European Agency for Safety and Health at Work

Worker participation and representation: the impact on risk prevention of AI worker management systems

Report

European Agency for Safety and Health at Work

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Executive Summary

The aim of this study is to analyse the challenges posed by artificial intelligence based worker management (AIWM) systems in relation to psychosocial risks and the role of worker participation structures in identifying, assessing, preventing and mitigating psychosocial risks arising from AIWM.

AIWM is 'an umbrella term that refers to a worker management system that gathers data, often in real time, on the workspace, workers, the tasks they do, and the (digital) tools they use for their work, 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' (EU-OSHA, 2022: p.5). In recent years, the increasing reliance on AIWM within workplaces has sparked significant discussion concerning its impact on workers' occupational safety and health (OSH). On the one hand, AIWM can be used to prevent and mitigate some risks, and to assist managers and health and safety representatives in detecting and managing psychosocial risks at work. On the other hand, AIWM has often led to heightened surveillance, decreased job control, unpredictable work patterns and a perceived lack of fairness.

The ultimate impact of AIWM technologies is contingent on the institutional and organisational context in which it is applied. Among all the factors shaping this impact, forms of industrial democracy, including worker representation structures at workplace level, social dialogue and collective bargaining, should play a key role. Worker participation structures, including health and safety representatives, can help in identifying, preventing and mitigating psychosocial risks derived from the use of digital technologies in general and AIWM in particular. Moreover, collective bargaining could be a mechanism to find shared solutions and regulate the use of these technologies. However, AIWM poses some important challenges for effective worker participation and the capacity of these structures to develop their role.

Through an analysis of the literature and a collection of case examples, this study provides new evidence and analyses the challenges posed by AIWM technologies in relation to psychosocial risks. Second, it analyses the role of worker participation structures and more broadly, industrial democracy (social dialogue and collective bargaining at different levels), in identifying, assessing, preventing and mitigating psychosocial risks arising from AIWM.

The study has shown that AIWM can have both positive and negative psychosocial implications. Research exploring the detrimental psychosocial effects of AIWM shows that AIWM systems may intensify surveillance and erode workers' autonomy, which in turn leads to high stress levels. AIWM systems can also increase work intensity and the speed of work and lead to unpredictability in work schedules. Moreover, AIWM technologies that are used to monitor and evaluate performance can create performance pressure and are also associated with high stress levels among workers, particularly when they perceive the metrics and processes to be unfair. However, research also shows that psychosocial risks related to AIWM vary according to the type of company or the sector. In this regard, further research is needed to better identify specific sectoral risks associated with AIWM systems, particularly beyond the digital platform sector and in SMEs.

In relation to the opportunities brought by AIWM to prevent psychosocial risks, literature review shows that this is an aspect which requires further research. Existing evidence shows that AIWM systems can improve job design and task allocation or be useful for burnout prevention (for example, by scheduling breaks and adjusting workloads based on relevant worker indicators). Nevertheless, research also shows that this positive use of AIWM may conflict with General Data Protection Regulation (GDPR) rules and lead to unwanted or negative effects on OSH (for example, managers using the same data to monitor performance, etc.).

The study also shows that industrial democracy can contribute to, mitigate or prevent psychosocial risk factors stemming from AIWM, but must overcome several obstacles to do this. For example, AIWM technologies pose challenges to trade unions and workers' representatives to develop their activities due to the opaque and dynamic nature of the technology. Moreover, the power imbalance between workers and the employer, which also tends to vary across sectors and companies, has significant implications. In those sectors and companies where unions and workers' representatives have

comparatively weaker power resources, the probability of achieving negotiated solutions to the challenges posed by AIWM is significantly lower.

Cases analysed show a diversity of situations in relation to the psychosocial risks posed by the introduction of AIWM systems. First, the manufacturing and mining sector cases analysed show how worker representative involvement in the design of AIWM systems contribute to the prevention of different risks. Second, the case of the two small riders' cooperatives clearly shows how organisational conditions mediate the perceptions and impact of technology on workers' wellbeing. In particular, management resting on socially cooperative principles has facilitated a worker-friendly implementation of algorithmic management systems under human supervision as well as the inclusion of additional safeguards for riders.

The two regulatory case studies provide relevant insights about how statutory legislation can support workers' representatives in co-regulating AIWM systems. In the case study of the German regulation, it is shown how new laws providing specific rights for workers' representatives regarding AI can favour different types of works council interventions in the introduction of AI technologies. By contrast, the case of Spain shows how statutory regulations and other regulatory instruments may create a favourable environment for social partners at both the sectoral and company level to detect and regulate risks arising out of the implementation of AIWM.

1 Introduction

In recent years, the increasing reliance on AI-based systems for worker management (AIWM) within workplaces has sparked significant discussion concerning its impact on Occupational Safety and Health (OSH). AIWM, is 'an umbrella term that refers to a worker management system that gathers data, often in real time, on the workspace, workers, the work they do, and the (digital) tools they use for their work, 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' (EU-OSHA, 2022: p.5). Such systems are characterised by the processing of large amounts of data by algorithms to manage company operations and workers under the promise of greater efficiency and flexibility. Previous research has pointed out the ambivalent character of AIWM on psychosocial risks (Moore, 2019), understood as those aspects of the work design, organisation and management, as well as the social context of work, which result in negative psychological, physical and social outcomes (EU-OSHA, 2012). On the one hand, AIWM can be used to prevent and mitigate some risks, but also to assist managers and health and safety representatives in detecting and managing psychosocial risks at work. On the other hand, AIWM has often led to heightened surveillance, decreased job control, unpredictable work patterns and a perceived lack of fairness. Hence, the overall impact of AIWM technologies on psychosocial risks cannot be determined *ex ante*, but it is very much contingent on the organisational and institutional context where these technologies are introduced. Thus, it remains an empirical question as to which conditions may contribute to the reduction of psychosocial risks with the introduction of AIWM technologies.

Worker participation structures, including health and safety representatives, can play an important role in identifying, preventing and mitigating psychosocial risks derived from the use of digital technologies in general and AIWM in particular (Underhill, 2022). However, AIWM poses some important challenges to worker participation and the capacity of these structures to effectively prevent and mitigate psychosocial risks deriving from these technologies. AIWM technologies are characterised by being opaque and constitute a black box for decision-making that makes it even more challenging for workers to understand, predict, or contest decisions affecting their working conditions and psychosocial factors. Furthermore, the dynamic and evolving nature of AIWM technologies adds to the difficulties worker representation structures face due to a changing workplace environment and the self-learning capacities of some AI-based technologies.

This discussion paper focuses on the role of industrial democracy, including worker representation structures at the workplace level, social dialogue and collective bargaining, in identifying, assessing, preventing and mitigating psychosocial risks associated with AIWM. This is done through a review of the literature on the relationship between industrial democracy, AIWM technologies and psychosocial risks. Moreover, the paper also shows a collection of case examples that illustrate how industrial democracy has contributed to the identification and prevention of psychosocial risks. The paper is structured in five sections. Section one briefly discusses the objectives and methodology used. Section two provides the conceptual framework for the paper. Section three moves into the analysis of the literature addressing the role of industrial democracy in identifying, assessing, preventing and mitigating psychosocial risks arising as a consequence of the implementation AIWM technologies. Section four presents company and regulatory case examples illustrating the role of industrial democracy in shaping the impact of AIWM. Section five provides some concluding remarks and policy pointers.

