Healthy Workplaces
Campaign 2023-2025

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Press briefing

Safe and healthy work in the digital age

#EUhealthyworkplaces

European Agency for Safety and Health at Work

Healthy Workplaces

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Contents

What is it about?

Although digitalisation is still a relatively new phenomenon, it is rapidly evolving, resulting in the introduction of technologies such as artificial intelligence (AI), big data, cloud computing, algorithms, collaborative robots or cobots, augmented reality, additive manufacturing, etc. in several domains of our lives. Their impact over the society as a whole, and, specifically, the world of work, is undeniable. Digital technologies are changing how, where and when we work as well as reshaping the labour market, opening also new types of jobs and ways they are organised and managed[i]. These trends may lead to new opportunities for occupational safety and health (OSH), such as eliminating repetitive tasks and protecting workers from hazardous environments, but also raise new risks and challenges (e.g. loss of job control or continuous digital monitoring)[ii].

The potential negative effects of digitalisation (e.g. job insecurity, data misinterpretation or invasion of privacy, among others) can be mitigated if digital technologies are designed, implemented, managed, regulated and used in a way that respects a human-centred approach[iii]. However, while these technologies are more common than ever in workplaces, their impact on the safety and health of workers is still not fully explored. In addition, a lot of risks stem from the lack of specific regulations in this area and from an ever-progressing digitalisation outpacing legal frameworks[iv]. It is therefore crucial to raise awareness about the risks attributed to digitalisation, notably promoting the assessment, prevention and management in order to maximise the benefits of new technologies for OSH. This is exactly the focus of the 2023-25 Healthy Workplaces Campaign **'Safe and healthy work in the digital age'**[v].

The campaign extensively draws on the research findings, outputs and resources developed in the framework of the OSH Overview on Digitalisation, as well as EU-OSHA's research in other areas (e.g. The Foresight studies, the OSH overview on supporting compliance), and is in line with the European Commission's 'Vision Zero' approach promoting a culture of prevention, which is a key priority of the 2021–2027 EU strategic framework on health and safety at work.

This press briefing lays out the main objectives, broader political context and key dates of the campaign and provides background information related to the issue of digitalisation and OSH, putting the focus on:

- the broader political context,
- the prevalence of digital technologies,
- the impact of digitalisation and awareness-raising efforts;
- priority areas of the campaign, including opportunities, risks and challenges related to each topic;
- specific groups and sectors at risk;
- the ways in which risks can be managed;
- the relevant legislation.

Campaign objectives

1. Raise awareness about the importance, relevance and implications for occupational safety and health (OSH) of the digital transformation of work, including the business case by providing facts and figures;
2. Increase everyone's awareness and practical knowledge across all sectors, types of workplaces and specific groups of workers (e.g. women, migrants) about a safe and productive use of digital technologies at work;
3. Improve knowledge about new and emerging risks and opportunities related to the digital transformation of work;
4. Promote risk assessment and a healthy and safe proactive management of the digital transformation of work by providing access to relevant resources (e.g.: good practice, checklists, tools and guidance); and
5. Bring stakeholders together to facilitate the exchange of information, knowledge and good practice and stimulate collaboration for a safe and productive digital transformation of work.

EU political context

The Healthy Workplaces Campaign 2023-2025 is particularly timely as it fits well in the increasingly wider range of initiatives undertaken by the EU and its institutions and bodies to support the digital transition of the European economy and society at large, and can effectively contribute to the achievement of the main goals of such initiatives.

The campaign is in line with the **European Digital Strategy**. In particular, the 2021 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on **'2030 Digital Compass: the European way for the Digital Decade'** maps out a clear path towards a common vision and actions for Europe to succeed in the Digital Decade, at home and in the world. The strategy aims to pursue digital policies that empower people and businesses to seize a human-centred, sustainable and more prosperous digital future. One of the main pillar is the 'digital transformation of businesses'.

The **2023 European Declaration on Digital Rights and Principles** aims at 'Putting people at the centre of the digital transformation' (Chapter I) and, under Chapter II ('Solidarity and inclusion') aims to achieve 'Fair and just working conditions'.

In particular, point 5 establishes that *'Everyone has the right to fair, just, healthy and safe working conditions and appropriate protection in the digital environment as in the physical work place, regardless of their employment status, modality or duration'*, while point 6 calls for trade unions and employers' organisations to play an important role in the digital transformation, particularly in relation to the definition of fair and just working conditions, including with regard to the use of digital tools at work.

In this area the declarations' signatory EU institutions (the presidents of the EP, the Council of the EU and the EC) commit to:

a. ensuring that everyone is able to disconnect and benefit from safeguards for work-life balance in a digital environment;

b. ensuring that, in the working environment, digital tools do not put workers' physical and mental health at risk in any way;

c. ensuring respect for workers' fundamental rights in the digital environment, including their right to privacy and the right to associate, right of collective bargaining and action, as well as protection against unlawful and unjustified surveillance;

d. ensuring that the use of artificial intelligence in the workplace is transparent and follows a risk-based approach and that corresponding prevention measures are taken to maintain a safe and healthy working environment;

e. ensuring in particular that human oversight is guaranteed in important decisions affecting workers, and that workers are generally informed that they are interacting with artificial intelligence systems.

The 2023-2025 Healthy Workplaces Campaign can effectively contribute to the achievement of the goals established by the EU in the **European Digital Strategy** and in particular in the principles of the **European Declaration on Digital Rights and Principles for the Digital Decade**.

