects or joint applications for research funding of the EU. Some of these examples are: joint HORIZON 2020 applications and exchange visits of researchers between the member institutes. Additionally, joint research projects between PEROSH members.

On 29 and 30 September 2021, we are organising PEROSH 2021, the 4th PEROSH Research Conference in Madrid, Spain. Our kind host this time is INSST from Spain. INSST is also celebrating this year its 50th year of existence.

PEROSH 2021 accommodates 45 high-quality abstracts. The conference has three parallel sessions on the following themes:



### **1. Pandemic and post-pandemic challenges**

2020 will be remembered as the year of the worldwide pandemic that has shaken the world of work. Epidemiologists insist that this will be a more common issue in the future, so work places must be prepared for it. What are we learning and what have we learned from this crisis? In this section, PEROSH researchers are invited to present their own findings on all those fields affected, directly or indirectly, by this threat: Working conditions, teleworking, psychosocial impact, health management, PPE's, preventive measures, and many others related to the topic.

### **2. Building bridges across OSH boundaries**

Today, OSH borders are drawn by blurred lines. The limits of OSH field research have been enlarged towards other areas both in research and in practice, involving necessarily solid cooperations. The interconnections with domains such as the human capital domain, technological developments, industrial regulations, economic impact, commerce & product regulations, traffic and mobility issues, pharmacy issues and regulations, just to mention some of them, show that OSH activities and research are closely related to other domains of expertise outside the pure "OSH-Labour" world. In this section, PEROSH researchers are invited to present their own experience on projects where the tight cooperation and full understanding of other fields is needed: Industry, Education, Health, Social Services, Industry, etc.

Globalization and the virtual communication in the (post) pandemic world also shortens geographic distances. Therefore, research in collaboration with other countries outside the EU is also welcomed to be presented.

### **3. Old problems waiting for innovative solutions**

Looking for the future and emerging problems cannot make us forget that there are old problems waiting for solutions. Innovative approaches, new technologies and fresh science or better tailored solutions for the "classic OSH" problems will be presented in this section. PEROSH researchers are invited to present their own experience, considerations and proposals to deal with those old challenges.

In this book of abstracts, one can find the final program and all names and contributions of the speakers.

We invite you all to enjoy the conference and the networking.

**Paulien Bongers**  
**Chair PEROSH Steering Committee**

**Louis Laurent**  
**Chair PEROSH Scientific Steering Group**



## Welcome

The Spanish National Institute for Health and Safety at Work (INSST) is celebrating its 50th anniversary in 2021. The institute was initiated in the light of the Spanish National Plan for Health and Safety at Work, regulated by the Order of 9 March 1971.

During these fifty years the INSST has been renamed, adapted to new demands and roles but kept its original duty on enhancing safety and health at work and fostering better working condition standards. Some of its main functions were redefined over time due to economic and political renewed scenarios but dissemination and training, technical assessment and research are the essence of its work.

During this special year, and despite the difficult situation due to the COVID pandemic, INSST wants to celebrate its anniversary with many activities. Among these, one that stands out is hosting **4th PEROSH Research Conference**. It will be a live event that will take place in Madrid, a welcoming and lively city, full of possibilities for the visitor due to its abundant artistic and natural heritage, its wonderful gastronomy and friendliness of madrileños and madrileñas. INSST takes on this task with enthusiasm and hopes to provide a successful experience to all researchers, giving them the chance of networking and sharing their last findings.

“Muchas vidas... a tu lado” (Many lives... by your side”) is the moto of this anniversary that was chosen in a contest between the INSST employees. Many thanks to all of you who have accompanied INSST during some of these 50 years. We will go on striving to achieve our goals, hoping that you keep by our side taking on the challenge of improving health and safety at work.

## Program

### PEROSH 2021 – 4th Research Conference Madrid

Venue: Instituto Nacional de Seguridad y Salud en el Trabajo (INSST)  
73 Torrelaguna Street, 28027 Madrid

<b>Wednesday 29<sup>th</sup> September 2021</b>	
<b>13:00 - 15:00</b>	Lunch for PEROSH Steering Committee members at INSST
<b>15:00 - 17:00</b>	Meeting of the PEROSH Steering Committee (only for invited members) at INSST
<b>16:00 - 18:00</b>	Registration of participants at Instituto Nacional de Seguridad y Salud en el Trabajo (INSST)
<b>19:30 - 20:00</b>	Welcome dinner for all registered participants; venue will follow
<b>Thursday 30<sup>th</sup> September 2021</b>	
<b>08:30 - 09:00</b>	Registration and arrival of participants
<b>09:00 - 09:30</b>	Welcome by INSST Director Mr. Carlos Arranz Cordero Welcome Paulien Bongers, chair PEROSH
<b>09:30 - 10:30</b>	Keynote (moderator: María de la O Culver González) Work and digitalization - Kristina Palm (Karlstad University) Keynote (moderator: María de la O Culver González) INSST and the PPE crisis during the COVID-19 pandemic - Pilar Cáceres Armendáriz (INSST)
<b>10:30 - 11:00</b>	Coffee and tea break

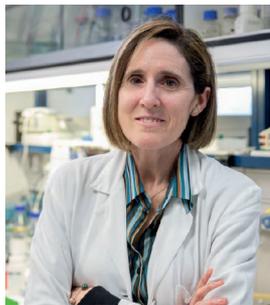
11:00 - 13:00	<b>Pandemic and post-pandemic challenges (risk management related issues)</b> Chair: Noortje Wiezer	<b>Building bridges across OSH boundaries</b> Chair: Pablo Orofino Vega	<b>Old problems waiting for innovative solutions</b> Chair: Dietmar Reinert
	Well protected at work? Occupational safety and health in the Corona pandemic from the employees' point of view Sophie Meyer (BAuA)	The work environment of immigrant employees in Sweden - a systematic review Nader Ahmadi (SAWEE)	Use and advantages of SIFT-MS in proficiency testing and method development at a dynamic test gas facility Christiane Kaus (IFA)
	The role of environmental assessment in the workplace COVID-19 outbreak investigation to understand SARS-CoV-2 transmission Chris Keen (HSE)	What consequences will the COVID-19 pandemic have on the organisation of work and the prevention of occupational risks in the years to come? Michel Hery (INRS)	The CALCULATOR for working exposure assessment to chemical agents according the standard EN 689:2018 José Luis Sanz Romera (INSST)
	(In)equality at the work place? Health management in German establishments during and after the Covid-19 pandemic Anita Tisch (BAuA)	An improved evidence-based occupational diseases investigation María Elena Moreno Atahonero (INSST)	Method development for hazardous substances (amines and furan) in foundries Leonhard Nünemann & Christiane Kaus (IFA)
	Indices to describe the development of pandemics and the effectiveness of regulatory measures Yi Sun (IFA)	The importance of proper fit of respiratory protective devices - long-known problems and new technical solutions Małgorzata Okrasa (CIOP-PIB)	Non-targeted screening as an innovative tool for human biomonitoring of multiple exposure to chemicals in occupational health Baninia Habchi (INRS)
	Assessing the risk of Covid-19 in the Italian workplaces: a methodological approach to guide the reopening strategies Fabio Boccuni (INAIL)	Integration and deployment of exoskeletons in companies: points of vigilance Jean-Jacques Atain-Kouadio & Liên Wioland (INRS)	How to improve the analysis of Chromium VI in air samples to fulfil the increased requirements for air limit values Patrick Hochwald (IFA)
	How to help workplaces manage COVID-19 Pia Perttula (FIOH)	Acute predictors of long-term health after electrical accidents. An approach aimed at targeting efficient and improved health follow-up Lars Ole Goffeng (STAMI)	Understanding risks for exposure to microbial biohazards in metal working fluids (MWF) Jodi Brookes (HSE)
	Exposure to a SARS-CoV-2 infection at work: development of an international Job Exposure Matrix (COVID-19-JEM) Karen Oude Hengel (TNO)	Using new technologies at work and in life by people with intellectual disability Karolina Pawłowska-Cyprysiak (CIOP-PIB)	Evaluation of work-related exposures to the inhalable and respirable dust fraction and to quartz Stefan Gabriel (IFA)
	Swedish companies' work environment routines during the Covid-19 pandemic; a snapshot Annette Nylund (SAWEE)	Practical tools for implementing organizational resilience engineering case study Josu Diaz Moreno (INSST)	Endocrine disruptors: OSH, REACH, CLP. What's next? Ruth Jimenez Saavedra (INSST)

<b>13:00 - 14:00</b>	<b>Buffet Lunch</b>		
<b>14:00 - 16:00</b>	<b>Pandemic and post-pandemic challenges (psychosocial risk/ telework related)</b> Chair: Diana Gagliardi	<b>Building bridges across OSH boundaries</b> Chair: Steffen Bohni	<b>Old problems waiting for innovative solutions</b> Chair: Jan Michiel Meeuwssen
	Working from home during the COVID-19- pandemic in the Netherlands Noortje Wiezer (TNO)	Influence of acoustic conditions in the mental work environment on visual perception and psychosocial load Joanna Kamińska (CIOP-PIB)	Determination of gaseous and particle-bound polychlorinated biphenyls (PCB 47, 51, 68) for workplace air monitoring Leonhard Nünemann (IFA)
	What about the psychosocial health of the healthcare sector during the Covid-19 pandemic? Rebeca Martín Andrés (INSST)	Respiratory Disease Occupational Biomonitoring Collaborative Project (ROBoCoP): protocol and first results Irina Guseva Canu (Unisanté)	Determination of a conversion function for the inhalable and respirable dust fraction of nickel and cobalt concentrations Cornelia Wippich (IFA)
	The relationship between working from home and employee health and well-being and the work environment: A systematic review Jolien Vleeshouwers (STAMI)	Just-in-time adaptive interventions for dealing with (work) stress Irene Niks (TNO)	Cross-sector collaboration enabling the safe implementation of 3D printing technologies Samantha Hall (HSE)
	Changes in Employee Wellbeing in Finland Before vs. During Covid-19 Jari Hakanen (FIOH)	Work from home; systematic literature search for systematic reviews Ingrid Jorgensen & Benedicte Mohr (STAMI)	Amorphous silicas – Comparison of analysis methods in Germany and the USA Sandra Boos (IFA)
	Mapping and Analysis of Conditions for Working from Home during the Coronavirus Pandemic Johan Stenmark (SAWEE)	Competence of Safety Technicians - Attitudes, Beliefs & Behaviour Barbara Huber & Christian Schenk (AUVA)	Analysis of the 16 EPA priority PAHs and beyond – which works better, GC or HPLC? Julia Linke (IFA)
	Impact of COVID-19 pandemic on nursing home care workers: health and working conditions Aude Cuny-Guerrier & Marjorie Pierrette (INRS)	"The good work" drives innovation and productivity Annette Nylund (SAWEE)	Applying the exposome concept to working-life health: The EU EPHOR project Anjoeka Pronk (TNO)
	Flexible and healthy working - effectiveness of a resource-oriented online training for employees with flexible working conditions Sarah Elena Althammer (BAuA)	From the diagnosis of OSH-related needs in the construction sector to Next Generation IoT architecture: Smart Safety of Workers and the ASSIST-IoT project Anna Dąbrowska (CIOP-PIB)	Air to go – air canister as sampling devices for highly volatile and reactive substances in occupational air Benedikt Thomas (IFA)
<b>16:00 - 16:30</b>	<b>Keynote speaker</b> (moderator: María de la O Culver González)		
	Development of a next generation RNA replicon vaccine against SARS-CoV-2 - Isabel Sola Gurpegui (CSIC)		
<b>16:30 - 16:45</b>	Conclusion @ Closing		
<b>16:45</b>	Coffee and tea "good travel back home"		

## Keynote speakers

### Isabel Sola Gurpegui

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#### Bio sketch

Isabel Sola Gurpegui has been working in the coronavirus (CoV) field for more than 25 years and is currently co-director of the Coronavirus laboratory at the National Center of Biotechnology (CNB), which is part of the Spanish National Research Council.

She made relevant contributions to the CoV field in the development of the first CoV reverse genetics system to engineer CoV genomes, the understanding of the coronavirus transcription mechanism, a unique process among RNA viruses, and virus-host interactions involved in viral replication and virulence. Her present interest is the development of a new generation of CoV-based RNA replicons as vaccine candidates, which are highly efficient and safe, since they are replication-competent and propagation-defective.

Isabel Sola has contributed to more than 70 peer-reviewed publications, is co-inventor of 3 patents and is a member of the Editorial Board of Journal of Virology, Virus Research and BMC Microbiology.

### “Development of a next generation RNA replicon vaccine against SARS-CoV-2”

The CoV lab at CNB-CSIC is currently working in the generation of RNA replicons as vaccine candidates against SARS-CoV-2. This strategy was previously applied to the development of an intranasal MERS-CoV vaccine candidate, which induced 100% protection in mice after a lethal challenge, leading to sterilizing immunity, since no infectious virus was detected in the lungs of challenged mice. The genome of SARS-CoV-2 has been engineered to generate a replication-competent propagation-defective RNA replicon by deleting genes essential for propagation and also virulence genes. Propagation defective RNA replicons are highly safe, since they are single-cycle and cannot propagate from cell to cell. Deletion of viral determinants of virulence, such as IFN antagonists, is known to result in both attenuation and improved immunogenicity due to the induction of an optimal innate immune response that promotes adaptive immunity. Self-replication of RNA replicons amplifies different viral immunogenic proteins, including S, M and N protein, leading to an efficient and long-lasting immune response. RNA replicons will be produced either using packaging cell

lines that provide in trans the missing proteins or by formulating in vitro transcribed RNA in polymer nanoparticles.

