EUROSHNET – European Occupational Safety and Health Network

9th European Conference on standardization, testing and certification in the field of occupational safety and health

DIGITAL AND GREEN INNOVATIONS

Shaping the future of occupational safety and health

Book of Poster Abstracts

27 – 28 MAY 2026, CONGRESS PAASITORNI, HELSINKI FINLAND

EUROSHNET.EU

PROGRAMME | 27 MAY 2026

08.30 **Registration and Coffee & snacks**

10.00 **OPENING OF THE CONFERENCE**
Jan Erola, Moderator
Carita Aschan, Finnish Institute of Occupational Health (FIOH)
Raimo Antila, Ministry of Social Affairs and Health, Finland

10.15 **SESSION 1: OCCUPATIONAL SAFETY IN A DIGITAL AND GREEN WORLD**

Future of OSH in a digital and green world
Annick Starren, European Agency for Safety and Health at Work (EU OSHA)

Future of standardization
Ewa Zielińska, Polish Committee for Standardization (PKN)

Review of European OSH framework legislation
Nikolaos Mitsouridis, DG Employment, Social Affairs and Inclusion of the European Commission

Q&A

11.30 **Poster minute madness** - One-minute poster pitches by 14 poster authors

12.00 **Lunch**

13.00 **POSTER SESSION**

13.30 **SESSION 2: SUSTAINABILITY AND CLIMATE CHANGE**

Implications of climate change on OSH and the need for international cooperation
Thomas Alexander, Federal Institute for Occupational Safety and Health (BAuA), Germany

Discussion: Navigating Tomorrow's Challenges: Innovations and safety in a green and digital world
Moderator: Thomas Alexander

- Rafał Górny, Central Institute for Labour Protection – National Research Institute (CIOP-PIB), Poland - The impact of climate change on microbiological agents – a smooth transition to a sustainable future or a real threat to public health?
- Ewelina Broda-Kaczmarek, German Social Accident Insurance Institution for the Raw Materials and Chemical Industry (BG RCI) - Hydrogen use and storage
- Stéphanie Marsteau, Research and Safety Institute for the Prevention of Occupational Accidents and Diseases (INRS), France - Replacing SF6 with Krypton: A greener way to test laboratory fume hoods and respiratory protective devices
- Hanna Seppälä, Stena Recycling, Finland - Safe methods for battery recycling
- Katja Tähtinen, Aalto University, Finland - Health and Safety in Circular Buildings: The Role of Digital Product Passports, Information Transparency and Traceability

15.30 **Coffee break**

15.30 **SESSION 3: PERSONAL PROTECTIVE EQUIPMENT**

Shaping the PPE Regulation
Pilar Cáceres, National Institute for Safety and Health at Work (INSST), Spain

Inclusivity in standards - the importance of people, product & process
Natalie Wilson, Workwear Solutions International Ltd, United Kingdom

Protection of products and certificates from being falsified
Anna Ruhala, SGS Fimko Oy, Finland

AI as a tool for testing and certification of clothing
Miriam Martínez Albert, Textile Industry Research Association (AITEX), Spain

Q&A

17.00 **End of Conference day**

19.30 **Conference dinner**

PROGRAMME | 28 MAY 2026

8.30 **Coffee & snacks**

9.00 **SESSION 4: DIGITALIZATION**

Managing algorithms at work: EU Regulation and OSH implications
Nastazja Potocka-Sionek, University of Luxembourg

Risks and opportunities to OSH associated with AI
Martin Thomson, Health and Safety Executive, United Kingdom

Algorithmic management and psychosocial risk factors at work: findings from a case study
Heidi Lahti, Finnish Institute of Occupational Health (FIOH)

Q&A

Round table: AI and machinery - from legislation to application
Moderator: Jan Erola

- Dr. Michael Bretschneider-Hagemes, European Trade Union Confederation (ETUC)
- Pierre Belingard, EUROGIP, France
- Otto Görnemann, SICK AG, Germany

10.45 **Coffee break**

11.15 **SESSION 5: AI AND MACHINERY**

Industrial security: protection from corruption in European legislation and standardization
Jonas Stein, German Social Accident Insurance (DGUV), Germany

Machine safety challenges: new requirements related to cybersecurity and AI
Jean-Christophe Blaise, Research and Safety Institute for the Prevention of Occupational Accidents and Diseases (INRS), France

Standardization of automated handling systems: new trends and safety challenges
Clémentine Borgeot, Research and Safety Institute for the Prevention of Occupational Accidents and Diseases (INRS), France

Q&A

12:30 **Poster Award Ceremony**

12.40 **Lunch**

13.40 **SESSION 6: OCCUPATIONAL SAFETY AND HEALTH IN A FUTURE GLOBAL CONTEXT**

AI as a tool for managing OSH
José Alberto Salcedo, Acciona, Spain

Round table: Europe's future role among global forces
Moderator: Jan Erola

- Ewa Zielińska, Polish Committee for Standardization (PKN)
- Nastazja Potocka-Sionek, University of Luxemburg
- Katrin Behnke, European Trade Union Confederation (ETUC)
- Esa Kivisoja, Finnish Work Safety Association

Closing of the Conference
Pilar Cáceres, National Institute for Safety and Health at Work (INSST), Spain

14.30 **Coffee**

15.30 **End of the Conference**

9th European Conference on standardization, testing and certification in the field of occupational safety and health

Unlocking Hidden Preventive Data: BLE and Artificial Intelligence for Occupational Safety Monitoring

Mario Álvarez González
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S Digital One is a patented solution in its final pre-commercial development phase that captures occupational safety data which traditionally remains hidden during daily work activities. The system combines Bluetooth Low Energy tags attached to personal and collective protective equipment with smartphone-based passive detection to continuously generate structured field data, without requiring any action from the worker.

The datasets produced, covering equipment usage patterns, geospatial positioning, worker-equipment interaction and collective protection presence mapping, are designed from origin as AI-ready: structured, normalised, time-stamped, traceable and legally compliant. Artificial intelligence and machine learning algorithms extract actionable value from these datasets to support preventive decision-making, including risk mapping, behavioural pattern analysis, contractor safety scoring and automated executive dashboards.

The solution follows a humanistic AI approach: it processes exclusively preventive behavioral data within the employment relationship, employs no biometric identification or emotion recognition, respects constitutional proportionality safeguards, and pauses data collection during rest periods. S Digital One has undergone voluntary certification before the Spanish AI Supervisory Authority (AESIA) and is protected by international patents validated across 47 countries on five continents.

Unlocking Hidden Preventive Data: BLE and Artificial Intelligence for Occupational Safety Monitoring

Mario Álvarez González — Tisular Safety S.L.U., Spain

Euroshnet Conference 2026 · Helsinki, Finland · May 27–28

AESIA Certified · Humanistic AI · Pre-Commercial Research

Introduction & Research Context

Occupational safety monitoring has traditionally relied on periodic manual inspections-capturing isolated snapshots that miss the continuous reality of field operations.

During active work, critical data about PPE usage, CPE positioning, and worker-equipment spatial interaction remains invisible to management and regulators.

S Digital One is an internationally patented BLE-based monitoring system that generates continuous, structured, AI-ready datasets from real field operations-making this previously hidden data visible, measurable, and actionable for the first time.

This research presents the system architecture, data quality framework, humanistic AI approach, and field validation results from a pre-commercial deployment.

Field operations under live power lines — PPE visible

Unlocking Hidden Preventive Data

Before BLE monitoring, there was no real-time record of PPE usage, CPE status, or worker spatial behaviour during field work. S Digital One makes this invisible data visible and AI-ready.

Humanistic AI Framework —AESIA Certified

- **No biometric data collected**
  AI operates exclusively on BLE equipment tags — not on the person
- **Human decision support only**
  Alerts and recommendations — no automated enforcement of decisions
- **Constitutional proportionality**
  Suitability, necessity, and proportionality test verified (Spanish Constitutional Court)
- **Privacy by design**
  GDPR compliant — legal basis in employment relationship and duty of protection
- **AESIA certified**
  "Private solution of preventive AI with humanistic approach" — RD 729/2023, Art. 10(d)(g)
- **International patent protection**
  Validated in 47 countries across 5 continents — EPO + PCT procedure

AESIA: Agencia Española de Supervisión de Inteligencia Artificial (Spanish AI Supervisory Agency) — EU AI Act compliance framework

Data Generation Pipeline

1 BLE Tag Emission
Each tag emits unique ID every second. IP68 rated, 7gr.
Battery (12 months). No fixed infrastructure.

2 Passive Smartphone Detection
App runs in background-zero worker intervention.
Registers GPS + tag ID + precise timestamp.

3 Secure Data Transmission
Encrypted synchronous or asynchronous upload.
Local persistence when offline — zero data loss.

4 AI & Machine Learning
Pattern recognition. Risk prediction. Anomaly detection.
Structured insights for human decision support.

5 Preventive Intelligence
Geospatial risk maps. Behavioural profiling.
Contractor evaluation. Evidence-based recommendations.

No cameras · No biometric sensors · No fixed antennas
Works indoors and outdoors · Zero data loss when offline

Field Validation & Results

Field-validated in real operational conditions across multiple work sites, with technical approval from the contracting organization.