The campaign will raise awareness about the use of digital technologies at work, which – if designed, implemented, managed and used respecting the human-centred approach - will be safe and productive. The campaign stimulates collaboration for a safe and productive digital transformation of work. One way to make the journey is through strategic planning based on the five main objectives mentioned above.

Committed to strengthening the prevention culture at all levels, the campaign is also in line with the **European Commission's Vision Zero approach** to eliminate work-related deaths, a key priority of the **2021–2027 EU strategic framework on health and safety at work**.

The campaign is also one of the flagship initiatives included by the **2023 EC Communication on a comprehensive approach to mental health** to tackle psychosocial risks at work, and will therefore contribute to the achievement of the goals set by the Communication.

On a final note, the campaign will also be an opportunity to promote and disseminate knowledge on and support the implementation of the most recent legislative and non-legislative initiatives with implications for workers, workplaces and OSH in areas related to digitalisation that have been put forward by the EU, including but not limited to:

- Declaration on Cooperation on Artificial Intelligence
- European Commission Communication on AI for Europe
- Communication on Building Trust in Human-Centric AI
- White Paper on Artificial Intelligence – A European approach to excellence and trust
- European data strategy
- Communication on Fostering a European approach to Artificial Intelligence
- European Commission's proposal for a Regulation laying down harmonised rules on Artificial Intelligence (AI act)[1]
- European Parliament briefing on the proposed Artificial Intelligence Act
- European Commission measures to tackle risks related to digital platform work
- European Commission proposal for a Directive on improving working conditions in platform work
- Communication on Better working conditions for a stronger social Europe: harnessing the full benefits of digitalisation for the future of work

Moreover, the campaign will also draw attention on and contribute to disseminating knowledge about the applicability of existing legislation in order to prevent and manage risks related to the digitalisation, including the Directive 89/391/EEC - the OSH Framework, transposed by national legislations of the Member States into law or other specific directives, including:

- Directive 90/270/EEC - the Display Screen Equipment
- Directive 2009/104/EC - the Use of Work Equipment
- Directive 2006/42/EC - Machinery[2]
- Directive 89/654/EEC - Workplace Requirements
- Directive 2003/88/EC - Working Time
- Directive 2002/14/EC - Informing and Consulting Employees

Knowledge regarding the applicability of other pieces of legislation that deal with aspects of the impact of digitalisation on work, such as the general data protection regulation (provisions on the collection and use of workers' data) as well as the already mentioned 2021–2027 EU strategic framework on health and safety at work, and directives covering personal protective equipment (PPE) will also be disseminated through the campaign.

Key dates

- EU campaign partnership meeting: September 2023
- Campaign launch: October 2023
- Go live of official campaign website: October 2023
- Launch of the Healthy Workplaces Good Practice Awards: October 2023
- European Weeks for Safety and Health at Work: October 2023, 2024, 2025
- Activities organised by focal points and other campaign partners: throughout 2023, 2024, 2025
- Good Practice Awards – deadline for submission of national examples: November 2024
- Good Practice Awards – shortlisted examples chosen: beginning of 2025
- Healthy Workplaces Good Practice Exchange event with official campaign partners: Spring 2025
- Good Practice Awards – announcement of winners and commended examples: April 2025
- Healthy Workplaces Summit and Good Practice Awards ceremony: November 2025

[1] The AI Act is still under trialogue negotiation and is expected to be approved by the end of 2023.
[2] Regulation (EU) 2023/1230 on machinery was published on 29 June 2023 and replaces Machinery Directive 2006/42/EC. It will enter into force on 20 January 2027. Since there are no transitional provisions, manufacturers will have to comply with the current machinery directive until then and with the new Machinery Regulation as of 20 January 2027.

Healthy Workplaces Good Practice Awards

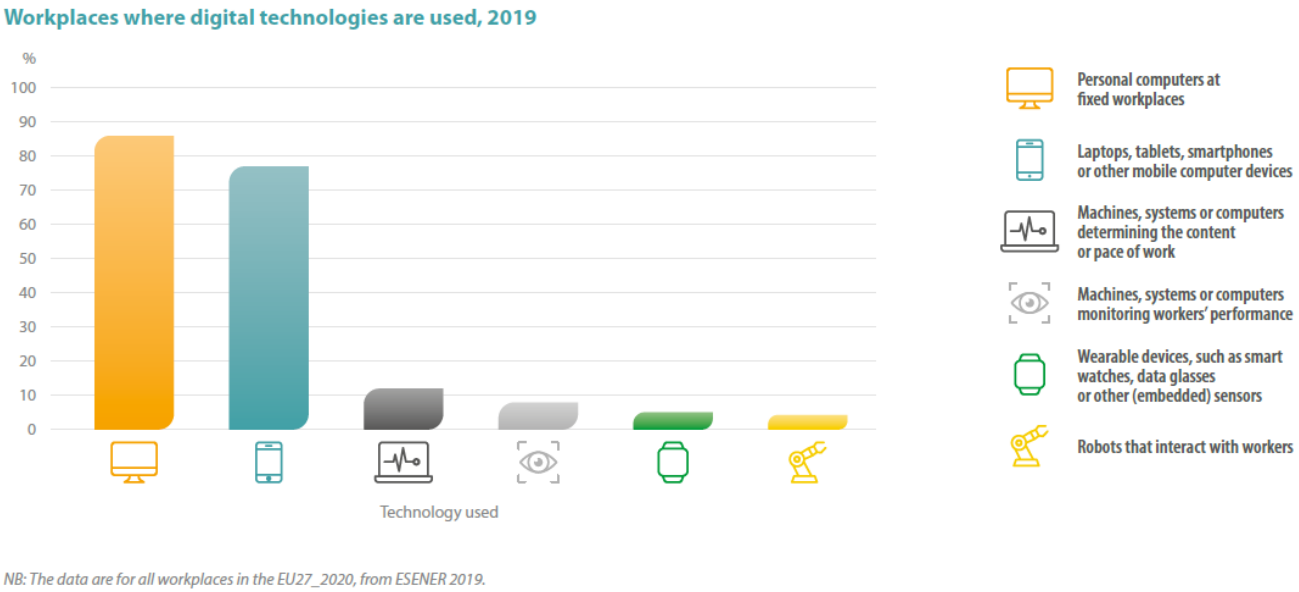
The Healthy Workplaces Good Practice Awards, an integral part of every HWC, acknowledge sustainable and innovative solutions to manage OSH. The current edition focuses on organisations that actively prevent OSH risks related to the introduction of digital systems in the workplace. The achievements of the shortlisted, awarded and commended cases are widely promoted throughout Europe, serving as examples for other organisations to inform their OSH strategies with best practices.

