

# Digital technologies at work and psychosocial risks: evidence and implications for occupational safety and health

## Summary

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This report was commissioned by the European Agency for Safety and Health at Work (EU-OSHA). Its contents, including any opinions and/or conclusions expressed, are those of the authors alone and do not necessarily reflect the views of EU-OSHA.

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This report<sup>1</sup> provides a comprehensive analysis of the implications of digitalisation for occupational safety and health (OSH) regarding psychosocial risk factors based on the findings of EU-OSHA publications. Drawing from over one hundred documents, including reports, policy briefs, discussion papers, case studies and results from the OSH Pulse survey 2022, the report outlines how digital technologies can result in work-related psychosocial risks and mental health issues. The analysis is broken down by type of technology and tasks that the technology is able to perform. The report presents the analysis of implications of digitalisation in terms of psychosocial risks according to the five key areas identified in EU-OSHA's research programme on OSH and digitalisation (2020-2023): advanced robotics and artificial intelligence (AI), smart digital systems, digital platform work, remote working technologies and artificial intelligence for worker management (AIWM).

## Key findings

### ▪ Advanced robotics and artificial intelligence

Advanced robotics and AI are defined as intelligent machines that collect, analyse data and make decisions. These systems are prevalent in sectors such as healthcare, education, customer support, marketing and financial advice, including mobile robots, assembly robots and exoskeleton robots. Although currently limited in use – 5% of OSH Pulse survey respondents use AI machines and 3% use cobots – the potential future spread of these technologies highlights the importance of understanding the related OSH risks. Advanced robotics and artificial intelligence can bring many opportunities, as they are able to perform tasks more efficiently, with higher precision and endurance, and offer humans safer conditions by taking over the more dangerous tasks. This allows for more time for learning and creativity among workers and reduces their exposure to hazardous environments. AI and data analytics can also be used to improve efficiency of OSH inspections (EU-OSHA, 2019d). However, the introduction of such technologies can also present some risks for the worker, which can be physical, organisational and psychosocial (EU-OSHA, 2022a; EU-OSHA, 2019c).

**Cognitive overload**, the most frequently reported risk across all case studies carried out in this area, is primarily associated with the adoption of technologies that automate cognitive tasks, leading to concerns about increased cognitive demands on workers due to the need to monitor and interact with complex systems. It may lead to stress and decreased job satisfaction. Companies are addressing this risk by implementing comprehensive training, clear communication and social support structures. Another significant risk is the **fear of job loss or job insecurity** which is linked to depression, anxiety and emotional exhaustion. Preventing this risk encompasses involving workers in the implementation process, clear communication from management, and providing psychological support services. **Lack of trust** can lead to 'automation complacency' or misuse of the technology. Building trust requires transparency about the capabilities and limitations of robotics systems, gradual introduction of technology, reskilling and feedback mechanisms. **Deskilling and/or the need for upskilling/reskilling** occur as automation shifts roles from manual tasks to monitoring systems, causing stress and uncertainty. Finally, **changes in job content** occur as automation shifts roles from manual tasks to monitoring systems, causing stress and uncertainty. Companies are addressing this through training, worker engagement and open communication for feedback and adjustments.

### ▪ Smart digital systems

Smart digital systems encompass a range of technologies including sensor-based devices, AI, the internet of things (IoT), wearables, wireless technologies, augmented and virtual reality (AR/VR) and drones. EU-OSHA's literature on smart digital systems highlights both challenges and opportunities deriving from the adoption of such technologies. Among the opportunities we find that smart digital systems can prevent and minimise harm to workers, improve OSH compliance, help in achieving informed decision-making and can provide more training opportunities in virtual environments.