2 Objectives and methods

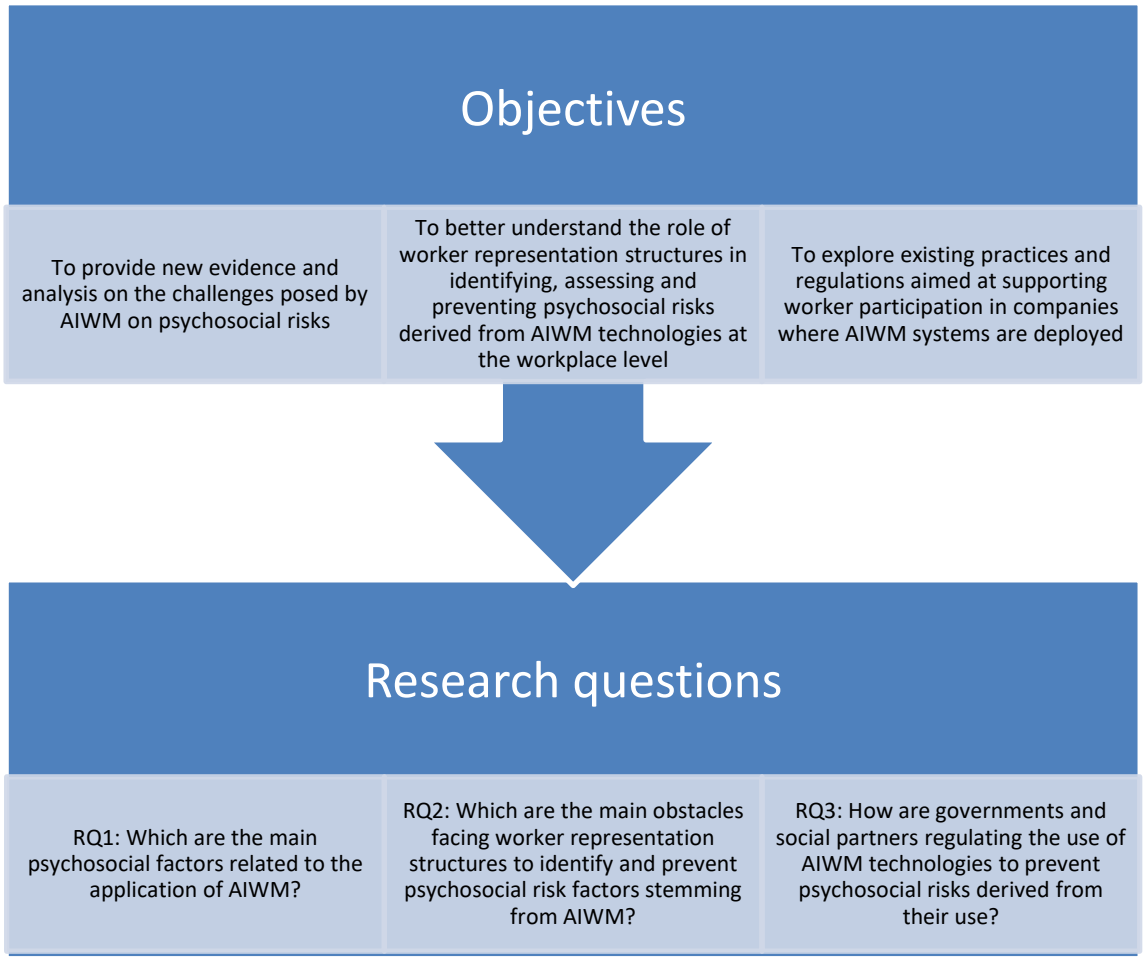
2.1 Objectives

This discussion paper addresses three research objectives as follows:

1. to provide new evidence and analyse the challenges posed by AIWM technologies in relation to psychosocial risks;
2. to better understand the role of worker participation structures and more broadly, industrial democracy, in identifying, assessing, preventing and mitigating psychosocial risks arising from AIWM; and
3. to explore existing regulations and initiatives aimed at supporting worker participation in those cases where AIWM technologies are implemented by organisations.

For each of these objectives a research question has been formulated (see Figure 1).

Figure 1: Objectives and research questions



Source: Authors' elaboration

2.2 Methodology

The **methodology** used in this paper is twofold.

First, it identifies studies dealing with the main risks associated with the introduction of AIWM and with the role of worker representation structures mediating these impacts, (research objective 1 and 2). Compared to the vast literature on digital platforms, the empirical evidence available on the use and

impact of AIWM for psychosocial risks in traditional or conventional workplaces is still limited (with some exceptions, most notably Rani et al., 2024). For this reason, we opted for a less demanding and exhaustive approach rather than a systematic review. Specifically, we selected scientific journals based on two criteria. The first being that it is high ranking according to Clarivate Journal Citation Reports 2023[1] and the second being that it covers the two fields this research deals with: occupational health and safety (*Applied Ergonomics*; *International Archives of Occupational and Environmental Health*; *Scandinavian Journal of Work*, *Environment and Health*; *Safety Science*) and employment relations (*New Technology, Work and Employment*; *Transfer*: *European Review of Labour and Research*; *Work, Employment and Society*). The Web of Science (WoS) Core Collection and Scopus were selected as primary sources for the keyword search. The search in these journals was limited to English papers between 2015 and 2024, since this period covers the emergence and consolidation of AIWM in the platform economy, and its extension to traditional workplaces. The search stream included three elements: AIWM and related terms, psychosocial risks, and worker representation, with papers discussing either very specialised and detailed technical topics, or insufficiently relating to the scope of the study. Eleven documents were excluded from the review. A total of 12 papers remained (*Applied Ergonomics*, 2; *International Archives of Occupational and Environmental Health*, 0; *Scandinavian Journal of Work*, *Environment and Health*, 0; *Work, Employment and Society*, 1; *Transfer*: *European Review of Labour and Research*, 6; *New Technology, Work and Employment*, 1; *Safety Science,* 2). Because of the limited number of papers, additional sources were retrieved from the 'grey' literature. Using the snowballing technique[2], 24 papers from international organisations and research centres were added to the review. Additional reports and policy documents were included, issued for instance by the European Commission, OECD, Eurofound, EU-OSHA, ETUI or JRC, among others. The final selection of 34 papers/documents for full review can be consulted in the reference list.

Second, concrete case examples were analysed to illustrate real-world practices of managing psychosocial risks derived from the implementation of AIWM technologies. The cases were split into two categories: company and regulatory. Their selection was carried out based on an exploration of previous research as well as discussions with EU-OSHA. The cases were put together based on documentary analysis and, in one case, an interview with a researcher. To facilitate the comparative analysis of cases, a common outline has been followed, comprising:

- the main characteristics of the company or regulation, including the main features of industrial relations or social dialogue, especially in relation to worker participation structures and processes;
- a description of AIWM technologies, main drivers for use and implications for work organisation; and
- the implications of AIWM in terms of psychosocial risks and how worker participation structures are relevant to detect and mitigate them.

[1] See: https://mjl.clarivate.com/search-results

[2] Using the reference list of a paper to identify additional sources.

3 Conceptual framework

3.1 AI-based worker management (AIWM)

Drawing on previous EU-OSHA research, we refer to AIWM in this paper as an umbrella term[3] referring to a 'worker management system that gathers data, often in real time, on the workspace, workers, the work they do, and the (digital) tools they use for their work, 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' (EU-OSHA, 2022: p.5). These decisions and recommendations could encompass a wide range of activities, such as setting work schedules and assigning tasks, monitoring worker activities, evaluating worker performance and providing guidance on preventing health hazards. As such, AIWM may be used for both control and support purposes (EU-OSHA, 2022).

AIWM reinforces traditional management control tools such as direction, evaluation and discipline (Kellogg et al., 2020; Ball, 2021). Research on AIWM's use for work control has primarily examined platform work (Kellogg et al., 2020; Ball, 2021). For instance, ride-hailing and food-delivery platforms use algorithmic technologies to direct drivers and riders with detailed instructions and break the workflow into manageable tasks (Wood, 2021). These platforms also employ customer rating systems to evaluate performance, where low ratings can lead to fewer orders and worse shifts, thereby reducing income, while high ratings can result in preferential treatment (Veen et al., 2020). On the other hand, AIWM can be used to identify, prevent and manage risky behaviours (EU-OSHA, 2022, 2024). AIWM tools may instruct workers on task performance and monitor posture to prevent musculoskeletal disorders (Katwala, 2017). Additionally, AIWM can be used for mental health monitoring, digital counselling and increasing worker engagement and satisfaction. While these last measures have the potential to mitigate OSH risks, they may also negatively impact worker OSH due to their intrusive nature (EU-OSHA, 2024).