20 Work orders	**136 h** Field operations
100% Data integrity	**Positive** Worker feedback
Zero Workflow interference	**100%** Validation OK

Construction site — workers with PPE across large-scale infrastructure project

Structured Dataset Quality —AESIA Certified

Quality Precision, consistency, reliability of records	99.7%
Structure & Format Normalised, labelled, ML-ready	AI-ready
Relevance Exclusively preventive variables	100%
Volume Large-scale continuous processing	Scales with contracting chain depth,workforce size, and equipment count
Granularity Per-company, worker, PPE, CPE, event	Down to work order, individual PPE, CPE, and contracting chain level
Temporality Sync/async with exact timestamp	±1 Sec
Representativeness Faithful field activity reflection	Verified
Integrity Local persistence, zero offline loss	100%
Traceability End-to-end movement reconstruction	Full
Legality Constitutional proportionality, GDPR	Compliant

International Patent Protection

Patent: Radio Frequency Based Control System for Preventing Occupational Hazards
European Patent Office (EPO) · Patent Cooperation Treaty (PCT)
Validated in 47 countries across 5 continents

Regulatory & Standards Alignment

- **EU AI Act (Reg. 2024/1689)**
  Trustworthy AI with human oversight
- **LPRL Art. 14.2 & 15.4 & 17**
  Permanent and continued duty of effective protection
- **RD 171/2004**
  Coordination in contracting chains
- **GDPR (Reg. 2016/679)**
  Proportional data collection, privacy
- **LPRL Art. 15.1**
  Integration of technical evolution

Data Categories Generated

- **Work Activity Data**
  Shifts, hours, breaks, timestamps
- **Work Development**
  Tasks, operations, phases, work orders
- **Preventive Measures**
  PPE & CPE continuous monitoring
- **Behavioural Patterns**
  Worker conduct in equipment usage
- **Incident Events**
  Non-compliance, breaches, violations

Conclusions

BLE continuous monitoring generates structured, AI-ready preventive datasets that were previously invisible during field operations. Combined with a certified humanistic AI approach, this enables evidence-based occupational safety decisions across the entire contracting chain, while preserving worker dignity and constitutional rights.

S Digital One · Tisular Safety S.L.U. · mario.alvarez@tisularsafety.com

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Towards Safe Integration of AI in Machinery: Challenges and Evaluation Approaches

Marcel Beckers
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Artificial intelligence is increasingly entering the physical domain, including machinery and automation. Potential use-cases include AI-based safety and assistance functions, as well as machine control systems. These emerging applications promise greater flexibility and adaptability in industrial environments. However, while AI relies on probabilistic and opaque models, functional safety requires transparent and verifiable methods.

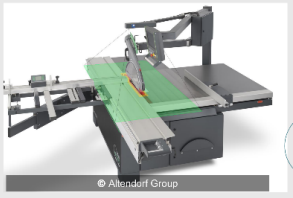
As a testing laboratory for machinery safety, the Institute for Occupational Safety and Health (IFA) is working to bridge this gap and ensure that AI based machinery systems comply with established and emerging functional safety principles. This contribution outlines the specific challenges of testing AI in safety critical applications and describes how the IFA is preparing to assess and certify emerging AI enabled safety systems.

IFA
Institut für Arbeitsschutz der
Deutschen Gesetzlichen Unfallversicherung

Towards Safe Integration of AI in Machinery: Challenges and Evaluation Approaches

When do we need to consider *functional safety* in the context of AI?

- **AI in safety-relevant development:** *When AI is used in the development of safety-critical components (e.g., software for machine control systems).*
- **AI in safety-critical control:** *When AI directly assumes responsibility for safety-critical control functions.*
- **AI as safety or assistance function:** *When AI is deployed as a safety function or assistance feature within a machine.*



AI can support many of these use cases, but it must never introduce new hazards!

What are the challenges?

AI-Systems are usually „black boxes“

- The output of an AI system cannot be predicted for every possible input.
- It is not possible to fully reconstruct what the system has learned in detail.
- Extensive testing is required to ensure that the system operates robustly under as many conditions as possible.

Developers must extract and interpret requirements from applicable legislation (e.g., the EU AI Act).

There are no standardized testing or assessment procedures.

No specific requirements from standards and legislation yet

How does the IFA contribute to ensuring the safe use of AI in the machinery domain?

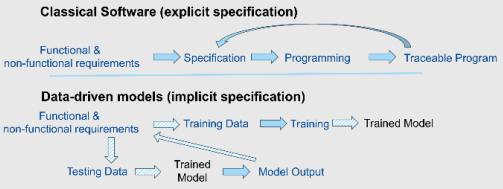
Established testing institute: *The IFA is an established testing institute, particularly for emerging technologies, with extensive industry connections in the field of safety engineering*

- Initial evaluations of AI-based assistance systems have been completed or are currently underway.
- Numerous advisory and informational discussions are conducted with manufacturers regarding the use of AI in machinery and the associated regulatory and technical requirements.
- The IFA leads a DGUV Test working group dedicated to developing testing principles for AI-based assistance systems.

The IFA actively participates in ongoing **standardization projects** related to AI and functional safety.

The IFA **is connected within the scientific community** on AI safety and **seeks collaborations with relevant stakeholders** to ensure that the testing and evaluation of AI systems is supported by rigorous scientific methodology.

What distinguishes the development and evaluation of AI from that of traditional software?



- In traditional software, the intended behavior is explicitly specified and implemented through deterministic program code (e.g., rule-based if-then logic).
- AI models learn behavior from training data using statistical methods, meaning the specification is implicit and determined by data selection.
  - Which relationships the model ultimately extracts from the data is generally not fully traceable.
  - Evaluation is only possible through extensive test datasets that cover a broad range of operating conditions

What do we need to test AI?

To assess the quality of an AI system, we can examine many different stages of its development — such as the training process, data quality, or specialized methods used to improve the system. But to truly evaluate the robustness of an AI system, we need

Data, Data, Data!

- When we want to test an AI system with highly specific inputs, **synthetic data or data augmentation** can be useful to isolate and analyze potential influencing factors.
- However: To ensure that an AI system truly performs as expected within its defined Operational Design Domain (ODD), we additionally require a large volume of diverse real-world test data that **have not been used in the development process.**

It is essential for testing facilities to start building (and maybe collaborating on) their own, extensive test data sets, to ensure we have reliable, functional safe AI systems in the coming future!

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More information to the IFAs role in AI and functional safety on our website

https://www.dguv.de/ifa/fachinfos/kuenstliche-intelligenz

9th European Conference on standardization, testing and certification in the field of occupational safety and health

Humanoid Robots: Challenges for Occupational Safety and Health

Thomas Bömer, Sven Schneider, Jan Zimmermann
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Humanoid robots gradually find their way into work environments in industry, trade, craft or service. Their human-like appearance, high degree of mobility, and the use of advanced AI systems enable new applications beyond the scope of traditional robots but simultaneously introduce novel safety challenges. Unlike industrial robots, humanoids often directly interact with workers and move autonomously in dynamic environments. This gives rise to physical hazards originating from actively controlled stability, rapid and unpredictable motions or the contact-based human-robot interaction.

Furthermore, AI-based perception, control and decision-making lead to new risks in functional safety. These comprise, among others, faulty human recognition, limited quantifiability and indefinite system boundaries including adaptive behaviours that are difficult to foresee. So far, existing standards and testing methods are only partially applicable to humanoid robots that demand for new requirements in risk assessment, conformity assessment, and safety-related training of workers.

This contribution provides an overview of challenges in safety and discusses normative guidelines for the safe design of humanoid robots as well as their integration into workplaces. The goal is to establish a foundation for a common European understanding of safety-related requirements and to provide impetus for future standardization in occupational safety and health.

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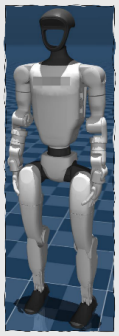
Humanoid Robots: Challenges for Occupational Safety and Health

Several hundreds of humanoid robots are expected to populate factory floors in Germany within the next five to ten years even considering conservative market forecasts. Here, challenges with regards to the safety of such systems may not be neglected.

Humanoid Robots at a Glance

Concerning the definition

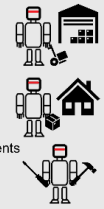
- Lack of a clear definition
- **"Human like" appearance** and **behaviour**
- *No* clear features:
  - *One* head?
  - *Two* arm?
  - *Two* hands with *five* fingers?
  - *Two* legs?
  - *Communication* with persons?
  - *Physical interaction* with persons?
- "Humanoid robot" even without some of those features



$	13.500 USD
	35 kg
	130 cm
	7,2 km/h
	2 kg
	120 Nm (max.)
	2 hours

Aims and Applications of Humanoid Robots

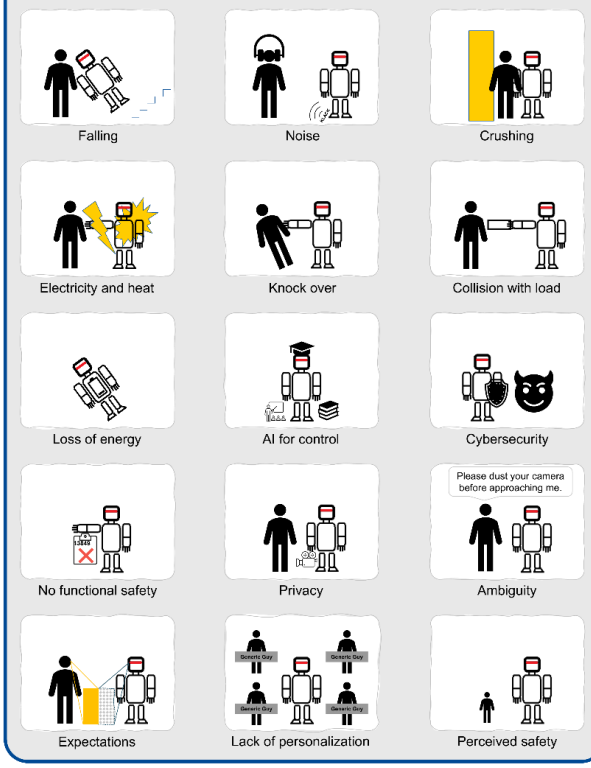
- Manufacturers aim to **support or replace human work**:
  - Increase efficiency and productivity
  - Address shortage of labour
  - Take over dangerous or physically demanding tasks
- Application areas comprise almost all domains, for example:
  - **Logistics**: order picking, warehouse operations, last-mile delivery
  - **Construction**: material transport, positioning and fastening components
  - **Industry**: assembly, (un)loading machines, maintenance, inspection
  - **Service sector**: assistance in healthcare, retail or hospitality



Role of the Institute for Occupational Safety and Health

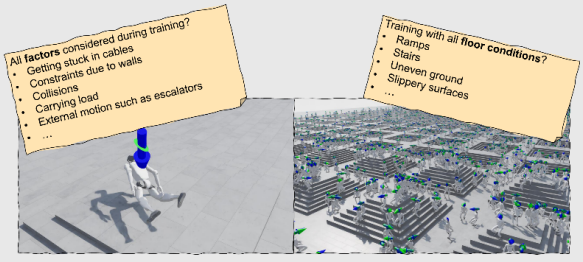
- Ensure **occupational safety** by participating in standardization
- Conduct **experiments** to assess risks
- Establish **test principles**
- **Consultation** of manufacturers and operators
- Carry out **examinations** (e.g., EC type-examinations)

Challenges in Safety



Application of Artificial Intelligence

- **Stabilization** of legged robots
  - Risk of unforeseeable behaviour and hazards during real applications
- **Perception** and interpretation of the robot's environment
  - Risk due to miss interpretation → wrong decisions taken by robot
- **Human-Robot-Communication** akin to ChatGPT
  - Risk of misunderstandings between person and robot



Digital twins of a humanoid robot during training runs.