RNA replicons represent a next generation of vaccines because of their ability to encode not only immunogens, but also immunomodulatory molecules specifically designed to improve the efficacy and safety of vaccine candidates, especially in older adults, which are the most vulnerable population to SARS-CoV-2 severe infection.

## Kristina Palm

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### Bio sketch

Kristina Palm Ph D and Associate Professor (Docent) at the department of Working Life Science at Karlstad University and Medical Management at Karolinska Institutet Sweden. Kristina has an interest in understanding different aspects of working life, from the working conditions of the individual worker to leadership and HRM. The last years she has specialized within the area of work and digitalization, boundaries between work and private life and how the Corona pandemic effects working life.



**Karolinska  
Institutet**

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## “Work and digitalization”

Digital technology is developing at a furious pace, contributing to comprehensive changes to society and working life. The digital transformation of work affects both work content and work design. Digital technology can be introduced for different reasons, for example to streamline and eliminate certain tasks or risks, to improve process efficiency and safety, to improve communication and availability, to take advantage of employee skills, or to introduce new business or organizational models. In other words, a positive view of digital technology lies behind its introduction, but its impact on the work environment is not necessarily positive. Regardless of why, the increased rate of digitalization has an impact on the work environment; it can often be both negative and positive, as well as difficult to predict. In addition, it is not only work that is being digitalized, but also life outside of work, which in turn affects work and makes working life even more complex. This presentation highlights research-based information on the impact on conditions for preventive occupational health and safety management and the effects of digitalization on the social and organisational work environment with a special focus on remote working during the Corona pandemic.

**Pilar Cáceres Armendáriz**

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**Bio sketch**

Pilar Cáceres Armendáriz, Director Centro Nacional de Medios de Protección (CNMP) – INSST.

Graduated in Physics by the University of Seville and Master degree in Leadership and Public Management by the International University Menéndez Pelayo.

She has been working since 1992 at the CNMP, centre of the Spanish National Institute of Health and Safety at work, specialized in personal protective equipment and working conditions in the agriculture and fishing sectors. CNMP is Notified Body nº0159 for the PPE Regulation. She has been involved in standardization, testing, certification, selection and use of PPE for more than 30 years. Deeply involved in specialized technical assistant on PPE to national authorities i.e.: Ministries of Labour, Industry, Consumer, Health, Labour Inspectors, Market surveillance and Border controls inspectors as well as the rest of stakeholders.

President of the CTN81/SC1, Spanish sub-committee on PPE.

Member of the PPE experts working group of the European Commission and PPE ADCO

Member of the Steering Committee and working group of Euroshnet.

**“INSST and the PPE crisis during the COVID-19 pandemic”**

2020 Has been a year like no other. Unprecedented, uncertain, tiring – we have actually run out of words to describe it. The coronavirus pandemic has affected us all in many different ways and the crisis of PPE is one of them. The shortage of PPE in the supply chain and the need to protect health workers provoked an “earthquake” in the European market in general and in the Spanish one in particular.

A series of actions were carried out in order to solve the problems and INSST was directly affected as were other similar European institutions. Tons of protective masks, gloves, clothing and facemasks invaded our labs somehow begging for a hint of guarantee. A relatively small group of professionals were faced with handling the situation while living in parallel with unprecedented professional and personal situation brought on by the pandemic.

The situation lived, the actions taken, the work done, the ensuing consequences – this is what will be presented as an example of the importance of OSH in general, PPE in particular, and European coordination as key points to move forward.

## Parallel session speakers

### Anita Tisch

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**b a u a :**  
Bundesanstalt für Arbeitsschutz  
und Arbeitsmedizin



#### Bio sketch

Anita Tisch is head of the unit "Working Time and Organization" at the Federal Institute for Occupational Safety and Health in Germany (BAuA). The main research topics of the unit are digitalisation, working time and flexibilisation, demographical change as well as changing leaderships and organisations. Her research focus involves flexibilization, digitalization and changing working conditions; she also is an expert in the collection and analyses of survey data.

### "(In)equality at the work place? Health management in German establishments during and after the Covid-19 pandemic"

Co-Authors: SOPHIE MEYER, SWANTJE ROBELSKI, SABINE SOMMER

All over Europe, occupational safety and health (OSH) gained importance during the Covid-19 pandemic. Most companies adapted many different OSH measures to cope with the risk of infection. Thereby, in German companies, the adoption of OSH measures highly depends on different company-related characteristics (Robelski et al. 2021). Furthermore, the increase in remote work during the pandemic has created new challenges for the OSH management of many companies.

However, even before the crisis, companies handled OSH differently and differences between different sectors and company sizes have been shown. In the course of the pandemic, existing OSH implementation gaps have been revealed, and point to a consolidation of unequal and often invisible OSH risks.

We contribute to the debate of new and emerging inequalities and invisibilities in OSH by analyzing the adoption of different infection control measures at the workplace during the Covid-19 pandemic. In addition, we shed light on future challenges for OSH arising from the pandemic.

In order to analyse differences between company characteristics, we employ data from the 2nd and the 16th survey round of the study "Establishments in the Covid-19 crisis (BeCovid)", a German representative establishment survey of approximately 2,000

companies in several branches. Both survey rounds, conducted in August/September 2020 and August 2021, focus on infection control measures and health and safety regulations. The latter further includes questions concerning future challenges for OSH. Considering different company characteristics, we analyse how OSH measures changed during the course of the pandemic including challenges as well as implications for the organization of OSH in the future.

**Anjoeka Pronk**

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**TNO** innovation  
for life



### Bio sketch

Anjoeka is an interdisciplinary researcher in the field of environmental and occupational exposure and risk assessment, health impact assessment and epidemiology. She heads the TNO exposome program, within which exposome concepts and methods are developed and applied to enhance health. She coordinates the EU EPHOR project.

### “Applying the exposome concept to working-life health: The EU EPHOR project”

By taking an exposome approach, the Exposome Project for Health and Occupational Research (EPHOR) aims to advance knowledge on the complex working life exposures in relation to disease beyond the single high exposure-single health outcome paradigm, mapping and relating interrelated exposures to inherent biological pathways, key body functions and health. The toolbox of developed methods and knowledge will be made available to policy makers, occupational health practitioners and scientists in order to develop evidence-based and cost-effective preventive policies and actions, ultimately contributing to reducing the burden of non-communicable diseases (NCDs). This presentation will present the EPHOR design and approach as well as some developments on the research and toolbox so far.

Introduction: Exposures at work have a major impact on NCDs. Current risk reduction policies and strategies are informed by existing scientific evidence, which is limited due to the challenges of studying the complex relationship between exposure in the workplace and outside work, and health. We define the working-life exposome as all occupational and related non-occupational (i.e. urban, lifestyle, behavioural and socio-economic status) exposures.

Objective: By taking an exposome approach, the Exposome Project for Health and Occupational Research (2020-2024) aims to advance knowledge on the complex working life exposures in relation to disease beyond the single high exposure-single health outcome paradigm, mapping and relating interrelated exposures to inherent biological pathways, key body functions and health.

Methods: This will be achieved by combining 1) large-scale harmonisation and pooling of existing cohorts systematically looking at multiple exposures and diseases, with 2)

the collection of new high-resolution (in time or agents/markers) external and internal exposure data in two case studies. Methods and tools to characterize the working-life exposome will be developed and applied, including sensors, wearables, a harmonised job exposure matrix (EuroJEM), non-invasive biomonitoring, omics, data mining, and (bio)statistics.

Results and Conclusion: The toolbox of developed methods and knowledge will be made available to policy makers, occupational health practitioners and scientists. Advanced knowledge on working life exposures in relation to NCDs will serve as a basis for evidence-based and cost-effective preventive policies and actions, ultimately contributing to reducing the burden of NCDs. This presentation will present the EPHOR design and approach as well as some developments on the research and toolbox so far.

**Anna Dąbrowska**  
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#### Bio sketch

Anna Dąbrowska, Ph.D. (Eng.) is a researcher at the Department of Personal Protective Equipment, Central Institute for Labour Protection – National Research Institute. She is the Head of the Protective Clothing Laboratory. Currently, she leads research conducted by the CIOP-PIB within the H2020 ASSIST-IoT project. Her main scientific interests are focused on integration of smart technologies with protective clothing to improve safety and ensure comfort at work.

### “From the diagnosis of OSH-related needs in the construction sector to Next Generation IoT architecture: Smart Safety of Workers and the ASSIST-IoT project”

Ensuring safety in the construction sector is a challenging task, primarily due to the dynamic nature and uniqueness of construction sites as well as the involvement of numerous stakeholders. According to Eurostat, the construction industry is identified as one of the sectors with the highest incidence of non-fatal accidents at work. These results clearly confirm a need for new measures that will enable quick, precise and secure monitoring of hazards at the construction sites, risk analysis and appropriate response. To this end, an innovative approach has been pursued to combine OSH aspects together with ICT solutions and Building Information Modelling (BIM). This approach will be validated within the Smart Safety of Workers (SSW) pilot in the context of the ASSIST-IoT H2020 project.

ASSIST-IoT aims at designing, implementing and validating an open, decentralized reference architecture, associated enablers, services and tools, to assist human-centric applications. Therefore, it is based on a tight interdisciplinary cooperation between various stakeholders, which, in the case of the SSW pilot, includes end-users (a construction company), research institutions (dealing with OSH, ICT and Next Generation IoT aspects), as well as technology providers.

Within the project, based on the analysis of the construction sector OSH-related

The Assist-IoT project has received funding from the European Union’s Horizon 2020 research and innovation programme under Grant Agreement No. 957258



needs, several issues to be solved have been identified, namely: supervision over various subcontractors; supervision over access/entrance authorization; interactions between humans, tools and heavy machines; falls from height; exposure to changeable environmental conditions (including UV radiation and high ambient temperature), dynamic escape routes, potential health issues, proper use of PPE etc. This presentation will showcase the progress beyond state-of-the-art solutions that will be achieved through the ASSIST-IoT approach to the identified OSH-related issues in the construction sector.

**Annette Nylund**

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Swedish Agency for Work  
Environment Expertise



**Bio sketch**

Annette Nylund, Philosophy Lic. in industrial economics and management, KTH; and doctoral studies in work science at Luleå Technical University; and advanced courses in economics and methodology as well as in political science at Stockholm University. Senior analyst at the Swedish Agency for Work Environment Expertise (SAWEE) since 2019. Earlier senior analyst at the Swedish Work Environment Authority Statistics/analysis; before being a senior analyst at Statistics Sweden National Accounts; and project leader/analyst at Institute for Growth-Political Studies, ITPS Department of Policy Intelligence; as well as project leader/analyst in Business Policy Analyses at the Swedish National Board for Industrial and Technical Development, Nutek.

**“The good work” drives innovation and productivity**

This study shows that “the good work” has a significant, positive direct impact on innovation and productivity, as well as an indirect effect on productivity. Good work is measured here through indicators based on human resource management (HRM) focusing on organizing the work and learning at work. The definition is in line with the Swedish Work Environment Act. Theories about innovation and productivity emphasize that proper HRM drives innovation which promotes productivity. Results are based on a telephone- and online survey carried out by the Swedish Work Environment Authority in the winter of 2015/2016. Questions were posed to the management of Swedish companies. The survey data are combined with register data on company structure, personnel and level of employees’ education, and innovation data. Response analysis shows that the participating companies represent the private business sector in the Swedish working life appropriately. About 1000 companies, with a 53 percent response rate, are included in the analysis. In general, the HRM suffers from both a lack of standardized data and theory about the process within the company and the impact on the company. Information about HRM is not mandatory for the company to provide to the national accounts, so the economic development cannot be fully described. Neither can the importance in terms of good working conditions for the employees be fully described. This study contributes with new operationalized indicators for organizing the work and learning at work based on company HRM practices-bundles. The data follow the EU Meadow Guidelines and the construction of new indicators follows the joint guideline for composite indicators by EU and OECD. The indicators

are validated by factor- and regression analyses, examining the implications of HRM on innovation and productivity contributing to the theory on the good work and learning at work as part of the innovation process in applied HRM and organizational economics.