Participation in the awards is open to all organisations located in the European Union, candidate countries, potential candidate countries or members of the European Free Trade Association (EFTA). EU-OSHA's national focal points collect entries and nominate national winners to compete at the European level.

Prevalence of digital technologies

The spread of digital technologies within businesses and among workers in Europe has been increasing, as shown by recent data (ESENER 2019 and OSH Pulse 2022 studies).

- More than 80% of enterprises in the EU use personal computers, laptops, tablets, smartphones and other mobile devices.89% of workers use at least one digital device at work. In large companies (250+ employees) 93% of workers) and in micro companies 85% use digital devices at work. 73% of workers utilise laptops, tablets and smartphones and other portable digital devices, while 60%- desktop computers, 11%- wearable devices, such as smart glasses, activity trackers or other sensors, 5%- machines or robots incorporating AI and 3%- robots interacting with them.
- In 2022, 17% of workers worked mostly from home, and 90% of them used laptops, tablets, smartphones or other portable device.
- Before the COVID-19 pandemic, in 2019, only 12% of EU workplaces allowed employees to work from home using digital technologies[vi].
    - Digital technologies are utilised by companies to monitor noise, chemicals, dust, and gases in the working environment of 19,2% of European workers. Such measurements as heart rate, blood pressure, posture, and other are tracked by technology for 7,4% of workers personally.
- 30% of workers across the EU note that their organisation uses digital devices to organise work (automatic allocation of tasks, shifts), 27% point out that their performance is being rated by third parties (e.g. customers, colleagues, patients etc.) through a digital technology, and 25% indicate that the technology is being utilised to supervise or monitor their work and behaviour.



NB: The data are for all workplaces in the EU27_2020, from ESENER 2019.

The impact of digitalisation

The processes of digitalisation, as discussed above, can positively and negatively affect workers and workplaces. The figures reported below are based on ESENER 2019 and OSH Pulse 2022 data.

Opportunities

- More flexibility for employees in terms of time and space has been noted by 63% of workplaces.
- Compared to the total of workers, 14.4% of those working remotely from home are less likely to report the lack of autonomy or influence over the work pace or work processes.
- Home-based workers are also less likely to experience violence or verbal abuse from customers, patients or pupils (reported exposure in only 7.9% of cases, in comparison to 15.7% in the total working population) and to harassment or bullying (only 4.4% of cases versus 7.3% of total workforce).
- Improved access to the labour market to disadvantaged workers (e.g. people with disabilities, migrant workers).
- Automation of repetitive and/or high-risk tasks and, therefore, reduced exposure to hazardous situations.
- Digital technologies used to monitor the presence of noise, chemicals, dust and gases in the working environment of 19% of European workers.
- Digital technologies are used to track heart rate, blood pressure, posture, and other vitals of 7.4% of workers.