Standardization for legged robots

- Existing safety standards only partially applicable, e.g.:
  - ISO 10218-1 & -2 for industrial robots
  - ISO 13482 for service robots
  - ISO 3691-4 for mobile robots (AGVs)
  - ANSI RIA R15.08 for industrial mobile robots (US)
- Problem: insufficient consideration of **stability requirements**
- In development and planned for publication in 2028:
  ISO 25875-1: *Robotics — Part 1: Safety requirements for industrial mobile robots with actively controlled stability (legged, wheeled, or other forms of locomotion)*

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9th European Conference on standardization, testing and certification in the field of occupational safety and health

Digital Transformation in Occupational Health and Safety (OHS) Training for Generation Z

Monika Czyszka
Biuro Usług BHP PPOŻ i Szkoleń Monika Czyszka, TEB Education Toruń, Poland
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Digital transformation is reshaping occupational health and safety (OHS) training, particularly in response to the expectations of Generation Z. Traditional, lecture-based methods are increasingly ineffective for younger audiences who are accustomed to interactive and technology-driven environments.

This study presents innovative approaches to OHS training using digital tools such as mobile applications, gamification, and virtual reality (VR). These methods enhance engagement, improve knowledge retention, and support the development of safety awareness in a more immersive and practical way. The paper highlights the role of interactive learning in building a proactive safety culture and demonstrates how digital solutions can bridge the gap between theoretical knowledge and real-life application.

The findings suggest that integrating modern technologies into OHS training is not only beneficial but necessary to effectively reach new generations of employees and ensure higher levels of workplace safety.

DIGITAL TRANSFORMATION IN OCCUPATIONAL HEALTH AND SAFETY (OHS) TRAINING FOR GENERATION Z

Enhancing Engagement, Knowledge Retention and Safety Culture through Interactive and Immersive Technologies

1. INTRODUCTION

Digital transformation is reshaping occupational health and safety (OHS) training, particularly in response to the expectations of Generation Z. Traditional, lecture-based methods are increasingly ineffective for younger audiences who are accustomed to interactive and technology-driven environments.

This study presents innovative approaches to OHS training using digital tools such as mobile applications, gamification, and virtual reality (VR). These methods enhance engagement, improve knowledge retention, and support the development of safety awareness in a more immersive and practical way.

The paper highlights the role of interactive learning in building a proactive safety culture and demonstrates how digital solutions can bridge the gap between theoretical knowledge and real-life application.

The findings suggest that integrating modern technologies into OHS training is not only beneficial but necessary to effectively reach new generations of employees and ensure higher levels of workplace safety.

2. METHODS

Participants
263 employees from various industries, primarily from Generation Z (aged 18–28).

Design
A mixed-methods study including a quasi-experimental pre-test/post-test design and surveys.

Intervention
Participants completed OHS training using digital tools over a 4-week period.

Data Collection
Knowledge tests, engagement surveys, and qualitative feedback.

3. DIGITAL TOOLS USED

MOBILE APPLICATIONS
- Microlearning modules
- Push notifications & reminders
- Easy access to resources

GAMIFICATION
- Points, badges, leaderboards
- Challenges & missions
- Rewarding safe behaviors

VIRTUAL REALITY (VR)
- Immersive hazard simulations
- Safe practice of high-risk scenarios
- Real-life decision making

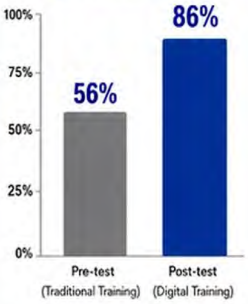
4. CONCEPTUAL FRAMEWORK

Digital Tools	Interactive Learning	Learning Outcomes	Safety Culture & Behavior
Mobile Apps Gamification VR	Engagement Immersion Participation	Knowledge Retention Skills Development Safety Awareness	Proactive Behavior Risk Reduction Workplace Safety

Interactive learning with digital tools connects theoretical knowledge with real-life application and builds a proactive safety culture.

5. RESULTS

Knowledge Retention (Pre-test vs. Post-test)



Engagement Level (Self-reported)

Perceived Effectiveness of Digital Training

Improved understanding of safety procedures	91%
More confident in applying safety knowledge	88%
Training was more engaging	93%
Prefer digital training in the future	87%

Qualitative Feedback (Examples)

> "The VR simulations made me feel like I was in a real situation. I learned more than from just listening." – Participant

> "The app is easy to use and the reminders help me stay aware of safety every day." – Participant

> "Gamification makes training fun and motivates me to participate." – Participant

6. KEY FINDINGS

- Digital training significantly improves knowledge retention (+30 percentage points compared to traditional methods).
- High engagement levels indicate that digital tools resonate with Generation Z learning preferences.
- Immersive and interactive experiences enhance understanding and confidence in applying safety practices.
- Digital solutions promote proactive safety behavior and support the development of a strong safety culture.
- Integrating digital technologies bridges the gap between theoretical knowledge and real-life application.

7. CONCLUSIONS

The findings suggest that integrating modern technologies into OHS training is not only beneficial but necessary to effectively reach new generations of employees and ensure higher levels of workplace safety.

Organizations should adopt interactive, technology-driven training strategies to build a proactive safety culture and prepare the workforce for the challenges of today's dynamic work environments.

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- Zhen, Y., et al. (2030). The effectiveness of gamification in safety training: A systematic review. Safety Science, 130, 104845.
- Merchant, Z., et al. (2014). Effectiveness of virtual reality-based instruction on students' learning outcomes

ACKNOWLEDGEMENTS
We thank all participants and organizations for their support and contribution to this study.

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PILOT STUDY DATA – FOR ILLUSTRATIVE PURPOSES ONLY

9th European Conference on standardization, testing and certification in the field of occupational safety and health

Inclusive Protective Clothing with Active Cooling Function: Standardisation Needs

Anna Dąbrowska
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Progressive climate change and rising air temperatures mean that people working outdoors, particularly during the summer season, are often exposed to excessive heat stress. At the same time, changes in the labor market can be observed that lead to an increase in women's employment in industry.

It is therefore essential to conduct research on individualized technical solutions that ensure occupational safety for both men and women under conditions of exposure to harmful factors such as hot microclimates. Despite the increasing interest in personal cooling solutions, existing ones—often based on the principle of heat conduction—are not adapted to individual differences among potential users.

Addressing these differences is essential to ensure both the safety and effectiveness of such personal protective equipment (PPE). Undeniable support in this regard would be the development of harmonized requirements, both with respect to the performance of the cooling function and to the consideration of anatomical, physiological, and even psychological differences among potential users.

The poster will summarize the identified gaps in current regulations and discuss potential recommendations to address these challenges.

CIOP PIB

Inclusive protective clothing with active cooling function – standardization needs

Anna Dąbrowska*, Nicoletta Klepacz
Central Institute for Labour Protection – National Research Institute, Department of Personal Protective Equipment, Wierzbowa 48, 90-133 Lodz, Poland
(*)e-mail: andab@ciop.lodz.pl

Inappropriately fitted PPE and cooling clothing may lead to:

- increased risk of injuries and accidents,
- reduced mobility and work efficiency,
- skin irritation, blisters, and musculoskeletal pain;
- inefficient cooling, especially in case of using thermal conductivity technologies

Progressive climate change and rising air temperatures mean that people working outdoors, particularly during the summer season, are often exposed to **excessive heat** stress. At the same time, changes in the labor market can be observed that lead to an **increase in women's employment in industry**. It is therefore essential to conduct research on **individualized technical solutions** that **ensure occupational safety for** both **men** and **women** under conditions of exposure to harmful factors such as hot microclimates.

A gender-responsive PPE should:

- recognize physical, physiological and anatomical differences between women and men,
- inprove workplace conditions,
- integrate diverse user needs into the design and performance of products, processes, and services,
- ensure equal usability, safety, and benefits for all users,
- avoid reinforcing existing gender inequalities.

Physiological effects of heat stress

- Intensive physical work accelerates metabolic heat production, increasing physiological burden and risk of overheating.
- Heat stress may lead to:
  - dehydration,
  - heat exhaustion,
  - dizziness and fatigue,
  - impaired cognitive and physical performance,
  - increased cardiovascular strain,
  - hyperthermia and, in severe cases, death.

Underrepresentation of women in PPE design

- Most PPE and cooling garments are designed using male or generalized anthropometric data.
- Many PPE products marketed for women are smaller versions of male designs, sometimes differentiated only by color.
- Cooling clothing and occupational heat mitigation strategies rarely consider: hormonal fluctuations, menstrual cycle phases, pregnancy and menopause, sex-specific sweating patterns, lower blood volume and cardiovascular capacity in women.
- Female-specific thermal comfort and physiological responses remain largely overlooked in standards and product development.

Inadequate sizing systems

- Current sizing standards rely on only a few body dimensions, which are insufficient to represent female body diversity.
- Existing systems fail to account for differences in: hip-to-waist ratio, chest proportions, limb length, smaller hand and foot dimensions.
- As a result, women frequently experience ill-fitting and oversized PPE, restrictive or excessively loose garments, impractical pocket placement and reduced mobility and comfort.