AIWM's usage and expansion are difficult to estimate accurately, as most existing data generally refer to the use of digital technologies without specifying whether they are algorithms or AI-based technologies. Acknowledging this limitation, quantitative research suggests that the use of AIWM may vary significantly both between and within countries. Within countries, differences are related to economic activity or company size, with large companies adopting digital technologies to a greater extent compared to SMEs, according to the European Survey of Enterprises on New and Emerging Risks (ESENER) (EU-OSHA, 2022a). Between countries, (Bechter et al., 2022) found, based on data from the fourth edition of the Eurofound European Company Survey, that data-intensive digital technologies are more prevalent in central and eastern European countries. Most of the cross-country variation is explained by firm-specific factors and the market context in which firms operate. The use of AIWM – and of digital technologies in general – increases with organisational size and the number of hierarchical levels. Moreover, firms operating in highly competitive markets are more likely to use these technologies. However, the authors also found some evidence that the use of data analytics is higher in countries with less stringent regulations on data and privacy protection and wider managerial prerogatives (Brandl et al., 2022).

3.2 Psychosocial factors

Psychosocial factors are aspects of the work design, organisation and management, as well as the social context of work, which have the potential to result in negative mental, physical and social outcomes. According to recent EU-OSHA reports, (EU-OSHA, 2022, 2024), psychosocial hazards associated with AIWM include workers losing control over their jobs, increased work intensity and performance pressure, decreased social support from managers, individualisation and dehumanisation of workers, creating an unhealthy, competitive environment, a lack of transparency, a loss of power for workers and their representatives, mistrust, limited worker participation, and blurring work-life balance (Todolí-Signes, 2021, Cefaliello and Moore, 2023). These hazards may in turn lead to numerous

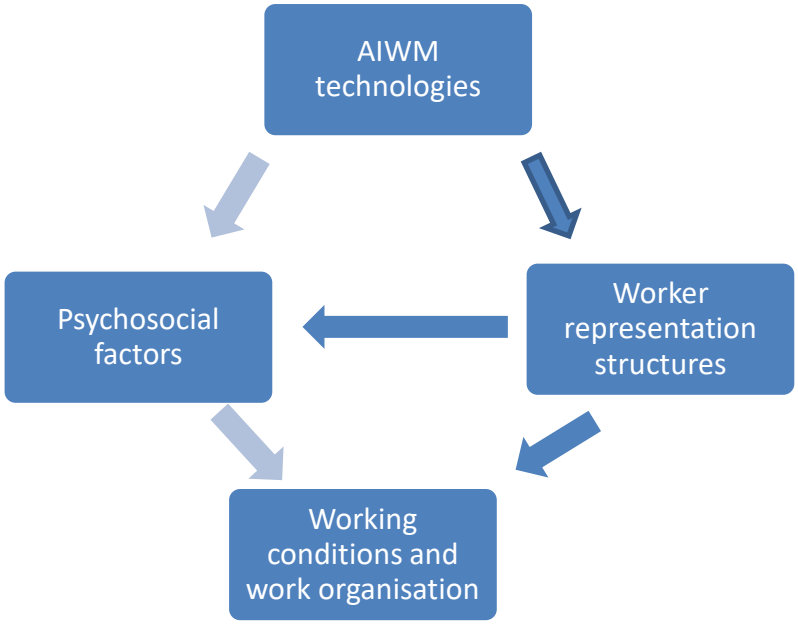
[3] This term also embraces 'algorithmic management' as defined by Kellogg et al., 2020 or Ball, K., 2021.

negative consequences for workers´ physical and mental health, such as musculoskeletal disorders, cardiovascular diseases, fatigue, stress, anxiety or burnout (EU-OSHA, 2022: p.5).

The relationship between AIWM technologies and psychosocial factors is ambivalent however (see Figure 2). First, these technologies can create or amplify psychosocial risks. Examples of direct effects include increased stress levels because of constant monitoring and data gathering or job insecurity. Yet, these technologies can also be a resource to prevent and mitigate psychosocial risks. An example would be the implementation of wearable devices to monitor workers' health (EU-OSHA, 2022b). The overall impact of AIWM on psychosocial factors, that is, whether the detrimental or beneficial effects prevail, will be shaped by the institutional context where the technology is applied and in particular, by worker representation structures. Through their participation in the implementation of AIWM, these structures will determine which technology is applied and how it is applied to maximise the benefits whilst reducing risks associated with them[VW1].

However, AIWM technologies pose a series of obstacles for worker representation structures to effectively mediate this impact, (see section 3.2). This is called the indirect effect of AIWM on psychosocial risks, which means that the erosion of power in worker representation structures will jeopardise their capacity to detect, negotiate or protect against psychosocial risks arising from these technologies.

Figure 2: Direct and indirect effect of AIWM on psychosocial factors



Source: Authors' elaboration

3.3 Industrial democracy

The term industrial democracy can be traced back to the late 19th century. It was introduced in the vocabulary of socialism by Sidney and Beatrice Webb (Webb and Webb, 1897) and was exclusively connected to trade union missions and activities (Kauffman, 2014). The Webbs used the concept in two different ways. The first meaning referred to the internal dimension of trade union democracy. In this regard, they represented trade unions as democracies ('government of the people, by the people and for the people') that had solved the main problem of democracy, that is, the combination of administrative efficiency and popular control (Webb and Webb, 1897, pp. VI). The second meaning referred to the

external dimension, which was connected to the role played by unions in the regulation of working conditions through collective bargaining, (Webb and Webb, 1897).

While there are also other definitions of industrial democracy[4], in this report we draw on the conceptualisation of industrial democracy elaborated on by Eurofound (2016, 2023). It refers to its external dimension and covers all means and institutions that workers' representatives may use to have a say in an employer's decision-making process and, more generally, in the governance of employment relationships. As pointed out by Sanz de Miguel et al. (2020), this definition of industrial democracy has several advantages over other alternatives for comparative research. First, from a normative point of view, it draws on a pluralistic theoretical approach which recognises goals of employers and workers on an equal footing. Second, the definition is in line with the key institutional pillars of the industrial relations approach of the European social model. Third, it is a multidimensional and comprehensive definition which covers both the macro or institutional level and the micro or workplace level of industrial democracy, which is associated with the quality of social dialogue at company level.

From this perspective, it is expected that workers can prevent and/or mitigate the impact of AIWM on psychosocial risks through different institutions at different levels (tripartite or bipartite bodies, works councils, etc.) as well as social dialogue and collective bargaining processes.

[4] See Muller-Jentsc (2008) for an analysis of the German definition and meaning of industrial democracy.

4 Review of the literature

This section reviews the literature on the role of industrial democracy and more specifically collective bargaining and workplace representation structures in regulating psychosocial risks arising from the implementation of AIWM technologies. The review is structured around the three research questions outlined in Figure 1.

4.1 RQ1: Which are the main psychosocial factors related to the use of AIWM in the workplace?

The use of AIWM technologies for worker management constitutes one of the most significant developments in employment relationships. These technologies have a multitude of impacts in different dimensions like working conditions, the organisation of work, social protection, industrial democracy or health and safety. The number of studies that have analysed the psychosocial implications of the adoption of AIWM by companies has grown significantly over the last five years. Although a systematic review of this literature is beyond the scope of this study, the present section will provide an overview of the main risks arising from the use of AIWM in the workplace.