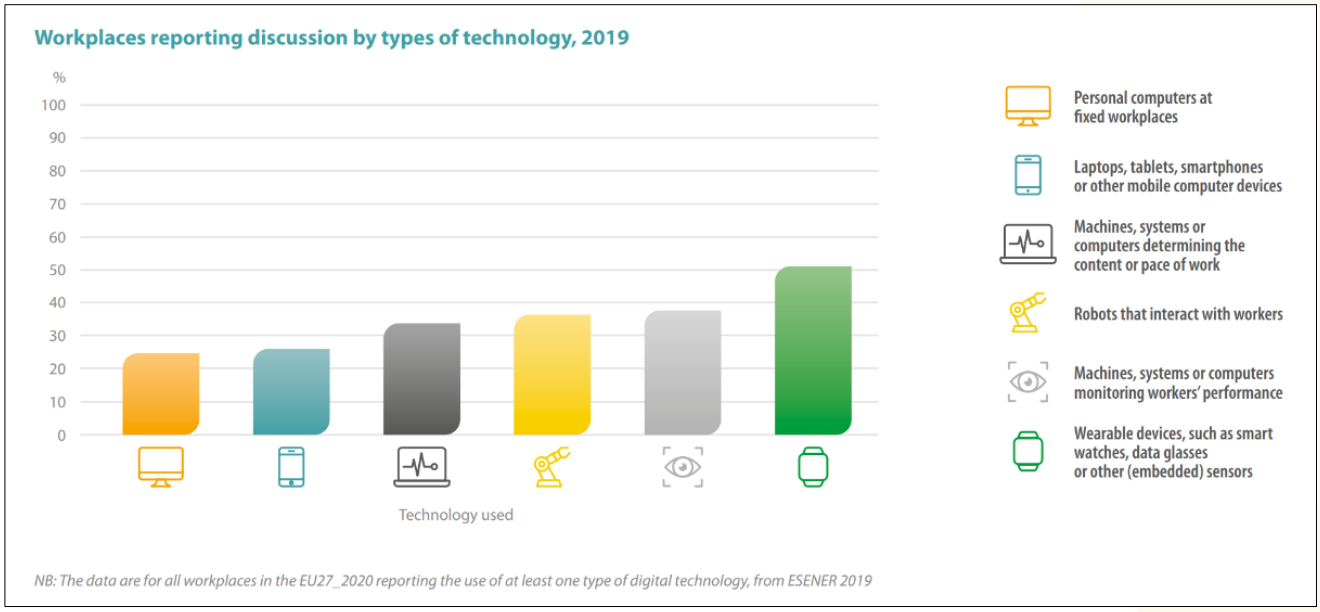
Risks

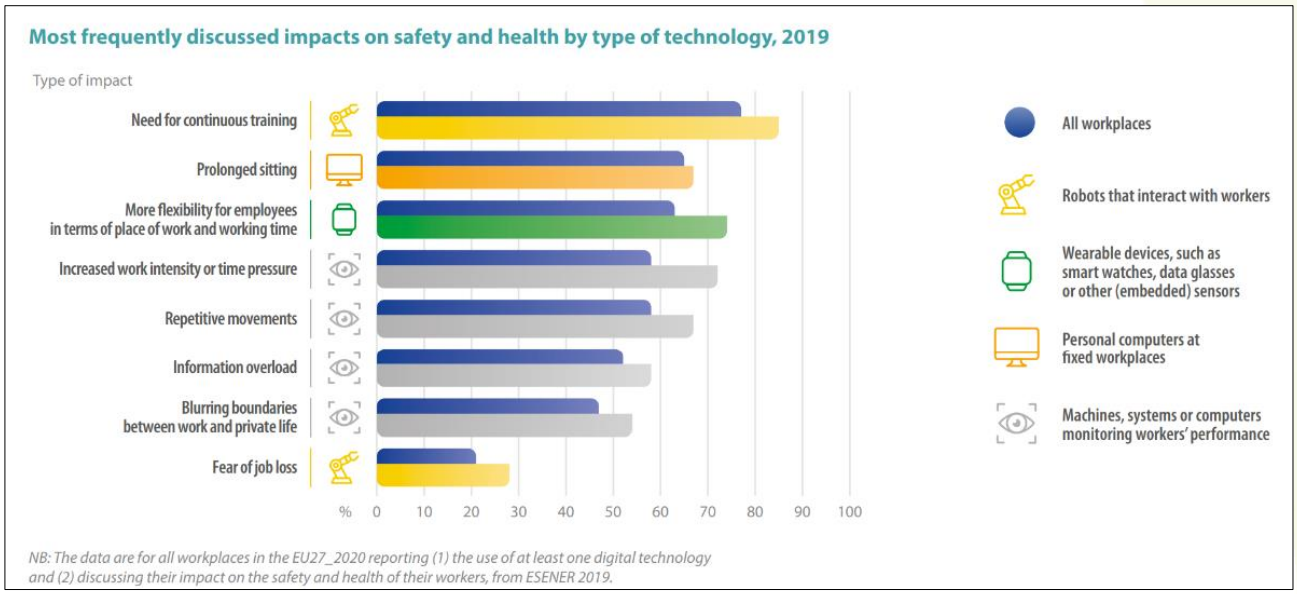
- The need for continuous training to update skills has been indicated by 77% of workplaces, the issue of prolonged sitting noted by 65% of workplaces, and 21% have pointed out the fear of job loss linked to the digitalisation under discussion.
- One in three workers (33%) point out that the use of digital technologies increases their workload, for 44% the use of these technologies results in lone working, for 37%- increases surveillance of them at work, for 19%- reduces their autonomy at work and for 52% determines the speed or pace of their work.
- Home-based remote workers report an increase in workload (33.2%), as well as the speed or pace of work determined by new technologies (61.2%), social isolation (56.8%) and severe time pressure or overload of work (46.9%) more often than the total of workers.
- The rise in the use of digital technologies is linked to psychosocial risks, such as time pressure, poor communication or cooperation, job insecurity, and working long shifts or irregular hours.

Awareness of the impact of digitalisation

The previous section pointed out that the full impact of digitalisation is not yet fully understood by businesses and workers. This is illustrated by several figures presented below, also based on ESENER 2019.

- Less than one in four workplaces (24%) have discussed the potential impact of digital technologies on the safety and health of workers.
- Regarding specific sectors, the conversation about the impact of digital technologies has been reported more frequently within workplaces in the sector of information and communication (31%) as well as finance and insurance (31%), and less frequently in construction, waste management, water and electricity supply (21%) and manufacturing (21%).
- Discussing the potential impacts on OSH is most often indicated among workplaces utilizing wearable devices (51%) and machines, systems or computers monitoring workers' performance (38 %).
- While 75% of EU workplaces carry out risk assessment on a regular basis, only 31% cover also homes of teleworkers.