In this area, several psychosocial risks stand out: for instance, **lack of trust** between workers and employers can arise from digital surveillance, leading to concerns around the invasion of privacy and the gathering and use of personal data. Addressing these concerns necessitates clear communication about data usage, security and privacy protections. **Workload increase and time pressure** are also

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<sup>1</sup> The full report is available at: <https://osha.europa.eu/en/publications/digital-technologies-work-and-psychosocial-risks-evidence-and-implications-occupational-safety-and-health>

significant risks, as smart systems often raise productivity expectations, resulting in stress and time pressure for workers. These systems might also reduce workers' **autonomy** by dictating work pace and methods, leading to demotivation and decreased job satisfaction. **Poor communication** and **poor social relationships** have also been mentioned in several case studies, as technology reduces face-to-face interactions, negatively affecting workplace cohesion and mental health. A sense of **unfairness** may develop if the technology is perceived as invasive or biased, particularly with algorithmic management lacking transparency. Finally, inadequate training on new technologies can leave workers feeling unprepared and anxious, exacerbating stress and dissatisfaction. Mitigation strategies to address these risk factors include ensuring data privacy, worker involvement in decision-making, enhanced human accountability in data interpretation, and adapting legal and policy frameworks.

#### ▪ Digital platform work

Digital platform work – defined as all paid labour mediated through online platforms – is characterised by non-standard working arrangements, algorithmic management, involvement of third parties and a shift of risks and responsibilities to workers. Digital platform work can bring benefits such as increased autonomy, more flexible working hours and better work-life balance. However, it is also associated with many challenges, especially because both algorithmic management and non-standard working arrangements can lead to psychosocial risks. Algorithmic management (i.e., the use of technological tools for remote workforce management, relying on data collection and surveillance to enable automated decision-making) creates high control on workers and their work, and how they are monitored, therefore reducing **job autonomy** and increasing **performance pressure**; at the same time, the presence of non-standard working arrangements means that platform workers are generally classified as self-employed (even though the situation is beginning to change), and therefore not covered by standard OSH legislation in most EU countries.

EU-OSHA's case studies on this topic examine OSH risks for four categories of platform workers: low-skilled on-location (e.g., parcel delivery), high-skilled on-location (e.g., handiwork), low-skilled online (e.g., content moderation), and high-skilled online (e.g., programming). Their analysis reveals that some psychosocial risk factors are common to all forms of platform work, while others are specific to some types of tasks. Common risk factors include **professional isolation**, **workload increase** and time pressure, job and income insecurity, lack of autonomy, and a sense of unfairness and lack of trust due to non-transparent algorithmic management.

Certain psychosocial risk factors are unique to specific tasks, for instance low-skilled online work, like content moderation, involves **exposure to distressing content**, which can lead to psychological trauma, stress and mental health problems. High-skilled online work, such as programming, is associated with **cognitive overload** due to intense mental focus. **Poor work-life balance** is especially pronounced in online work, exacerbated by the global nature of platform demand. **Physical health risks** are more prevalent in on-location work, with potential accidents and exposure to hazards during parcel delivery and handiwork. On-location workers may also face **violence**, **harassment**, and exposure to crime, particularly taxi drivers or delivery riders.

EU-OSHA's research on the platform economy highlights that the self-employed status of platform workers shifts the OSH risk management burden from the company onto workers. The reports propose expanding current OSH regulations to protect platform workers, irrespective of employment status. Proposed solutions include the provision of insurance, training, ergonomic practices, measures for professional isolation and work-life balance, task performance guidance and regular risk assessments by the companies. Facilitating collective bargaining and representation is also crucial to address job and income insecurity.

#### ▪ Remote working

Remote working offers flexibility and autonomy, potentially increasing productivity and can benefit workers with chronic conditions by allowing better management of health and fatigue. However, the use of remote working technologies can also give rise to several psychosocial risk factors, including work-life balance issues, feelings of isolation, constant connectivity leading to increased workloads, reduced autonomy and poor social relationships.