One striking element highlighted in the literature is the wide variety of risks posed by the introduction of AIWM. As shown in section 2.2, psychosocial risks associated with AIWM include increased work intensity, individualisation and social isolation of workers, a lack of transparency, and blurred work-life boundaries (Todoli-Signes, 2021; Wood, 2021; EU-OSHA, 2022, 2024). The risk may vary according to the type of company or the sector. Whilst AIWM can lead to long working hours and work-life balance difficulties in the platform economy, this is less likely to be the case in a traditional manufacturing company for instance, due to differences in the application of labour laws, notably on working time. Compared to other digital tools whose impacts are more easily detectable and manageable (for example, computers or tablets), AIWM systems are characterised by having a wider or systemic impact on workers' wellbeing since they not only affect working conditions, but also the way workers are managed and how decisions are taken (Aloisi and De Stefano, 2022). This leads to an accumulation of psychosocial risks thus increasing the risks of mental and physical illnesses. Moreover, these technologies may erode workers' strength and voice, hence making it harder for them to reduce these risks.

Another aspect that was featured prominently in the literature is the acknowledgement that the use of these technologies for worker management can have both positive and negative psychosocial implications (EU-OSHA, 2022b). According to Jetha et al. (2023), there are three ways in which AIWM can have an impact on workers' health, safety, wellbeing and equity. First, AIWM can be a catalyst for change to the nature and availability of work, leading for instance to intensification of work or higher workload. Secondly, AIWM can become tools for health and safety promotion by improving the capacity of management and worker representation to detect and prevent risks. Finally, reliance on AIWM can lead to forms of discrimination and bias. Whether the positive or negative impacts of AIWM prevail crucially depends on the characteristics of the workplace, including the existence of workers' representation structures.

Yet most studies have focused on the first of these three pathways, namely on the detrimental effects of AIWM on OSH, with an emphasis on mental health at work. For example, Wood et al. (2019) found that algorithmic decision-making can lead to unpredictability in work schedules, which increases work-related stress and negatively affects worker wellbeing. Intensified surveillance and an erosion of worker autonomy have also figured as major risks derived from the application of AIWM (see Pereira et al., 2023 for a systematic review). In a comprehensive review of the literature, Berastegui (2021) identified three dimensions giving rise to psychosocial risks in the platform economy: physical and social isolation, work transience and boundaryless careers, as well as algorithmic management and digital surveillance. It highlights that algorithmic management in platform work results in 'an increasingly hectic pace of work, a lack of trust towards the platform, and pronounced power asymmetries limiting workers' opportunities to resist or develop effective forms of internal voice' (p. 87). These risks compound one another, resulting in their joint impact being much greater than the impact they would have individually. In fact, it

is precisely the negative impact that AIWM technologies may have on workers' voice and power that can intensify some of the risks derived from their use.

While concerns about the negative impact of AIWM on psychosocial risks are relevant, there are also significant opportunities for these technologies to prevent psychosocial risks at work (EU-OSHA, 2022b). First, AI can prevent and mitigate psychosocial risks through improved job design and task allocation. For example, AI-based systems can distribute tasks in a way that maximises individual strengths and preferences, thereby reducing job strain and increasing job satisfaction (Lee et al., 2015). Additionally, such systems may be valuable for burnout prevention by scheduling breaks and adjusting workloads based on relevant worker indicators, for instance. Considering project timelines and individual work pattern preferences, such systems may suggest optimal work-break cycles and therefore contribute to better mental health and productivity. Monitoring the health and wellbeing of workers may also open the way for proactive interventions when risks are detected. For example, wearable devices and health monitoring apps equipped with AI can track physiological indicators like heart rate and stress levels, providing real-time feedback to both workers and employers (Shajari et al., 2023).

The downside of relying on algorithms and AI technologies to identify and prevent psychosocial risks is that these technologies are data intensive and require a close monitoring and surveillance of the worker and the workplace more generally. Collecting this data, even when it is done to mitigate psychosocial risks, may conflict with the GDPR. Moreover, due to the difficulties in accessing and interpreting the algorithms behind AIWM technologies, it is hard to establish how the data is used and the extent to which management relies on this same data to quantify individual or collective performance.

To maximise the positive impact of AIWM technologies on psychosocial risks, whilst reducing risks associated to close monitoring and surveillance, workplace characteristics have been shown to play a key role (EU-OSHA, 2022a). In particular, the existence of workplace representation structures will not only help to put limits on the way in which AIWM systems are applied, including the devices used to collect data, the type of data collected and the guarantees for workers' wellbeing, but will also facilitate access to data for workers' representatives and support its use/application. The next point discusses the main obstacles worker representation structures face to achieve these goals.

4.2 RQ2: Which are the main obstacles facing worker representation structures to identify and prevent psychosocial risks stemming from AIWM?

There is well-established literature showing that worker representation structures can have a positive effect on reducing incidence of psychosocial risks at work (Walters, 2011; Castiblanque and Pizzi, 2020). On the one hand, worker representation structures may provide valuable information to managers to identify the actual risks facing workers in the production process since some of these risks may not be totally evident for managers. Moreover, worker representation structures can also help to find innovative ways to prevent these risks whilst ensuring adequate protection of workers' privacy. Research shows that companies that support worker representation structures are more likely to mitigate and prevent negative impacts of AI on OSH and working conditions. As shown by Bråten et al. (2023), companies that have union reps, safety delegates and data protection officers are more likely to have implemented privacy protection measures in new digital technologies than companies that do not have these resources (Walters and Wadsworth, 2019).

As has been already pointed out in section 2.2, an important aspect often missing in these analyses is that AIWM technologies may affect the (technical) capacities and power of existing worker representation structures. This complicates the diagnostic since these structures are not only mediating the impact of psychosocial risks associated with AIWM on working conditions and OSH but are simultaneously affected by these technologies and may see their effectiveness in identifying and preventing psychosocial risks undermined. As pointed out by Kramer and Cazes (2022) AIWM technologies may affect social partners' capacity to promote the benefits and mitigate the risks of AI for workers and employers through social dialogue.

Specifically, AIWM poses three obstacles for worker representation structures.

The first pertains to **the seamless integration of AIWM technologies in work processes**, making these systems barely visible and often unnoticed. Such invisibility contributes to the lack of awareness of workers and their representatives on the OSH implications of AIWM. Even when employers fulfil their obligation to inform workers' representatives, workers may not be fully aware of all the risks and implications these technologies may have. Despite the growing number of regulations establishing obligations to inform workers and their representatives about the use of algorithms and AI-based technologies, it is sometimes difficult to enforce these rights since workers themselves struggle to grasp the full scope of their use. As pointed out by Molina et al. (2024), while workers and their representatives may be aware that data is gathered through different tools, they may not necessarily know how it is used.

A second obstacle is **the opacity of AIWM technologies.** Most AI-based systems are proprietary and operate as black boxes, with their inner workings not visible or understandable to outsiders. Such opacity makes it difficult for workers' representatives to question or verify the fairness or accuracy of these systems and the decisions stemming from them. Opening the black box of algorithms is a pre-condition to ensure the accountability and regulation (Mougdir, 2024). One way of achieving this is to ensure that workers and their representatives are granted access to the algorithm behind these technologies. However, this is just a necessary condition, but by no means sufficient to ensure that they will be able to enforce their rights and prevent the negative impact caused by these technologies. This should go hand in hand with having the adequate technical capacities to understand the algorithms since interpreting and negotiating over AIWM systems presents several technical barriers for workers' representatives. These issues are often rooted in the complexity of the technology, the lack of transparency, and the specialised knowledge required to understand and challenge algorithmic systems effectively. AIWM systems, especially those using machine learning and AI, are based on complex mathematical models and programming that require specialised knowledge. Workers' representatives often lack the technical expertise to understand these models thoroughly, making it challenging to assess how decisions are made or to argue against misuse or potentially biased algorithmic practices. Moreover, when companies classify algorithms and the data they use as proprietary, they limit access under the guise of protecting business interests or guaranteeing data privacy (Vedder and Naudts, 2017).