Priority areas

The campaign has been organised into five priority areas looking into specific topics related to OSH and digitalisation.

Digital platform work

Definition

All paid work provided through, on or mediated by an online platform[vii]. These platforms match a demand for and supply of labour provided by a platform worker either online (e.g. software programming, graphic design) or on location (e.g. food delivery, handiwork)[viii].

Opportunities

Maximised if the challenges are addressed by promoting algorithmic transparency, correct classification of workers and workers' consultation[ix]:

- greater flexibility and autonomy for the workers regarding when and how much to work;
- more employment options in geographical areas with few job offers and for groups of workers who have difficulties in accessing the labour market (e.g. migrants).

Risks and challenges

- isolation and lone working;
- intensification of work;
- long and/or irregular working hours;
- algorithmic management;
- digital monitoring and surveillance;
- a blurring line between work and private life;
- the lack of professional identity or meaningless tasks or jobs;
- the limited applicability of OSH provisions and employment regulations to digital platform workers in the majority of EU Member States, as platform workers are usually classified as self-employed.

Automation of tasks

Definition

Use of systems or technical procedures with some degree of autonomy, to perform physical or cognitive tasks that were previously, or could potentially be, carried out by a human. They can be embodied (robotics) or non-embodied (smart applications)[x].

Opportunities

Maximised if workers remain in control of the whole work process in a transparent way[xi]:

- workers no longer have to perform high-risk or non-creative, repetitive tasks that are required to be carried out on a daily basis;
- workers can be removed from hazardous environments and tasks;
- workers have more time for continuous learning, to exercise or develop creativity.

Risks and challenges

- loss of human situation awareness;
- over-reliance on such technology;
- possible loss of specific skills of workers.

It is important to note that the opportunities and challenges of automation depend on which and how many functions are automated.

Remote and hybrid work

Definition

Any type of working arrangement involving the use of digital technologies (e.g. personal computers, smartphones, laptops, etc.) to work from home or, more generally, away from the employer's premises or in a fixed location for most or part of the working time. The combination of remote work with work at the employer's premises is also referred to as hybrid work. Telework is a common way to define home-based remote work[xii].

Opportunities

Maximised if there are clear policies, risk assessment and preventive measures in place[xiii].

- more flexibility and, therefore, a better work–life balance, an increase in workers' motivation and engagement and, consequently, their productivity;
- decrease in commuting times and home-to-work accidents;
- less office-related costs;
- removal of workers from high-risk or distant environments or from performing high-risk tasks.

Risks and challenges

- blurring lines and conflicts between private and working life;
- isolation and lone working;
- working 'around' (e.g. not in fixed indoor location), thus, an increase in on-the-road accidents;
- intensification of work;

- long or irregular working hours;
- requested continued availability;
- detachment from reality;
- algorithmic management;
- digital monitoring and surveillance;
- the lack of information regarding OSH prevention in remote and virtual workplaces;
- the use of inadequate equipment (both ergonomic and digital equipment);
- the challenge of carrying out risk assessments outside the employers' premises.

Worker management through AI

Definition

Digital management systems and tools that collect real-time data about workers, workers' behaviours and the workspace from various sources with the purpose of informing management and supporting automated or semi-automated decisions (e.g. allocating tasks, organising work or establishing how workers are disciplined or rewarded). These systems can be based on algorithms or more advanced forms of AI, that, unlike the former, take into account the changes in the environment[xiv].

Opportunities

Maximised if a human-centred, transparent, safe and healthy approach based on workers' involvement and trust is supported[xv].

- better allocation of tasks and scheduling;
- optimisation of work organisation;
- providing information that is helpful for identifying OSH issues, including psychosocial risks, and areas where OSH interventions are required;
- real-time advice tailored to the individual to influence workers' behaviour to improve their safety and health.

Risk and challenges

- reduced job control and increased micromanagement;
- increased workload and pace of work;
- competitiveness;
- individualisation;
- social isolation;
- a blurring line between work and private life;
- invasion of privacy.

Smart digital systems

Definition

Intelligent applications or digital systems using AI, portable equipment and/or high-speed wireless networks, in combination with sensor technologies in order to enhance workers' safety and health (e.g. smart Personal Protective Equipment, wearables or drones capable of detecting high levels of gases or noise, high-risk temperatures or dangerous areas of work)[xvi].

Opportunities

Maximised if the systems are managed in a transparent, trustworthy, empowering and understandable way[xvii]:

- prevention or minimisation of harm to workers and promotion of OSH via collected data on the working environment;
- more accessibility to work for people with risky health conditions or older workers and an overall improvement of the wellbeing of the workforce via tracking of workers' safety and health;
- more training opportunities in a virtual reality environment;
- improved compliance in OSH (e.g. via provision of real-time data on the proper use of PPE);
- better-informed decisions or decision-making;
- effective enforcement through the identification of risks at aggregated level.

Risks and challenges

- the data collected through systems may sometimes be inaccurate, limited or could contain mistakes;
- the data collected could be highly sensitive personal data;
- the data could be used not only strictly for safety and health purposes, but also for monitoring and surveillance activities;
- workers may begin to over-rely on such technology which may lead to more accidents;
- workers may feel they are losing control over the tasks they carry out;
- the availability of standards in this area is minimal.

