NEW FORMS OF WORKER MANAGEMENT BASED ON ARTIFICIAL INTELLIGENCE (AI) AND THEIR IMPLICATIONS FOR OCCUPATIONAL SAFETY AND HEALTH (OSH)

Virtual workshop, 4 November 2021

Introduction

Artificial intelligence (AI) and digital technologies have given rise to new forms of managing workers. Unlike earlier forms of management that largely rely on human supervisors, worker management using AI refers to new management systems and tools that collect real-time data about workers' behaviours from various sources with the purpose of informing management and supporting automated or semi-automated decisions based on algorithms or more advanced forms of AI. These worker management systems are increasingly being implemented in a variety of sectors and jobs.

These novel forms of monitoring and managing workers give rise to a number of legal, regulatory, ethical and privacy issues as well as challenges and risks for occupational safety and health (OSH), particularly in terms of psychosocial risk factors. Nevertheless, if they are built, implemented and used under certain conditions, they may also provide helpful information to identify and prevent OSH risks, including harassment and violence, and support evidence-based intervention.

The objective of the workshop was to present and discuss the European Agency for Safety and Health at Work's (EU-OSHA) research on these new forms of AI-based worker management and their implications for OSH. It was an opportunity to exchange views with experts and policy-makers at the EU and Member State/EU country levels. The workshop was organised as part of EU-OSHA's project 'Overview of Research and Practices in Relation to New Forms of Worker Management through AI-based Systems and Occupational Safety and Health (OSH)'.

Introductory words by the European Commission

By Mr Jesús Francisco Alvarez Hidalgo, European Commission

- EU-OSHA's work on artificial intelligence and digitalisation is of particular importance to the European Commission.
- The Commission has recently adopted the EU Strategic Framework on Health and Safety at Work 2021[1], in which digital transitions have a prominent role. The EC has a balanced outlook on digitalisation, looking not only at challenges but also at opportunities that the advancements in AI can provide for workers, and their health and safety. However, digitalisation, including AI developments, may also raise some risks to OSH. Therefore, in this context, the new Strategic Framework on Health and Safety at Work makes reference to the first legal framework that the Commission has proposed on AI which addresses the risks of certain AI systems.
- The Artificial Intelligence Act (2021)2 has been proposed after a very broad consultation with all the stakeholders. It has a balanced approach and aims to protect both the market, and health and safety of workers. There are many elements relevant to OSH in the draft Artificial Intelligence Act. One of the key objectives of the proposed act is to make AI-based systems compatible with fundamental rights in general and OSH in particular.

[1] See: https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12673-Health-&-Safety-at-Work-EU-Strategic-Framework-2021-2027-_en

[2] See: https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1623335154975&uri=CELEX%3A52021PC0206

Setting the scene: findings from EU-OSHA research

By Dr Karin Reinhold and **Dr Marina Järvis**, Tallinn University of Technology

After the introduction by EU-OSHA, the project experts Dr Karin Reinhold and Dr Marina Järvis from Tallinn University of Technology presented the study results, as summarised below:

- The research focused on mapping the types and uses of AI-based worker management (AIWM) systems, estimating their uptake across the EU, as well as evaluating how AIWM might, and in some cases already does, affect OSH, both in terms of creating risks and opportunities. The analysis was carried out by implementing (i) a literature review (over 300 documents including academic, policy and grey literature); (ii) a consultation of EU-OSHA network of national focal points ; (iii) in-depth expert interviews (in total 22 experts); and (iv) statistical data analysis (analysis on EU-OSHA's Third European Survey on Emerging and New Risks (ESENER-3) data, supplemented with analysis on Eurofound's 2019 European Company Survey (ECS-2019) data where relevant).

- The operational definitions used in the research are the following:

  (i) Artificial intelligence (AI) systems (High-Level Expert Group on Artificial Intelligence, 2019, p. 6) – software (and possibly also hardware) systems designed by humans that, given a complex goal, act in the physical or digital dimension by perceiving their environment through data acquisition, interpreting the collected structured or unstructured data, reasoning on the knowledge, or processing the information, derived from this data and deciding the best action(s) to achieve the given goal. AI systems can either use symbolic rules or learn a numeric model, and they can also adapt their behaviour by analysing how the environment is affected by their previous actions.

  (ii) AI-based worker management (AIWM; based on European Commission, 2021; European Parliament Research Services, 2020; High-Level Expert Group on Artificial Intelligence, 2019; Moore, 2019) – worker management systems that gather data, often in real time, from the workspace, workers and the work they do, which is then fed into an AI-based system that makes automated or semi-automated decisions, or provides information for decision-makers (for example human resources (HR) managers, employers, sometimes workers), on worker management-related questions.