Finally, the third element to be considered is **the power imbalance** between workers and the employer. When the imbalance is significant, the probability to have negotiated solutions to the challenges posed by AIWM is significantly lower. Employer resistance to engage in such negotiations may stem from concerns about competitiveness and managerial control. It has been the case in the platform economy, and more specifically in food delivery platforms where traditional forms of worker representation are fragmented or less prevalent, hindering collective action to address psychosocial risks (Wood et al., 2019). A similar situation can be found is SMEs, often lacking worker representation structures and exhibiting low levels of unionisation, where employers are in a stronger position to unilaterally implement AIWM technologies and workers may fear challenging or denouncing these practices.

4.3 RQ3: How are governments and social partners regulating the use of AIWM technologies to prevent psychosocial risks derived from their use?

Preventing psychosocial risks associated with the use of AIWM technologies calls for a holistic approach combining different tools, ranging from capacity building for workers representatives (see 3.2) to new regulatory tools adapted to the characteristics and challenges posed by these technologies. In a recent work exploring the regulation of algorithmic management across six EU countries, Molina et al. (2023) identified two different regulatory approaches regarding the use of AIWM. First, protective approaches consist of granting individual and collective rights through statutory regulations, but also including those achieved through social dialogue and collective bargaining. A second approach encompasses what can be labelled as participatory standards. In this case, the objective is to support and strengthen the position of worker representation and participation structures with a view to facilitating a stronger role in preventing risks derived from AIWM technologies. These two approaches are not mutually exclusive, and Molina et al. (2013) showed differences across countries in the emphasis of one vs the other that could be traced back to the institutions governing employment relations. However, the development of

effective collective regulations first requires statutory protections like improved information and consultation rights (De Stefano and Taes 2023).

In the case of regulations by either EU or national governments, or by social partners through social dialogue and collective bargaining, recent years have witnessed the development of several initiatives with a stronger emphasis on protective standards.

Regarding EU-level regulations, the prevention of psychosocial risks stemming from the use of AIWM technologies has been approached through three main sets of regulation. First, in the context of the EU OSH Framework Directive 89/391/EEC that applies to all risks, including those posed by digital technologies, and all the so called 'daughter directives' that have been approved thereafter. Secondly, through GDPR regulations providing additional protection in relation to the use and access to data – since psychosocial risks associated with AIWM technologies notably pertain to increased monitoring and data-gathering capacities (see for instance case 4.1.1 below). Finally, and more recently, the AI Act regulated aspects relevant to the use of AIWM, including the safe deployment of AI-systems, prohibiting some of them while casting others as 'high-risk' requiring more safeguards for their design, development and use. Among the high-risk AIWM systems are those used for task allocation and for monitoring and evaluating workers' performance and behaviour. Moreover, the Act includes obligations for employers using high-risk AI systems to establish risk management systems.

AIWM technologies and their associated risks can also be regulated through social dialogue and collective bargaining. A consensus seems to emerge in the literature about the importance of collective bargaining and social dialogue in regulating AIWM compared to statutory regulations. The flexibility required to prevent psychosocial risks in the context of changing digital technologies calls for a stronger role of collective bargaining (De Stefano and Taes 2023; Molina et al., 2023). Compared to other types of regulatory mechanisms, collective bargaining may include sector or company-specific risks derived from the use of AIWM. For instance, Doellgast et al. (2023) show how in the case of call centres of two EU countries, worker representation structures have relied on different sources of institutional power to protect worker privacy and discretion associated with remote monitoring and workforce management technologies. Thus, the responses given by worker representation structures have been shaped by the specific characteristics of the workplace, workers and institutional context. However, Kramer and Cazes (2022) warn about the challenges facing social dialogue to prevent risks derived from AIWM technologies. In their analysis, they explore the role of social dialogue in shaping the AI transition in beneficial ways for both workers and firms and show how compared to other technologies, AIWM technologies may affect social dialogue and erode industrial democracy. Therefore, they argue for measures to support social partners' efforts in shaping the AI transition.

Even though AIWM technologies share some characteristics of other digital technologies, they nonetheless pose new regulatory challenges. The capacity of these systems to collect and analyse large amounts of data, the complexity and opacity of algorithms behind them, and the dynamic nature of AI may require new regulatory approaches. Scholars have already expressed concerns about the adequacy of existing regulatory frameworks at national and EU level to address psychosocial risks associated with AIWM technologies. For example, Cefaliello et al. (2023) argue that new regulations are not only required, but that it is also necessary to move beyond approaches based on 'safety by design' and to adopt regulations that cover the risks arising during the deployment phase of AIWM as well. Since AI-based systems have the capacity to learn and refine themselves over time, regulatory mechanisms should be flexible enough to incorporate new risks as they emerge, as well as enforcement issues.

5 Case examples of governance of psychosocial risks in the context of algorithmic management

5.1 Company case studies

5.1.1 A Swedish mining company

- **Context**

Bender and Söderqvist (2024) conducted a case study on technological bargaining in one of Sweden's largest mining companies, which is involved in the extraction and exploitation of ore from mining sites and smelting facilities in Sweden, Finland, Norway and Ireland. It is worth noting that the company holds a leading technological position in the sector, which can be attributed to the growing specialisation of the Swedish mining industry in the development of new technologies, which has now become the primary source of industry revenue.

Swedish industrial relations are characterised by high membership rates and a multi-tier bargaining system, where sector-level regulations and legislation underpin a largely self-regulated social dialogue culture and reliable industrial relations at the company level. This is evidenced by the co-determination framework, which grants unions some degree of influence over the implementation of technological changes, although this remains a managerial prerogative.

The researchers emphasised that joint regulation of technological change relies on institutional arrangements that grant unions access to valuable resources for negotiating the implementation of new technologies in the workplace. Additionally, it depends on the alignment of interests between both social partners regarding the need for increasing the company's productivity through innovation as the primary strategy for remaining competitive in the global market.

- **Description of AIWM technologies**

The case study examined the deployment of two AIWM solutions: a safety monitoring system and semi-autonomous vehicles.

In 2013, following a non-fatal incident in which 22 workers were trapped in a mine, the company made the decision to install a Wi-Fi-based positioning system. This system was implemented only for preventing and helping workers in emergency situations. It allows for real-time monitoring of workers' location through GPS tools and improved communication in the event of collapses or any other emergency in the mines. More specifically, the technology can trace the position of workers and provides them with guidance in case of an emergency, including signalling of safe roads. However, the company and workers' representatives were aware of potential concerns regarding worker privacy and negotiated the inclusion of an anonymisation feature that would only permit worker identification in cases of emergency. Furthermore, access to the stored positioning data was restricted to exceptional circumstances.

The second technological solution involved the integration of remotely operated autonomous vehicles and machines. The deployment of semi-autonomous machines for extraction, loading and transportation tasks presented significant advantages in terms of OSH, as it reduces workers' exposure to unsafe working environments. In addition, it leads to productivity improvements as workers can operate more than one machine simultaneously and work can be conducted at times when there are few if any humans present, such as during scheduled breaks or at night (Bender and Sodërqvist, 2024).

- **Social dialogue and workers' involvement**

The adoption of technological changes in work organisation is a managerial prerogative and as such, the scope for negotiations on this matter is limited for workers' representatives under the Co-determination Law (Co-Determination in the Workplace Act SFS 1976:580). Nevertheless, information-sharing and consultation processes through either informal or formal procedures are deemed essential for sustaining meaningful cooperation between social partners. It is argued that both employers and trade unions shared common views on the long-term benefits of the implementation of new technologies, including improvements in competitiveness and the perceived OSH benefits associated with automated

technologies. Additionally, the company acknowledged that the involvement of trade unions and employees in the implementation process could yield better outcomes.

