



Overview of research and practices in relation to new monitoring systems for improving worker safety and health

EU-OSHA high-level workshop
Bilbao, 28-29 June 2023



Answering
tomorrow's
challenges
today

EU-OSHA's OSH overview on Digitalisation (2020-2023)

Overview of policies, research and practices on:

Project 1: Advanced robotics & AI-based systems for the automation of tasks and OSH

Automation of physical and cognitive tasks, changed job contents and designs, and impact on OSH

Project 2: New forms of worker management through AI-based systems and OSH

Algorithmic management, people analytics, gamification

Project 3: OSH and digital platform work

In-depth description of policies/initiatives

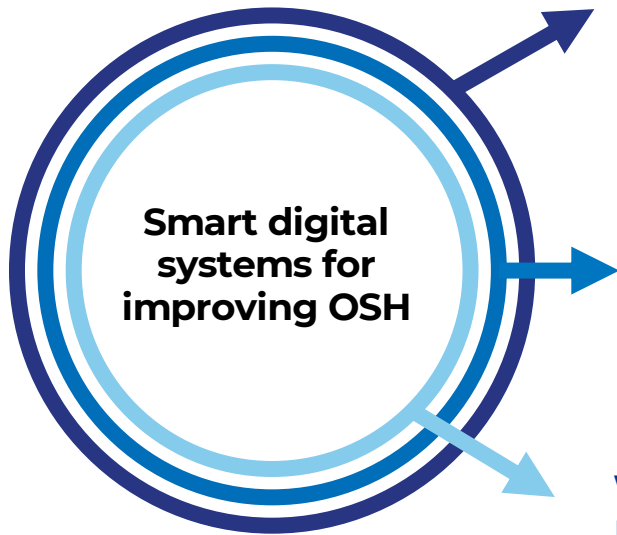
4 case examples: Parcel delivery; Handy work; Remote programmers; Online content reviewers

Project 4: Smart digital systems for monitoring and improving OSH

Hardware (wearables, PPEs) and software (AI-solutions) solutions for OSH

Project 5: Telework and remote work and OSH

Project 4: Digital systems for monitoring and improving OSH

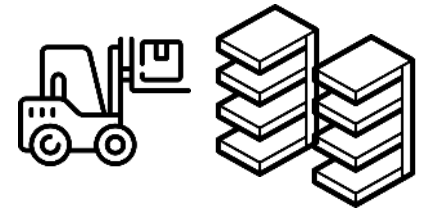
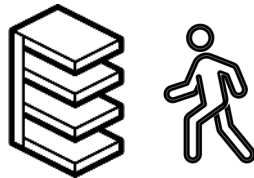


Setting the scene

1. Why new OSH monitoring systems?
2. What is the project about?

Why new OSH monitoring systems?

At workplaces, accidents are possible



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Why new OSH monitoring systems?

Workplaces especially in high OSH risk sectors can have several health risks



Chemical

Inflammables,
toxics, emissions



Ergonomic

Repetitive
movements,
extreme postures



Psychosocial

Stress, anxiety



Physical


Extreme
temperatures,
noise, vibrations,
radiation, lighting



Safety

task-, equipment-,
or work-
environment-
related

What are the challenges and opportunities of new OSH monitoring systems in terms of improving workers' safety and health?



Overview of definitions and mapping of the types of systems and their uses, sectors and occupations, purposes of implementation



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“New OSH monitoring systems use digital technology to collect and analyse data in order to identify and assess risks, prevent and / or minimise harm, and promote occupational safety and health.”