Specific groups and sectors at risk

The campaign targets all types of workers and businesses, and takes into account also OSH challenges and risks of specific groups of workers including migrants, women, disabled people and older workers. The changes brought about by technology and digitalisation in the organisation of work may have a disproportionate impact on workers, such as increased non-standard employment leading to work intensification and job insecurity, heightened requirements for training and reskilling specific groups, as well as challenges related to language barriers or discrimination[xviii].

Consequently, the campaign also emphasises workers employed under flexible working arrangements, those working away from the employer's premises, around' or visiting clients, in decentralised premises (e.g.: remote, platform workers) and micro and small enterprises.[xix]

In case of digital platform work, a number of challenges and risks for OSH are stemming from this type of work, especially, affecting the on-location, lower-skilled platform workers, whose performance is highly controlled (e.g.: those within delivery, transport sectors).

However, the risks associated with digitalisation are not limited to jobs managed by digital platforms. Sectors and occupations, such as health and social care, are also encountering new risks due to the emergence of digital systems.

Regardless of the sector, the overall fear of job loss stemming from digitalisation can induce stress, fatigue, and have a negative impact on workers' psychosocial wellbeing.

How can risks be managed?

With the right approach, the risks and challenges surrounding OSH brought by the processes of digitalisation, can be effectively addressed and managed. The following aspects should be taken into account[xx]:

- adoption of a human-centred and human-in-command approach, which means that AI and digital technologies should support and not replace human control and decisions. This ensures that such human traits as empathy, compassion, concern for workers are not replaced by computerised decision-making;
- guaranteeing equal access to information of employers, managers, workers and their representatives;
- involvement and consultation of workers and their representatives in the decision-making process linked to the design, implementation and use of digital technologies and systems;
- ensuring transparency about how digital tools operate and their benefits and risks;
- promoting a holistic approach when it comes to the evaluation of digital technologies and their impact on workers as well as wider society;
- encouraging and facilitating the conduct of regular risk assessments. For example, EU-OSHA's Online interactive Risk Assessment[xxi] (OiRA) tool and checklist[xxii] for the risk assessment of telework– can offer support to employers and worker representatives to implement remote work safely.

Overall, the influence of digital technologies over the safety and health of workers should be considered from the very early stages of design of such technologies, as to do so in the implementation stage might already be too late. Therefore, it is advisable to include programmers and developers in the first phases of design as well.

In addition, to maximise the opportunities offered by digitalisation, it is crucial to foster digital literacy among workers and employers through training and a promotion of qualification and skills development for digital

applications[xxiii]. Upskilling and reskilling workers (i.e. improving their existing skills and training them in new ones) is therefore crucial to prevent OSH risks surrounding digitalisation; in this sense, the Healthy Workplaces Campaign fits well with the European Year of Skills organised by the European Commission.

Legislation

The regulatory framework concerning safety and health in the age of digitalisation involves specific OSH legislation as well as a number of initiatives in this area, conducted at EU level[xxiv].

The main legislative act covering any risk to workers' safety and health in the workplace, including those related to digitalisation, is called **Directive 89/391/EEC - the OSH Framework**, transposed by national legislations of the Member States into law.

Certain risks stemming from the use of digital technologies are also tackled by other specific directives, including:

- Directive 90/270/EEC - the Display Screen Equipment
- Directive 2009/104/EC - the Use of Work Equipment
- Directive 2006/42/EC - Machinery
- Directive 89/654/EEC - Workplace Requirements
- Directive 2003/88/EC - Working Time
- Directive 2002/14/EC - Informing and Consulting Employees

In the area of digitalisation, several legislative and non-legislative proposals have been put forward by the EU, which have implications for work and OSH, involving:

- Declaration on Cooperation on Artificial Intelligence
- European Commission's Communication on AI for Europe
- Communication on Building Trust in Human-Centric AI
- European Digital Strategy
- White Paper on Artificial Intelligence – A European approach to excellence and trust
- European data strategy
- Proposal for a Regulation on a European approach for Artificial Intelligence
- Communication on Fostering a European approach to Artificial Intelligence
- European Commission measures to tackle risks related to digital platform work
- Communication on Better working conditions for a stronger social Europe: harnessing the full benefits of digitalisation for the future of work
- A proposal of Directive to improve the working conditions of people working through digital labour platforms

Moreover, other legislation and initiatives deal with the impact of digitalisation on work, such as the general data protection regulation (provisions on the collection and use of workers' data) as well as the already mentioned 2021–2027 EU strategic framework on health and safety at work, and directives covering personal protective equipment (PPE)[xxv].

At Member States level, the COVID-19 pandemic also prompted various initiatives, particularly with regard to remote and hybrid work, as reflected in national legislation and regulations.

Glossary

A

Additive manufacturing

Additive manufacturing uses data, computer-aided-design (CAD) software or 3D object scanners to direct hardware to deposit material, layer upon layer, in precise geometric shapes. As its name implies, additive manufacturing adds material to create an object. Although the terms '3D printing' and 'rapid prototyping' are occasionally used to refer to additive manufacturing, each process is actually a subtype of additive manufacturing.

Advanced robotics

The term advanced robotics refers to the design, production and use of machines able to carry out difficult and complex tasks using AI to interact with the real world around them.