**Keywords:** Individual learning, learning at work, participation, structural learning, the Swedish Work Environment Act, organising the work

### “Swedish companies’ work environment routines during the Covid-19 pandemic - a snapshot”

In general, companies in the service sector have undertaken telework as a work environment routine to a larger degree than companies in the manufacturing sector during the coronavirus pandemic in Sweden. The manufacturing companies undertake to a high degree limited work environment routines such as better hand hygiene and keeping distance in the company’s premises. Results are based on an online survey carried out by the Swedish Agency for Work Environment Expertise in the autumn of 2020 with questions asked to the management of Swedish companies. The survey data are combined with register data on company structure, personnel and level of employees’ education. Response analysis of the survey shows that the participating private companies represent the total share of this sector in the Swedish working life appropriately. Nearly 3000 companies are included in the study, with a 43 percent response rate. A basic assumption in the work environment is that the nature of industrial production drives the ways of work environment management. The survey in combination with register data shows that the specific characteristics of industry production only partly drive the adoption of different work environment routines during the pandemic. The result is significant, to a high degree of trustworthiness. Teleworking as a work environment routine is to a large degree driven by company size-class; the smaller size-class the higher is the proportion of companies using the routine. Also, the age and the gender of the workforce drive the teleworking routine; the younger people and the higher degree of women in the company the larger is the proportion of companies undertaking the teleworking routine. The imposition of several work environment routines is to a lesser degree driven by the different industries’ production during the pandemic. Manufacturing and the service industries show different patterns; the part of manufacturing that does not count as knowledge-intensive contributes to the use of several different work environment routines, but among the service industries it is the knowledge-intensive service industries that contribute to the use.

**Keywords:** pandemic, industry production, teleworking, work environment routines, service sector

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#### Bio sketch

Aude Cuny-Guerrier is researcher in ergonomics at the French Research and Safety Institute for the Prevention of Occupational Accidents and Diseases. Her topics of interest are the prevention of musculoskeletal disorders and psychosocial risks in a variety of occupational sectors. She works more specifically on conditions supporting line-managers' involvement in health and safety and consequences of the use of new technologies at work.

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#### Bio sketch

Marjorie Pierrette is researcher in Social Psychology at the French Research and Safety Institute for the Prevention of Occupational Accidents and Diseases. Her research focuses on prevention of psychosocial risks and musculoskeletal diseases in various occupational sectors. She works more specifically on the use of new technologies and the impact on employees and work organisation.

### "Impact of COVID-19 pandemic on nursing home care workers: health and working conditions"

Healthcare professionals in nursing homes, such as healthcare assistants, nurses and nurse managers are concerned with professional physical and psychological exposure leading to musculoskeletal diseases, stress, burnout, etc. New questions emerged on potential adverse effects on care workers health during the international COVID-19 pandemic associated with contamination risk and working changes. The aims of this study are to measure the perceived health of French nursing home healthcare assistants, nurses and nurse managers during the pandemic and to identify working conditions strongly associated with. From October to December 2020, an online survey with 121 questions was distributed via social media and professional networks

to these healthcare professionals. We analysed 458 questionnaires. Among the total of respondents, 69% report cases of COVID-19 among residents and 83% among employees. The average global health was “medium” with a score of 2.9 out of 5 (SD 0.76). Among participants, 22% were in “good” health; “medium” for 50% and “critical” for 28%. 50% of participants estimated their overall health worse than before the pandemic, 48% their physical health, 57% their moral and 58% their stress level. There were no differences taking into account the profession, the age or the experience. Nevertheless, the predictors of global health differed by profession. These are strongly linked to specific occupational activities. Indeed, healthcare assistants, the most distant of top decisions and medical training, perceive a lack of information and training about ways to protect themselves from the virus. For nurses, the factors are strongly related to the relationship with residents. For nurse managers, who organise and manage staff activities, the factors appear to be related to difficulties in implementing multiple and time-critical protocol adjustments and to coordinate them with members of their staff. They seem to suffer more from the lack of recognition from the public as a whole.

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### Bio sketch

I am a Lebanese, French researcher with multilingual and intercultural professional experiences interested in the role of small molecule metabolites in driving biology. I obtained my PhD thesis in analytical sciences and metabolomics in 2017 from INRA-AgroParisTech, Paris-France. My PhD was focused on the detection of metabolic disruptions induced by exposure to pollutants using an HRMS instrument in combination with chemometric tools. After my PhD thesis, I pursued my postdoctoral studies at Aix-Marseille University to detect a metabolomic signature of uranium contamination. In January 2020, I started a new postdoctoral research in metabolomics epidemiology, focusing on the link between early life metabolism and the onset of respiratory diseases using the Swedish BAMSE cohort at Karolinska Institutet, Stockholm-Sweden. Since June 2021, I am working at the INRS, Nancy-France in the field of human biomonitoring of multiple exposure to chemicals which I have found particularly interesting and important for occupational safety and health programs.

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### “Non-targeted screening as an innovative tool for human biomonitoring of multiple exposure to chemicals in occupational health”

The knowledge of all possible exposures to chemicals and toxic products of employees is essential for improving the risk assessment for occupational health. However, the preventive measures adopted to reduce such risks are in general based on the measurement of a single chemical product, or a selected panel of predefined compounds having similar physicochemical properties [1]. These targeted approaches will be always limited by the number of known and predefined compounds/metabolites. The latter approaches are not suitable for running analyses dedicated to workers exposed to several occupational substances, which is the most common exposure scenario at workplaces. Indeed, it is noticeable that a combined or mixed exposures may have different effects compared to what would be expected from an individual chemical substance [2]. Therefore, enhanced efforts and development of more suitable approaches are needed for evaluating the health effects of the multiple exposure on workers' health.

In our opinion, the most appropriate human biomonitoring is the non-targeted screening (NTS) metabolomic approach for detecting biomarkers of exposures and their related early biological effects. The NTS approach aims to detect as many molecules

as possible to generate patterns representative of the complete metabolome without any prior hypothesis regarding the detected metabolites. Such an approach enables feature-based group classifications and the discovery of unknown metabolites. The recent development in metabolomics by liquid chromatography coupled to a high-resolution mass spectrometry (LC-HRMS) instrument provides strong insights in such context. HRMS is characterized by yielding thousands of features defined by mass-to-charge ( $m/z$ ) ratio and retention time (RT).

Non-targeted metabolomic approaches have proved their effectiveness for health monitoring in different fields of research (e.g., toxicology and nutrition [3], chemical food safety [4], epidemiology [5]). Many studies showed the interest in the non-targeted metabolomic approach in the health research field to obtain clinical phenotypes such as the characterization of a metabolic transitory pre-diabetic phase which can precede severe alterations of metabolism [6].

This approach can be very useful for occupational safety and health programs in which the complete metabolome from each worker would be acquired allowing the identification of occupational chemicals of concern. In addition, a posteriori investigation could be carried out at any time allowing to answer any questions straightaway without investigating in factories again. For example:

What substances the workers are exposed to? During a specific period, which new molecule could be considered of interest? Can we observe any discrimination between the different samples?

The non-targeted screening (NTS) metabolomic approach is definitively a prevention tool.

#### References

- [1] J. Zheng, L. Zhang, M. Johnson, R. Mandal, D.S. Wishart, Comprehensive Targeted Metabolomic Assay for Urine Analysis, *Anal. Chem.* 92 (2020) 10627–10634. doi:10.1021/acs.analchem.0c01682.
- [2] F. Clerc, N.J.H. Bertrand, B. La Rocca, Taking multiple exposure into account can improve assessment of chemical risks, *Ann. Work Expo. Heal.* 62 (2018) 53–61. doi:10.1093/annweh/wxx086.
- [3] A. Paris, J. Sébédio, E. Pujos-guillot, La métabolomique : un nouvel outil en nutrition et toxicologie, (2009).
- [4] B. Habchi, A. Kassouf, Y. Padellec, E. Rathahao-Paris, S. Alves, D.N. Rutledge, et al., An untargeted evaluation of food contact materials by flow injection analysis-mass spectrometry (FIA-MS) combined with independent components analysis (ICA), *Anal. Chim. Acta.* 1022 (2018) 81–88. doi:10.1016/j.aca.2018.03.042.
- [5] N. Bonvallot, M. Tremblay-Franco, C. Chevrier, C. Canlet, C. Warembourg, J.P. Cravedi, et al., Metabolomics Tools for Describing Complex Pesticide Exposure in Pregnant Women in Brittany (France), *PLoS One.* 8 (2013) e64433. doi:10.1371/journal.pone.0064433.
- [6] M. Lucio, A. Fekete, C. Weigert, B. Wägele, X. Zhao, J. Chen, et al., Insulin sensitivity is reflected by characteristic metabolic fingerprints—a Fourier transform mass spectrometric non-targeted metabolomics approach., *PLoS One.* 5 (2010) e13317. doi:10.1371/journal.pone.0013317.

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**Bio sketch**

Occupational psychologist, active in the prevention department at AUVA since 2012, responsible for vocational training and occupational psychology issues.

Areas of expertise: Psychosocial risks, soft skills, online training.

**Christian Schenk**

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**Bio sketch**

Mechanical engineer, working for 28 years in the prevention department at AUVA. Head of vocational training at AUVA, quality manager for the certification of competence of persons. Areas of expertise: Competence development, workplace assessment, Machinery Safety.

**“Competence of Safety Technicians - Attitudes, Beliefs & Behaviour”**

The notion of competence goes beyond the notion of qualification and describes the mental or physical disposition to self-organization. A competent person can act self-organized, is able to take independent action, control and adjustment measures and is able to define desirable goals and outcomes.

For being able to assess the gain of competence of the trainees in our Safety Technician courses a questionnaire was developed in order to evaluate the competence status when starting the course and when finishing it. A third questionnaire six months after the course provides information about applicability of our defined learning goals in the job as Safety Technician.

The output of the questionnaires renders the possibility to track down the development of persons in the defined fields of competence, detecting possible flaws and shortages in our courses.

So far, the evaluated data from more than 200 questionnaires provided the first well-founded findings about the development and changes in attitudes, believes and behaviour of Safety Technicians.

**Benedikt Thomas**

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**Bio sketch**

After my Bachelor's degree in Forensic Science, which I completed with an internship in the forensic toxicology institute, I focused on instrumental analysis in the GMP environment during my Master's degree in analytical chemistry and quality assurance. The M.Sc. was completed with a practical phase in a pharmaceutical contract laboratory working under GMP. Today I am working as a scholarship holder at the Institute for Occupational Safety and Health of the DGUV and researching topics relevant to occupational safety and health with a focus on air sampling and analysis.

**"Air to go – air canister as sampling devices for highly volatile and reactive substances in occupational air"**

Substances such as n-hexane, ethylene oxide and butadiene have a potentially carcinogenic and/or genotoxic effect. The sampling of such highly volatile, low molecular weight and sometimes very reactive substances often proves complicated in practice. The sample collection on adsorbent tubes can lead to breakthrough of the analytes. When collecting in gas sampling bags, the biggest pitfall is the required inertness of the bag in order to store gas samples over a longer period with as little loss as possible.

The canister sampling offers a sampling opportunity, as the canisters are evacuated prior to sample collection and the actual sampling takes place through a pressure gradient and a mass flow controller. This enables pump- and thus voltage-free, time-integrated sampling at the working or measuring site for periods ranging from a few minutes up to 24 hours. In particular, the focus lays on the implementation of the canister sampling methodology in the occupational safety environment.

Canister sampling methods are currently not implemented at the IFA, so a GC-FID and SIFT-MS method is set up to enable the separation of the partly isomeric substances and the quantification of the small and reactive molecules. The SIFT-MS device offers the chance for direct measurements of unprocessed air samples and functions as a threshold indicator for workspaces due to the detection of potentially harmful concentrations of target substances in real time. The former establishment of a high-performance dynamic test gas line has already made it possible to instrument a uniform sample filling of the various canisters for calibration and test purposes.

The prospect of the project is to establish canister sampling as a standard sampling method in German occupational health and safety when dealing with very reactive and/or low molecular weight gases.

**Chris Keen**

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**Bio sketch**

Chris is an occupational hygienist with over 30 years' experience in assessing and controlling workplace health risks. She has worked across the breadth of industry, from the major hazards sector to construction, manufacturing and agriculture. Chris is technical lead for occupational hygiene in HSE's Science Division and is currently president-elect of the British Occupational Hygiene Society.

**"The role of environmental assessment in the workplace; COVID-19 outbreak investigation to understand SARS-CoV-2 transmission"**

SARS-CoV-2 is a highly transmissible novel virus that has caused the COVID-19 pandemic. Evidence is required to support effective mitigation strategies. Existing evidence has shown that the virus can be transmitted through three routes: person-to-person, in the air; and on surfaces. However, their relative importance is not yet understood. It is also unclear how environmental conditions can alter the dynamics of the virus transmission.

The COVID-OUT (COVID-19 Outbreak investigation to Understand Transmission) study aims to understand SARS-CoV-2 transmission routes, transmission risk factors, and the role they play in COVID-19 outbreak in workplaces. This study is part of the UK COVID-19 National Core Study (NCS) on Transmission and the Environment. The study has a series of field studies to investigate outbreaks in a range of workplaces. Each field study has serial measurements of workers and the work environments. Environmental assessment is an essential component of the study. Its data can be combined with epidemiological and laboratory data to generate hypotheses of the causes of an outbreak and can also be used to support simulation models to characterize the relative contribution of transmission routes.

The field study is led by a team of occupational hygienists from the Health and Safety Executive (HSE) who work closely with epidemiologists, public health investigators, microbiologists, environmental exposure specialists to ensure critical data are collected and findings are interpreted appropriately. Occupational hygienists are skilled in assessing physical, chemical and biological hazards in workplace settings. They are equipped with established tools and frameworks for assessing risks of various hazards which can be adapted and applied in COVID-19 outbreak investigations. Preliminary findings and lessons learnt will be presented.

