Healthy Workplaces
SAFE AND HEALTHY WORK IN THE DIGITAL AGE

European Agency for Safety and Health at Work

Healthy Workplaces

Towards AI-based and algorithmic worker management systems for more productive, safer and healthier workplaces

Key points

- AI and algorithm-based worker management (AIWM) refers to digital systems that use data from the workspace, workers and tasks. The data are fed into algorithmic or artificial intelligence (AI) systems to make automated or semi-automated decisions about work shifts, the allocation of work tasks, the supervision of workers and the evaluation of their performance.
- AI and algorithm-based systems enable the automation of management tasks and lead to optimised work organisation, helping both employers and workers when occupational safety and health (OSH) fundamentals are paid proper attention.
- The use of these systems may affect workers' job autonomy, workload, stress and privacy, making a human-centred (worker-centred in this case) approach crucial when implementing them.
- With proper design, implementation, use and worker involvement, these systems may improve not only productivity but also workloads, work intensity and workers' safety and health.

Safe and healthy work in the digital age

The European Agency for Safety and Health at Work (EU-OSHA) is running the 2023-2025 Europe-wide Healthy Workplaces Campaign (HWC) to raise awareness of the implications of using digital technologies for safety and health at work. If designed, implemented, managed and used in line with a human-centred approach, digital technologies can be safe and productive. As the use of these technologies at work continues to increase and their impact on work and workplaces is not yet fully understood, it is important to gain an understanding of how to fine-tune strategies that promote and protect workers' safety and health.

Reshaping work with digitalisation

Digitalisation is rapidly evolving, impacting society and, more specifically, work organisation and management. Across Europe, digital systems, including those based on algorithms and AI, are becoming an integral part of workplaces, redefining task execution and coordination, and worker supervision. Although the use of these systems can have a positive impact, there are certain risks and challenges to consider throughout their implementation.

What is AI and algorithm-based worker management?

AIWM refers to digital systems that gather data, often in real time, from the workspace, workers and tasks. The data are fed into AI and algorithm-based systems that make automated or semi-automated decisions or provide information to employers, managers, human resource services and sometimes workers. This information is used to allocate work tasks, establish work shifts and monitor and evaluate workers' behaviour and performance.

AIWM can offer real-time task guidance to improve performance, efficiency, safety and health if properly designed and used. Automated decision-making involves AI systems reaching decisions independently, without human supervision. Semi-automated systems, in contrast, provide insight and support, enabling employers and workers to make informed decisions.

Associated risks to workers' safety and health

The use of AIWM systems is increasing, mainly in larger companies in sectors with jobs involving manual or repetitive routine tasks, including white-collar jobs. As their uptake grows, it is important to address the work-related risks, mainly psychosocial risks, associated with their use to ensure workers' safety, health and well-being.

A significant risk with AIWM systems is **work intensification**. To increase productivity, employers might implement AIWM systems that direct workers to work more and at higher speed and that monitor their performance. As a result, workers may feel increased **performance pressure** and may not take breaks when needed, which may lead to stress and exhaustion and, in turn, to accidents and musculoskeletal disorders. This is common not only in warehouse operations but also in white-collar jobs, such as banking and call centre jobs.

AIWM systems can severely reduce workers' **job control and autonomy** by determining work content, pace and schedule, leaving little room for workers' initiatives and decisions on how to perform their work. Such increased micromanagement can cause frustration and stress – and lower productivity – as workers feel constantly monitored and unable to use their professional judgement.

Such jobs where workers have high work demands and little control over their work have the highest negative impact in terms of stress.

AIWM systems can create a comprehensive overview of an individual's performance that is visible to peers. This may result in an **unhealthy competitive environment** among colleagues, leading to intense competition at the expense of teamwork and collaboration, which can result in stress.

The emphasis on productivity with AIWM can reduce peer communication, resulting in **social isolation**. This lack of interaction weakens team spirit, limits support from peers and causes loneliness, negatively affecting mental health and job satisfaction. Reduced interactions with and support from supervisors in cases where AIWM systems replace them may also lead to increased stress. Indeed, supervisors play a key role in mitigating the negative effects of jobs with high demands and reduced autonomy.

In addition, intrusive monitoring by AIWM systems collecting confidential and sensitive data leads to **privacy concerns**. This practice may cause anxiety and distrust towards employers, as workers worry about the potential misuse of their personal information.

Excessive use of AIWM systems in the workplace can reduce workers' and managers' cognitive abilities, creativity and autonomy and result in their **de-skilling**, which can lead to stress.

Opportunities for occupational safety and health

AIWM systems can **improve task allocation** by matching tasks to workers' skills, increasing workforce utilisation and job satisfaction.