Regarding the implementation of a Wi-Fi-based location system, the co-determination process involved informal discussions that were later reflected in the conclusion of local collective agreements or protocols at each site where the system was implemented. Trade unions acknowledged the company's aim to improve workplace safety, but they demanded the anonymisation of all personal data to prevent the monitoring of breaks or individual worker productivity. Additionally, they stipulated that only specifically designated supervisors should be authorised to match each tag (identification number) with its corresponding worker, and that deanonymisation should only be permissible in emergency situations, such as accidents or fires.

Although the introduction of semi-autonomous vehicles was an employer initiative that did not require negotiations with union representatives, the implementation of night shifts required a local-level agreement, as it involved a derogation from the legislation on working time, which only permits night-time work under very specific circumstances. This situation granted union leverage over how this technology was to be implemented.

- **OSH implications**

Both the employer and employees shared a common goal of improving competitiveness while safeguarding the wellbeing of workers. The trade unions' concerns regarding the implementation of the technologies were properly addressed by the employer, as the implementation was expected to result in mutually realised gains. Such interest alignment and common understanding deterred the employer from using the tracking systems to monitor the performance of individual employees, a relevant issue highlighted in the literature on AIWM.

Trade unions were able to shape the implementation of AIWM systems in the workplace by setting conditions for their use and, in doing so, preventing OSH risks. Unions' ability to influence and negotiate these aspects is however contingent on the existence of legislation as well as higher-level and collective agreements. During negotiations, unions can leverage national or EU legislation which obliges employers to consult with workers' representatives before deciding on technological and organisational changes with an impact on working conditions and OSH. In this case, the EU GDPR provides a framework for discussing the use of workers' personal data.

5.1.2 A manufacturing company in Denmark

- **Context**

This case study draws from research carried out within the INCODING project[5] funded by the European Commission[6] (Larsen et al., 2023). It involves a Danish multinational manufacturing company that, over the last decade, has introduced several technological innovations, including AIWM technologies. These technologies have been applied in different units and with different purposes, notably in production lines and for administrative tasks. Being a large manufacturing company, the firm is characterised by a high level of unionisation and strong worker representation structures and collective bargaining, in line with some of the defining traits of the Danish industrial relations model (Larsen and Illsøe, 2022).

- **Description of AIWM technologies**

As part of its medium-term strategy, the company has gradually introduced technological innovations across the different plants and departments, but not in a uniform manner. For example, the company uses digital devices with embedded AIWM technologies, like smartwatches and tablets, to get up-to-date information on workers and to communicate with them. These devices are also facilitating the interaction between workers, and with machines and robots. More specifically, it helps organise and streamline work processes and workflows, allocating tasks to workers and guiding them through the

[5] The aim of the INCODING project is to analyse the role of collective bargaining and other forms of employee involvement at the workplace level in (co)governing the black box of algorithmic management.

[6] Agreement number VS/2021/0216.

manufacturing process. The introduction of these devices raised workers' concerns about excessive and pervasive employee monitoring and surveillance.

Cobots were also introduced to replace humans in standardised work or for specific tasks involving hard physical labour like lifting heavy objects. Workers complained about the risks cobots entailed for workers. For instance, some cobots were equipped with tools such as screwdrivers, which could pose a threat to workers as cobots move in the production line, sometimes in proximity with workers. Those concerns were acknowledged by the management, which eventually decided to use them in fewer tasks and in a more controlled environment.

- **Social dialogue and workers' involvement**

Social dialogue and workers' participation played an important role in the adoption of these technologies (Larsen et al., 2023). Despite having a positive perception of the impact of new technologies and AIWM on working conditions, workers expressed concerns about the data gathered and their privacy. Consequently, they required management guarantees that privacy would be secured along with their participation in the deployment of these technologies. Management involved workers and their representatives during all the phases of the process, from early organisation and design to the implementation and testing of the system. This formal involvement was supplemented with informal consultations with groups of workers to get more direct feedback about the actual impact of the technology. For example, the introduction of smartwatches for task allocation started with consultations of workers' representatives to agree on an implementation plan. It was decided to introduce the devices gradually to make sure they did not have a negative impact on workers' wellbeing. A few volunteer employees were then tasked with testing the devices and reporting on any impacts they might have. The testers reported their experience back to management, the shop steward and the health and safety representatives. Based on this feedback and close communication with other employees and their representatives, management decided to slowly roll out the smartwatches to other areas of the production line, with careful consideration for those employees that felt that such smartwatches were a stress factor. Accordingly, only those workers willing to use them participated in the extension of this technology.

This case study highlights the benefits of non-formalised mechanisms under permanent negotiation between management and workers' representatives, allowing for safe implementation of AIWM technologies. Another striking finding is the lack of awareness of workers regarding the type of data collected, how it used by management, and the risks these technologies entailed. Similar findings were reported in another manufacturing plant in Spain where workers and their representatives were not worried about the capacity of these technologies to collect data nor where they aware of how it could be used by management (Godino et al., 2023). This unawareness and apparent trust in management's use of data is probably explained by the context, that is, large manufacturing companies with strong workplace representation structures and a history of cooperation.

- **OSH implications**

The case study shows how the involvement of workers through health and safety committees can help to fine-tune the way AIWM technologies are implemented and reduce any detrimental effects they may have on working conditions. In this regard, OSH representatives and committees play a pivotal role, especially when collective agreements at company and sectoral level do not address AIWM technologies. Issues raised by employees and management mainly pertained to constant monitoring and surveillance. Work-related stress has also been debated in the broader context of the digitalisation of work processes across production sites. The constant flow of data and real-time updates, with alarms ringing and blinking, have been pointed at as sources of stress, leading to discussions on ways to mitigate these risks (Larsen et al., 2023).

5.1.3 Home-delivered food service providers in Spain

- **Context**

This case study focuses on two home-delivery cooperatives: Zámpate located in Zaragoza and Mensakas in Barcelona. Both belong to the cooperative economy and mainly operate in the food delivery sector, together with other activities such as last mile deliveries and, for Mensakas, procurement

contracts from the Barcelona City Council. It is worth noting that Mensakas was set up in response to legal disputes initiated in 2017, when a group of Glovo and Deliveroo workers denounced their companies for bogus self-employment. The workers ended up setting up an alternative organisation that would be based on the respect of workers' rights (Moral-Martín, Pac Salas and Minguijón, 2023). The two cooperatives were analysed in the context of a research project[7] funded by the Spanish Ministry of Science, Innovation and Universities (Moral-Martín, Pac Salas and Minguijón, 2023).

In both companies, workers are mostly cooperative members, although some are hired as employees, under the Spanish General Regime of direct contracting[8]. This hiring policy is linked to a formal renunciation of commercial contracts in the form of self-employment, which is precisely the way in which the largest companies in the sector operate. In this sense, cooperatives differ from hiring practices that are currently under investigation in some corporate companies in Spain (Sanz et al., 2023). They are very small organisations compared to the digital labour platforms dominating the sector. Zámpate Zaragoza employs seven workers (five cooperative members and two employees) while Mensakas employs 27 workers (17 cooperative members and 11 employees).

- **Description of AIWM technologies**

In both cooperatives, work organisation is within the realm of the 'dispatcher', a cooperative member in charge of distributing and assigning deliveries. As such, the dispatcher relies on an AIWM system. In contrast to the digital labour platforms operating in the sector, the AIWM system and software application are designed by a worldwide federation of cooperatives called CoopCycle. It is a freely accessible open-source programme ensuring the adoption of a cooperative model that meets the definition of social economy, as set out by the European Union[9]. A key distinguishing feature is that the system cannot be used for any punitive or exclusionary purpose. This allows for labour relations based on recognition and professional reciprocity, in which workers understand that digital tools are meant to support them, and not to monitor them.