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**Bio sketch**

Analytical Chemist & Research Officer at the Department Chemical and Biological Hazards at the Institute for Occupational Safety and Health.

**“Use and advantages of SIFT-MS in proficiency testing and method development at a dynamic test gas facility”**

Quantification of harmful substances in workplace environments is a topic of huge interest. For quality assurance purposes, the IFA provides proficiency testing schemes for various hazardous substances at its dynamic test gas facility. Due to continuous improvement, new online analytical methods have been established. By using SIFT-MS, the quantitative real-time analysis of all currently used substances in IFAs test gas facility is possible. Furthermore, SIFT-MS is successfully applied in the development of a new dosing system. Results of the validation process and comparison to other offline- and online-methods will be presented.

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**Bio sketch**

- 2011-2014: Bachelor: Forensic Sciences (University of Applied Sciences Bonn-Rhein-Sieg, Germany)
- 2014-2016: Master: Analytical Chemistry and Quality Assurance (University of Applied Sciences Bonn-Rhein-Sieg, Germany)
- 2016-2019: PhD (Dr. rer. sec.): School of safety engineering (Issue: "Discussion of the ratio between inhalable and respirable dust fractions and their constituents in a range of working areas"; University of Wuppertal, Germany)
- From 2019 research officer at the section metal analysis of IFA, DGUV

**"Determination of a conversion function for the inhalable and respirable dust fraction of nickel and cobalt concentrations"**

Nickel and cobalt are two of the most commonly used elements in different industrial sectors. At different workplaces, the exposure to these metals can be high and known occupational diseases range from allergic reactions to the hard metal disease and primarily different forms of cancer. In the past in many cases, only one fraction e. g. inhalable dust was measured. For retrospective assessment, such as investigations on occupational diseases for example, it remains problematic, if only data for nickel or cobalt in one dust fraction, e. g. inhalable dust is available. To evaluate historical data, e. g. for epidemiological studies, a possibility to estimate nickel or cobalt from inhalable dust is highly desirable. It was possible to extract 551 pairs of parallel measured nickel concentrations in respirable and inhalable dust and 639 pairs of parallel cobalt measurements from the exposure database MEGA. These pairs were divided into working activity groups: 'surface treatment', 'high temperature processing', 'filling/transport/storage', 'machining/ abrasive techniques' and 'forming'. Based on these groups, task specific subgroups are formed, such as 'welding' or 'grinding'. In each group, the measured concentrations are transformed by the natural logarithm ( $\ln$ ) and processed by linear regression analysis. The results are conversion functions for each group with confidence intervals (95%) and quality measures of the chosen model. These functions are with one exception not linear, meaning that it is not possible to calculate the amount of nickel or cobalt from inhalable dust by just one factor: . Where  $C_{inh}$  and  $C_{res}$  are nickel concentrations in respirable and inhalable dust, respectively and  $a$  and  $b$  regression coefficients. The functions can be used for retrospective analysis but should not replace workplace measurements of metal constituents. More working activity groups can be formed, by performing further measurements in future.

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**Bio sketch**

Fabio Boccuni is graduated in Engineering at the University of Rome "La Sapienza" in 2003. At present he is a researcher at the Department of Medicine, Epidemiology, Occupational and Environmental Hygiene (DiMEILA) of INAIL, for which he carries out research on emerging risks for health and safety in the workplace, with particular reference to the assessment and management of risks associated with new technologies and innovative materials. Since 2020 he is part of the DiMEILA working group which carries out activities in support of the Technical-Scientific Committee set up by the Italian Government for overcoming the epidemiological emergency due to the spread of COVID-19. He was speaker at over 30 conferences and seminars of national and international interest in the field of health and safety at work and is the author of over 100 publications including peer-reviewed articles in scientific journals, book chapters, monographs and abstracts for conference proceedings.

**"Assessing the risk of Covid-19 in the Italian workplaces: a methodological approach to guide the reopening strategies"**

Fabio Boccuni, Giuliana Buresti, Diana Gagliardi, Bruna Maria Rondinone, Benedetta Persechino, Antonio Valenti, Sergio Iavicoli

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The work dimension has been recognized as a key determinant in the COVID-19 pandemic. Transmission dynamics have been a substantial challenge for occupational health and several types of working conditions have been reported as putting workers at risk of infection worldwide (1-2). Workers' compensation claims (3), specific surveillance systems (4) or cluster analysis (5) were used as indicators to identify occupational groups at risk for Sars-CoV-2 infection.

INAIL developed a methodology for assessing the risk of SARS-CoV-2 infection in the workplace based on the analysis of the work process, proximity between employees and the potential exposure related to the type of activity. The conceptual model accounted also for the social aggregation connected to the job due to the involvement of third parties in work processes. This methodology allowed building a job exposure

matrix for each NACE activity sector (6) and to classify the activity sectors into four levels of risk (high, medium-high, medium-low, low) (7).

The Italian Government adopted this approach for action-oriented policy to determine priority and interventions on COVID-19 emergency and to assess the impact of the modular reopening of work activities after the first lockdown period in May 2020 (8).

Notably, the proposed risk classification appeared coherent with the distribution by economic sectors of compensation claims for work-related COVID-19 infection received by INAIL during the pandemic (9).

Finally, the estimated “a priori” level of risk by economic sector and the incidence of compensation claims for COVID-19 work-related infection were used as quantitative indicators to prioritize the access to the vaccination program in the workplace, engaging companies and their occupational health services as additional vaccination sites (10-11).

The use of objective indicators and solid epidemiological data allows considering the strategy we used as a starting point in the event of future health emergencies, requiring only the adjustment of few variables to quickly identify economic sectors or jobs at higher risk.

## References

- Marinaccio A, Guerra R, Iavicoli S. Work a key determinant in COVID-19 risk. *The Lancet Public Health*, 2020. 8(11):E1368. DOI: [https://doi.org/10.1016/S2214-109X\(20\)30411-3](https://doi.org/10.1016/S2214-109X(20)30411-3)
- ILO-WHO, 2021. COVID-19: Occupational health and safety for health workers. Interim guidance ILO-WHO 2 February 2021
- Bernacki, EJ et al. 2021. What Industrial Categories Are Workers at Excess Risk of Filing a COVID-19 Workers' Compensation Claim? A Study Conducted in 11 Midwestern US States. *JOEM*, Volume 63, Number 5, May 2021
- Van der Molen HF, Kezic S, Visser S, et al. Occupational COVID-19: what can be learned from notification of occupational diseases? *Occup Environ Med*, oemed-2020-107121R1, 18 Oct 2020
- ECDC, 2020. COVID-19 clusters and outbreaks in occupational settings in the EU/EEA and the UK. Stockholm: ECDC; 10 August 2020.
- INAIL. Documento tecnico su possibile rimodulazione delle misure di contenimento del contagio da SARS-CoV-2 nei luoghi di lavoro e strategie di prevenzione. Aprile 2020. ISBN 978-88-7484-911-5
- Iavicoli S, Boccuni F, Buresti G, Gagliardi D, Persechino B, Valenti A, Rondinone BM. Risk assessment at work and prevention strategies on COVID-19 in Italy. *PLoS ONE* 2021 16(3): e0248874
- Marziano V, Guzzetta G, Rondinone BM et al. Retrospective analysis of the Italian exit strategy from COVID-19 lockdown. *PNAS* January 26, 2021 118 (4) e2019617118.
- Marinaccio A, Boccuni F, Rondinone BM et al. Occupational factors in the COVID-19 pandemic in Italy: compensation claims applications support establishing an occupational surveillance system. *Occup Environ Med* 2020;77:818–821.
- INAIL-MdS-MinLav-Regioni-Commissario, 2021. Indicazioni ad interim per la vaccinazione anti-SARS-CoV-2/COVID-19 nei luoghi di lavoro. 8 aprile 2021. ISBN 978-88-7484-690-0
- INAIL-MdS-MinLav-Regioni-Commissario, 2021. Documento tecnico operativo per l'avvio delle vaccinazioni in attuazione delle indicazioni ad interim per la vaccinazione anti-SARS-COV-2/COVID-19 nei luoghi di lavoro approvate dalla Conferenza delle Regioni e delle Province Autonome l'8 aprile 2021. 10 maggio 2021. ISBN 978-88-7484-694-8

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**TNO** innovation  
for life



#### Bio sketch

Irene Niks is an occupational and organizational psychologist. In 2015, she obtained her PhD degree at Eindhoven University of Technology for research on work stress interventions in healthcare. Ever since, she has been working on various research and consultancy projects in the field of occupational health. Her topics of expertise include work stress, workplace wellbeing, recovery from work, and sustainable employability.

#### “Just-in-time adaptive interventions for dealing with (work) stress”

A just-in-time adaptive intervention (JITAI) “is an intervention design aiming to provide the right type/amount of support, at the right time, by adapting to an individual’s changing internal and contextual state” (Nahum-Shani et al., 2018, p. 1). In other words, the goal of JITAI is to address the changing needs of individuals for support. JITAIs are increasingly used to promote health behaviour change (Carpenter et al., 2020; Nahum-Shani et al., 2018).

We developed a JITAI-prototype aimed at supporting health care professionals in managing their daily work stress. This prototype operates in a smartphone application (How-Am-I-app). At the end of each working day, the app prompts the user to fill in a short questionnaire on stress, workload, and context-related factors. Immediately after this assessment, the developed algorithm results in personalized feedback and provides the user with suitable tips on dealing with work stress.

The prototype has not been tested in practice yet. However, the prototype is based on another JITAI smartphone application that has shown promising results, the so-called Stress Autism Mate (SAM). SAM was developed to support persons with autism spectrum disorder in managing their daily stress levels. SAM provides users with direct feedback on their stress levels, personal tips to reduce their stress, and insight in their individual stress patterns by providing statistics.

In the presentation we will illustrate the potential of the JITAI-prototype by showing results of SAM. Also, we will reflect on lessons learned and future challenges for other JITAIs aimed at reducing (work) stress.

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**Bio sketch**

Prof. Guseva Canu is head of Academic sector of the Department of Occupational and Environmental Health at Unisanté. She is occupational epidemiologist and toxicologist and leads several multidisciplinary research projects focused on the exposure and health effects of engineered nanomaterials, indoor air exposure to fine and ultrafine particles, and since recently, on the workers' mental health and occupational burnout.

**“Respiratory Disease Occupational Biomonitoring Collaborative Project (ROBoCoP): protocol and first results”**

The ROBoCoP project is focused on chronic obstructive pulmonary disease (COPD) biomarker development and validation. It encompasses a pilot study followed by a field study at Parisian underground subway. The pilot study is a longitudinal exposure assessment and biomarker study aiming at: 1-understanding the suitability of the candidate biomarkers in surveying populations exposed to COPD causing agents; 2-determining the best sampling plan with respect to the half-life of the candidate biomarkers; 3-implementing and validating the sampling procedures and analytical methods; 4-selecting the best suitable biomarkers to be measured in the field. Nine participants were surveyed during the 6-8h work-shifts for two consecutive weeks. The field study comprises implementation research aimed to demonstrate the applicability of the standardized protocol for biomarker measurements in occupational settings and to assess the biomarkers' validity. This research includes 303 underground subway workers randomly selected from the personnel registry. We measured particulate matter (PM) exposure, exposure biomarkers and a series of effect biomarkers in exhaled breath condensate (EBC) and urine. The pilot study results on exposure and biomarkers of nitrosative and oxidative stress will be presented.

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### Bio sketch

Jari Hakanen is a Research Professor at the Finnish Institute of Occupational Health and a docent in social psychology in the University of Helsinki. His areas of expertise include positive work and organizational psychology and occupational health psychology with special interests in e.g. the job demands-resources model, work engagement, burnout, servant leadership, job crafting, and work-family interface. He has developed and implemented several positive interventions in organizations to enhance work engagement, proactive behaviours and servant leadership.

### “Changes in Employee Wellbeing in Finland Before vs. During Covid-19”

At the Finnish Institute of Occupational Health, we launched two longitudinal research projects – one in the general working population and the other in seven organizations – three months before the outbreak of COVID-19. Thus far we have followed up the general population sample three times and the organization sample once. I will give an overview (1) how employee well-being (work engagement, burnout and job boredom) both among teleworkers and non-teleworkers has changed after the outbreak of COVID-19, (2) for which demographic groups changes in well-being have been more prominent, and (3) to share some findings, for example on the changing reciprocal relationships between organizational work characteristics: justice, organizational identification and job insecurity and employee-being. Overall changes in employee well-being in the general working population have fluctuated over time but the differences after one year of the pandemic compared to the baseline before the pandemic, are quite modest. The challenge seems to be more in preventing boredom at work than in burnout.