One of the most frequently mentioned psychosocial risk factors brought about by the mass shift to telework after COVID-19 is the **blurring of work-life boundaries**. Indeed, the home environment,

traditionally a personal space, became a workspace for many while often lacking the ergonomic features of an office. The convenience of working from home has meant many continue to work even when unwell, and not taking the sick leave they are entitled to. In addition, the pressure to remain constantly connected and respond to emails outside working hours has led to work extending into evenings and weekends.

Feelings of **isolation and poor social communication** are also widespread among teleworkers. The lack of informal, spontaneous interactions that typically occur in office environments can lead to a sense of disconnection from colleagues and the **organisation**. **Reduced work autonomy** is another concern – monitoring tools, such as time tracking software and more intrusive technologies that log keystrokes and monitor communications, can feel invasive and diminish workers' sense of autonomy.

Finally, gender-specific impacts are significant. Women often face higher **work-life conflict** and stress levels due to the blurring boundaries between work and private life, intensified by their care responsibilities. Reports indicate that women who telework experience more severe time pressure, work overload and worse mental health outcomes compared to their male counterparts. Additionally, the increase in domestic violence during the pandemic has further complicated the situation for many women, who may have considered their workplace as one of the few safe spaces.

- **Artificial intelligence for worker management (AIWM)**

Artificial Intelligence systems for Worker Management (AIWM) collect real-time data from the workspace, workers and their activities. These data are processed by AI systems to make automated or semi-automated decisions or to provide information to decision-makers such as HR managers and employers. The use of AIWM can present significant benefits, such as improved scheduling and task allocation, optimised work organisation, and provide better information to identify OSH issues; however, it may also lead to psychosocial risks.

According to EU-OSHA's literature, AIWM systems in workplaces are associated with **time pressure, increased workload, cognitive overload, fear of job loss**, and stress due to continuous surveillance. The lack of transparency in AIWM systems and the opaque nature of automated decisions can foster **lack of trust** and a sense of **unfairness** among employees. Additionally, the reduction in work autonomy and the need for constant adaptation to new technologies contribute to cognitive overload and job dissatisfaction. Suggested solutions focus on transparency, worker participation in the implementation phase, worker feedback and rules to prevent work from invading private life. Reskilling and upskilling initiatives are also recommended to counteract the fear of job loss and perceived lack of training.

The main psychosocial risk factors identified for each technological area and the proposed preventive strategies are summarised in the table below.

## Psychosocial risks related to the use of digital technology and proposed solutions

Technology area	Main psychosocial risk factors identified	Proposed solutions
Advanced robotics and AI	Cognitive overload, fear of job loss/job insecurity, lack of trust, deskilling/need for upskilling, changes in job content.	Comprehensive training and upskilling programs, worker involvement in planning and implementation, clear communication, ergonomic adjustments, psychological support.
Smart digital systems	Lack of trust, workload increase and time pressure, poor communication and social relationships, sense of unfairness, lack of training.	Clear communication about data usage, security, and privacy protections, involving workers in implementation, ergonomic considerations.
Digital platform work	Professional isolation, workload increase and time pressure, job and income insecurity, lack of autonomy, sense of unfairness and lack of trust, exposure to distressing content, cognitive overload, poor work-life balance.	Extending OSH obligations to platform workers, multi-level governance involving local authorities and worker organisations, transparent algorithmic management, collective risk assessments, training and ergonomic support.
Remote working technologies	Poor work-life balance, increased workload/extended working hours, isolation/poor social communication, lack of autonomy.	Comprehensive teleworking agreements, ergonomic support and necessary equipment, involvement of social partners, clear communication, the right to disconnect.
AI for worker management (AIWM)	Time pressure, poor communication, fear of job loss, workload increase/work intensification, cognitive overload, poor work-life balance, lack of trust/sense of unfairness, lack of autonomy, worker deskilling/lack of training.	Transparency in data use, participatory approach, specific rules to prevent work from spilling into private life, reskilling and upskilling initiatives.