AI (Artificial Intelligence)

AI refers to systems that display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goals. AI-based systems can be purely software-based, acting in the virtual world (e.g. voice assistants, image analysis software, search engines, speech and face recognition systems) or AI can be embedded in hardware devices (e.g. advanced robots, autonomous cars, drones or Internet of things applications).

AI-based worker management (AIWM)

Refers to a worker management system that gathers data, often in real time, on the workspace, workers and the work they do, which is then fed into an AI-based model that makes automated or semi-automated decisions or provides information for decision-makers on worker management-related questions.

AI-powered prediction models

Forecasting models that use AI for data analysis to predict different factors related to workers, such as those used for people analytics. These may be used for example to predict who in the staff is most likely to leave the company soon as a result of stress or burnout or for lack of motivation, and hence should receive more attention from managers.

Algorithm

An explicitly defined set of instructions describing how a computer or a human could perform an action, task or procedure or solve a problem.

Algorithmic management

A worker management system where simple (i.e. without 'intelligence') algorithms and digital technologies (e.g. worker-monitoring devices, computers or face recognition software) are used to manage workers in an automated or semi-automated manner. It provides the means to automate a large number of worker management tasks (e.g. schedule-making, shift-making and worker monitoring through wearable devices). AI-based worker management involves the intelligence simulation necessary to deal with uncertainty (e.g. providing different outputs based on changes in the environment), whereas algorithmic management is deterministic in nature (i.e. it always provides the same output, given the same input).

Algorithmic transparency

Algorithmic transparency is the principle that the factors that influence the functioning of algorithms and the results they produce should be visible, or transparent, to employers, policy-makers and workers, who use, regulate, and are affected by the systems that employ those algorithms. The involvement of staff representatives is essential to build workers' trust in the systems.

Anthropomorphism

The attribution of human traits, emotions or intentions to non-human entities (e.g. robots).

Artificial intelligence

(AI) AI refers to systems that display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goals. AI-based systems can be purely software-based, acting in the virtual world (e.g. voice assistants, image analysis software, search engines, speech and face recognition systems) or AI can be embedded in hardware devices (e.g. advanced robots, autonomous cars, drones or Internet of things applications).

Automation

Use of systems or technical procedures to allow a device or system to execute (partially or fully) a function that was previously, or conceivably could be, carried out (partially or fully) by a human.

B

Big data

Datasets characterised by volume (large size), velocity (constantly growing), and variety (structured and unstructured form such as texts), which are often used by artificial intelligence machines.

C

Cameras to monitor activities

There are two types of cameras: basic systems that only record signals, which can be stored and/or actively monitored; and intelligent systems that use algorithms to interpret data, related to the environment and/or to behaviours, for instance.

Client relationship management (CRM) software

Customer Relationship Management, abbreviated as CRM, is an integrated management information system that is used to schedule, plan and control the sales and pre-sales activities in an organization. CRM systems comprise of hardware, software and networking tools to improve customer tracking and communication.

Cloud computing

Cloud computing is the on-demand availability of cloud-hosted services (e.g. data storage, computing power) delivered to a user over the Internet.

Cobot (collaborative robot)

A type of robot designed to perform tasks in collaboration with workers in industrial sectors.

Cognitive task

A task that requires a number of mental processes for its completion, such as decision-making, pattern recognition, and speech- or language-based tasks.

Cybersecurity

The protection of computer systems and networks from information disclosure and theft of or damage to their hardware, software or electronic data, as well as from the disruption or misdirection of the services they provide.

D

Data analytics

A process of extracting insights and knowledge from data using statistical or other techniques and tools.

Data bias

Data bias occurs when data contain systematically certain types of errors for which some elements in a dataset are more or less weighted and/or represented than others. Socio-cultural prejudices and

beliefs of programmers or software developers can be the reason why systems collect and produce biased data.

Deep learning

Branch of machine learning that uses (artificial) neural networks to mimic a human brain and to improve artificial intelligence learning capabilities.

Deskilling

Loss of skills and knowledge needed to perform a job as a consequence of automation.

Digital labour platform

An online facility or marketplace operating on digital technologies (including the use of mobile apps) that are owned and/or operated by an undertaking, facilitating the matching between the demand for and supply of labour provided by a platform worker. Examples of platforms include Uber, Glovo, Wolt and Task Rabbit.

Digital platform work

Digital platform work is all paid work provided through, on or mediated by an online platform – that is, an online marketplace operating on digital technologies that facilitate the matching of demand for and supply of labour.

E

Exoskeletons

Exoskeletons are wearable devices that modify internal or external forces acting on the body and therefore enhance or support the strength of the user. For workers wearing occupational exoskeletons (both active and passive), several risk scenarios can be identified relating to their prolonged use.

G

Gamification

Gamification refers to bringing ideas and concepts from games, such as rewards for milestones, into the work environment and work processes to nudge the worker into behaviours desired by the employer to ultimately improve efficiency and productivity. It can promote collaboration and interaction between teams, reduce stress and improve overall employee satisfaction in the workplace.

H

Human-in-command approach

In the human-in-command approach to digital transformation, artificial intelligence and digital technologies support but do not replace human control and decisions or information, consultation and participation of workers. Making the design, development and use of digital systems human-centred allows them to be used to support workers, while leaving humans in control.