- Based on how AI systems function (according to OECD (2019)), it can be stated that AIWM systems operate by: (i) collecting relevant data from an environment, such as the workplace, workforce, and work; (ii) processing and preparing the data so that it can be used by AIWM algorithms; and (iii) creating a representation of reality based on such data that allows to make predictions, recommendations and decisions on worker management. The created predictions, recommendations and decisions are given to machines or humans that act upon them, modifying how workers are managed.

- AI-powered performance/productivity management tools improve worker performance and productivity by evaluating them and providing recommendations on how they can be improved. For example, a tool called 'enaible' measures how quickly employees complete various tasks and suggests ways to speed them up (Heaven, 2020). AI-based scheduling and task allocation tools can automatically schedule tasks to specific workers (i.e. match skills with tasks), as well as ensure optimal labour coverage for every shift. AI-powered worker direction tools can provide instruction, direction or guidance to workers on how to perform their task better.

- According to interviewed experts, the literature review and statistical data analysis, in general it seems that the uptake of AIWM systems is relatively low across the EU-27 (2020), but it is growing. However, as there is lack of data specifically measuring the use of AIWM systems, the uptake can only be inferred from proxies. For example, 71 % of international

companies consider people analytics a high priority (Deloitte et al., 2017). Demand for worker monitoring software increased by 87 % in April 2020 compared to pre-pandemic (Top10VPN, 2020). The study found that larger companies are more likely to employ technologies that are related to AIWM than smaller workplaces due to their need to manage, and often control, a large workforce (Eurofound, 2020; Mateescu and Nguyen, 2019; Wujciak, 2019). This is also supported by ESENER-3 survey data analysis. AIWM is used more heavily by organisations from sectors that have a lot of manual tasks that are routinary in nature. This is supported by interviews with experts, academic literature (Dzieza, 2020; Mateescu and Nguyen, 2019), and by ESENER-3 data (for example technologies mentioned previously are more frequently used in sectors such as manufacturing, transportation and agriculture). AIWM systems are more frequently used for blue-collar workers who have a lot of routine tasks, and hence they can be easily monitored, evaluated and managed (Dzieza, 2020). However, experts and some literature also highlight that white collar occupations, especially those that have more routine tasks, are also susceptible to AIWM (Boiral et al., 2021; Gigauri, 2020). This includes individuals working in call centres and similar occupations, as well as workers who work from home.

- AIWM can create opportunities for OSH. For example, it can alert to a dangerous situation, and can help in hazard and risk monitoring, including ergonomic risks, risks of collision with machines, or psychosocial risks such as high workload, or bullying and violence. It can contribute to securing workers' safety as well through real-time accidents and incidents factor analysis. AIWM can be used for mental health monitoring and burnout detection as well as digital counselling. However, with regard to stress and mental health monitoring, there is a lack of proven efficacy of such systems and a lack of standards, with fuzzy relation between signals monitored and stress or well-being. AIWM could also be used to foster health promotion and to increase employee engagement and satisfaction. AIWM may also be used to customise work and the workspace to individuals and as such support specific workers' groups, for example ageing workers or workers with disabilities. Finally, AIWM can be used to design safety training programmes.

- However, AIWM also poses numerous risks and challenges for workers' safety and health. Indeed, AIWM facilitates constant monitoring, direction and control of workers, and as such increased micromanagement, increased work pace and work intensity, and a loss of workers' job control and autonomy, also resulting in deskilling of the workforce. Increased performance pressure may lead to increased competitiveness and isolation. Workers may be unable to take breaks when they need to. Being managed by AI means a loss of human interaction with managers, which is a mitigating factor to high job strain. As the key operational components of AIWM often are a 'black box', workers and their representatives may lack information on and power over decisions made. If workers lack a clear understanding about which data are collected and how they are used, this may lead to a real or perceived invasion of privacy, which in turn can result in a loss of trust and be a source of stress and anxiety. AIWM creates the risk of dehumanising workers and reducing them to behaving like machines, when monitoring turns workers into objects of data collection. This can be referred to as the 'datafication' of workers. All these risks may result in musculoskeletal disorders (MSDs), cardiovascular disorders, disorders of the urinary system, work-related stress, fatigue, exhaustion, burnout, anxiety or fear of losing one's job, technostress, techno-anxiety and techno-fatigue, decreased cognitive and intellectual behaviours as well as creative thinking, loss of autonomy and shortness of independence of thought.