Source: author's elaboration

### Policy pointers and good practices

EU-OSHA's literature on digitalisation and OSH underlines the importance of several key practices for an effective management of the psychosocial risks associated with the introduction of new digital technologies, particularly in the context of AI, advanced robotics and remote working technologies.

According to the reviewed literature, existing legislation does not fully address the new challenges introduced by digitalisation. While current regulations, such as the European Framework Directive 89/391/EEC on Safety and Health of Workers at Work and 'daughter' directives, and directives on working time and work-life balance, are generally applicable, they do not specifically address the impacts of these new technologies. For this reason, it is vital to integrate emerging risks related to digitalisation into OSH strategies, including the provision of specific guidance on risk prevention in relation to the directives. To this end, it is necessary to involve a wide range of stakeholders, including workers and their organisations, to ensure that strategies on digitalisation and work comprehensively address psychosocial risks, resulting in more robust and responsive OSH policies. On the other hand, OSH needs to be embedded in directives, national legislation and stakeholder agreements on digitalisation when they are developed.

Organisations need to implement robust policies that guarantee adequate training, clear communication and supportive management practices. These measures are crucial not only for mitigating the negative effects of digitalisation but also for promoting a healthier, more secure and productive working

environment. Case studies show that companies offering comprehensive training programmes and involving workers in decision-making processes achieve better adaptation to new technologies and successfully prevent psychosocial risks, such as cognitive overload and job insecurity, and their impacts in terms of mental health. Legislators are encouraged to support education systems and training programmes specifically designed to address the psychosocial risk factors associated with new digital technologies.

The importance of **training and upskilling** is frequently cited across the case studies. Providing comprehensive training sessions ensures that workers are well-prepared to handle new equipment and processes. This approach not only improves their skills, but also boosts their confidence, significantly reducing stress related to potential job displacement. For instance, the successful implementation of collaborative robots in a Portuguese case and the AI-based systems in a German case was largely due to the extensive training and involvement of workers, which facilitated smoother transitions and greater acceptance of new technologies.

**Worker involvement and engagement** are also highlighted as crucial elements to increase trust and reduce fear of job loss. This approach fosters a sense of ownership among workers and helps identify potential issues early on, allowing for a more seamless integration of new technologies. Policy case studies reveal that in both Portugal and Germany, the feedback and active participation of workers were integral to the successful deployment of AI and robotics.

**Clear and open communication** is essential for managing the psychological risks associated with the introduction of AI and advanced robotics. It is vital to inform workers what the technological changes entail, including operational changes, new safety protocols and procedures for emergency situations. Clearly outlining how these changes will affect individual roles and what workers can expect helps to reduce fears and build trust between management and workers.

**Regular workload assessments and consequent adjustments** are necessary to maintain a healthy work environment by ensuring tasks are distributed fairly and workers are not overburdened so as to prevent excessive pressure and cognitive overload. Promoting flexible work arrangements to foster better work-life balance for workers is essential in managing the psychosocial risks associated with digital technologies.

Finally, given the widespread issue of poor work-life balance, which is associated with telework, platform work and AIWM technologies, ensuring the **right to disconnect** is crucial for preventing worker stress and burnout.

It should also be remembered that while digitalisation poses significant risks, it holds the potential to improve working conditions, particularly for vulnerable workers. By ensuring that new technologies are designed and implemented with the needs of all workers in mind, organisations can create more inclusive and supportive work environments.

**The European Agency for Safety and Health at Work (EU-OSHA)** contributes to making Europe a safer, healthier and more productive place to work. The Agency researches, develops, and distributes reliable, balanced, and impartial safety and health information and organises pan-European awareness raising campaigns. Set up by the European Union in 1994 and based in Bilbao, Spain, the Agency brings together representatives from the European Commission, Member State governments, employers' and workers' organisations, as well as leading experts in each of the EU Member States and beyond.

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