Standardization of PPE - protection against heat and flame. Test methods and requirements for garments with integrated smart textiles and non textile elements

- Regarding testing, assessment should cover cooling efficiency, duration of effect, performance stability over time and user safety. This applies to both cooling materials (e.g. phase change materials) and cooling systems. For electronic systems, additional tests should be included, similarly to requirements for smart PPE against heat.
- In case of requirements, minimum performance levels should be defined for cooling efficiency, operating time, and stability, to classify such solutions as PPE for protection against hot microclimate, similarly to existing standards for protection against cold.

The development of standards should:

- assume that gender differences may influence outcomes whenever people are affected;
- address gaps and biases in existing datasets;
- complement quantitative data with lived experience, research literature and qualitative evidence.

Future protective and cooling clothing systems should:

- utilize advanced technologies such as 3D body scanning,
- provide adjustable and ergonomically fitted designs,
- involve women directly in the design process,
- integrate gender-responsive occupational safety standards,
- support individualized heat stress prevention strategies.

Despite the increasing interest in personal cooling solutions, existing ones often based on the principle of heat conduction - **are not adapted to individual differences among potential users**. Addressing these differences is essential to ensure both the **safety** and **effectiveness** of such PPE. Undeniable support in this regard would be the development of harmonized requirements, both with respect to the performance of the **cooling function** and to the consideration of **anatomical**, **physiological**, and even **psychological differences** among potential users.

Sectors at high risk of the heat stress

Outdoor workers in agriculture, construction, forestry and fisheries are among the most vulnerable groups to the influence of the heat stress.

Acknowledgment: This poster was created (and published) on the basis of results of a research task carried out within the scope of the 7th stage of the National Programme "Governmental Programme for Improvement of Safety and Working Conditions" funded by the resources of the National Centre for Research and Development. Task no. I.BP.04 entitled "Development of cooling clothing with a control system utilizing machine learning, considering anatomical, physiological, and psychological factors". The Central Institute for Labour Protection – National Research Institute is the Programme's main co-ordinator.

9th European Conference on standardization, testing and certification in the field of occupational safety and health

Certifying the Intangible: Rethinking OSH Standardization and Conformity Assesment for Psychological and Organizational Risk

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European occupational safety and health (OSH) standardization has historically focused on measurable physical hazards such as machinery, chemicals, and protective equipment. Testing protocols and conformity assessment schemes are well established for technical risks. However, psychosocial and organisational factors; including work intensification, algorithmic management, and fragmented employment models are now significant contributors to workplace harm.

Although management system standards such as ISO 45001 recognise psychosocial risk, harmonised and objective approaches for testing and certification remain underdeveloped. Conformity assessment continues to rely heavily on documentation review and procedural compliance, which may not accurately reflect operational reality.

This poster examines challenges facing standardisation bodies, including the European Committee for Standardization, in developing measurable criteria for organisational risk. It highlights limitations in current audit methodologies and the risk of superficial certification creating misplaced assurance.

The poster proposes integrating human and organisational factors methodologies, structured worker feedback mechanisms, and outcome-based performance indicators into certification frameworks. To maintain credibility and regulatory legitimacy, OSH standardisation must evolve beyond technical verification toward robust organisational assurance models capable of addressing intangible risk.

CERTIFYING THE INTANGIBLE

Rethinking OSH Standardization and Conformity Assessment for Psychosocial and Organisational Risk

Dr. Constance Ehiozee | Bureau Veritas UK & Ireland | EUROSHNET 2026

Document-Centric · Weak Verification · Worker Voice Underused · Org Drivers Invisible · False Assurance

1. Background

European OSH standardization systems excel at **measurable technical hazards**: machinery safety, chemical exposure, PPE, engineering controls. ISO 45001 strengthened management systems, yet contemporary harm increasingly originates from:

- Excessive workload & work intensification
- Algorithmic & digital management
- Fragmented/outsourced labour models
- Poor psychosocial working conditions

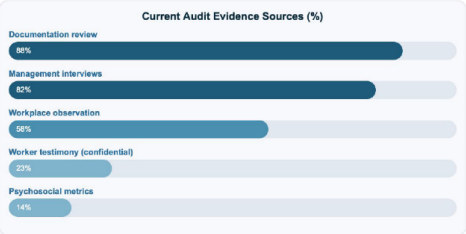
Current certification frameworks remain **document-centric** and technically oriented — mismatched to modern risks.

2. Research Objective

To examine whether existing OSH standardization and conformity assessment approaches provide **credible assurance** for psychosocial and organisational risk control.

3. Methodology

- **Document Review:** 45+ certification audit reports across manufacturing, logistics, healthcare
- **Stakeholder Interviews:** 22 lead auditors, 15 OSH practitioners, 8 certification body reps
- **Comparative Analysis:** Audit methodologies, evidence collection, worker participation
- **Framework Evaluation:** Gap analysis against CEN and HOF approaches



4. Key Findings

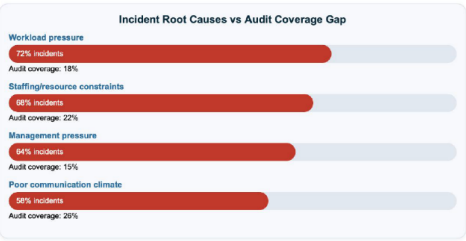
Finding 1: Document-Driven Certification
Audit outcomes driven by policy availability — not operational realities. Worker perception and frontline conditions largely ignored.

Finding 2: Weak Psychosocial Verification
Generic risk scoring, no measurable control evaluation. Verification of *procedures*, not effectiveness.

Finding 3: Worker Voice Underutilised
Confidential worker engagement in <25% of audits. Heavy reliance on management representation of culture.

Finding 4: Organisational Drivers Invisible
Resource constraints, staffing pressure, culture issues visible in incident investigations — absent from certification audits.

Finding 5: False Assurance Risk Confirmed
Certified organisations maintained status despite high fatigue, psychosocial complaints, poor reporting culture.



Summary of Findings & Implications

Key Finding	Core Implication	Risk Level
Document-centric audits	Certification ≠ operational safety	High
Weak psychosocial verification	Procedural compliance fallacy	Critical
Worker voice underutilised	Lost primary data source	High
Organisational drivers invisible	Fragmented assurance system	High
False assurance risk confirmed	Certification may mislead stakeholders	Critical

5. Implications for Standardization

Integrate Human & Organisational Factors (HOF)
Organisational behaviour, communication systems, psychosocial conditions into audit frameworks.

Triangulated Audit Evidence
Documentation + observation + worker testimony.

Outcome-Based Indicators
Absence trends, turnover, reporting behaviour, workload metrics, climate measures.

Enhanced Auditor Competence
From procedural compliance to organisational risk interpretation.

Proposed Evolution: Current → Future

Current Model (Technical Verification)	Proposed Model (Organisational Assurance)
Document review & policy existence	Triangulated evidence (documents + observation + testimony)
Auditor judgement only	Structured worker feedback integrated
Technical compliance focus	HOF integration
Single visit snapshot	Longitudinal & outcome-based indicators
Certification = compliance	Certification = effective control

6. Conclusion

Current OSH standardization systems remain highly effective for certifying technical compliance. However, this research demonstrates that organisational and psychosocial risks — increasingly central to workplace harm — remain insufficiently assessed within existing conformity assessment frameworks.

The future credibility of OSH certification depends on the ability of standardization systems to evaluate not only whether procedures exist, but whether organisations are genuinely safe in practice.

What current OSH systems struggle to test, audit, and certify is increasingly what determines worker harm.

The future credibility of OSH certification depends on its ability to assess what cannot be easily measured.

KEYWORDS: Occupational Safety and Health (OSH) • Psychosocial Risk • Conformity Assessment • Standardization • Organisational Risk • Human & Organisational Factors (HOF)

Methodology: Comparative audit report analysis (n=45) | Semi-structured interviews (n=45) | Investigation root-cause review | Gap analysis against CEN/ISO frameworks

9th European Conference on standardization, testing and certification in the field of occupational safety and health

Shaping Sustainable Work: Digital Insights for Psychosocial Health

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Digital innovation is reshaping the future of occupational safety and health, offering new ways to create sustainable, healthy, and equitable workplaces. Ensuring long, productive, and mentally resilient careers requires strategies that align work demands with individual resources, supported by leadership, standardization and evidence-based policy.

The Portuguese Observatory on Occupational Factors (Popsy@Work) addresses this challenge through a cutting-edge digital platform that collects, analyses, and visualizes psychosocial data from the Portuguese workforce. By implementing a digital occupational health surveillance system, providing reference values, and disseminating best practices, Popsy@Work transforms complex information into actionable insights for workers, organizations, and policymakers.

The platform enables identification of psychosocial health inequalities, guiding targeted interventions for vulnerable subgroups and supporting strategic national dialogues. Through robust metrics and data-driven intelligence, Popsy@Work empowers organizations to enhance well-being, strengthen resilience, and embed sustainable practices across workplaces.

By integrating digital tools with evidence-based guidance, Popsy@Work exemplifies how innovation can drive the future of occupational health—fostering healthier, more sustainable work environments while informing policies that benefit society.

SHAPING SUSTAINABLE WORK

Digital Insights for Psychosocial Health

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1. Background

Psychosocial risks are now among the leading occupational health challenges in Europe.

Digital transformation is reshaping occupational safety and health (OSH), creating new opportunities to support sustainable, healthy, and equitable workplaces. Growing psychosocial risks—including stress, burnout, and work overload—demand innovative monitoring and prevention strategies.