- At the EU level, some generic or basic regulation applicable to AIWM is available. More specifically, the EU OSH *acquis communautaire* implicitly applies to the risks posed by AIWM to workers' safety and health. The General Data Protection Regulation (GDPR) also has extensive provisions preventing organisations from abusing private data, including, according to Article 22: preventing "a decision based solely on, automated processing, including profiling, which produces legal effects concerning him or her or similarly significantly affects him or her'. The EU Charter of Fundamental Rights and the Council Directive establishing a general framework for equal treatment in employment and occupation are also relevant. In addition, in April 2021, the EC proposed a new regulation that explicitly targets AI, including

AIWM, titled Proposal for a Regulation of the European Parliament and of the Council laying down harmonised rules on Artificial Intelligence (Artificial Intelligence Act). The proposal covers safe deployment of AI systems, prohibiting some of them, while casting others as 'high-risk' requiring more safeguards and for the design, development and use of these systems. The proposed list of 'high-risk' systems includes AIWM tools, such as AI systems used for recruitment or selection, and AI systems used for making decisions on promotion and termination of work-related contractual relationships, for task allocation, and for monitoring and evaluating performance and behaviour of workers. Finally, it proposes compliance with mandatory requirements for high-risk AI systems, for example, establishing and maintaining risk management systems throughout the life cycle of AI systems, and training these systems with human oversight.

- At the national level, a majority of EU countries have adopted AI strategies and have ongoing debates regarding general AI issues. There are also some emerging examples of regulations, guidelines and strategies that can be connected to AIWM and OSH.

- To prevent the OSH risks and challenges related to AIWM and to maximise the opportunities for OSH, the following measures are needed: (i) development of an ethical framework for AIWM at the national and enterprise levels; (ii) a strong 'prevention through design' approach that integrates a human/worker-centred design approach of AIWM; (iii) AIWM should respect workers' characteristics, agency and autonomy, and contribute to their safety, health and well-being; (iv) AIWM should be designed, implemented and managed in a trustworthy, transparent, empowering and understandable way, guaranteeing workers' consultation, participation and equal access to information, as well as putting humans in control ensuring that AIWM is used not to replace workers but to support them; (v) it must be ensured that AIWM systems are safe, sustainable, reliable, resilient and secure; (vi) there is a need to increase knowledge and awareness about AIWM and its risks to workers, and to provide training focusing on OSH for developers of AIWM systems as well as for organisations using them and their workers; (vii) ensuring that organisations only collect data that are strictly necessary for AIWM systems to operate while guaranteeing workers' health, safety, privacy and fundamental rights more generally; (viii) an open and effective dialogue between workers and employers as well as a participatory approach (for example effective workers' involvement) need to be implemented within organisations in relation to the use of AIWM; (ix) a participatory approach and workers' involvement is essential from ex ante assessment to design, implementation, use and ex post assessments of AIWM; (x) advanced and dynamic OSH risk assessment of AIWM needs to be conducted both at the development stage by developers and when these AI-based systems are used (workplace risk assessment); and (xi) diversity, non-discrimination and fairness need to be acknowledged in order to avoid negative implications of AIWM. There is also a need to develop certain mechanisms in order to ensure responsibility and accountability for AIWM and its outcomes.

The experts' perspective: key messages

Dr Christina Colclough, The Why Not Lab

- One of the myths around productivity and efficiency is that they can be increased with AIWM and similar systems. However, according to the Organisation for Economic Co-operation and Development (OECD), labour productivity growth has declined in recent years. Therefore, we should ask who benefits from this efficiency and productivity being increased, and for what purpose. If the AIWM burns out workers in the long run, is this management system particularly efficient?

- The use of AIWM is, rather, more of a question of power. It is a way for companies to outcompete the market, and to have power over competitors and workers. It is monopolisation of power, and, ultimately, of the truth. Therefore, the question is how unions can fight this type of monopolisation. Regarding power over workers, the key issue is not only that the data are used to control the workers but also to control the narrative. However, as algorithms are not necessarily correct, and the data they use can be biased, the inferences they make may not

be correct either.