Human-robot interaction (HRI)

Human-robot interaction (HRI) is the study of interactions between people (users) and robots. HRI is multidisciplinary with contributions from the fields of human-computer interaction, artificial intelligence, robotics, speech recognition, and social sciences (psychology, cognitive science, anthropology, and human factors).

I

Industrial robot

An industrial robot is an automatically controlled, reprogrammable multipurpose manipulator, programmable in three or more axes, which can be either fixed or mobile.

Internet of things (IoT)

The IoT is a cyber-physical system in which the information collected is fed, via the internet, to computers to gather data about production and work processes and to analyse these data with unprecedented granularity. This entails humans creating a '"ubiquitous world" in which all devices … will be fully networked.' The IoT reshapes our interaction with the physical world through devices interconnected on a platform (e.g. the cloud) and performing functions adaptively based on inputs and programming.

K

Kinematics

A branch of physics, developed in classical mechanics, that describes the geometrically possible motion of points, bodies (objects), and systems of bodies (groups of objects) without considering the forces involved (i.e. causes and effects of the motions).

M

Machine learning

Machine learning is a branch of artificial intelligence dealing with how computers can learn, grow and improve on their own from data without human intervention.

N

New occupational safety and health (OSH) monitoring systems

New OSH monitoring systems use digital technology to collect and analyse data from workers and/or working environment to identify hazards, assess risks, prevent and/or minimise harm, and promote OSH.

P

People or workforce analytics

Application of AI-based worker management used to support decision-making about human resource management aspects. It uses digital tools and data to measure, report and understand employee performance.

Physical task

A task that requires one or more physical acts for its completion.

R

Radio-frequency identification (RFID)

RFID is 'a wireless sensor technology which is based on the detection of electromagnetic signals [that] includes three components: an antenna or coil, a transceiver (with decoder) and a transponder (RF tag). […] There is emission of radio signals by the antenna in order for the tag to be activated and data to be read and written to it.'

Remote work

Remote work is any type of working arrangement to work from home or – more generally – away from the employer's premises or in a fixed location. In this context the focus is on remote work enabled by digital technologies (e.g. personal computers, smartphones, laptops, software packages and the internet).

Reskilling

The process of acquiring/learning new skills.

S

Semi- and fully automated decisions

Semi-automated decision-making refers to human decisions supported by results of automated computer algorithms (with or without AI integration), while fully automated decision-making refers to giving full autonomy to computer algorithms to make decisions.

Smart digital systems

Umbrella term to indicate digital systems for monitoring and enhancing workers' safety and health including for example smart PPE (that can identify levels of gases, toxins, noise levels and high-risk temperatures), wearables (able to interact with workers, with sensors that may be embedded in hardhats or safety glasses), mobile or static systems that use cameras and sensors (e.g. drones that effectively reach and monitor dangerous areas of work sites avoiding to put humans in danger in the construction and the mining industries).

Smart personal protective equipment (PPE)

Smart PPE is the last level of protection to be used against hazards for workers and is used when hazards cannot be removed or their risks cannot be mitigated further by collective or organisational measures, engineering designs or maintenance practices – it combines traditional garments with smart parts, such as sensors, detectors, data transfer modules, batteries, cables.

T

The cloud

The cloud is a network of remote servers around the world which are connected together and operate as a single ecosystem. These servers are designed to either store and manage data, run applications, or deliver content or a service (e.g. streaming videos, web mail, office productivity software, or social media). Files and data are accessible online from any Internet-connected device.

Trust

Trust can be defined as the attitude that an agent [automation technology, i.e. advanced robotics] will help achieve an individual's goal in a situation characterised by uncertainty and vulnerability.

U

Unmanned aerial system (UAS)

UASs are ‘composed of the vehicle airframe and power supply, vehicle sensors, remote operator, an onboard computer, and vehicle actuators. Sensors gather information about the vehicle’s environment and actuators cause movement of the vehicle. The operator can receive information by looking directly at the vehicle (flying by ‘line of sight’) or by looking at a video transmitted from the vehicle (flying by ‘first-person view’)’.

Upskilling

The process of acquiring/teaching additional skills.

V

Virtual reality (VR) and augmented reality (AR)

VR is a computer-generated scenario that simulates a real-world experience, while AR combines real-world experiences with computer-generated content. AR can be defined as an ‘immersive’ technology, blurring the lines between reality and the virtual world, enhancing the interaction of the user with the environment. Practically, AR users point their devices (smartphones, wearables, etc.) towards a specific image, which is acquired and processed to create projections (2D or 3D), which the user can interact with.

W

Wearables

Wearables are electronic devices with sensors and computational capacity (e.g. smart watches, data glasses, or other devices with embedded sensors or tags), which can be placed on different body parts to gather data to be fed into other digital systems for processing purposes. They can be used to analyse physiological and psychological data such as feelings, sleep, movements, heart rate, body temperature and blood pressure, via applications either installed on the device itself or on external devices, such as smartphones connected to the cloud.

Worker monitoring

The practice of capturing information on employees, such as their location, wellbeing and current task, with a goal to track performance and compliance with company policies, but also to identify health issues or safety risks. Worker monitoring is reported to entail violation of data protection legislation and worker’s personal rights and can result in stress and mental health issues.

Worker surveillance

A more intrusive worker monitoring, extending also beyond work and including activities as tracking social media posts and website visits to gather as much information on workers as possible. Worker surveillance practices can violate data protection legislation and worker’s personal rights and can result in stress and ill mental health.

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