- **Social dialogue and worker involvement**

Social dialogue significantly differs from the way it is typically conducted in private companies, as the cooperative formula implies the existence of several areas in which all workers participate. The mere existence of cooperative members means that the management, direction and responsibility of the company is shared equally among all of them. The participation of all the workers who make up the cooperative, regardless of their status, takes place in the assembly. The assembly discusses and decides on a wide range of issues specified in its own statutes and in the legislation that protects it (for example, budget and accounting). It also discusses other labour-related aspects such as wage increases. For example, the Assembly of Mensakas voted a 10% salary bonus exclusively to its female workers to encourage women to participate in this male-dominated activity.

However, cooperatives with many workers can exercise their right to freedom of association, as stated in the Spanish Supreme Court ruling STS-SOC 347/2019. The ruling recognises the right to freedom of association of cooperatives' members, under the assumption that they also have labour interests through this type of collective action. Nevertheless, workers in these cooperatives have not set up representation structures, both because of the small size of the organisations and the pre-existing ideological cohesion and unity of interests between the workers.

- **OSH implications**

Cooperativism has a positive impact on OSH due to its governance system, which relies on workers' participation. This model promotes a hiring system based on dependent employment, meaning that the company is responsible for providing a safe environment for workers and must meet OSH standards. In the case of Mensakas, cooperative members are also employees, which entitles them to the same rights

[7] Project number 10.13039/501100011033.

[8] In the case of Mensakas, all cooperative members are also hired as employees. In the case of Zámpate Zaragoza, cooperative members were self-employed at the time of conducting the interviews (2022). However, cooperative members from Zámpate Zaragoza also clarified that they were also considering becoming employees.

[9] See https://social-economy-gateway.ec.europa.eu/about-social-economy_en

as workers. Additionally, the management system combines AIWM and human decision-making to improve workers' OSH by socialising the distribution of effort among all available riders.

In the platform-dominated food delivery sector, excessive workload, time pressure and atypical work schedules have been highlighted as key sources of psychosocial risks (EU-OSHA, 2022c). The two cooperatives addressed those risks through better distribution of work among all the employees on public holidays and weekends. In both cooperatives, work is distributed according to the availability and interest of the workers, with no penalties associated to declining an order. Moreover, attention is paid to the accumulation of hours. Riders are restricted from cycling for more than 3 hours a day, as this duration is considered the maximum limit for exertion.

A fairer distribution of working time resulted in a better work-life balance and a lower workload, which in turn reduced the occurrence of drowsiness and fatigue especially during peak times when there is a high volume of vehicles on the road and an accumulation of orders. Another element that safeguards work-life balance is the limit both cooperatives have set on the use of the application, only during working hours. Moreover, there are no penalties in case of justified delivery delays, hence reducing the stress caused by unexpected problems during the delivery process.

Finally, the two platforms provide workers with OSH trainings, including for personal protective equipment – a legal obligation since they rely exclusively on labour contracts. Both cooperatives provide safe bicycles and motorbikes, with working brakes, lights and tyres in good condition. The application also incorporates an 'emergency button' for all women delivery workers in case they are in difficult, dangerous or uncomfortable situations (Soto, 2023).

5.2 Regulatory case studies

5.2.1 Adaptation of worker participation structures in Germany

- **Context**

This case study draws on two publications on the approaches and strategies deployed by trade unions in regulating the use of AIWM at the company level in Germany. These publications examine how workers' representatives use different tools to influence the implementation of AIWM technologies in a context where a new law, enacted in 2021 and partly discussed with trade unions, provided workers' representatives with specific rights regarding AI. In the first publication, Krzywdzinski et al. (2023) examined the areas and use cases in which AI is being deployed in the world of work, the role of trade unions in political discussions over the regulation of AI and trade union strategies on the use of AI in the workplace. The article is based on an evaluation of existing research literature and on the experiences gained by the authors in the course of their work. In the second publication, Doellgast et al. (2023) carried out a company case study in a German contact centre (the case is anonymised), which provides relevant insights to understand how German regulation aiming to support works councils in managing AIWM, works in practice.

In Germany, workers' representation institutions at the company level are characterised by a dual system where works councils are formally independent from but closely coordinated with union organisations. German works councils have stronger bargaining rights than workers' representatives in many other EU countries, including co-determination rights. In 2021, legislation on this institution was amended to extend consultation rights on new AI-based technologies. A critical aspect highlighted in these two publications is that workers' involvement is necessary for the successful implementation of AIWM systems. This is because the development of AIWM models require extensive employee involvement to validate the quality of the data that is fed into the systems and to verify that the results are applicable to the intended functions. Additionally, there is a need to comply with existing data protection regulations, which provides opportunities for works councils to influence the adoption of these systems.

- **Description of AIWM technologies**

The study carried out by Doellgast et al. (2023) focuses on two AIWM technologies that are widely used in contact centres. The first type includes monitoring technologies that can be used to record, document and evaluate workers' calls, screens and keystrokes. These technologies are associated with high stress

levels among employees, particularly when they perceive the metrics and processes to be unfair (O'Brady and Doellgast, 2021, quoted by Doellgast et al., 2023). The second type encompasses technologies that are used to manage workers, especially in scheduling, recruitment and selection processes. These technologies may limit employees' ability to challenge unfair evaluations and can limit their control over working hours through enforced schedules (Doellgast et al., 2023).

The publication of Krzywdzinski et al. (2023) follows a broader approach and focus on different AI technologies leading to automatisation, standardisation of work processes and processing of personal data. The article describes the trade unions' challenges regarding employment, skills, agency, privacy rights and worker surveillance.

- **Analysis of the legal framework**

In Germany, regulatory debates on digitalisation have provided new momentum to some key elements of neo-corporatism. These include the coordination between the state and social partners. This coordination has also occurred in the case of AI, with the involvement of social partners in consultation with expert bodies and standardisation committees on AI. A notable development is the debate around the modernisation of co-determination rights, which preceded the adoption of the new Works Council Act in June 2021. The law provided specific rights for workers' representatives regarding AI (Krzywdzinski et al., 2023).

- Consultation rights: The works council can request expert involvement financed by the company when an AI system is introduced to assist them in the assessment of its operation and consequences.
- Information rights: Employees have the right to be informed about technical innovations and changes in work processes that include AI applications.
- Co-determination rights*:* When AI is used for human resource decisions – such as those involving recruitment, staff mobility and dismissals – the works council's consent and verification are required.

However, despite a consensus on the promotion of ethical and responsible approaches to the use of AI, these instruments remain insufficient to achieve a progressive AI policy. German trade unions believe that the risks associated with AI systems, such as those pertaining to automation and discrimination, can be managed by making more effective use of already existing co-determination rights. However, works councils currently rely heavily on external support to influence the use of these technologies and their approaches tend to be conservative and defensive. An effective involvement of works councils in the design or introduction of new technologies is only feasible when there are strong works councils and trustworthy relationships with management, but this is not the case in many companies and industries. Trade unions support works councils by providing advice on how to deal with the topic of digitalisation and other actions for building expertise and the capabilities of workers' representatives at workplace level (Krzywdzinski et al., 2023).

- **Experiences of industrial democracy**

Different examples are provided by Krzywdzinski et al. (2023) to illustrate key aspects of union interventions in the introduction of AI technologies and digitalisation.

- In 2020, IBM Germany reached a framework agreement to establish principles for AI transparency, interpretability, non-discrimination and quality assurance – prioritising human decision-making. The agreement categorises AI systems based on their decision-making capabilities, prohibiting automated decisions about humans. An AI ethics council was also established to monitor and improve the agreement.
- The Airbus agreement for the implementation of Industry 4.0 projects provides for the cooperation between managers and works council representatives at different levels, including rules for introducing new technologies and training employees. The process begins with project profile preparation by managers, describing the technology to be introduced, the affected employee groups and anticipated effects on work. Then, managerial and works council steering committees are established for each project, which jointly decide on the way in which the technology will be introduced, including technical aspects (which devices and technology, where

it will be applied in production) but also the schedule for implementing them. All projects are coordinated at the company level in the central steering group comprising of management and the works council.