- There are positive and negative sides of data extraction. The negative aspects include work intensification, discrimination/bias, mental and physical health pressures, deskilling and job loss, lower wages, economic insecurity, less mobility, suppression of organising, loss of autonomy and dignity, and loss of privacy. On the positive side, data extraction could contribute to lowering overtime, a better distribution of tasks, protection of workers' rights, collective agreement compliance checks, better and more balanced worker evaluations, better control over worker competencies, and better understanding of workers' and customers' wishes. However, these positive aspects are only thought examples at the moment rather than a reality, unlike the negatives that are lived harms.
- Work intensification is of particular concern. If all routine tasks are automated, how will this affect work intensity? Routine tasks give us a break from high-intensity work, and not having these breaks as part of our jobs may lead to an increase in burnout cases. Currently, there is no system in place that would benefit workers despite all the recommendations (for example predicting burnout, too intense shifts).
- Two ideas to reverse the tides: First, unions could negotiate the data life cycle at work and compliance with GDPR must be ensured. Today, unions are not part of data protection impact assessment, even though the Article 29 Working Party recommended they should be. Unions say they do not know what digital systems are in place in their workplaces. Second, workers who are subject to algorithmic influences must be protected. Therefore, co-governance of algorithmic systems is an absolute must, and it has to be stipulated in regulations.
- Introduction of these AIWM tools is shifting the balance of power across different management levels. Workers must have clarity from the management regarding responsibility of the decisions made by algorithms and to whom they should be able to turn to contest these decisions. Another problem is that companies do not govern these digital technologies properly. If risks are identified and the algorithm cannot be amended, it means it cannot be used as it is and should be modified.
- We really need to bring dialogue back into vogue. All algorithmic systems should be done in a co-governance setting.

Professor Valerio de Stefano, KU Leuven

- In discussing risks and opportunities of AI-based systems at work, it is important to resist the idea that we have to work in silos with OSH on one hand, and privacy, discrimination and union rights on the other hand. It is important to see how AI integrates all these potential opportunities and risks. For example, biometric technologies pose many threats in terms of privacy invasion, discrimination and OSH, having a direct impact on people's bodies and, in some cases, minds. The increased level of stress also poses enormous threat in terms of OSH as AI systems can be used to subtract autonomy from workers and subtract control from unions. AI systems might also be used with anti-union goals, for example identifying and firing workers gathering.
- One of the important elements in OSH legislation is the involvement of workers and unions in countering and controlling OSH risks and bringing workers' representatives into health and safety questions.
- AI tools are proprietary, unilateral, and in many cases not under control of workers or even managers. We also have to consider that many managers know nothing about these AIWM systems, as they lease and rent these systems from providers. Therefore, it is difficult to identify someone in the company who can report on the possible implications of introducing such systems. There is a huge problem of transparency. There is a problem of exclusion of workers from extremely important aspects of their working life.
- AI systems do not do things for the sake of doing things. They do things they are asked to do. If we do not ask them to identify OSH risks, they will not do it. At the moment these systems are implemented and used to increase productivity, to increase control over workers, and to

subtract autonomy from people. It is very difficult to find employers who have introduced these expensive AI systems to improve OSH.

- We should not fall into the idea that AI can be introduced to bring positive elements. Systems that have been introduced in the past few years and in particular during the pandemic were aimed to control and monitor employees, track their productivity, etc. Many of these systems are not legal in the EU.

- We should focus more on fundamental rights. We do not need to reinvent the wheel with ethics as ethics is not in the hands of regulators, it is in the will of the people.

- We do not have to reinvent the wheel, but to push organisations to follow regulations. Fundamental rights need to be taken into account. Many of the systems violate and are not compatible with existing laws (i.e. existing laws are often ignored). Labour authorities should step in and work with employers and include unions to roll back some of these systems.

- Involvement of trade unions is essential. When unions are present, less OSH issues occur. Unions can be called to step in in this area. We have some legislation that can allow to involve unions in collective bargaining in a better way so that they can contribute to setting up the principles of AI-based system governance and to protecting people at work. Collective bargaining and co-determination of rights are crucial in this case.

- Some of the AI systems that read people's minds (emotion recognition, facial scanning) and that can predict their behaviours should never be part of workplaces. Monitoring keystrokes and attention span of people should not be in workplaces. We need a strong proactive role of OSH, labour and political authorities to roll back these systems that are already present in workplaces. Regulations should be mobilised, and enforcement of existing laws is crucial.

- To ensure that employers comply with existing regulations, we need to allow labour authorities to work together with employers and workers without sanctions for employers during a short, limited period of time. In addition, we need to increase involvement of trade unions and to make sure that certain systems, i.e. highly intrusive technologies, such as facial and emotion recognition, never enter workplaces.