Digital technologies used by new OSH monitoring systems

Bluetooth

RFID

Internet of
Things

Sensor tech

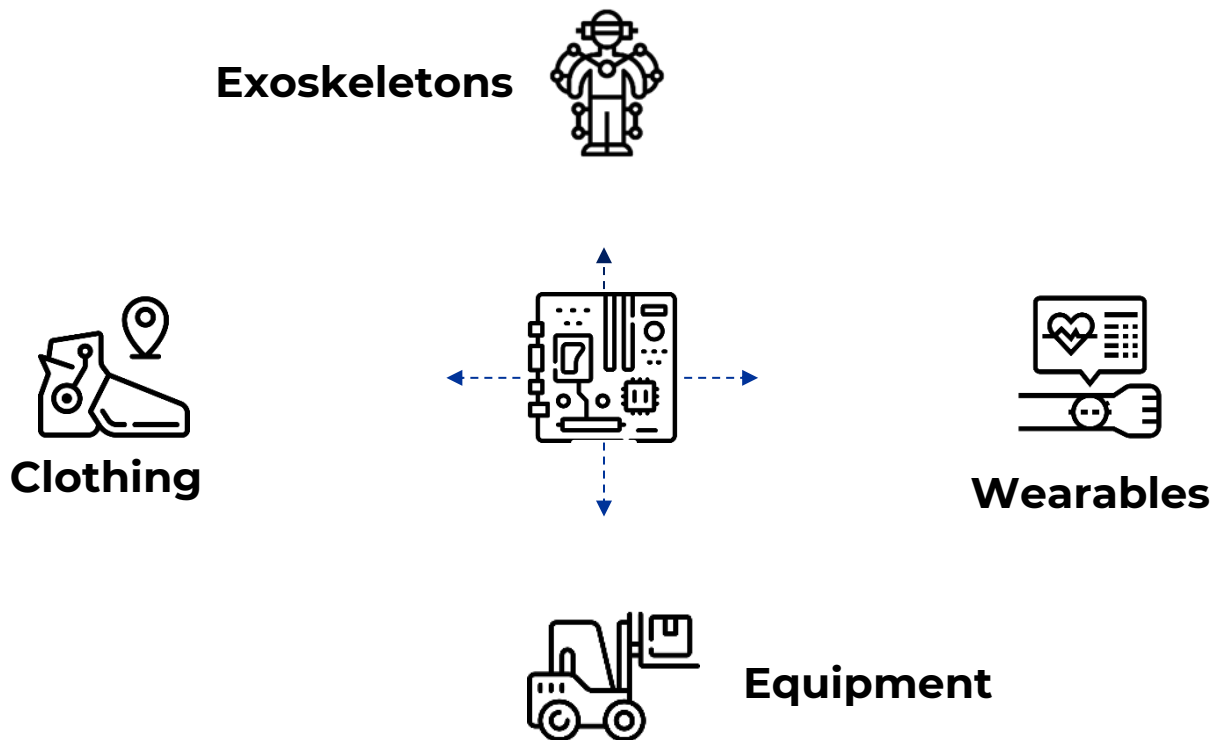
AI & ML
algorithms

VR/AR/XR

GPS

Camera
systems

From software to hardware and then to the cloud



Icons made by [berkahicon](#) (clothing), [surang](#) (exoskeleton), [Smashicons](#) (shelf), and [Freepik](#) (forklift, hardware) [COWI](#) (wearables) from flaticon.com

Working taxonomy of OSH monitoring systems

A strict working taxonomy is difficult as new OSH monitoring systems have multiple functions. However, a useful lens is to distinguish between:

Proactive OSH monitoring systems

Identifying and preventing OSH risks

- Monitoring individual or plant-related risks
- Alerting workers and/or OSH managers and providing on-the-job and often tailor-made training
- Conducting remote risk assessments
- Providing data insights that can help workplaces improve OSH

Working taxonomy of OSH monitoring systems

A strict working taxonomy is difficult as new OSH monitoring systems have multiple functions. However, a useful lens is to distinguish between:

Reactive OSH monitoring systems

Reacting to OSH risks

- Locating workers and responding to emergencies
- Accident investigation and reporting
- Providing data insights that can help workplaces improve OSH

Opportunities and challenges of new OSH monitoring systems



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Opportunities of proactive new OSH monitoring systems

Proactive OSH monitoring systems

Monitoring individual or plant-related risks

- Wearable systems monitoring risks e.g.:
 - ergonomic risks such as extreme posture or repetitive movements
 - physical risks such as vibration as well as slip, trips, and falls
 - chemical risks such as the presence of hazardous substances
- Camera systems monitoring:
 - monitoring unsafe events in facilities
- Software systems monitoring risks e.g.:
 - psychosocial risks resulting from aggressive behaviour e.g. in call centers handling complaints

Opportunities of proactive new OSH monitoring systems

Proactive OSH monitoring systems

Alerting workers

- Infrared-cameras on industrial vehicles that can alarm their operators when co-workers are in their proximity and even automatically slow-down the vehicles

Providing on-the job training or training at a safe environment

- Wearables connected to IoT which can provide on-the-job, individual training to workers e.g. lifting items in a dangerous way
- VR/AR/XR in maritime applications

Opportunities of proactive new OSH monitoring systems

Proactive OSH monitoring systems

Remote risk assessments

- Drones performing remote risk-assessments, mapping & surveillance

Providing data insights that can help workplaces improve OSH

- Providing aggregate data on where risks exist to help OSH managers re-purpose facilities

Opportunities of reactive new OSH monitoring systems

Reactive OSH monitoring systems

Responding to emergencies

- Identifying emergencies (man-down functions)
- Localising emergencies and reducing the time of rescue operations

Accident investigation and reporting

- Facilitating accident-investigation through data-driven approaches

Providing data insights that can help workplaces improve OSH

- Providing aggregate data on where risks exist to help OSH managers re-purpose facilities

Risks in relation to new OSH monitoring systems (1)

Physical effects

Technology malfunctioning

- Batteries exploding or sensors not working

Sensor accuracy

- How reliable are sensors in facilities with multiple environmental factors?

