



Healthy Workplaces **SAFE AND HEALTHY WORK IN THE DIGITAL AGE**



Strategies for safety and health in an automated world

Key points

- Advanced robotics and artificial intelligence (AI)-based systems for the automation of tasks (both physical and cognitive) have entered sectors such as manufacturing, healthcare and education.
- Implications of these systems for occupational safety and health (OSH) are physical, psychosocial and organisational.
- Automation of tasks has significant benefits for OSH since it can remove workers from dangerous work environments and reduce their cognitive workload.
- Psychosocial risks related to advanced robotics and AI can arise due to misplaced trust, a low level of acceptance, automation bias or fear of job loss.
- Early OSH management during implementation, early worker involvement, human-centred design and clear communication are effective tools to address OSH issues.
- OSH management should be adapted with new tools for risk assessment, while cybersecurity should be considered as well.

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 still not fully assumed, it is important to gain an understanding of how to fine-tune strategies that promote and protect workers' safety and health.

The growth of advanced robotics and AI-based systems

Traditional industrial robots began appearing in factories in the 1950s, but recent developments of advanced algorithms and AI-based systems have automated more and diverse tasks – not only physical ones but also cognitive ones. Machines can

be used to automate tasks that are dirty, dull or dangerous, providing opportunities for improving OSH while increasing productivity and transforming work. However, a number of challenges should be considered, too.

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Task-based approach for automation

Tasks are a better unit of analysis when investigating the impact of automation potential. The task approach allows a more nuanced and detailed understanding of which specific aspects of human work can be more easily automated. To that end, advanced robotics and AI-based systems are currently, in most cases, used to automate specific tasks of a job and not to replace humans by automating jobs.

Automation of physical tasks

The automation of physical tasks can be seen in a number of industries, such as manufacturing and transportation. Based on AI, routine tasks can be automated, while sensors and actuators enable the identification of obstacles and allow stopping or redirecting movement. Numerous tasks have automation potential in these areas, such as welding, assembly, packaging and cutting. In logistics, robots are becoming increasingly autonomous, following pre-programmed routes while being set up for collision avoidance. Such automated AI-based systems are used for loading and unloading containers, stationary and mobile piece-picking tasks and storage and delivery tasks.

Automation of cognitive tasks

The growing capacities of AI to perform cognitive tasks can impact a wide range of sectors in the short- and long-term future. Healthcare is an industry that can have a major transformation with these technologies. Data-based processes in the medical field are being automated, providing support for decision-making, while higher cognitive tasks, such as diagnoses and treatment plans, are still carried out by skilled medical professionals. However, as this technology advances, such cognitive tasks could become less supervised. Another impacted sector is education, where AI can automate various tasks, such as preparing lesson plans and assisting teachers so they can spend more time on individual student support.

Implications of automation for OSH

Advanced robotics and AI-based systems create challenges and opportunities for OSH. The effects can be classified as physical, psychosocial and organisational. Not all technologies present all of them, and their manifestation differs case by case. In addition to scientific research findings about potential challenges and opportunities, first-hand experience could provide further insight. To that end, 16 case studies were developed by EU-OSHA to illustrate the practical implementation of advanced robotics and AI-based systems and related challenges and opportunities for OSH. Each case study comes with implications specific to the specific scenario, but there are several repeatedly occurring OSH effects related to these technologies.

Physical workload reduction and physical health improvement are the main benefits of advanced robotics. The automation of physical tasks supports workers by avoiding long-term strain injuries, removing them from hazardous working environments, reducing their workload, eliminating exposure to dangerous substances and avoiding accidents. The improvement of cognitive workload and health is another benefit, along with upskilling and reduction of screen time.

On the other hand, the drawbacks of the impact of AI-based systems used for the automation of tasks are mainly psychosocial and organisational, which should be addressed with the same attention given to the physical impacts. A common challenge is the fear of job loss within the workforce. In the case studies, this seems to prevail even with all companies stating that their

intention is not to dismiss people but to move them into more fulfilling positions. Perceived job insecurity is related to risks of depression, anxiety and emotional exhaustion. While upskilling is an opportunity, the increased cognitive workload that it brings can be a challenge. Companies usually require workers to acquire new skills in a short amount of time while adjusting their working routines. It can be difficult for some to adapt to this change. Moreover, when AI-based systems are employed for social tasks, there are risks of depersonalisation and loss of social interaction between workers, clients, students and patients. Especially in the social field, most technologies cannot replace the complex layers of human interaction.

Best practices for an effective and safe automation

The case studies developed by EU-OSHA investigate the practical implementation of AI-based systems for the automation of physical and cognitive tasks and the use of intelligent cobots (collaborative robots) in the workplace. They focus on the impact of these technologies on OSH and provide a better understanding of the drivers, barriers and success factors for the safe and effective implementation of these systems. Based on these case studies, several key points can be highlighted.



'When OSH improvement is the main motivator, and adequate information is provided to workers ... automated systems are more effectively introduced into the procedures and accepted by employees.'

To ensure OSH for automation, companies should include the technology as early as possible in their OSH management. While including such systems is not so different from other procedures, some companies have noticed that this process can be time-consuming, particularly during the initial steps linked to OSH policy. Before a cobot or AI-based system is integrated into a workplace, an OSH risk assessment should be carried out. There is a reported need for comprehensive risk assessment tools that reflect the abilities and limitations of today's technologies. This needs to run in parallel with current legislation and norms, and enforcement authorities should adapt as well.

When OSH improvement is the main motivator, and adequate information is provided to workers in a clear and transparent way, automated systems are more effectively introduced into the procedures and accepted by employees. It is important to educate workers not only on how to use a machine but also on how it helps them, including information in training materials about the technology's benefits. Especially in cases of automating secondary tasks, this approach might help in achieving greater acceptance, reducing negative psychosocial reactions and increasing productivity. To that end, a human-centred approach in the design and implementation of new automation could ensure performance and OSH improvements.

In addition, active steps need to be taken to prevent deskilling, not only to perform the task manually in case the technology malfunctions, but to understand the work process and make informed decisions. This counteracts the feeling of complete dependency on the system that could otherwise lead to a perceived loss of autonomy.

Data privacy and cybersecurity

Any AI-based system in the workplace should follow the latest privacy and data protection regulations. Companies should focus on the principles of consent, transparency, participation and accountability towards their employees to keep the loss of actual and perceived privacy to a minimum.

With interconnected technology and data as a resource for some AI-based systems to improve their functionality, cybersecurity could become central. Some systems require additional safety and security measures depending on their use, given that cyber threats can also affect OSH.

Resources

Check out all related content under the priority area 'Automation of tasks':

<https://healthy-workplaces.osha.europa.eu/en/about-topic/priority-area/automation-tasks>

Consult all publications on the topic:

<https://osha.europa.eu/en/publications-priority-area/automation-tasks>

Access EU-OSHA's thematic section on digitalisation of work and its implications for OSH:

<https://osha.europa.eu/en/themes/digitalisation-work>