AIWM systems can monitor workplace conditions to **warn of risks** such as high workload, bullying, fatigue and burnout.

They can **personalise work routines** to improve workers' safety, health, well-being and productivity, or by analysing workers' communication patterns to assess the risk of bullying or burnout.

AIWM using chatbots can also provide **personalised support to at-risk workers**.

AIWM can also be used to **support the design of effective safety and health training and programmes** with the data they collect and analyse.

'AIWM systems can improve the monitoring of working conditions, providing early alerts and warnings about occupational safety and health risks, in particular work-related psychosocial risks.'

Digital technology and management of safety and health in European workplaces

EU-OSHA's third European Survey of Enterprises on New and Emerging Risks (ESENER 3) in 2019 [1] highlighted that over 80 % of European enterprises used digital technologies such as personal computers, tablets and smartphones, 13 % used digital systems to determine the pace of work, 10 % used digital systems to monitor worker performance and 5 % used wearables, devices that can be used as part of an AIWM system.

The 2022 OSH Pulse survey [2] revealed that 89 % of workers use at least one digital technology at work – 93 % in large companies and 85 % in smaller companies, with 30 % of workers reporting that their organisation used digital devices to automatically allocate work tasks and shifts, 27 % reporting that they were rated by third parties through digital technology and 25 % mentioning that they were supervised or monitored digitally. Furthermore, 52 % of the workers interviewed indicated that they had digital technologies determining their speed of work, 37 % reported that digital technologies were used to increase surveillance and 7 % that they were used to monitor their vital signs. They also reported that the use of digital tools for such surveillance corresponded to an increase in psychosocial risks such as reduced work autonomy (27 %), poor communication within the organisation (35 %) and time pressure and work overload (55 %). According to the 2019 survey, increased work intensity or time pressure was the impact on workers' safety and health most discussed by establishments using digital technologies to monitor workers' performance.

1 EU-OSHA, 'Third European Survey of Enterprises on New and Emerging Risks (ESENER 3)', 2019, https://osha.europa.eu/sites/default/files/ESENER_3_first_findings.pdf.

2 EU-OSHA, *OSH Pulse – Occupational safety and health in post-pandemic workplaces – Report*, Publications Office of the European Union, Luxembourg, 2022, https://data.europa.eu/doi/10.2802/478476.

'To have a positive impact, it is important to inform, consult and involve workers in decisions about the design, implementation and use of AIWM technologies. This is essential to build trust."

Human insight for optimal results

A human-centred and proactive approach is essential for effectively managing risks stemming from the use of AIWM systems. This approach prioritises transparency, human control, effective dialogue among stakeholders, proper worker consultation and participation, holistic risk assessment, awareness-raising and training. Adherence to EU-level ethical frameworks and regulations should guide AIWM design and usage, with ongoing research to improve OSH. Fostering trust through worker consultation and participation in the design and implementation of algorithmic and AI systems is crucial to protecting workers' safety and health.

Real-life examples

AIWM systems are improving demand prediction, shift scheduling and task assignment based on worker capabilities, thus contributing to workers' safety, health and well-being. For example, an Italian company that produces parts for the automotive industry has implemented AIWM in production, maintenance and logistics, enhancing productivity, reducing stress and improving work–life balance. The AIWM system supports skilled operators in managing the process and adapting to changing constraints using real-time data and automated task assignments.

A Belgian car manufacturer has optimised its assembly line with AIWM systems to address health and safety risks, especially in the final stages, where parts are assembled onto freshly painted car bodies. Extensive training and data monitoring ensure a balance between efficiency, job quality and OSH considerations, benefiting operators and team leaders.

Chatbots may be used to manage workers and to detect and prevent mental health issues by analysing communication patterns and providing personalised support. The EU-funded MindBot project boosts worker motivation and engagement, preventing stress, anxiety and boredom, thus creating safer, healthier and more productive work environments.

These real-life cases confirm that worker participation, a sound OSH policy and OSH management system in place in the organisation and transparency about data collection and use are key success factors in the safe and healthy use of AIWM systems.

Resources

Check out all related content under the priority area 'Worker management through AI':
https://healthy-workplaces.osha.europa.eu/en/about-topic/priority-area/worker-management-through-ai.

Consult all publications on the topic 'AI and worker management':
https://osha.europa.eu/en/publications-priority-area/ai-and-worker-management.

Access EU-OSHA's thematic section on digitalisation of work and its implications for OSH:
https://osha.europa.eu/en/themes/digitalisation-work.

Print: ISBN 978-92-9402-341-4, doi:10.2802/9128270, TE-01-24-005-EN-C • PDF: ISBN 978-92-9402-340-7, doi:10.2802/2069792, TE-01-24-005-EN-N