Professor Adrian Todoli, University of Valencia

- There are algorithms that should be banned, but also there are those that we have to live with and that can be improved not to be dangerous. To improve algorithms, we need to identify risk factors. Main risk factors include constant monitoring, intensification of work, micromanagement or lack of autonomy, biases and discriminations, lack of empathy and malfunctions. These are psychosocial risk factors that can be found in 'traditional' workplaces. But when these risk factors are found in relation to algorithms, they are much bigger because algorithm capabilities are stronger.

- When AI is used in workplaces, managerial responsibilities become diffused because the decision is also taken by AI. If the presumption is that AI is more accurate, then the tendency is to think that decisions made by AI can be enforced more strongly. However, the problem is that workers most often cannot challenge these decisions.

- Actions are needed at three levels. First, companies need to be aware of the OSH risks specific to algorithms and to include them into ex ante assessment of algorithms. Although this requirement is already in the law (OSH regulation, GDPR), many companies are not doing that. Second, algorithms should be designed to do no harm. Key aspects here include transparency, adaptation to the capabilities of each worker, margin of autonomy for workers, respect for privacy and non-discrimination, and assessment of any element that poses risks to health and safety. OSH and labour authorities should ensure that companies comply with this. Finally, empathy is very important. Workers have a right to receive human responses and therefore human-in-command must be ensured.

- There is a new regulation in Spain[3] that gives workers' representatives a word in programming algorithms used in workplaces. The law applies to all platforms in all sectors. Platforms are obliged to inform unions and workers' representatives about algorithms in place. Workers' representatives can issue a report about these algorithms and potential risks. There is also a debate in Spain that there is a need for a dedicated governmental agency in relation to enforcement of AI-related laws, as companies are not compliant with these laws. Enforcement of existing laws is crucial.

Professor Yves Roquelaure, University of Angers

- Two applications of algorithms raise particular concerns from an ergonomist's perspective: human resources management (recruitment, promotion) and algorithmic management (task allocation, monitoring, evaluation). The latter management approach follows five principles: continuous monitoring of workers' behaviour, constant performance evaluation, automatic decision without human intervention, interaction with the system with no opportunities for feedback or negotiation, and low transparency.

- From the manager's perspective, algorithmic management allows for optimising the efficient allocation of resources in the production, highly adaptative production methods, strict procedural control of the prescribed task, and reducing costs and increasing productivity. For workers it results in highly variable 'real work' organisation, constant need to adapt its operating methods, permanent adaptation of gestures, information gathering, information exchange, very low possibility of decision-making and very little operational leeway to cope with the task.

- From an ergonomics perspective, the importance to preserve the margin of manoeuvres (MMs) of workers must be discussed before implementing such digital technologies. Situational MMs refers to options (space of freedom) available or created by workers to elaborate alternative strategies and ways of working according to their skills, knowledge and values in order to achieve production targets, while reducing psychological, mental and physical strains, and, finally, avoiding negative health effects.

- Various forms of MMs can coexist at organisational, spatial, temporal, as well as individual and collective levels. Several levels of MMs can be considered. Sufficient MMs means that several working strategies are possible, and the operator can alternate and invent new ones (developmental perspective). Low MMs means that the range of possible operating methods is very limited, which can lead to overstrain and/or difficulties in achieving performance. Finally, the absence of MMs leads to failure in achieving objectives, even at the cost of overstrain and health disorders.

- From an ergonomic perspective, algorithmic management has cascading effects on the risks of MSDs at different levels. At the company level, digital technologies and new forms of work organisation will increase the use of new forms of management, particularly AI-based systems. At work situation level, they will increase performance pressure due to continuous monitoring, excessive micromanagement, increased work intensity and repetitiveness, cognitive workload, psychosocial demand, low autonomy given to workers and little possibility for cooperation, lack of possibility to take a break/change activities, lack of social support and lack of transparency. At workers' level, they will decrease workers' leeway to elaborate alternative strategies and ways of working, to cope with the task intensity, variability and complexity in order to achieve production targets while reducing psychological, mental and physical strains, avoiding negative health effects (MSDs, mental health disorders). In addition, AIWM can result in workers having to adapt their cognitive strategies and gestural working strategies. In turn, this will impact workers' social behaviours (cooperation), skills, knowledge and values, and their functional status.