### Jean-Jacques Atain-Kouadio

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#### Bio sketch

Jean Jacques is an expert in assistance at INRS for 15 years, specialising in MSDs and new technologies. He has been working for more than 7 years on exoskeletons in close collaboration with the physiologists and ergonomists of the INRS exo group and with experts involved in occupational risk prevention and companies

### Liên Wioland

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#### Bio sketch

Li en is an ergonomist Phd and has been in charge of studies at INRS for 20 years. In recent years, her activity has been mainly dedicated to the issue of acceptance of new technologies such as exoskeletons and collaborative robots

## “Integration and deployment of exoskeletons in companies: points of vigilance”

Jean Jacques Atain Kouadio, Li en Wioland, Hugo Br eard, Ana is Ferry, Kevin Desbrosses

Currently, despite the development of automation and mechanisation, physically demanding tasks are still present in many work situations. Physically demanding tasks are known to expose workers to significant biomechanical constraints, which constitute risk factors of musculoskeletal disorders (MSDs), which have long been recognised as the most frequent occupational diseases. To deal with this, companies are now experimenting new preventive approaches such as the use of exoskeletons.

These new technologies can be defined as external structures, worn by the operator, designed to provide physical assistance in carrying out a task. An exoskeleton can

be 'active' when it is operated by a robotic system and 'passive' when it operates by mechanical energy release (e.g. through spring systems or elastic bands).

The introduction of this type of device constitutes a major technological breakthrough which raises questions and may destabilise companies wishing to have exoskeletons as part of a prevention project. This observation is partly linked to the lack of knowledge on the reality of the repercussions of the integration of an exoskeleton in a company. In this context, a multidisciplinary team from INRS carried out several interventions with a company specialised in construction and maintenance of road infrastructure during its national deployment project for a robotic exoskeleton. These interventions concerned the identification of the effects of the introduction of the robotic exoskeleton on the work activity of the users, on the team but also on the organisation of the company. Furthermore, it also appeared that users reacted in very different ways to the exoskeleton (some adopted it, others refused to use it). The question of acceptance of this type of technology was therefore also addressed. The results of these different interventions have produced knowledge of the effects of introducing exoskeletons, the steps to be taken to integrate and deploy them in companies. From the point of view of occupational risk prevention, points of vigilance were identified from the integration phase of these devices to their deployment.

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#### **Bio sketch**

Dr Joanna Kamińska works at the Central Institute for Labor Protection - National Research Institute. Her main scientific interests include ergonomics, analysis of the musculoskeletal system load, eye-tracking, as well as adapting the workplace to the needs of disabled people. She has given lectures on ergonomics at postgraduate studies, during social campaigns and at periodic trainings.

#### **“Influence of acoustic conditions in the mental work environment on visual perception and psychosocial load”**

Exposure to noise in the office work environment is one of the factors that can affect workers' ability to concentrate, cognitive abilities, number of errors made, productivity and comfort. The aim of the study was to determine the effects of acoustic conditions in the mental work environment on visual perception and psychosocial load.

The study was conducted on a group of 11 people aged between 26 and 34 years. The following variants of acoustic stimulus testing were selected: Variant W1 - No presentation of acoustic stimuli; Variant W2 - Sounds of office equipment; Variant W3 - Sounds of office equipment with quiet conversation in Polish; Variant W4 - Sounds of office equipment with loud conversation in Polish; Variant W5 - Filtered pink noise. The analysis of the results of the subjective assessment of acoustic conditions carried out after each variant of the study showed that there are significant differences in visual perception and psychosocial load.

Analysis of the results of subjective assessment (according to the Grandjean Scale) showed the deterioration of mood and increase of fatigue after each variant. However, it can be noted that the subjects rated their performance highest in W3 variant. On the other hand, the greatest decrease in concentration was observed for W4 variant.

The results of the individual scales of the NASA TLX questionnaire indicate that the subjects rated highly psychosocial load (values were similar for all study variants) and time pressure (the lowest value was observed in W3 variant).

Preliminary analysis of the results of eye-tracking indicates that the trends of changes in the values of maximum and mean saccadic velocity seem to be similar to the

subjective feelings of the participants. When reading the presented text, the highest values of saccadic velocity and fixation time were observed for W4 variant. This may indicate that reading comprehension may be most difficult under these conditions, as the aforementioned parameters indicate greater perceptual load.

**Jodi Brookes**

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**Bio sketch**

Jodi is a Health Exposure Scientist working within HSE's Health Capability Group. Before working here she undertook a collaborative PhD with HSE and Sheffield Hallam University in Bioanalytical Science. This was titled "Identifying biological and chemical hazards in water-mix metalworking fluids and their mists". This was focused on looking at contaminants/components of metalworking fluid that could cause allergic respiratory conditions seen in machine operators who use metalworking fluid. To date, it remains unclear as to what component or contaminant of the metalworking fluid is the cause for such conditions. Since completing her PhD in 2017, she has been involved in continued research in this area and the application of new technologies to try to determine the causes of ill health from metalworking fluid exposure.

**"Understanding risks for exposure to microbial biohazards in metal working fluids (MWF)"**

**Background**

Contact and inhalation of metal working fluids is associated with occupational skin and lung disease. This is a historic problem associated with neat oil lubricants and the introduction of water-based oil emulsions lubricants used for machining work. Asthma and hypersensitivity pneumonitis are the more commonly reported allergic conditions in machinists. Used water-mix MWFs contain many potentially hazardous contaminants including soluble metal ions, fine metal particles, tramp oil, and micro-organisms. Published investigations have proposed that inhalation of micro-organisms and microbial toxins is a likely cause of respiratory inflammation and allergy.

**Problem**

Methods to investigate microbial hazards in MWFs have remained largely unchanged in the last few decades. They include culture-based methods for viable microorganisms and the use of genetic probes to identify the specific organisms. However, the adequacy of these methods is questionable. Bacteria that grow and adapt to MWFs, when transferred to laboratory culture conditions may not grow with a small percentage of different bacteria in a MWF growing successfully under laboratory conditions. The use of targeted genetic probes may also require an assumption about the bacteria that are present in the MWF. The consequence is that pathogenic bacteria in MWFs may be missed and information about other organisms they associate with, termed the 'microbiome', may also be missed.

### New approaches

To address these shortcomings the HSE Science laboratory has been using next generation DNA sequencing (NGS) of a region of bacterial DNA that is variable and allows distinction of many different bacteria. This method allows each type of bacteria to be identified in comparison to published DNA sequence data. The NGS method has the potential to improve our knowledge about the types of bacterial (and fungi) that grow in MWFs and conditions which may favour specific microbiomes that in turn support potentially pathogenic bacteria, such as *Mycobacteria* spp.

A summary will be given about how NGS is helping identify biohazardous organisms, and about how the quality of the MWFs affects the likelihood that hazardous organisms will grow in a lubricant supply system. This study is being supported by members of the UK Lubricants Association (UKLA) Product Stewardship Safety Group. It is part of HSE's shared occupational research programme about reducing ill-health from MWFs.

### Outcomes

The outcomes from this research will feed into updated guidance for machine workshops and build on the UKLA Good Practice Guidance for Managing MWFs that HSE supported.

**Johan Stenmark**

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Swedish Agency for Work  
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**Bio sketch**

My name is Johan Stenmark and I am working as an analyst and project manager at the Swedish agency for work environment expertise. I have been working for the agency for the last one and a half years and before that I worked at the Swedish energy agency. I have also a background in operational development for municipalities and done some work as a resilient consultant. My educational background has an interdisciplinary focus with a bachelor in sociotechnical systems and a Master's in sustainable development.

**“Mapping and Analysis of Conditions for Working from Home during the Coronavirus Pandemic”**

Due to the Corona pandemic around 40% of employees in Sweden have transitioned from working at an office to working from home. This study is based on a review of existing literature followed by interviews with experts and managers/supervisors with experience in transitioning to working from home. The study shows that transition to working from home has led to an individualization and digitalization of the work environment and related measures. While many employees are positively disposed towards working from home due to reduced stress from not having to commute, greater means of concentrating at work and more flexibility in terms of combining work and leisure time, others report ergonomic problems and social isolation. The work environment risks identified by us include: risk for higher stress levels due to technical deficiencies such as inadequate broadband connections and non-functioning hardware and software; increased distance between managers and employees negatively affecting employees who need colleagues to perform their job tasks, or who are less experienced; diminished social contact, less collaboration and poorer teamwork; reduced opportunities for informal chats and social interactions; blurred boundary between work and leisure time. Our study also points at various needs for oversight and adaptation of the existing work environment regulations regarding questions about adjustment of the employer's work environment responsibilities when he/she does not have control over the employee's home; clarification of the employee's responsibility for their own work environment, and the issue of employees' compensation insurance. Among our suggestions are: to enhance employers' ability to engage in systematic work environment management when the workplace is not the office and to enhance employees' competence in terms of how they can adapt their own workplaces to create a good work environment.

**Keywords:** working from home, individualization of work environment, work-life balance

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**Bio sketch**

Jolien Vleeshouwers, PhD, works as an Associate Research Professor at the Norwegian National Institute of Occupational Health (STAMI) – Unit for Systematic Reviews.

**“The relationship between working from home and employee health and well-being and the work environment: A systematic review”**

**Background**

Working from home (WFH) has become the new normal for many, yet research on how this may affect both the physical and the psychosocial work environment are sparse. In order to understand the effects that working from home may have on the working environment and employee health this systematic literature review aims to identify, evaluate, and summarize the findings of all relevant individual studies on the topic of WFH.

**Methods**

A systematic literature review. Searches conducted in MEDLINE, Embase, Amed, PsycINFO, PubMed and resulted in 3354 publications. Preliminary and full-text screening assessed independently by at least two reviewers resulted in 53 peer-reviewed original studies following predetermined inclusion- and exclusion criteria to be included in the present review. Fifteen individual work environment outcomes and 5 employee health outcomes were studied. Risk of bias assessed via NOS and quality of overall evidence via GRADE.

**Results**

Limited evidence to support effects of WFH on the included work environment and employee health outcomes. GRADE scores for individual outcome variables range from very low to low.

**Conclusions**

There is a clear lack of research investigating the effects of WFH on the physical and psychosocial work environment and employee health and well-being. In order to suggest WFH guidelines or recommendations, there is a need for quality research within this field.

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**Bio sketch**

- Graduated with a degree in Chemical Sciences.
- Occupational Health and Safety Spanish Institute officer since 1992.
- Expert in Chemical Agents assessment.
- Involved in several International groups (CEN, ISSA)

**“CALCULATOR for the exposure assessment to chemical agents according to the standard EN 689:2018”**

The European standard EN 689:2018 is a reference document for the measurement of exposure to chemical agents at work.

This technical and complex document gives a procedure to demonstrate, with a high degree of confidence, that workers are unlikely to be exposed to concentrations exceeding the OELV.

The INSST has developed a tool “CALCULATOR” that allows the assessment of the workers’ exposure in line with all the requirements of the EN 689 Standard.

This presentation will show how the CALCULATOR works and a case study on exposure to crystalline silica will be presented.

And this tool will facilitate the assessment of exposure to chemical agents. This tool is available through the Institute ([INSST](#)) webpage.

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**Bio sketch**

Navigation and Economics Degree. Former Field Investigator at Spanish Marine Accidents Investigation Branch. MBA, EFQM evaluator and Researcher at INSST.

Managing uncertainty at complex environments in troubled times. How much resilient are we as an organization and how it could be implemented and trained. Dealing with it in practice.

**“Practical tools for implementing organizational resilience engineering case study”  
Case study of Spanish maritime ports from the Port Safety Management perspective**

Once it is considered a system’s capacity to recover from a threat affecting its safety –whether this is expected or unexpected- as a quality to promote, the question is how to achieve such a result. Especially when the system consists of a wide variety of stakeholders who interact and are subject to different interests and cultures.

At a port, the space is shared among administrations: local, national and international, public and private companies: warehouses, maritime, road and rail transports, stowage, brokers, safety and security as well as emergency teams, firefighters, salvage, police ... Through this social and physical environment, the whole production of any type of human activity passes by: industrial (chemical, mechanical, pharma, explosives, any types of goods), mining, agriculture, etc. Each one of them subject to its own requirements and legislation.

The port authority is one of the players in this network and within this presentation we will show some of the proposed relevant practices, methods and analysis tools as well as the preliminary results obtained when implementing resilience management techniques adapted to this environment (Kpi-osh tools, Darwin Project from European Union’s Framework Programme Horizon 2020, RAG, etc.)

These tools deconstruct the concept of generative resilience leading to a better reappraisal of safety management policies and practices where a safer behaviour tries to be fully integrated in the organization. For achieving it, the focus is based on the ability to respond of the system, the ability to monitor its own performance, the ability to anticipate the future (events, conditions or state changes leading to a threat), its ability to learn (considering both positive and negative past performances) and finally the interactions and resonance among different stakeholders and its trade-offs.

**Julia Linke**

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**Bio sketch**

After finishing my Bachelor's degree in forensic sciences, analytical chemistry became my scientific field of choice. Thus, I completed my Master's degree in analytical chemistry and quality assurance, focusing on environmental chemistry with my Master thesis at the Fire Brigade Cologne. My Master studies also led me to the field of occupational safety and health, in which I have started my Ph.D. project in December 2020.

**"Analysis of the 16 EPA priority PAHs and beyond – which works better, GC or HPLC?"**

Polycyclic aromatic hydrocarbons (PAHs) are a class of compounds that have been analysed in the environment, in foodstuff and in workplaces for decades. Due to their carcinogenic properties, they can be the source of a number of occupational diseases such as skin, lung or bladder cancer. PAHs occur at several different workplaces, e. g. coking plants, tar distilleries and carbon electrode production plants.