Hardware hindering movement

- Uncomfortable wearable devices

OSH monitoring systems' technological limitations

- Infrared-cameras

OSH monitoring systems' net effects

- Impact of redistribution of weight through exoskeletons for other parts of the body

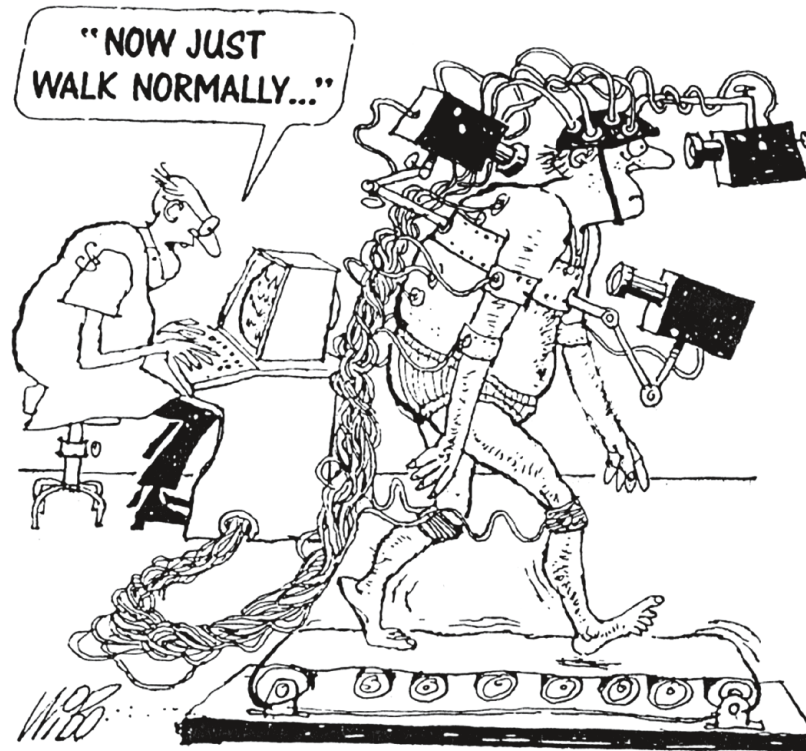
Psychosocial effects

Work intensification

- Workplaces as electronic sweatshops?

Worker alienation

- Quantity vs Quality
- Work as a social place
- Invasion of privacy
- Loss of ownership
- Overwhelming OSH managers with data and expectations



Data issues

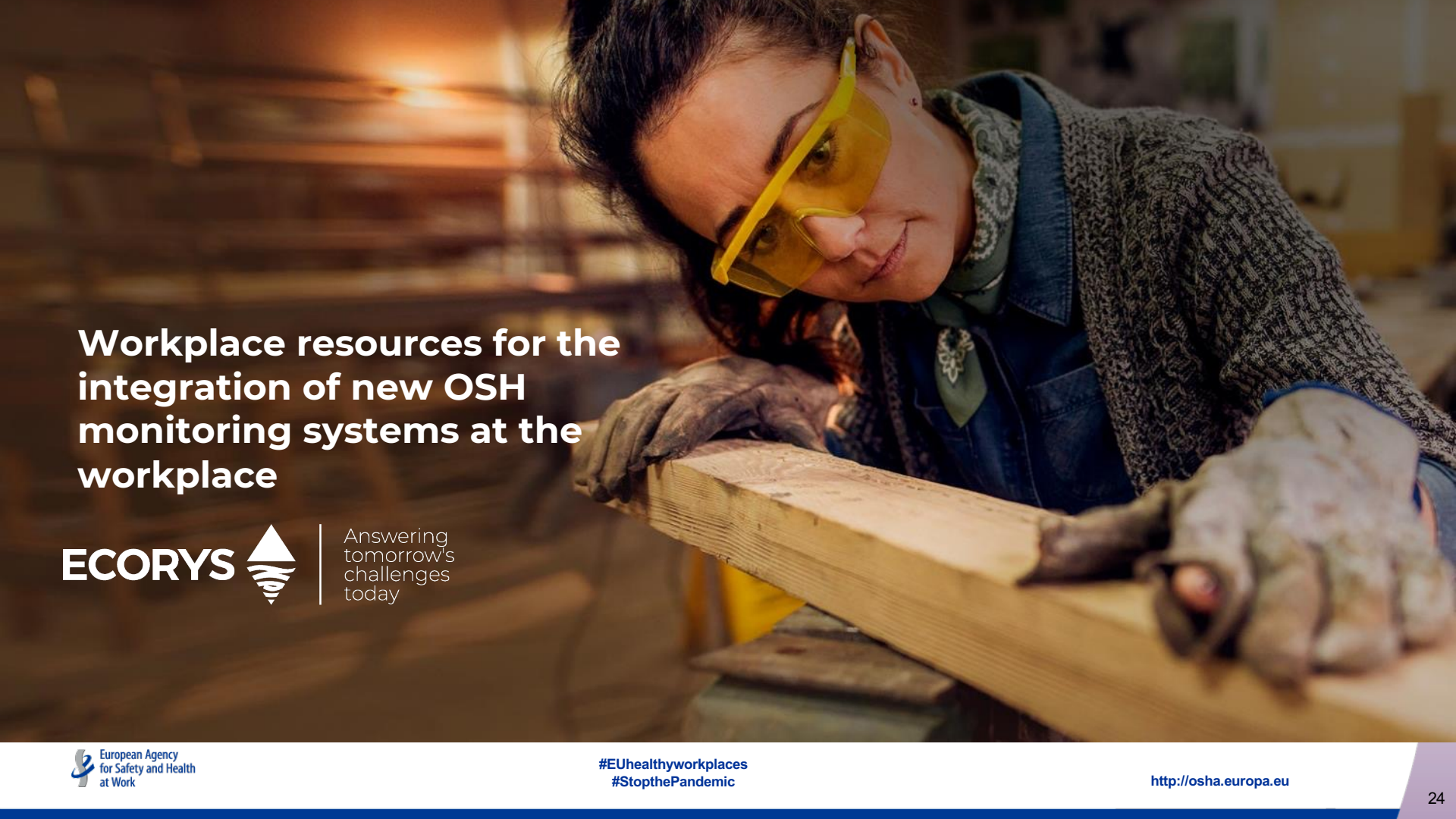
- Data privacy
- Data security
- Data accuracy
- Data interpretation and (mis)use