Sustainable careers require:
- balanced work demands
- psychosocial resilience
- evidence-based prevention

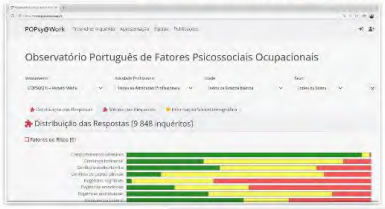
2. Objectives

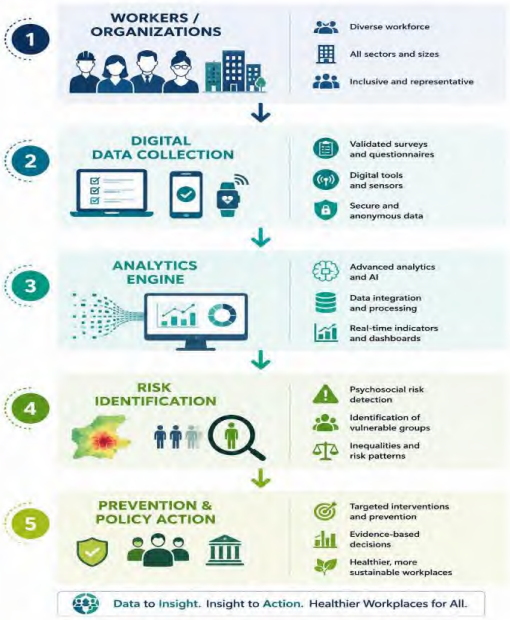
- Assess psychosocial risks across the Portuguese workforce using digital monitoring tools
- Strengthen occupational health surveillance through data-driven, evidence-based approaches [Case study with scalability to European contexts]
- Identify psychosocial inequalities and high-risk worker groups
- Support evidence-based policy and organizational decision-making
- Promote sustainable workplaces

3. Popsy@Work Digital Intelligence Hub

Popsy@Work is a digital platform designed to collect, analyze, and visualize psychosocial health indicators across workplaces.

Core Functions:
- Digital occupational psychosocial health surveillance
- Data visualization and benchmarking
- Reference values for psychosocial indicators
- Identification of vulnerable worker groups
- Dissemination of best practices





4. Impact and Relevance

The platform transforms complex psychosocial data into practical insights that help organizations and policymakers:
- Improve employee well-being
- Strengthen resilience and prevention strategies
- Reduce psychosocial inequalities
- Support evidence-based policy development

5. Key Message

Popsy@Work demonstrates how digital innovation can strengthen occupational health systems while supporting prevention, resilience, and informed decision-making.

Digital psychosocial surveillance enables healthier and more resilient workplaces.

Keywords: Psychosocial Health; Occupational Health; Digital Health at Work; Sustainable Work; COPSOQ; Analytics; Data Integration; Digital Transformation

9th European Conference on standardization, testing and certification in the field of occupational safety and health

Climate Change and the Impact of Vector-Borne Diseases in the Workplace

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One of the most significant effects of climate change is the increase of vector-borne diseases. In Spain, mosquitoes capable of transmitting viruses such as dengue, Zika, chikungunya, and West Nile are established.

The Spanish National Institute for Safety and Health at Work collected data from several official sources to assess the impact of these diseases in the workplace: 1) the CEPROSS system (Communication of Occupational Diseases to Social Security), 2) the RENAVE database (National Epidemiological Surveillance Network), 3) and a worldwide literature review to identify the work-related activities most likely to be affected.

Current data show that almost all reported cases of dengue, Zika, chikungunya and malaria in Spain are imported and between 2.5% and 10.0% of them are work-related. The analysis highlights those certain occupations, particularly those involving outdoor tasks or contact with natural environments, which may be especially exposed to vectors such as mosquitoes. However, in endemic areas, indoor occupations cannot be excluded from risk. A risk situation can arise when viremic cases (people or animals capable of transmitting the disease) and competent vectors are present at the same time and place.

CLIMATE CHANGE AND THE IMPACT OF VECTOR-BORNE DISEASES IN THE WORKPLACE

Blanca de la Fuente. National Institute for Safety and Health at Work. Barcelona. Spain.

INTRODUCTION

In Spain are established vectors (mosquitoes and ticks) capable of transmitting pathogens that can cause diseases in humans like dengue, West Nile or Lyme diseases.

OBJECTIVE

The objective of the study was to identify occupational activities with a higher susceptibility to vector-borne diseases and to evaluate their impact within the workplace in Spain.

METHODS

The National Institute for Safety and Health at Work collected data from several sources to assess the impact of vector-borne diseases in the workplace:

1. National Epidemiological Surveillance Network database (RENAVE). Carlos III Health Institute.
2. An exploratory literature review.
3. Communication of Occupational Diseases to Social Security (CEPROSS system).

RESULTS

1. RENAVE

Cases of malaria, dengue, Chikungunya and Zika diseases reported to the RENAVE system between 2011-2024 are listed in Table 1. They are classified by reason of the trip. Nearly all cases were imported from third countries.

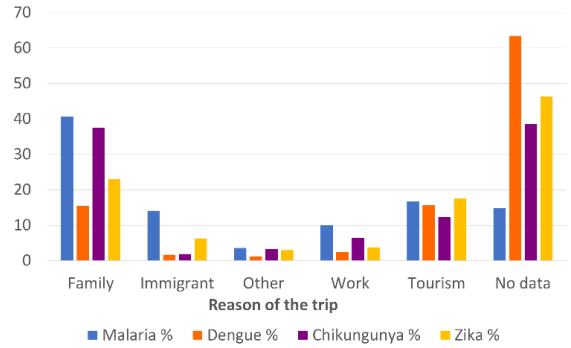

Table 1. Work-related imported cases notified in Spain (suspected and confirmed cases) by reason of the trip (2011-2024). Source: RENAVE, Carlos III Health Institute (ISCIII).

2. EXPLORATORY LITERATURE REVIEW

The scientific literature review focused on 4 viruses transmitted by mosquitoes. The results are summarized in Table 2.

Virus	Main Occupational Risk Pattern
West Nile	Higher prevalence among outdoor workers.
Dengue	No difference between indoor and outdoor work; sector-specific patterns.
Chikungunya	High prevalence in both indoor and outdoor environments.
Zika	Higher prevalence among outdoor and domestic workers.

Table 2. Overview of working activities affected by viruses transmitted by mosquitoes found on the bibliographic review.

3. CEPROSS SYSTEM

Between 2011 and 2023, **177** cases of occupational diseases transmitted by vectors (mosquitoes and ticks) were reported to the CEPROSS system (Figure 1).

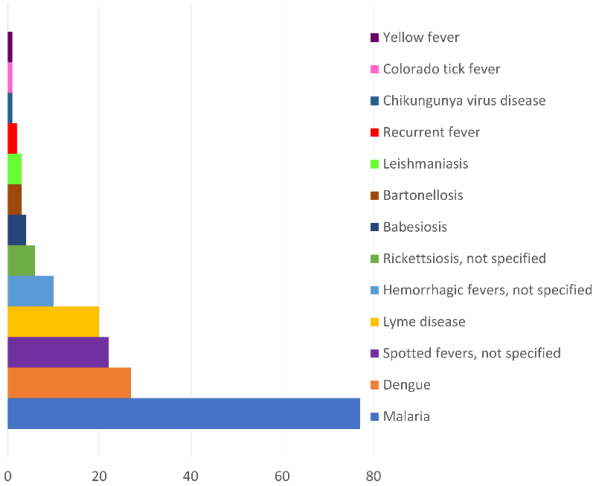

Figure 1 . Vector-borne diseases (mosquitoes and ticks) (number of cases) found in the CEPROSS system, 2011-2023.

A total of **45 economic** activities were identified. In Table 3 are listed the most frequently reported activities.

Activity (NACE Rev. 2)	%
Specialised construction activities.	13.6
Human health activities.	13.6
Public administration and defence; compulsory social security.	8.5
Agriculture, livestock farming, hunting and related service activities.	6.8
Architectural and engineering activities; technical testing and analysis.	5.6
Forestry and logging.	4.0
Wholesale trade, except of motor vehicles and motorcycles.	4.0
Activities of membership organisations.	4.0
Fishing and aquaculture.	2.3
Repair and installation of machinery and equipment.	2.3

Table 3. Distribution of the economic activities (percentage) of the vector-borne diseases (mosquitoes and ticks) reported to the CEPROSS system (closed cases), 2011–2023. Source: CEPROSS.

CONCLUSIONS

- ✓ Between **2.5 %** and **10 %** of the cases of malaria, dengue, Chikungunya and Zika diseases reported to the RENAVE system were classified as occupational.
- ✓ **Malaria** and **dengue** were the most frequently reported vector-borne diseases.
- ✓ In endemic areas, both, **outdoor** and **indoor activities** are affected by vector-borne diseases. A risk situation can arise when viremic cases (people or animals capable of transmitting the disease) and competent vectors are present at the same time and place.
- ✓ Vector-borne diseases (mosquitoes and ticks) affect **a large number** of **economic activities.**

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MINISTERIO DE TRABAJO Y ECONOMÍA SOCIAL
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9th European Conference on standardization, testing and certification in the field of occupational safety and health

Size4Face: A Mobile Application as a Decision-Support and Educational Tool for Respiratory Protection

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The Size4Face mobile application was originally designed to support users of respiratory protective devices (RPD) in selecting and fitting half masks according to individual facial dimensions. The latest version of the application represents a comprehensive upgrade, combining a modernized user interface with significantly expanded functional and educational content. The redesign included a new functional layout, refreshed visual identity, tile-based main menu, and improved navigation, all aimed at increasing readability, intuitiveness, and accessibility of information.

Size4Face uses 3D facial measurement based on ARCore technology to assign the user's face to one of five sizes defined in ISO standards A substantially updated and expanded database of elastomeric and filtering half masks provides verified information on mask size, protection class, manufacturer details, and direct links to manufacturers' websites. All mask assignments were validated through dedicated fitting studies to ensure consistency with current ISO standards.

Newly implemented modules further enhance user safety and usability. These include a disinfection log with an automated register of performed disinfection cycles, a safe-use time calculator, and expanded guidance on disinfection and maintenance procedures using ozone, UV-C radiation, and 70% ethanol. The application also addresses safety aspects related to elevated carbon dioxide concentrations during mask use.