The U.S. Environmental Protection Agency (EPA) has established a list of 16 priority PAHs, which are commonly analysed. However, in recent years, studies suggested that the total carcinogenic risk of a PAHs mixture is not entirely represented by the 16 so-called EPA PAHs. Especially high-molecular weight (HMW) PAHs pose a higher carcinogenic threat than their low-molecular weight (LMW) congeners. While GC is the method of choice for the (mostly) LMW PAHs included in the EPA list, the question arises whether it is still the best method if an extension of the list with emphasis on HMW PAHs is pursued.

The comparison of a GC and an HPLC method for the analysis of 34 different PAHs with molecular weights between 128 and 302 Da is the objective of this project. Both methods are geared to currently employed sample preparation techniques to ensure practicability and easy adaptation into routine analysis. Method parameters such as limit of quantification, recovery and resolution are compared for the two systems to determine which analytical system is most suitable for the analysis of the EPA PAHs as well as the PAHs that are not included yet.

**Karen Oude Hengel**

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**TNO** innovation  
for life



**Bio sketch**

Karen Oude Hengel is occupational epidemiologist and senior researcher at TNO. She is involved in many projects focusing on the interplay between work and health, with a specific interest in socioeconomic health inequalities. Since 2021, she is the project leader of a Dutch cohort study measuring the impact of the Covid-19 pandemic on workers.

**“Exposure to a SARS-CoV-2 infection at work: development of an international Job Exposure Matrix (COVID-19-JEM)”**

**Introduction**

Workplaces are one of the key settings in the spread of SARS-COV-2 infections. A job-exposure matrix (JEM) is a common tool to classify job titles by degree of occupational exposure to a potential health hazard in epidemiological studies. Within this study, a COVID-19-JEM was developed.

**Methods**

Experts in occupational epidemiology from three European countries (Denmark, the Netherlands and United Kingdom) defined the relevant exposure and workplace characteristics with regard to possible exposure to the SARS-CoV-2 virus. In an iterative process, experts rated the different dimensions of the COVID-19-JEM for each job title within the International Standard Classification of Occupations system 2008 (ISCO-08). Agreement scores, weighted kappa's, and explained variances are estimated.

**Results**

The COVID-19-JEM contains four determinants of transmission risk (number of contacts, nature of contacts, contaminated workspaces and location (indoors or outdoors)), two mitigation measures (social distance and face covering), and two factors for precarious work (income insecurity and proportion of migrant workers). Agreement scores ranged from 0.27 (95%CI 0.25;0.29) for 'migrants' to 0.76 (95%CI 0.74;0.78) for 'nature of contacts'. Weighted kappa's indicated moderate to good agreement for all dimensions (ranging from 0.60 (95%CI 0.60;0.60) for 'face covering' to 0.80 (95%CI 0.80; 0.80) for 'contaminated workspaces'), except for 'migrants' (0.14 (95%CI -0.07; 0.36)). Explained variance at job group level was between 95%-100% for all dimensions. Due to some between-country differences, the COVID-19-JEMs also has a country-axis.

### Conclusions

The COVID-19-JEM assesses eight dimensions related to SARS-COV-2 infections at work, and is a valuable tool for epidemiological studies. Additionally, the dimensions of the COVID-19-JEM could also fit other future communicable diseases at workplaces.

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#### **Bio sketch**

M.A., researcher and assistant in the Department of Ergonomics, Central Institute for Labour Protection – National Research Institute, Warsaw, Poland. Main interests include psychosocial and health determinants of professional and social activity among people with disabilities, work–life balance, learning and willingness to learn among older workers.

#### **“Using new technologies at work and in life by people with intellectual disability”**

New technologies, especially information and communication technologies, are perceived as those which can reduce social and physical barriers. For people with intellectual disability new technologies are sometimes the only way to improve dysfunctional areas (e.g., cognitive skills, motor skills). People with intellectual disability see them as an opportunity to improve their own functioning. Motivation to use mobile applications among people with intellectual disability is the same as motivation to use these applications among people without disabilities. Using these improve such competencies as independence, efficiency, subjectivity, but also responsibility or attentiveness. Information and communication technologies allow this group to establish contact with others, achieve personal goals but also to organize everyday life, participate and integrate into society. The use of assistive technologies is also a way to improve the productivity of people with intellectual disabilities. Own research shows that people with intellectual disability in daily life use mainly mobile phones rather than computers or tablets. They learn how to use these devices mainly with the support of family and friends. Simple instruction, good explanation but also pictograms, pictures and illustrations help people with intellectual disability to use mobile devices. A mobile phone is used mainly as a source of entertainment and a way to establish and maintain interpersonal contacts. People with intellectual disability mostly use applications such as instant messaging, banking applications, web browsers, social media, cameras, music players and games. They also indicated that mobile applications can support them in their daily professional activities. It is important to provide support to people with intellectual disabilities in learning to use such technologies (adapting them to their individual cognitive abilities) and to identify opportunities to use them in everyday life.

**Lars Ole Goffeng**

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**Bio sketch**

Research scientist, neuropsychologist at NIOH since 1990, PhD Occupational Medicine. Field of interest: Health effects and prevention of electrical accidents. Nervous system effects from chemical exposure; H<sub>2</sub>S in sewer work, acrylamide in tunnel construction. Nervous system response to physical or environmental burden from an accident risk and health perspective; Shift work/long working hours, diving. Dissemination of scientific knowledge, interface between work-life and science.

**“Acute predictors of long-term health after electrical accidents. An approach aimed at targeting efficient and improved health follow-up”**

**Authors: GOFFENG LO, VEIERSTED KB**

**Background and aims**

Electricity as an energy source is gaining an increasingly dominant place in a modern society, both in general production, transport, and information, with increasing demands for security of supply. Accordingly, professionals in the production and distribution of electricity must be able to do unplanned or complicated repair work at short notice in the event of a power failure. This occurs at a time when climatic conditions more often contribute to power outages, creating challenging working conditions for those in charge of repairing damage to power supply equipment and lines. Accident reporting have increased, presumably without an increase in actual accidents. Nevertheless, health services are becoming pressurized, and the need to differentiate emergency follow-up in the increasing number of power accident victims admitted to hospitals and acute health care, is becoming more important. We present an approach to this topic, from a study where the aim was early identification of prolonged health effect following electrical accidents, and also to identify those not in need of extensive acute treatment and follow-up. Specifically, the aim was to identify aspects of acute exposure, acute health effects and treatment after low-voltage electric accidents that may predict later general health.

**Methods**

Eighty-nine male electricians previously exposed to a low-voltage electric accident constituted a light-arc accident group, and two groups with passage of current through the body, either fixed to the current source (the no-let-go-group), or not (the let-go-

group). The subjects assessed their current general health, and described exposure, acute reactions and symptoms at a health examination 3.9 years (range 2-9) after the accident.

### Results

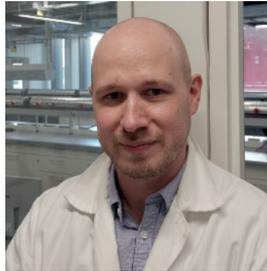
The mean general health at examination was comparable between the exposure groups, while acute reactions and later health problems varied. Acute symptoms beyond the first day after a light arc accident, was associated to later poor general health. After passage of current accidents, acute headache, dizziness, apathy, confusion, bodily numbness or irregular heartbeats, were associated to later poor general health. The no-let-go-group more often reported panic, death anxiety, confusion, exhaustion, bodily numbness, or immediate unconsciousness. A linear regression analysis included background-, exposure-, and injury variables. In the let-go-group, acute confusion, and in the no-let-go-group, time since accident, profound acute headache and bodily numbness, were associated with reduced general health at follow-up.

### Discussion and conclusions

The presentation elaborates and emphasizes that the study and its aims has emerged as a consequence of extensive and continuous contact and cooperation with those involved in production or distribution of electricity, as well as with the extended organizational network surrounding electricians, engaged in accident prevention, or medical treatment when electrical injuries occur. Acute symptoms may predict later reduced general health and should be considered in acute patient assessment. Thorough exposure characterization is important to differentiate patients' need of long-term health follow-up after an electrical injury.

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#### Bio sketch

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- MSc. (2018) - Analytical chemistry with Quality Assurance, University of Applied Sciences, Rheinbach
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#### Bio sketch

Analytical Chemist & Research Officer at the Department Chemical and Biological Hazards at the Institute for Occupational Safety and Health.

### “Method development for hazardous substances (amines and furan) in foundries”

A large number of chemicals are used in foundries or are released during the foundry process. Short-chain aliphatic amines are used as catalysts in the cold box process. Amines are odor-intensive substances, with very low odor thresholds in some cases. Recently, N,N-dimethylpropylamine has been increasingly used, as the odor threshold is higher and thus the odor nuisance to employees can be reduced. The amines used in the above-mentioned process have limit values in the single-digit mg/m<sup>3</sup> range; the limit value of N,N-dimethylpropylamine, for example, is 6.1 mg/m<sup>3</sup>.

Furan resins are used for molding, from which furan is released as a reaction product at high temperatures (>1000°C) during the molding process. Furan is suspected of causing cancer and has a low OEL of 56 µg/m<sup>3</sup>.

Methods are being developed which are capable of quantitatively detecting these recently used substances and ensuring compliance with the limit value. For the amines

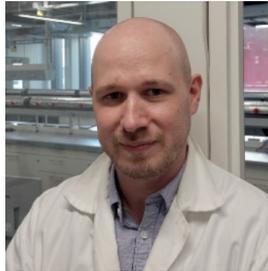
that can be used in the cold box process (N,N-dimethylpropylamine, triethylamine, dimethylethylamine, dimethyl-i-propylamine), an ion chromatographic method is being developed that can quantify the substances down to 0.1 OEL. For the determination of furan, a method of thermal desorption gas chromatography is being developed.

The methods satisfy the requirements of EN 482 and EN ISO 22065. For this purpose, the performance characteristics set out in various standards, such as the minimum measurement range and the expanded uncertainty, are taken into account. The usability of the methods is tested via measurements in foundries. Afterwards the methods are adopted as standard procedures in the measurement system for exposure assessment (MGU).

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**Bio sketch**

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**“Determination of gaseous and particle-bound polychlorinated biphenyls (PCB 47, 51, 68) for workplace air monitoring”**

Polychlorinated biphenyls (PCBs) are a group of 209 related substances (congeners) that differ only in the amount and position of their chlorine atoms. PCBs were mainly used in the past in capacitors and jointing compounds. They were produced as mixtures commonly known as “Aroclor” products.

In Europe their use and production were restricted in 1985. Household and industrial waste disposal still introduce PCBs to the environment, where they can accumulate in the food chain due to their high persistence. The main routes of exposure are through ingestion of contaminated food and direct inhalation of PCBs or airborne PCB containing particles. Established analytical methods mainly focus on the sum of six indicator PCBs (28, 52, 101, 138, 153, 180), which are routinely monitored in food products, for environmental remediation as well as in indoor and workplace air. The occupational exposure limit (OEL) for PCBs in Germany is 3 µg/m<sup>3</sup> in the inhalable and vapour fractions.

Recent findings have shown that during silicone rubber production the use of a chlorinated netting agent (Bis(2,4-dichlorobenzoyl)peroxide) may result in the formation of three tetra-chlorinated PCBs that do not occur in Aroclor-products. The existing method for the analysis of PCB is not suitable for these three congeners alone, therefore a suitable GC ECD method was developed. The method has to satisfy the requirements of the EN 482 and EN ISO 22065. For this purpose, the performance characteristics set out in various standards, such as the minimum measurement range and the expanded uncertainty, had to be taken into account.

The method has been tested at silicone producing factories and is suitable for the determination of the PCBs 47, 51 and 68. It has been adopted as a standard method in the German Social Accident Insurance Institutions’ MGU measurement system for exposure assessment.

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#### **Bio sketch**

Physicist by training, respiratory safety specialist by choice. I'm actively involved in the fields of safety research and environmental engineering, especially in relation to occupational exposure to harmful airborne substances, including bioaerosols and also PPE design, fabrication, and testing with respect to existing hazards and working conditions.

#### **“The importance of proper fit of respiratory protective devices – long-known problems and new technical solutions”**

Consistent and proper use of masks is one of the most important actions everyone can take to reduce their risk of contracting and spreading the coronavirus. Even if not all masks provide the same protection, wearing any mask correctly is better than not wearing a mask at all. Since the coronavirus spreads mainly through respiratory droplets emitted while breathing, coughing, sneezing, or talking, it is essential to cover the nose and mouth entirely and fit the facepiece snugly against the sides of the face to reduce any leakage of those droplets.

In a workplace setting, a face fit test is recommended before the first-time workers use a particular type of respirator to ensure that it was selected adequately to their facial features. Also, a seal check should be performed every time a respirator is put on to confirm that it was correctly donned. However, those methods are troublesome, if not inapplicable, in the community setting where the issue of proper fit has to be addressed with different measures.

Several new strategies that can be used to better protect the wearer and the people they interact with have recently emerged and will be discussed, including new seal materials with improved comfort properties, mask fitters, and braces or earloop holders and clips. Also, IT solutions supporting the proper selection of the respirator's facepiece size will be presented.