[3] The so-called Spanish Riders' Law was enacted by the Spanish Government's Royal Decree Law (RDL) 9/2021 of 11 May. See: https://www.boe.es/boe/dias/2021/05/12/pdfs/BOE-A-2021-7840.pdf

- In conclusion, digital management techniques can increase OSH risks, especially in terms of MSDs, mental disorders and accidents. From an ergonomic perspective, MSDs and mental disorders can be conceived as the consequence of a lack of workers' MMs and a defect in the self-regulatory processes of work activity.

- Designers need to consider the global dimension of the work activity in the digital world which mobilises the individual in all its dimensions (inseparably physical, cognitive, subjective and social). It is very important to incorporate ergonomic concepts to enrich the design and uses of algorithms and avoid the spread of the old Taylorian 'one best way' of designing working methods in the digital working world. Job quality measures should be included explicitly in health and safety risk assessments for workplace AI systems. There is also a need to improve managers' and engineers' knowledge related to ergonomic principles and the risks associated with digital technologies. Finally, regulations on digital technologies in the workplace must be reinforced and adapted prevention interventions need to be developed.

Q&A session

During the Q&A session, the following questions and remarks were raised by the workshop participants:

- AI systems and algorithms are not used to monitor employers; they are always focused on workers. But in many ways they could also monitor employers. For example, emissions of dangerous substances in the workplace could be measured and directly sent to the labour inspectorate in cases where the limits values are exceeded. Employers could be obliged to send the labour inspectorate data in a digital way about, for example, the chemicals they are using, the measures and risk assessments they implement.

- Labour authorities could also make use of algorithms to improve OSH. For example, using big data and algorithms, the labour inspectorate in Switzerland ranks companies according to non-compliance with OSH regulations. In Spain, the government passed a law on allowing labour inspectorates to send automatic sanctions to companies. More specifically, if an algorithm using big data detects a breach, it automatically sends sanctions to the company. There have been debates, however, whether this approach is lawful or not. In the Netherlands, for instance, a similar method was applied but it was decided by court that the system used by Dutch labour authorities was not in compliance with data protection, and as such was declared illegal. In France, on the other hand, a similar system used for tax inspection was found to be legal by the French Court of Cassation.

- The question of automatic reporting in relation to compliance with all sorts of laws within Europe is relevant. We need bodies for that which possess sufficient resources. However, currently bodies such as labour inspectorates, Data Protection Authorities or OSH bodies are vastly underfunded. Nevertheless, we must be careful with over surveillance, monitoring and tracking in general.

- There has been a debate regarding the disclosure of how algorithms work to trade unions within the lines of trade secrets. However, there are many legislations in Europe that already oblige companies to share sensitive information with trade unions, for example, about companies' accountancy. Algorithm can be an intellectual property of a company, but it does not mean they are a trade secret. Therefore, all is needed is that trade unions treat the information provided on AI-based tools used in specific workplaces confidentially. However, a further question is whether it is enough to share information about algorithms with trade unions or whether there should be a public data sharing of such information.

- We need steps to create the necessary knowledge about AI for managers, supervisors, trade unions and workers. The only way to create this knowledge is to force the developers and providers of AI systems and algorithms to cooperate and to share information without hiding behind the excuse of trade secrets. If the developers cannot show what is in the systems that affect people's lives, these systems should not be allowed. All AI-based systems that are on

the market must be fully transparent.

- The awareness of the risks posed by robotic systems and the regulation in this area are to some extent stronger than for AIWM (for example through Machinery Directive4). This might be related to the fact that robotic systems are physical entities, while AI-based worker management systems are only based on software and thus are 'invisible'.

- Adequate enforcement of laws must be ensured. Governments need either specialised agencies to deal with AI regulations or people within existing agencies who have sufficient competencies to understand AI and algorithms, including the risks they pose.

- Trade unions not only need to be given information about AI-based tools in place, but they also need to be consulted or negotiated with. In this respect, a limitation of the Spanish Riders' Law is that it obliges companies to inform trade unions but not to involve them in decisions. The proposed Artificial Intelligence Act by the European Commission may also be a step back compared to some national legislation, for example, in Italy by law companies have to obtain consent from workers' representatives to monitor workers.

- We need to dare to regulate, to put the transparency demands on the table. Unfortunately, the current regulations are heavily influenced by industrial wishes and will not protect the human rights of citizens and workers.

Key takeaways of the workshop

Three groups of questions – on the OSH risks and benefits of AIWM, on the regulatory framework, and on the management of AIWM at the workplace level – were discussed in two parallel group work sessions, followed by plenary reporting back from the groups and discussions. Key points that were put forward by the workshop participants are reported below.