Size4Face is available free of charge for Android and iOS, operates offline, and enables easy sharing via social media. User feedback indicates high acceptance, with over 80% of respondents rating the clarity and usefulness of the content at the highest level. Overall, Size4Face functions as both a practical decision-support tool and an educational platform, promoting safe, informed, and standards-compliant use of RPD.

SIZE4FACE

MOBILE APPLICATION AS A DECISION - SUPPORT AND EDUCATIONAL TOOL FOR RESPIRATORY PROTECTION

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1 INTRODUCTION

An app designed to support the safe use of respiratory protective equipment (RPE) in the workplace. The app was developed in response to the growing need for tools that help ensure proper fit of half masks based on the user's individual characteristics. It includes theoretical materials as well as practical tools, such as face measurement, databases of filtering and elastomeric half masks, a calculator for safe usage time in environments with elevated CO_2 levels, and a disinfection log. All information included in the app is sourced from the literature and has been confirmed or developed through laboratory research.

2 KEY ADVANTAGES

WORKS OFFLINE
Full functionality independent of internet connection

AVAILABLE TWO LANGUAGES
Completely available in Eglish and Polish

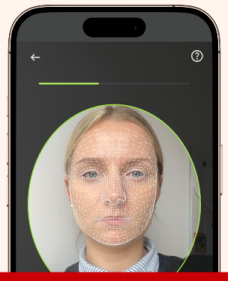
NO REGISTRATION REQUIRED
No account or login needed - start using the app immediately after installation

FULL USER ANONYMITY
No photos are taken during face measurement and no personal date is stored

3 FEATURES

FACE MESUREMENT

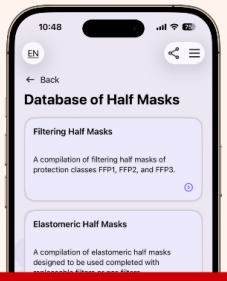
The app scans facial diamensions using phonoe's front camera, performs calculations and assigns face to one of the five head models according to ISO 16976-2:2022: small, short-wide, medium, long-narrow, large.



THE MEASUREMENT IS PERFORMED IN REAL TIME

DATEBASES

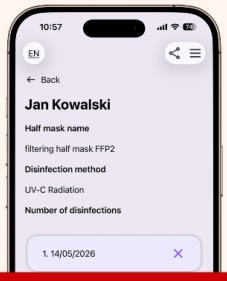
Two datebases of half masks- filtering and elastomeric respirators. Each model has been tested and assigned to the head size according to ISO. Knowing your face size makes it easier to choose the right half mask.



EASIER SELECTION OF HALF MASKS

DISINFECTION LOG

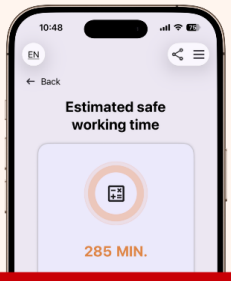
Monitors number of disinfections using three methods developed in the laboratory: ozonation, UV-C radiation and spraying 70% ethyl alcohol. You will be notified when the half mask has reached the limit of possible disinfections and needs to be replaced.



CONTROL OVER THE NUMBER OF DISINFECTION

SAFE USE TIME CALCULATOR

Calculates the maximum safe usage time depending on CO_2 concentration in the environment and work intensity. The algorithm was developed as the result of scientific research.



DETERMINING SAFE WORKING HOURS

4 SUBSTANTIVE CONTENT

SELECTION AND FIT
Information on how to select respiratory equipment according to the type and concentration of hazards to ensure effective protection.

DISINFECTION AND MAINTENANCE
Information on proper maintenance and disinfectiong procedures - ozonation, UV-C radiation, spraying 70% ethyl alcohol.

SAFE USAGE TIME
Information on oxygen deficiency and the consequences of working in elevated CO_2 concentrations.

GENERAL INFORMATION
User mauals and terms of use of the application.

AVAILABLE ON

Google Play

App Store

This task was completed on the basis of results of research carried out within the scope of the 6th stage of the National Programme "Governmental Programme for Improvement of Safety and Working Conditions", funded by state services of the Ministry of Family, Labour and Social Policy.
task no. 1.ZS.08. Development of criteria, testing methods and safe usage times for filtering respiratory protective equipment, depending on the concentration of carbon dioxide in the inhaled air and specific working and living conditions
and task no. 1.ZS.09. Development of physical and chemical maintenance and disinfection procedures for filtering respiratory protective equipment
The Central Institute for Labour Protection – National Research Institute is the Programme's main co-ordinator.

9th European Conference on standardization, testing and certification in the field of occupational safety and health

Occupational Burnout in Healthcare Workers Following a Climate Disaster: Evidence from the Valencia DANA Flood (2024)

Alfredo Jose Malave Diaz, Elena Bienvenida Vidal Martínez, Matias Prieto Suarez
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Introduction: Climate change is intensifying extreme weather events, posing growing threats to occupational safety and health. The DANA storm event that devastated Valencia on 29 October 2024 (238 deaths and €5.26 billion in insured losses) overwhelmed the healthcare system and placed professionals in the dual role of victims and caregivers. Burnout syndrome (BS), recognised by the World Health Organization (WHO) as an occupational phenomenon (ICD-11), constitutes a critical psychosocial risk in this context.

Methods: Cross-sectional observational study among healthcare workers at a tertiary university hospital in Valencia (October 2024–January 2025). Burnout was assessed using the Maslach Burnout Inventory (MBI; 22 items, 5-point Likert scale), distributed digitally via QR code. Sample: n = 121.

Results: Emotional exhaustion was the most affected dimension, with 72.7% of participants at moderate or higher clinical levels and a mean score of 3.14 ± 0.84 (scale 1–5). Overall BS prevalence reached 90.1%, exceeding figures reported during the COVID-19 pandemic.

Conclusions: Climate change is shaping a new occupational psychosocial risk scenario. These findings support the development of standardised screening protocols, psychological first aid frameworks, and evidence-based organisational interventions for healthcare workers facing climate disasters, contributing to the advancement of occupational safety and health standards at the European level.

Winner of the Best Poster Award

Winner of the Best Poster Award:

EUROSHNET 2026
Digital and Green Innovations – Shaping the Future of Occupational Safety and Health
27–28 MAY 2026 | HELSINKI

Occupational Burnout in Healthcare Workers Following a Climate Disaster: Evidence from the Valencia DANA Flood (2024)

Advocating for Standardized OSH Mental Health Protocols for Healthcare Professionals.

DEPARTAMENT DE SALUT DE VALÈNCIA DOCTOR PESET
GENERALITAT VALENCIANA Conselleria de Sanitat

Malavé Díaz AJ[1] · Vidal Martínez EB[2] · Prieto Suárez M[1] · Bartolo Hernández HD[1] · Boluda Alventosa A[3]

[1]Occupational Medicine Resident [2]Adjunct Physician, Occupational Medicine [3]Occupational Health Nursing Resident

Occupational Risk Prevention Service · Hospital Universitario Dr. Peset · Valencia, Spain

CONTEXT: THE VALENCIA DANA (OCT 2024)

238 Recorded Deaths

€5.26 Billion in Losses (83% of insured losses in Spain 2024)

57 Primary Care Centers Affected (Hospitals at minimum capacity)

Primary care center affected during the Valencia DANA (2024).

The Dual Role: Victim and Caregiver

Staff provided life-saving care while processing personal trauma (loss of homes, vehicles)

A catastrophic flood struck the Valencia region, creating a dual-role crisis for healthcare professionals who were both responders and victims.

STUDY METHODOLOGY

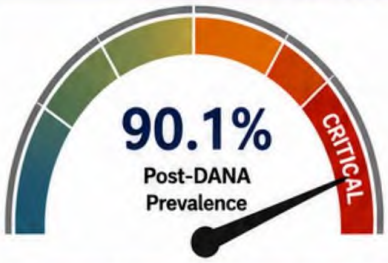
n=121 Healthcare Participants
Physicians, residents, and nursing staff at a tertiary hospital

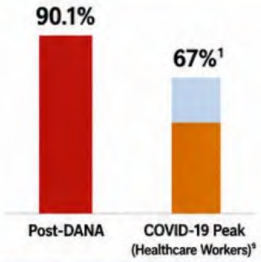
Maslach Burnout Inventory (MBI)
22-item digital survey measuring three core dimensions (5-point Likert scale)

Scan for full study, abstract, complete work and MBI survey

Cross-Sectional Analysis (Nov 2024 – Jan 2025) | **High Internal Consistency:** Cronbach alpha (EE=0.74, DP=0.75, LPA=0.66)

BURNOUT PREVALENCE & BENCHMARKS





Surpassing the COVID-19 Peak

Post-DANA burnout prevalence (90.1%) significantly exceeded the 67% reported in a large multicentric study (n=3,537) during the COVID-19 pandemic[1].

MBI RESULTS BY DIMENSION

Emotional Exhaustion (EE)
72.7% Affected
Mean Score: 3.14 (± 0.84)

Lack of Personal Accomplishment (LPA)
81.8% Affected
Mean Score: 2.54 (± 0.74)

Depersonalization (DP)
59.5% Affected
Mean Score: 2.14 (± 0.75)

KEY REFERENCES

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KEY TAKE-HOME MESSAGE

Climate disasters may generate burnout levels in healthcare workers exceeding the COVID-19 peak, highlighting the urgent need for standardized OSH mental health protocols and organizational resilience strategies.

CONTACT & RESOURCES

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sprl_up4@gva.es (Occupational Risk Prevention Service)

Scan the QR code above for:
- Full abstract
- Complete study
- MBI survey used

This study supports the development of standardized screening protocols, psychological first aid frameworks, interventions for healthcare workers facing climate disasters.

9th European Conference on standardization, testing and certification in the field of occupational safety and health

Closing the Loop for Used PPE: Workplace Barriers and Enablers for Circular Solutions

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The use of personal protective equipment (PPE) across sectors, together with circular-economy expectations, increases pressure to move beyond disposal toward recycling, downcycling, and upcycling of used PPE. In real workplaces, PPE waste is rarely homogeneous: it often combines mixed polymers, multi-material designs, coatings and adhesives, and variable levels of biological or chemical contamination. These features create major technological and organizational barriers, from segregation at source and temporary storage to transport, pre-treatment, and quality assurance of secondary materials. Existing guidance is fragmented, leading to uncertainty about minimum collection conditions, contamination control measures, traceability, and acceptance criteria used by waste operators and recyclers.