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**Bio sketch**

Career officer as Senior Technician in the Department of Health Promotion and Occupational Epidemiology in the National Institute of Health and Safety at Work (INSST, Spain). Previously she has worked in the Environmental Conditions Department of INSST (Barcelona, Spain). BS in Chemistry in 2006 and PhD in Sciences in 2011 from the University of Castilla La Mancha. MSc in Occupational Risk Prevention in 3 specialities. Currently studying a MSc in Public Health from The Carlos III Institute (Madrid, Spain).

Research experience in centres at CSIC (Spain) and CNRS (France).

Accredited by ANECA to teach and the Course of Pedagogical Aptitude.

**“An improved evidence-based occupational diseases investigation”**

A Spanish Working Group on Occupational Diseases has been created to provide a stable forum for discussion, design and intervention. It is a reference resource aimed to improve the “collective knowledge” about occupational diseases epidemiology, based on field investigation.

This group has used The European Instrument Appraisal of Guidelines Research and Evaluation (AGREE instrument) to obtain the expert group’s agreement about the main topics to take into account in the design of an investigation procedure in occupational diseases for the Spanish Labour Inspectorate.

Some results to emphasize are:

In step 1 on writing a harmonized investigation procedure 15 experts participated from the Labour inspectorate, Social Security Authorities, Regional Governments and INSST. The consensus concerning the contents of the procedure headings was: aims and results (83%), key information to be collected (92%), investigation barriers (69%), opportunities for improvements (88%), team and persons (92%). A data set and a code of 7 groups of occupational diseases causes was also agreed upon.

In step 2 regarding checking of the occupational diseases investigation procedure, a trial was conducted and 122 occupational diseases were investigated, jointly, by Labour inspectors and OSH experts. The main lessons learned were:

The trial showed the usefulness of the procedure to improve the labour inspectorate practices in occupational diseases investigation.

- In 59.8% of the cases the company had not performed an investigation of the occupational disease.
- In 46.5% of the cases the risk related with the occupational disease was not identified.
- In 81.9% of the diseases investigated there were no preventive recommendations
- In 95.1% there was no specific preventive measure planned.

More prevalent occupational diseases causes were: (i) lacks in the adaptation of the workplace, (ii) deficiencies in training, information or instructions (iii) conditions of the worker especially sensitive to the risk related with the occupational disease.

**Michel Héry**

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**Bio sketch**

Michel Héry is a specialist in the assessment of exposure to chemical pollutants, particularly carcinogens, at the workplace. Since 2013, he has been working for the Prospective mission of the INRS. In this capacity, he has been involved in the study of possible developments in the use of physical assistance robots, the circular economy, OHS training, etc. A significant part of INRSs work was devoted to changes in the organization of work in the decades to come and their consequences on occupational risks and their prevention.

**“What consequences will the COVID-19 pandemic have on the organisation of work and the prevention of occupational risks in the years to come?”**

The lockdown measures taken at the beginning of the COVID-19 health crisis had strong consequences in terms of work organisation: development of remote working, physical distancing imposed in companies continuing to operate, strong recourse to e-commerce, etc. This has occurred in a context of disruptions in certain supply chains, in particular for personal protective equipment.

Between 2014 and 2018, the INRS’s Watch and Foresight mission devoted several studies to possible changes in work in the years to come, particularly those linked to the use of new technologies through automation (in industry as in services) or through new forms of organisation such as digital intermediation platforms (Uberisation). The objective of these studies was to focus on the occupational safety and health issues resulting from these developments and the prevention of the corresponding risks.

In the second half of March 2020, some results of these studies were reworked empirically by INRS, based on the few lessons learned from the first weeks of containment, with the introduction of a few additional variables such as: the more or less lasting nature of the pandemic, the need to maintain physical distance, the possible relocation of certain productions deemed strategic, etc.

During summer 2020, in cooperation with the Futuribles think tank and with the help of some fifteen representatives of large French companies, INRS carried out (entirely by videoconference) a new exercise devoted to the evolution of work organisation by 2025. Then a reflection was carried out within INRS with about fifteen experts (also entirely by videoconference) on the consequences of these changes for occupational health and safety.

The aim of the presentation is to show how the COVID-19 pandemic may influence the evolution of the organisation of work in the years to come and what the consequences will be for occupational safety at work: status of workers, automation of production (in industry as well as in services), future of work collectives, procedurisation of work, reappearance of certain risks, etc. This reflection is based on all the works produced on the subject and referenced here: it highlights the convergences, differences and possible biases.

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**Bio sketch**

Nader Ahmadi is Professor of Sociology and Director-General at the Swedish Agency for Work Environment Expertise. His research areas are cultural approaches to identity, sexuality, coping with cancer and the concept of the self. He has also been doing research on different public health questions for example, questions related to doping among the youth. He has co-authored several nationally and internationally published sociological books. Most recent books in English are Meaning-Making Coping: Exploring Ways of Coping with Crisis in an International Perspective and Doping and Public Health.

**“The work environment of immigrant employees in Sweden - a systematic review”**

The aim of our systematic review was to summarize existing research results on the work environment of employees with an immigrant background in Sweden. We focus on the common characteristics of the work environment of immigrant employees in Sweden, and on identifying factors that specifically harm or improve their work environment.

We systematically searched for literature published between the years of 1990 and 2020 in four databases, Web of science, PubMed, SocIndex and Academic Search Elite. We started the selection process by reading title and abstracts, then proceeded to read a selection of full-text studies and eliminated those that did not fulfil the inclusion criteria. We did a quality assessment on the full-text studies based on the MMAT-tool, and then performed a narrative synthesis of the results.

The results show that immigrants experience several issues in their work environment. They experience discrimination and social exclusion at the workplace, they are subjected to several physical, psychological and social risks, and they are over-represented in low-skilled jobs with poor working conditions. The literature also demonstrates some important inclusionary aspects in their work environment, e.g., an empowering form of leadership.

Conclusions: Our main conclusion is that Swedish workplaces need to introduce more active measures to raise awareness of and combat workplace discrimination, eliminate physical, psychological and social risks and promote inclusion at the workplace. The leadership and management have an important role to play here, as does the employees' trade unions and its special functions.

**Noortje Wiezer**

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**TNO** innovation  
for life



**Bio sketch**

Dr. Noortje Wiezer is, as Principal, one of the driving forces behind the TNO research program on Mental Health of workers. A senior professional with more than 23 years of experience and a PhD in the field of Organizational, Social and Behavioural Sciences. She was coordinator of several (inter)national studies on this area. She is a member of the PEROSH Scientific Steering Group and participates in the PEROSH project Wellbeing and Work.

**“Working from home during the COVID -19- pandemic in the Netherlands”  
Change in working conditions and the effects on health and wellbeing for different groups. Result of four waves of the Dutch NWCS COVID-19 Cohort study**

K. OUDE HENGEL, T. ZOOMER, N. WIEZER and W. HOOFTMAN

**Introduction**

The call to work from home as much as possible was one of the measures taken by the Dutch government during the pandemic to reduce the pressure on healthcare. Almost 50% of the Dutch workers has (partly) worked from home during the pandemic. Although working from home was already common in the Netherlands, the number of workers who worked from home and the number of hours they worked from home increased significantly. This paper provides an overview of the changes in working conditions and health of homeworkers in the Netherlands between 2019 (pre-COVID-19) and March 2021.

**Methods**

For this, the NWCS-COVID-19 cohort study is used. This study is a follow up study of the regular Netherlands Working Conditions Survey (NWCS), an annual survey conducted by TNO and Statistics Netherlands among a representative group of workers in the Netherlands. For the NWCS-COVID-19, a group of participants that had responded to the NWCS 2019 were approached again in June 2020, in October 2020 and in March 2021. 8,911 Respondents provided data in all four waves.

**Results**

The results show both improvements and deteriorations of working conditions and health and wellbeing. For example: compared to the pre-pandemic period, the hours overtime increased and respondents reported more sedentary behaviour. Especially

workers with young children struggled with work-life balance during the first wave. Home workers report a good health and less musculoskeletal disease problems than before the crisis. Work related stress did not increase. Some groups, however, do feel lonely and miss the connection with work.

### Conclusion

The expectation is that home working will be more common in the future than before the pandemic. In organizing this hybrid way of working, we must ensure that the positive effects of home working are maintained and the negative ones are minimized.

**Patrick Hochwald**

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**Bio sketch**

Graduated with a Bachelor of Science degree in Chemistry with Material Science in 2015. Worked for a manufacturer of high-performance polymers in quality assurance, but decided to do the Master's degree in Analytical Chemistry and Quality Assurance in 2019. Employed at the IFA as a research associate since March 2020, to develop new analytical methods for the measurement of hazardous substances in air.

**“How to improve the analysis of Chromium VI in air samples to fulfil the increased requirements for air limit values”**

With a few exceptions - such as barium-chromate - chromium VI compounds are classified as carcinogenic 1B, sensitising to the skin and in some cases to the respiratory tract. Cr(VI)-compounds are used in a wide variety of industries and therefore many different manufacturing processes, e.g. electroplating of surfaces with chromium, tanning of leather and as oxidising agents. In addition Cr(VI)-compounds can be found during the welding of chromium-containing alloys or during the burning of cement.

In Germany the assessment scale for Cr(VI)-compounds is risk-based and the limit value for the inhalable fraction is set to  $1 \mu\text{g}/\text{m}^3$  ( $0.001 \text{ mg}/\text{m}^3$ ). Below this value there is a non-quantifiable low lung cancer risk. This means that a concentration of 1/10 of the limit value must be achieved as the lower working range limit for the exposure measurement according to EN 482. Currently used photometric methods are susceptible to interfering substances such as iron(III), vanadium(V), mercury(I, II), molybdenum(VI) and nitrates. Therefore, an ion chromatographic (IC) measurement method for Cr(VI)-compounds is developed. Matrix influences are largely excluded by chromatographic separation of the sample using IC. The enrichment of Cr(VI) leads to a significantly improved sensitivity. This method is more robust and sensitive than photometric methods and the achieved limit of quantification is below the demanded value of  $0.1 \mu\text{g}/\text{m}^3$ . The method is to be extensively tested in practical measurements, with different filters and stabilizing liquids. The aim is to establish this method as a standard procedure in the Measurement system for exposure assessment (MGU).

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#### **Bio sketch**

DSc (Tech) Pia Perttula works as a senior research scientist in Finnish Institute of Occupational Health. Her main area of interest is improving occupational safety. She has also been producing guidance for workplaces during the COVID-19 pandemic.

#### **“How to help workplaces manage COVID-19”**

The COVID-19 pandemic has revealed that workplaces need information and support in order to manage sudden or unforeseeable risks. The pandemic has required measures at both the workplace and individual level. Workplaces needed information to create their own guidance for their personnel.

The Finnish Institute of Occupational Health (FIOH) has offered information on its website to help workplaces manage pandemic-related risks. The basis of this guidance has been risk assessment and deciding on the measures to manage the risks detected, i.e. how to keep a safe social distance, how to protect oneself if this distance cannot be kept, increased hygiene measures, etc. In addition to general risk assessment guidance, FIOH has also provided some supplementary guidance for specific branches of business, which it prepared in co-operation with trade unions, employer organizations and authorities.

In order to manage COVID-19, workplaces have been advised to establish a preparedness team. The purpose of this team is to continuously monitor the situation and prepare the measures to be taken at the workplace. Arranging communication during the pandemic has been essential not only for managing COVID-19 measures, but also for reducing employees' psychosocial burden.

COVID-19 has shown that continuous risk assessment is needed when managing continuously changing, unforeseeable threats. In addition to sharing information and experiences, research is required. FIOH is conducting a pandemic and risk assessment research project, which focuses on workplaces' experiences of managing the pandemic risk and following the related instructions.

The lessons learned from the pandemic must be memorized, as other unforeseeable risks may occur in the future. The work carried out on managing COVID-19 will likely create some permanent risk management measures at workplaces, which will also help in managing minor risks.

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**Bio sketch**

Psychologist with extensive experience in clinical intervention. She has been working in INSST since 2019. She has led a study of psychosocial risks in the health sector during the Covid -19 pandemic. She is a creative, dynamic and enthusiastic person who enjoys challenges and feels that her work contributes to improve people's lives.

**“What about the psychosocial health of the healthcare sector during the Covid-19 pandemic?”**

The COVID-19 crisis will have an undeniable impact on the population's psycho-emotional health, with particular risks for professional groups in the health field. The present study aims to shed light to the psychosocial impact on the Spanish health centres' workers during the first wave of COVID-19 and possible interventions to minimize it.

The results show us that the most likely groups to develop pathologies as a consequence of a traumatic occupational event are women, nurses or low-qualified professionals, aged 20-30 years old, work experience below 5 years and without previous crisis intervention training.

The literature review indicates that the impact of epidemic outbreak on mental health leads to a higher prevalence of anxiety, depression, and post-traumatic stress disorder. There are various preventive interventions to implement in the workplace, including those based on peer support and resilience training.

The semi-structured interviews confirmed manifestations of the impact of the crisis compatible with those found in the bibliographic findings and allowed us to develop a deeper understanding of the sector's preventive system.