Risks and benefits of AIWM for workers' safety, health and well-being

What are the main risks of AIWM to workers' safety and health?

- The parallel was made between the use of AI systems and digital technologies in the workplace and Taylorism and was referred to as Digital Taylorism. History seems to repeat itself. Will decades of efforts to improve workers' rights and conditions be needed again? Companies using technology to monitor and manage workers should make sure they are employing these tools and techniques in a responsible and acceptable way.

- Implementation of AIWM will greatly increase workers' stress and mental health issues. Currently, we do not fully understand how AIWM will impact on mental health of workers. The whole outcome of the situation will become evident in the coming years. Mental issues have to be further investigated and addressed.

- An additional issue to consider with regard to AIWM is that the use of these systems can create stressful working conditions and that stress increases the probability of interpersonal conflicts (stressed workers, workplace bullying).

- Big, successful tech-savvy companies may lead by (bad) example. Previous research has documented a series of risks posed by the AIWM tools extensively used by such companies. For example, Amazon workers work through an app and are evaluated by these apps. When they log in, they are linked automatically with a barcode that tracks their productivity. The company requires workers to meet certain targets, but no one knows what the targets really are. Thus, they work harder and compete with each other.

[4] See: https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:157:0024:0086:EN:PDF

- AI use for HR management (for example hiring, career development or firing) might result in job insecurity that leads to increased stress and mental pressure. Precarious working relationships can be fostered through AIWM, especially since various applications are used to outsource certain activities and employ external workers through these applications.

- Monitoring and control have been augmented by AI. In the same vein, employers' power and prerogatives have been augmented by AIWM. It is not just strictly about OSH but also about changing labour relations, so there is a need to take a holistic approach to AI-enabled workplace systems.

- With regard to changing work environments and mode of work, every type of worker must be protected. Therefore, the definition of a 'worker' should be meant to include anyone, anywhere, doing any paid activity.

- It is important to highlight that risks stemming from AIWM might be more severe than risks stemming from working with humans (lack of human empathy and too much trust in AI). The issue is not only the design of an algorithm; human control on the work must be kept.

What are the main benefits of AIWM to workers' safety and health?

- Workers need to compete with each other as a result of AI-based tools. However, competition is not always a bad thing, it can be a way to improve one's activities.

- A general problem with AI is that it can be used for control. But it could be used for learning purposes as well. One example is robotic surgery in the healthcare sector where a robot and the video taken by the robot while operating help in sharing transparent knowledge. It is up to workplaces to decide how the data collected by AIWM are used.

- What is particularly concerning is that the opportunities and benefits of AIWM for workers are not entirely clear, but we already know of multiple risks and their list is long. There can be an algorithm to protect OSH, but there is not a lot of funding behind it. There is need for funding for tech for good, including in companies and public authorities. Otherwise, the lack of tools that help workers will remain.

Regulatory framework

Do you think the current/under development regulatory framework at EU level is fit to regulate AIWM?

- We should not solely focus on standards, guidelines, recommendations and awareness raising campaigns, but consider existing pieces of legislation and the obligations on employers. Campaigns have to be more specific and inform about employers' legal obligations.

- Guidelines on AIWM and related risks are needed to support the labour inspectorates in ensuring compliance with the legislation.

- The proposal of the European Commission (Artificial Intelligence Act 20215) will be good if approved as it classifies some systems as high-risk. However, it does not consider psychosocial risks and mental risks sufficiently. Therefore, it endangers the proper consideration and inclusion of psychosocial issues in AI risk management. There is an important gap to properly address psychosocial hazards related to AIWM.

- The new AI regulation is industry-focused, and ignores the perspective of social partners and workers. More specifically, according to the Machinery Directive6, the certification of AI

[5] See: https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1623335154975&uri=CELEX%3A52021PC0206
[6] See: https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:157:0024:0086:EN:PDF

machines will be done by private bodies (i.e. the Notified Bodies) without the possibility for trade unions to have a say. As per the proposed Artificial Intelligence Act, the same certification procedure would be applied to high-risk AI-based systems. If we deem certain systems as high-risk, we should not allow organisations to self-regulate. Therefore, effective social dialogue and co-governance should be ensured.

- The proposal also disregards the fact that such AI systems are self-learning and dangerously treats them as static. Such systems should be periodically assessed to ensure that what did not have a negative effect on OSH previously is still harmless.
- Transparency on how AIWM is developed, operates, and is used should be ensured and developers should not be allowed to hide behind trade secrets.
- AI-based systems could also be developed to implement digital, remote enforcement of regulation.