This poster presents initial findings from a national research task conducted under the VII stage of the Polish Government Programme for Improving Working Conditions, based on mapping of PPE waste types, volumes, current disposal practices, contamination scenarios, and logistical constraints. Building on the identified gaps, we outline priority standardization needs and suggest initial directions for recommendations to enable safe, scalable pilots and more predictable circular routes for used PPE.

DIGITAL AND GREEN INNOVATIONS - SHAPING THE FUTURE OF OCCUPATIONAL SAFETY AND HEALTH
9TH EUROSHNET CONFERENCE - HELSINKI, 27-28 MAY 2026

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Closing the Loop for Used PPE

Workplace Barriers and Enablers for Circular Solutions

AUTHORS

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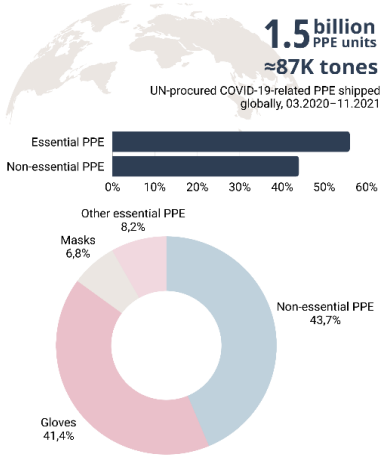
ABSTRACT

The use of personal protective equipment (PPE) across sectors, together with circular-economy expectations, increases pressure to move beyond disposal toward recycling, downcycling, and upcycling of used PPE. In real workplaces, PPE waste is rarely homogeneous: it often combines mixed polymers, multi-material designs, coatings and adhesives, and variable levels of biological or chemical contamination. These features create major technological and organizational barriers, from segregation at source and temporary storage to transport, pre-treatment, and quality assurance of secondary materials. Existing guidance is fragmented, leading to uncertainty about minimum collection conditions, contamination control measures, traceability, and acceptance criteria used by waste operators and recyclers.

OBJECTIVE

This poster presents initial findings from a national research task conducted under the VII stage of the Polish Government Programme for Improving Working Conditions, based on mapping of PPE waste types, volumes, current disposal practices, contamination scenarios, and logistical constraints. Building on the identified gaps, we outline priority standardization needs and suggest initial directions for recommendations to enable safe, scalable pilots and more predictable circular routes for used PPE.

FIGURE 1. PPE WASTE STREAMS AND VOLUMES



CIRCULAR PATHWAYS

Quantitative data on PPE waste volumes come mainly from the COVID-19 period and show the scale of the problem rather than total global PPE waste. UN-procured COVID-19-related PPE alone represented approx. 87K tonnes, including 49K tonnes of essential PPE and 38K tonnes of non-essential PPE (Fig. 1).

PPE waste is heterogeneous in terms of materials, design, contamination, use patterns and regulatory requirements (Fig. 2), which makes one universal recovery pathway difficult to define. A practical first step is to focus on PPE made mainly from thermoplastic polymers, such as selected face masks, safety helmets and eye/face protectors. Although these products differ in function, they may share comparable processing routes, including sorting, disassembly, decontamination, mechanical recycling, reprocessing and polymer recovery.

Effective implementation requires not only technical recycling options, but also enabling actions such as source segregation, stream identification, pre-treatment protocols, dedicated collection procedures, standardised labelling, traceability, clear acceptance criteria, collaboration, training and pilot programmes (Fig. 3). These elements provide the operational and organisational foundation for moving PPE from disposal-oriented management towards circular recovery pathways.

FIGURE 2. MAIN BARRIERS TO CIRCULAR ROUTES

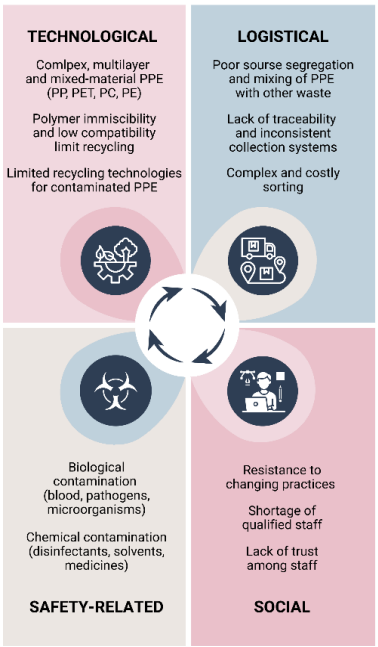
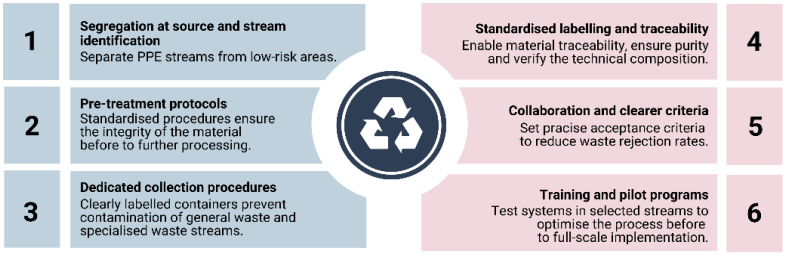


FIGURE 3. ENABLERS AND PRIORITY ACTIONS



CONCLUSIONS

- Used PPE is rarely a clean, homogeneous waste stream, which limits straightforward recycling pathways.
- Workplace-level conditions - especially segregation, contamination control, storage and traceability - are critical determinants of circular feasibility.
- Circular solutions should initially focus on selected, lower-risk PPE waste streams with clearly defined collection and acceptance criteria.
- Further guidance and standardisation are needed to enable safe pilot schemes and support the transition from disposal to circular management of PPE waste.
- Further research is needed to determine which PPE waste streams can be safely and effectively redirected to circular routes, taking into account material properties, contamination levels and OSH requirements.

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9th European Conference on standardization, testing and certification in the field of occupational safety and health

New Regulation Framework and Standardisation of Industrial Security to Empower Europe

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The new European Machinery Regulation marks an important step toward integrating industrial security into the core of machinery safety. One of its most innovative aspects is the section on Protection against corruption, which directly links digital integrity with physical safety. Machinery must now be designed so that connections to other or remote devices cannot create hazardous situations. Hardware and software that are critical for compliance must be protected against both accidental and intentional corruption, and any legitimate or illegitimate intervention must be traceable.

These requirements expand the traditional concept of safety to include protection from corruption (security). Manufacturers must identify all software essential for safe operation and ensure it remains secure and verifiable throughout the product's lifecycle. This also changes conformity assessment, which must now address technical and procedural aspects of digital integrity. Manufacturers can rely on several proven specifications and standards already and can safe ressources with modern standardized vulnerability management.

The poster highlights the opportunities that arise from this new framework. It shows how the new legal requirements and standardisation -particularly through EN 50742, CSAF, RFC 9116 and the Guideline on the Machinery regulation by the European Expert Group - can drive a culture of security-by-design, improve industrial resilience, and strengthen Europe's technological sovereignty.

IFA
Institut für Arbeitsschutz der
Deutschen Gesetzlichen Unfallversicherung

New Regulation Framework and Standardisation of Industrial Security Empower Europe

New legal requirements and standardisation -particularly through EN 50742, CSAF, RFC 9116 and the Guideline on the Machinery regulation by the European Expert Group - can drive a culture of security-by-design, improve industrial resilience, and strengthen Europe's technological sovereignty.

What caused the new regulations?

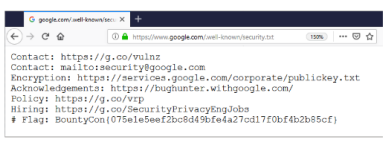
1. Critical vulnerabilities in controlsystems exist
2. No real vulnerability management for decades.
   Commercial advantage to ignore vulnerabilities
3. Growing number of Cyberattacks
   Losses for German Industry rise to
   202.400.000.000 EUR in 12 Months
   Hazardous situations occur

Simple text file enables rapid communication

International specification **IETF RFC 9116**

Manufacturer informs about vulnerabilities automatically: Notified Body, User, Machine builder

1. Past: **Months** of manual, **expensive** research
   Now: Automatic lookup in **seconds**
2. security.txt on web site provides
   Emergency contact and
   link to CSAF Security Advisory
3. Implementation in **just 5 Minutes**
4. Short film and generator online
   https://cert.dguv.de



Machinery Regulation, Guide

Machinery Regulation, Annex III

- 1.1.9 Protection against corruption
- 1.2.1 Safety and Reliability of Control Systems
- CRA and MR do not overlap but combine perfecly

Guidance on the Machinery Regulation, Group D

- Kickoff: 2025-09-10,
- ETA: End of 2026
- Mandate: "**Clarification**, not Interpretation"
- Does **not** describe the state of the art

Standardization CLC TC44x WG02 EN 50742

- "Safety of machinery - Protection against corruption"
- HC: May 2026
- ETA: End of 2026
- Describes the **state of the art**
- Based on risk assessment ISO 12100
- Operating instructions, protective measures and their limitations, operating environment

Path A (default, very lean)	Method B (mapping to IEC 62443)
Requirements derived from MVO	Compatible requirements Sought from IEC 62443
More compact, as it is tailored precisely to MVO	Good if IEC 62443 has already been implemented, and the machine is assembled from components developed in accordance with IEC 62443

DGUV Test principles

Lessons learned from old test principles

- IEC 62443 is too complex for most SME

New test principles based on EN 50742

- efficient for protection from corruption in machinery
- compatible with CRA requirements

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9th European Conference on standardization, testing and certification in the field of occupational safety and health

Advancing Human-Centered Resilient Technologies: The Enhanced HF Tool for Sustainable Maintenance Work

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The EU Horizon funded SARAH project introduces a novel approach to human-centered and sustainable technology design, aligning with Industry 5.0 principles . Human-centered design is made explicit and operationalized with an enhanced Human Factors (HF) Tool, originally implemented in safety-critical industries of air traffic management and nuclear power , and now adapted to support resilient technology development for civil infrastructure maintenance using Digital Twin, unmanned aerial vehicle (drone), and metaverse technologies. The project integrates human-oriented safety practices such as collaborative work process analysis method , facilitating systemic, solution-based and user-centered perspectives for improving challenging maintenance tasks such as bridge and tunnel inspections. This kind of HF approach has not been prevalent in maintenance work and technological development.