In conclusion: working in situations such as those generated by the COVID-19 pandemic in health centres causes psychosocial risks that requires a specialized approach. Occupational exposure to these risks can have negative effects on people's physical and mental health. It is important to implement preventive measures in workplaces. Mental health surveillance and addressing the damage caused by the pandemic are the keys to an early detection.

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**Bio sketch**

Ruth holds a Master's degree in biology, Degree in Chemistry, Master in Management of Health and Safety and MBA. She has participated in several working groups in the European Commission, the National Commission for Health and Safety at Work and national and European standardisation bodies. For the last nine years she has been working at the Spanish National Institute for Health and Safety at Work managing projects on chemicals, nanomaterials, exposure modelling, control banding tools, REACH and CLP.

**“Endocrine disruptors: OSH, REACH, CLP. What’s next?”**

Endocrine disruptors are chemicals that have an impact on the hormonal system of humans and animals. In recent years, the scientific community and authorities worldwide have been discussing this topic and how to regulate it. Significant progress has been achieved. However, the criteria to identify endocrine disruptors chemicals have changed and grown in separate pieces of legislation, such as PPP (*Plant protection product*) Regulation, Biocides and REACH through the process of authorisation, the candidate list and its consideration as SVHC (*Substances of Very High Concern*). How can we tackle endocrine disrupting chemicals identification for risk and exposure assessment purposes? This presentation will give an update on the current situation and how we can help in workplace identification and risk management of endocrine disrupting chemicals.

**Samantha Hall**

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**Bio sketch**

Samantha Hall is an Exposure Assessment and Control Scientist and Chartered Physicist working at the Health and Safety Executive's Science and Research Centre. The projects Samantha delivers are focused on measuring airborne hazards and evaluating exposure controls. Her research includes both laboratory and field-based studies and spans many sectors including construction, manufacturing and education.

**“Cross-sector collaboration enabling the safe implementation of 3D printing technologies”**

Three-dimensional (3D) printing technology can be found in homes, across the education sector, in research and in full scale manufacturing. The Health and Safety Executive (HSE) have led a number of research projects to investigate emissions and exposures to particles, metals, and volatile organic compounds associated with 3D printing. HSE encourages innovation and aims to enable the safe implementation of new technology through its research. Collaboration and communication across these sectors has been instrumental in understanding the issues and developing effective and accessible guidance.

The results from laboratory research to evaluate emissions and potential exposure controls from desktop 3D printers fed into a working group of representatives from the manufacturing industry, education sector, the regulator, national standards body and the occupational hygiene community. The collaboration resulted in the publication of evidence-based guidance on the safe use of desktop 3D printers.

Research into metal powder exposures in large scale additive manufacturing was carried out in collaboration with a UK Catapult Centre focused on manufacturing technology and innovation, and their industrial members. Workshops were held to understand the key issues and site visits were carried out to take measurements and make observations. Collaboration with the network continues in developing good practice guidance for additive manufacturing with metal powders.

The research team also meets with an international network of researchers, similarly working on this topic, to share knowledge and experience of how challenges are being approached by others.

The success of this work to date was possible because of the solid cooperation of these sectors and a full understanding of the unique challenges faced by each group. The projects have demonstrated the importance of working together to solve common gaps in knowledge and the advantages a collaborative approach brings to all concerned.

**Sandra Boos**

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**Bio sketch**

Sandra Boos studied at the Bonn-Rhein-Sieg University of Applied Sciences and graduated in 2020 with a master's degree in analytical chemistry and quality assurance. She has been working at the Institute for Occupational Safety and Health of the German Social Accident Insurance (IFA) since November 2020.

**“Amorphous silicas – Comparison of analysis methods in Germany and the USA”**

Amorphous silicas are used in a variety of industrial applications and are present in different workplace atmospheres. The classification of amorphous silicas as hazardous to health justifies the need for suitable and sufficiently specific analytical methods.

In Germany, amorphous silicas are analysed by infrared spectroscopy. This method was developed at the Institute for Occupational Safety and Health of the German Social Accident Insurance (IFA). An indirect analysis method developed at the US National Institute for Occupational Safety and Health (NIOSH) uses X-ray diffraction after the amorphous silica has been converted to cristobalite by annealing. Several series of tests have been conducted to compare the two methods. Recent analytical results have shown that the indirect method leads to the formation of different cristobalite proportions, depending on the type of amorphous silica, its composition and the annealing conditions. Basically, a significant underestimation of amorphous silica can be observed even for pure substances, since these are only partially converted into cristobalite by annealing. The main reasons for these results are the choice of annealing temperatures below the ideal crystallization temperature, the annealing duration and the presence of other components in the dust that influence the cristobalite formation process (e.g. formation of tridymite, glass or other phases). The infrared spectroscopic analysis used in Germany is less sensitive to these factors, but has specific cross-sensitivities. Exposure data obtained using the U.S. method are not comparable to data obtained in Germany.

Overall, the determination of amorphous silicas in dust at workplaces is still a major challenge and requires further development to enable a suitable and sufficiently specific determination of amorphous silica.

**Sarah Elena Althammer**

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**Bio sketch**

Sarah E. Althammer is a psychologist and works as a research assistant at the BAuA in Dortmund. As part of her doctorate at the University of Heidelberg, she conducts research on self-regulation, work-life-balance, recovery, and the effectiveness of resource-oriented interventions for employees with temporal and spatial flexibility.

**“Flexible and healthy working - effectiveness of a resource-oriented online training for employees with flexible working conditions”**

Over the last decade, flexible working conditions have become increasingly common. Even before the COVID-19-pandemic, many employees had the autonomy to (partly) choose their working time and location. The post-pandemic future of work is therefore likely to see a greater percentage of workers with more flexible working conditions. Flexible working conditions can have benefits for employees (e.g., self-determined organization of working time, reduction of commuting times, balancing of work and family roles). However, if boundaries between work and private life are blurring, potential risks are conflicts between work and private life, insufficient recovery due to incessant thoughts about work or permanent availability, and extension of working hours. To support employees in their self-regulation in the context of flexible working conditions, we developed a resource-oriented online training. We evaluated whether this training would positively influence recovery, work-life balance, and well-being.

In the six-week online training, participants complete an online module every week and a short daily task. They learn various self-regulation strategies regarding how to manage boundaries between work and private life, how to recover in leisure time and in work breaks, and how to organize their daily work. The training was evaluated in a randomized controlled trial in which participants were assigned to a training group and a waitlist-control group. Changes were measured over time at four measurement points (pre-intervention, post-intervention, four-weeks and six-months follow up). In addition to a description of the content and structure of the online training, first results of the evaluation study will be presented. The intervention is specifically designed for workers with flexible working conditions. Knowledge about the effectiveness of a self-regulation training provides indications for the design of flexible working conditions in an increasingly digitalized working world.

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**Bio sketch**

Sophie-Charlotte Meyer is a research associate in the unit “Working Time and Organisation” at the Federal Institute for Occupational Safety and Health (BAuA) at the Dortmund site since 2017. Her research mainly focuses on digitalisation and working conditions in changing work environments. Before joining the BAuA, she completed her doctorate on the topic of “Health Inequalities” at the University of Wuppertal, Chair of Health Economics.

**“Well protected at work? Occupational safety and health in the Corona pandemic from the employees’ point of view”**

**Co-authors: ANITA TISCH, SABINE SOMMER, SWANTJE ROBELSKI**

Crises in general and the COVID-19 crisis in particular, are associated with uncertainties for all parties involved. Some establishments are even threatened in their existence while nearly all had to significantly increase infection control and occupational safety and health (OSH) measures in order to continue to operate. However, the measures were not equally successful everywhere in protecting workers from infection and satisfying their need for safety. Even before the pandemic, OSH risks were not the same for everyone. Health highly correlates with occupation or sector and OSH implementation varies based on organizational characteristics. Against this background we investigate inequalities in profound infection control and a safe working environment. In doing so, we aim to explore whether OSH-management during the COVID-19 crisis reinforces existing inequalities in occupational health and safety.

The analyses are based on the German Socio-Economic Panel’s supplementary survey on the COVID-19 crisis (SOEP-Cov, Kühne et al., 2020), collected in summer 2020 as well as in January 2021 by the German Institute for Economic Research (DIW). SOEP-Cov is representative for the German working population and includes detailed information on infection control measures and the respondents’ evaluation of the different measures. First results indicate that infection control measures have been largely implemented and workers generally feel safe at most work places during the pandemic. However, we find differences across occupational as well as educational groups, pointing to a consolidation of existing inequalities in occupational health. Moreover, a dominance of person-related measures compared to organizational measures can be observed, which even increased over time. This suggests an individualization of responsibilities for occupational health, whereas technology and organization-related measures should preferably be implemented from an OSH perspective.

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**Bio sketch**

Study at Friedrich-Wilhelms-University Bonn; Subjects: Chemistry and Physical education

Since 1989 at IFA.

Since 2003 Sector manager "Exposure Monitoring – MGU"

The tasks of this section involve research, development and consulting for the monitoring, documentation and evaluation of working conditions. An essential goal of the unit is to use recorded data for the purposes of risk management in OSH at company and industry level, in order to identify and evaluate exposure and thus to contribute effectively to reducing risk.

**"No, dust was not just yesterday: dust is today"**

Between 2005 and 2016, 35,000 measurements on inhalable and respirable dust fractions were performed in the "Measurement System for Exposure Assessment" – MGU. In addition, 15,000 measurements on respirable quartz were also performed in this data period. The obtained exposure data on the dust fractions and quartz was stored in the IFA exposure database MEGA – "Measurement Data on Exposure to Hazardous Substances at the Workplace". Statistic evaluations of these data were done according to industrial sectors and work areas. Further differentiations concerning the measurement strategy – "personal measurements" and stationary sampling in the working areas – and the sampling time –  $\geq 2$  hours and  $< 2$  hours – help to describe the dust and quartz exposure at work places.

Are limit values complying with in the working areas in companies?

Do we identify a need for action in individual working areas?

All evaluations of the respirable and inhalable dust fractions were compiled in a report (German, English) and provide a register of exposure data for prevention purposes, particular for risk assessments.

Link to the report in English:

<https://www.dguv.de/ifa/publikationen/reports-download/reports-2020/ifa-report-6-2020/index-2.jsp>

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### Bio sketch

Dr. Yi Sun is an epidemiologist in the institute for occupational safety and health of the German social accident insurance. He is an expert in occupational epidemiology, especially in the area of epidemiological methods, exposure assessment and quantitative risk assessment.

## “Indices to describe the development of pandemics and the effectiveness of regulatory measures”

**DR. YI SUN, BARBARA HIRSCHWALD, DR. FRANK BOCHMANN**  
Institute of Occupational Safety and Health of the German Social Accident Insurance (IFA-DGUV), Sankt Augustin, Germany

### Background

The protracted COVID-19 outbreak has resulted in worldwide difficulties and represents an ongoing international public health emergency. The purpose of this approach is to clarify what preventive measures can be taken in occupational health and safety to ensure worker protection. These are derived from the non-pharmaceutical measures in the public sector, because pharmaceutical measures can only be imposed operationally in a few exceptional cases. In this analysis, we therefore described the development of a COVID-19 pandemic in the German state of North Rhine-Westphalia (NRW) and quantified the effectiveness of the non-pharmaceutical measures applied in NRW.

### Methods

Incidence rates, intensive care unit (ICU) cases, and infection reproduction rates (R-values) are used to describe the evolution of the pandemic over time. R-values were quantified and validated using standard methods of the Robert Koch Institute in Germany. A multivariable linear regression analysis was performed to estimate the association between the 7-day R-value and different intervention measures.

### Results

A total of 3 pandemic waves occurred between March 2, 2020, and July 31, 2021. The incidence rate of COVID-19 in NRW is nearly identical to that in all of Germany. ICU cases occur on average about 21 days after patients become infected. Although only

1-2% of infected patients become ICU patients, the need for ICU beds is extremely high due to the long length of stay of ICU patients. To prevent rapid spread of COVID-19, a large number of regulatory non-pharmaceutical interventions (20 main intervention groups) were implemented in NRW in different calendar periods. Our analysis showed that collection restrictions and contact bans had the strongest effect on COVID-19 infection control.

### **Conclusion**

Recommendations for infection prevention in occupational health and safety should focus primarily on contact limitation (home office, contact distancing, workplace organization to minimize collection contacts, carpool bans, etc.).

## Thank you for your participation

We thank all delegates and contributors for their participation to make PEROSH 2021 a success. A special thank you goes to INSST, the Spanish host of the conference. It is not easy to organise a live conference in these turbulent times, but you did it.

Also, many thanks to Joyce Lufting, Marian Nieuwenhout and Jos van den Assem for their support on behalf of the PEROSH secretariat.

A certificate of attendance is available and will be handed over at the conference. For those who did attend, but could not collect their certificate, please contact us through the conference e-mail address: [madridconference2021@perosh.eu](mailto:madridconference2021@perosh.eu).

The Book of Abstracts and all presentations of the speakers who gave consent, will be available soon through the PEROSH repository. We also invite all delegates to subscribe to the PEROSH Newsletter to stay up to date on news and events from PEROSH. Follow the hyperlinks or visit our website (see below).

**Jan Michiel Meeuwsen**  
Manager international affairs PEROSH