What is the situation in your country? What are the gaps and needs at national level?

- Ethics on AIWM can be debated endlessly because it is a political issue, but what is needed is a clear legislation. At the same time, there is also a need for stronger enforcement of existing regulations.
- Provisions in the relevant legislations need to be clear and specific so that labour inspectorates and OSH authorities can enforce these. Moreover, legislation on psychosocial risks in general, and even more so related to AIWM, is very vague and therefore authorities do not know how to inspect properly.
- Better resources (financial and knowledge) for labour inspectorates, OSH authorities and Data Protection Authorities are needed to ensure enforcement of existing laws. The mandates of relevant authorities should be extended so they have algorithmic governance control. Alternatively, new specialised agencies could be created for monitoring and oversight.
- More effective communication and collaboration between different organisations dealing with AIWM and OSH are needed.

Management of AIWM at workplace level

What are the drivers and the barriers to the prevention and management of OSH risks related to AIWM in the workplace? What is needed at workplace level to improve OSH prevention and OSH management of risks related to AIWM?

- The problem of introducing AI systems in a company also depends on safety culture and level in a company. Considerations for OSH should already start in the research phase where a general safety of AI systems is considered, not limited to workers only. Ethical principles should be considered in the early stages of system development as well as deployment. Another key aspect is that it is important to understand the original purpose of AI systems being introduced in workplaces, and whether by improving certain things they can pose risks to OSH.
- Traditional OSH management systems do not serve well anymore in the context of AIWM and more in general in the digitalised workplace. OSH management systems need to be dynamic, knowledge-based, risk-based, integrated and related to other processes in the organisation. A holistic view of an organisation is needed.
- Governance of algorithmic systems should ensure that any developer of such systems must be obliged to carry out both human and social rights evaluations. Impact assessment should be a prerequisite for each tool developed. Today, 90 to 95 % of tools that are deployed are developed by third parties. What should be required by law is that companies should do their

own ex ante and ex post assessments in consultation with workers. This is one way to ensure that deliberate harms are not committed towards the workers. Currently, there is a lack of regulation on this, and a lack of public debates to require this.

- AI is self-learning and not static, and hence a systematic approach to analysing it and its effect on OSH is needed. Support and practical solutions also have to be developed for the workplace level. For example, a support system for workers could be introduced. Work councils could make use of experts from outside their companies as they may not have the knowledge to ask complex questions about data usage and functioning of algorithms. A system (for example based on the hotline principle) where workers can ask their questions to experts could be created. Co-governance, safety culture, clear management responsibilities, an effective dialogue and a participatory approach are needed.

Closing remarks

The active and rich discussions that took place at the workshop reflect the high interest in the topic and the need to reflect on how to address it and take necessary actions.

While AIWM systems pose numerous risks to OSH, they also provide potential, at least theoretical, avenues for opportunities in improving workers' health and safety. There is a clear need for a holistic approach to regulate and manage AI-based worker management systems effectively and to establish clear limits with regard to certain functions and use of such systems that are not acceptable as endangering workers' safety and health, especially mental health, as well as fundamental rights more generally. AIWM systems must be designed, implemented and managed to be safe and transparent, guaranteeing workers' consultation, participation, and equal access to information at all stages, and ensuring that humans are in command. Compliance with existing legal provisions applicable to AIWM (such as OSH legislation, GDPR, forthcoming Artificial Intelligence Act, and anti-discrimination law) should be ensured. In addition, raising awareness at policy and practical levels (including employers, HR departments, workers and their representatives, OSH actors including labour inspectorates, AIWM systems developers) about the OSH risks stemming from AIWM and their prevention is of utmost importance.

Through its research programme in the area of OSH and digitalisation, EU-OSHA will continue to contribute to knowledge development and awareness raising in this area. EU-OSHA's European Healthy Workplaces Campaign on Digitalisation and OSH running from 2023 to 2025 will contribute to this by disseminating the findings of this project and translate these into practical resources. Conscious of the importance of a holistic response, EU-OSHA cooperates with a range of organisations and EU bodies to bring together relevant disciplines and expertise. In particular, the cooperation with Eurofound and the Joint Research Centre of the European Commission will result in the publication of a joint report on data-driven forms of management and implications for workers in 2022. Last but not least, all the resources produced by EU-OSHA on AIWM (and more generally on digitalisation) and OSH will be made available in a section dedicated to digitalisation on its website.