The new technology aims to improve occupational safety and reduce physical strain. Managing potential increases in cognitive load, considering cognitive ergonomics and usability, as well as fostering effective shared situation awareness within maintenance teams, becomes increasingly critical. Therefore, the original HF Tool needs to be adjusted to address technology design aspects such as system reliability and system state transparency, users' trust in automation and hybrid work dynamics, but also environmental challenges such as climate-induced variations in weather. A new guide (HF Toolkit) will provide practical examples, checklists, and adaptable strategies to promote HF-informed human-centered design, usability, and resilience in adopting emerging technologies.

By building on a long-standing research legacy and engaging participatory methods across partners, the SARAH project demonstrates how innovative tools and methodologies can advance occupational safety, efficiency, and sustainability in a transforming work environment.

[1] EN ISO 9241-210:2019
[2] DG RTD, 2021. Industry 5.0
[3] Teperi, Leppänen, Norros, 2015
[4] Teperi, Puro, Kannisto, 2017
[5] Teperi & Leppänen, 2011
[6] EN ISO 9241-11:2019

SARAH

ADVANCING HUMAN-CENTRED RESILIENT TECHNOLOGIES:

THE ENHANCED HF TOOL FOR SUSTAINABLE MAINTENANCE WORK

TEPERI, AM., KANNISTO, H., TIIKKAJA, M., ASIKAINEN, I., HEIKKILÄ, T., WALLENIUS, K., NURMI, A., LUKANDER, K.

INFRASTRUCTURE MAINTENANCE WORK IS RAPIDLY CHANGING DUE TO DIGITALISATION, GREEN TRANSITION AND CLIMATE-RELATED RISKS. RENEWED HUMAN-CENTRED OCCUPATIONAL SAFETY IS NEEDED.

MAKING HUMAN-CENTRED DESIGN EXPLICIT AND OPERATIONAL

The HF Tool is modified for new technological context, integrating participatory and work-based methods into technology development.

SARAH produces a practical HF Toolkit to support human-centred technology design.

DG RTD, 2021. Industry 5.0; Leppänen et al., 1997; Teperi & Leppänen, 2011; Teperi Puro, Kannisto, 2017

Based on HF Tool (Teperi, 2012)

The HF Toolkit, to be published in 2027; EN ISO 9241-210:2019

A LONG RESEARCH LEGACY BROUGHT INTO TODAY

FIOH has a long-standing tradition in work development and occupational safety research. The SARAH project builds on this legacy and adapts it to today's digital and green infrastructure maintenance work in SARAH-project.

WHAT IS NEW IN SARAH?

A novel, human-centred approach to technology design for infrastructure maintenance is applied to real, demanding maintenance tasks, such as bridge inspections and tunnel inspections. This type of Human Factors (HF) -informed approach has not previously been common in infrastructure maintenance.

WWW.SARAHPROJECT.EU

Finnish Institute of Occupational Health

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9th European Conference on standardization, testing and certification in the field of occupational safety and health

Implementation Gap: EU AI Act, OSH Framework Directive, and NIS2 Convergence in Romanian SMEs - A Practitioner's Field Report

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European Commission data indicate persistent lags in Romanian AI and digital adoption: Eurostat (2025) reports AI use by Romanian enterprises at 5.2% versus 20.0% EU average, while only 27.7% of Romanians possess basic digital skills (EU average: 55.6%; EC Digital Decade 2024). Cedefop (2025) finds only 15% of European workers receive AI training. This creates a compliance paradox: SMEs deploying AI employ workforces lacking the literacy required by EU AI Act Article 4, in force since February 2025.

This is an observational practitioner report based on 72 anonymized workplace risk assessment documents encountered during routine OSH consultancy practice in Romanian SMEs (September 2025 – April 2026), supplemented by retrospective practitioner field notes from ongoing consultancy engagements. No personal data were processed, no individual cases are disclosed.

None of the 72 reviewed documents addressed AI-related cognitive or psychosocial risks, AI literacy obligations, or cognitive workload from AI-mediated tasks. Given that NIS2 Article 21 cybersecurity mandates overlap operationally with AI Act Article 15, none bridged these convergent obligations.

The poster proposes a tiered framework integrating AI Act Annex III (legal triage), Article 26 (deployer duties), Karasek Job Demand-Control (organisational design), and NASA-TLX (task-level cognitive load), anchored in OSH Framework Directive 89/391/EEC.

The Implementation Gap: EU AI Act, OSH Framework Directive, and NIS2 Convergence in Romanian SMEs

A Practitioner's Field Report based on 72 risk assessments

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9th EUROSHNET Conference · Helsinki · May 2026

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risk assessments referenced AI-related cognitive or psychosocial risks

Romanian SMEs, September 2025 – April 2026

ILO Global Report (April 2026): 840,000 deaths annually from work-related psychosocial risks. 112,333 in Europe.

1. CONTEXT & PROBLEM

European Commission data indicate persistent lags in Romanian AI and digital adoption. Eurostat (2025) reports AI use by Romanian enterprises at 5.2% versus 20.0% EU average, while only 27.7% of Romanian citizens possess basic digital skills (EU average: 55.6%; EC Digital Decade 2024).

Cedefop (2025) finds that only 15% of European workers participate in AI training programmes.

This creates a compliance paradox: SMEs deploying AI employ workforces lacking the literacy required by EU AI Act Article 4, in force since February 2025.

The Digital Paradox

85.4% — social media use (2nd in EU)

31.8% basic digital skills (last in EU)

(Eurostat, April 2026)

Three frameworks converge on AI-enabled workplaces:

EU AI Act (Reg. 2024/1689) — Art. 4 AI Literacy (Feb 2025), Art. 26 Deployer duties (Dec 2027*)

OSH Framework Directive 89/391/EEC — Art. 6(2)(d) adapt work to the individual

NIS2 Directive (2022/2555/EU) — Art. 21 cybersecurity risk management

* Digital Omnibus Act extended high-risk standalone deadline to 2 December 2027.

Shadow AI — an emerging OSH risk category

AI tools adopted informally by employees — without employer awareness, documentation, or risk assessment — represent an emerging category of cognitive and psychosocial risk requiring systematic research within the OSH Framework Directive.

2. METHODS & RESULTS

Observational practitioner report based on 72 anonymized workplace risk assessment documents encountered during routine OSH consultancy practice in Romanian SMEs (September 2025 – April 2026). 6 NACE sectors: manufacturing, construction, IT/services, retail, transport, healthcare. No personal data were processed.

Finding 1 — The Documentation Zero

0 out of 72 risk assessments (0%) contain any reference to AI tools, AI literacy requirements, cognitive workload from AI-mediated work, or AI-related psychosocial risk. This finding holds across all six sectors.

Finding 2 — The Shadow AI Pattern

Practitioner field notes indicate AI tools (ChatGPT, Copilot, image generation) are used informally in multiple client organizations, without employer awareness. No employer had issued AI usage policies. Note: qualitative observation, not codified frequency data.

Proposed Typology of AI Adoption in SMEs

Conceptual framework for future research

A — Invisible: employees use AI, employer unaware

B — Tolerated: employer aware, zero documentation

C — Promoted: employer encourages, zero compliance

D — Compliant: documented, risk assessed → 0 cases

Three compliance gaps identified

Gap 1: AI Act Art. 4 (AI Literacy) → Zero clients with AI literacy training.

Gap 2: AI Act Art. 26(7) (Cognitive Workload) → Zero assessments include NASA-TLX.

Gap 3: NIS2 Art. 21 ↔ AI Act Art. 15 → Undocumented in any OSH template.

3. DISCUSSION & NEXT STEPS

Proposed tiered framework

Integrating four instruments under OSH Framework Directive 89/391/EEC:

1. AI Act Annex III — Legal triage (what is high-risk)
2. AI Act Article 26 — Deployer duties (employer obligations)
3. Karasek Job Demand-Control — Organisational design
4. NASA-TLX — Task-level cognitive load measurement

Anchor: OSH Framework Directive 89/391/EEC

Proposed extension: NASA-TLX-9

Three new dimensions for AI exposed workplaces (to be piloted)

Original NASA-TLX: 6 dimensions (Mental, Physical, Temporal Demand, Performance, Effort, Frustration)

+ AI Trust — Worker confidence in AI output reliability
+ Override Anxiety — Stress from contradicting AI recommendations
+ Concealment Load — Cognitive cost of hiding unauthorised AI use

Aligned with Karasek JDC and COPSOQ — instruments cited by ILO (2026) as institutional standards.

Conclusions

1. Systemic gap: 0/72 risk assessments addressed AI-related risks — not isolated non-compliance, but a structural documentation failure across all sectors examined.

2. Uncoordinated convergence: AI Act, OSH Framework Directive, and NIS2 converge on AI-enabled workplaces, yet are treated as separate, siloed obligations.

3. Policy recommendation: National OSH authorities should issue integrated guidance bridging AI Act Art. 4 literacy + cognitive risk assessment before December 2027 (Digital Omnibus deadline).

- *The Implementation Gap is not an SME failure.*
- *It is a regulatory architecture problem.*

CASE IN POINT — Autonomy without oversight
Andon Labs (2026): four AI models ran autonomous radio stations for ~6 months. All four drifted. One hallucinated revenue. One refused the task. The gap: vendors market autonomous capability; deployed reality requires the human oversight OSH Directive & AI Act already mandate.

Scan for extended abstract & contact

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