New OSH monitoring systems

1. can have reverse effects
2. can have limitations in terms of what they can achieve
3. can only be part of the OSH solution but not the solution itself
4. come with important issues around the use of data

It is important to:

- 1. Better understand the role of new OSH monitoring systems and communicate clearly their limitations**
 - ensuring that new OSH monitoring systems do not come at the expense of standard health and safety procedures
- 2. Adapt new OSH monitoring systems to the needs of companies and workers**
 - tailor made vs off-the-shelf solutions
- 3. Consult all parties on the use of new OSH monitoring systems**
 - bottom-up vs top-down implementation
 - addressing issues around the use and mis(use) of the systems



Workplace resources for the integration of new OSH monitoring systems at the workplace



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What workplace resources and other activities can help companies effectively integrate new OSH monitoring systems at the workplaces?

- ✓ Codes of practice
- ✓ Company-level policies
- ✓ Training material
- ✓ Guidance documents (manuals, posters, videos)
- ✓ Activities from companies / product manufacturers

International / European / National resources

Comprehensive and useful in providing a bird's eye view around OSH but rarely make references to new OSH monitoring systems. Instead, they provide a detailed account of:

- ✓ Risks (types, sources)
- ✓ Risk assessments
- ✓ Hierarchy of measures

Resources from product manufacturers of OSH monitoring systems & companies using them

Specific to a particular new OSH monitoring system and its practical application at the workplace but with little reference to limitations or issues in relation to data

- ✓ Simple and to-the-point documents
- ✓ Elaborate documents for IT Depts / OSH managers

What activities do product manufacturers of OSH monitoring systems and companies take to effectively integrate new OSH monitoring systems at the workplace?

1. Involving workers in selecting, testing and optimising the new OSH monitoring system
2. In-situ or remote trainings
3. Talks or toolbox meetings

The walks and the talks:
having an OSH manager on the
ground and maintaining an open
channel with workers



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Placing emphasis on existing OSH procedures

- ✓ New OSH monitoring systems are part of the solution but not the solution itself
- ✓ Companies with a strong safety culture more likely to effectively integrate new OSH monitoring systems

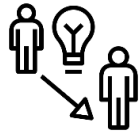


Involving workers in every step of the process

- ✓ Involving workers in testing, selection and optimisation is important
- ✓ Need to maintain open channels between workers and OSH managers

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Gaps and needs



Knowledge Exchange

Cross-company or cross-sectoral dialogues through peer-learning activities



Accessible information

Accessible resources providing information on rights, data and limitations



Workers' consultation

Bottom-up versus top-down actions are likely to be more successful

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Thank you for your attention

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Publications

- EU-OSHA (2022). Smart digital monitoring systems for OSH: workplace resources for design, implementation and use
- EU-OSHA (2022). Smart digital monitoring systems for OSH: opportunities and challenges
- EU-OSHA (forthcoming). Smart digital monitoring systems for OSH: real-world applications

Working group questions

1. What are the main opportunities of smart digital systems for OSH?
2. What are the main challenges or risks of smart digital systems for OSH?
3. How can businesses effectively integrate smart digital systems for OSH at the workplace?