- The joint agreement between Merck and the works council focuses on reorganising the works council's operations to better address the challenges posed by digitalisation. The agreement stipulates the creation of committees and working groups that include employees without a works council position. The aim is to broaden employee involvement and provide further training to prepare them for this task. The company recognised that the works council could not handle the upcoming tasks alone and that a change in *modus operandi* and a distribution of work to more people were necessary for co-determination to function properly, thus accepting the agreement.

Regarding the contact centre case study, Doellgast et al. (2023) analysed the company-level agreements concluded for the corporate group, which set up regular co-determination and consultation procedures over the introduction of AIWM technologies. A pilot agreement was implemented to regulate the use of workforce analytics. This agreement explicitly prohibited the use of the AIWM technology for monitoring employee performance or behaviour, or for making individual human resource decisions without human supervision. As the use of workforce analytics can result in work intensification and ultimately in stress, the measure can contribute to the mitigation of such risks. The agreement also provided for the establishment of a joint expert group in charge of the evaluation of the use of these tools, guaranteeing transparency in the use of personal data and providing mechanisms for employees to challenge or access information on algorithm-based decisions. This framework promotes transparency and trust between employees and managers, thereby reducing potential objections from works councils to the use of these tools, as well as the stress generated by opaque procedures.

5.2.2 Practical guide on algorithmic management in Spain

- **Context**

Spain was the first EU country to establish a presumption of employment in the field of delivery platforms, with the Riders' Law enacted in September 2021. The law was the result of social dialogue and included a second provision with amendments to establish the right to information on algorithmic management. In the application of this provision, employers are required to provide information to worker representatives on the use of algorithms or automated decision-making systems for decisions that may affect working conditions and access to or maintenance of employment (for example, profiling).

This case study focuses on the guidelines issued by the Spanish Ministry of Employment to clarify the scope and obligations of employers regarding the information that must be provided to workers and their representatives (MITES, 2022). In addition, we present some recent developments in collective bargaining regarding the regulation and exercise of these rights (Rodríguez Fernández, 2024). The main purpose of both regulatory initiatives is to improve algorithmic transparency which, as explained in previous sections, is a key obstacle that worker representation structures face with a view to identify and prevent psychosocial risks stemming from AIWM.

- **Description of the technologies**

Automated decision-making systems are employed in various organisational and management processes such as recruitment and performance monitoring. However, the legal provisions for algorithmic transparency do not provide a precise definition of the technologies they cover. As a result, any automated decision-making process that relies on algorithms is subject to the employer's obligation to disclose information about its usage to worker representatives, even in cases where the algorithm does not make the final decision. All companies, regardless of whether they have collective representation or not, are required to provide information to employees. Companies with collective representation bodies must also comply with the collective information rights outlined in the Spanish Workers' Statute.

- **Analysis of the legal framework**

Spain's existing legal framework provides two options for exercising information rights related to algorithms and automated decision-making processes. These options are either individual, in

accordance with the GDPR, or collective, as stipulated in the workers' statute. Nevertheless, the content or type of information provided by the company is common to the two legal frameworks and consists of:

- information on **the use** of algorithms or AI systems to make automated decisions, including profiling, and also includes the following information on each algorithm:
  i. the use of algorithms and AI systems in recruitment and selection decisions;
  ii. the specific personnel management decisions made by using these technologies (selection or recruitment, performance management, etc.);
  iii. the type of technology used by the algorithm and if it generates a 'black box' (when the procedures, logic and variables are not immediately evident or knowable) or if it is a continuous learning algorithm;
  iv. the particular software or product, along with any relevant certification information and details about the supplier company; and
  v. the level of human input in the choices made, and specifically, the capacity and power of human agency to diverge from the decision proposed by the algorithm.

- meaningful, straightforward information about **the logic and operation** of the algorithm, including:
  i. the variables and parameters, including the type of profiles created by the algorithm and the information used for their characterisation;
  ii. the variables used by the algorithm for decision-making and profiling workers, and whether these are personal data, such as candidates' education or job experience, along with the weighting of each variable in the model, and any changes introduced that affect the operation of the algorithm;
  iii. the programming rules used by the algorithm;
  iv. the training data and validation procedures used;
  v. the precision or error metrics for the automated tasks; and
  vi. audits or impact assessments carried out by the company.

- information on **the potential consequences** of any decision adopted through the use of algorithms or automated decision systems, such as:
  i. any consequences for workers in terms of access to and maintenance of employment and working conditions;
  ii. any possible impact in terms of gender equality and non-discrimination.

Finally, it should be noted that legal provisions do not oblige companies to provide the source code for the algorithm, and that the information provided must be clear and accessible to people without technical knowledge.

- **Experiences of industrial democracy**

To date, two pioneering experiences have been identified regarding the collective regulation of AI at work (Rodríguez Fernández, 2024).

First, the XXIV national sectoral collective agreement for the banking sector, concluded in January 2021, made an explicit acknowledgement of the role of collective bargaining in the governance of digitalisation in the sector. According to this guiding principle, the agreement includes a range of digital rights of employees, namely the right to digital disconnection, the right to privacy on the use of digital devices provided by the company, and the 'right to AI'.[10] Employees have the right not to be the object of decisions based exclusively on algorithms and can request human intervention to prevent discrimination.

[10] As in Article 80.5. See: https://www.boe.es/diario_boe/txt.php?id=BOE-A-2021-5003

The agreement also includes worker representatives' rights to be informed about the operation and outcomes of algorithms, and an impact assessment to prevent potential biases.

Drawing on this experience, the Comisiones Obreras (CCOO) union organisation has engaged in further initiatives to extend the regulation of AI to other sectors and companies. First, the union drafted a procedure for requesting information from companies about the use of algorithms and another for reporting any breaches of these companies' obligations to the Labour Authorities. This procedure includes information regarding design specifications, the parameters used, and an impact assessment of its outcomes. In addition, the union is also seeking to include a standard clause in all collective agreements providing for the training of employees directly involved in the programming or the acquisition of these technologies to reduce the risks posed by them.

Second, the company-level agreement on the food delivery platform Just Eat, concluded in 2021 with representatives of sector union federations in the absence of workers' representation in the company. The agreement provides a detailed list of workers' digital rights along with the obligation for the company to provide worker representatives with the relevant information used by the algorithm for organising delivery activities, including relevant information on working hours and employment contracts. The agreement also specifies the personal data which cannot be used by the algorithm, such as sex and nationality, and it also provides for the establishment of a joint committee for the management of the information. At the time of writing, the implementation of the agreement is still pending the conclusion of the election process for worker representatives in the company.

6 Conclusions and policy pointers

This discussion paper has analysed the challenges posed by AIWM technologies in relation to psychosocial risks (RQ1) and the role of worker participation structures and more broadly, industrial democracy, in identifying, assessing, preventing and mitigating psychosocial risks arising from AIWM (RQ2). In addition, it has explored existing regulations and initiatives aimed at the company level, supporting worker participation in the regulation of AIWM through six case studies (RQ3).

The paper has shown that AIWM can have both positive and negative psychosocial implications. Research exploring the detrimental psychosocial effects of AIWM shows that these systems may intensify surveillance and erode workers' autonomy, which in turn leads to high stress levels. AIWM systems can also increase work intensity and the speed of work and lead to unpredictable work schedules. Moreover, AIWM technologies that are used to monitor and evaluate workers create performance pressure and are also associated with high stress levels among employees, particularly when they perceive the metrics and processes to be unfair. However, research also shows that psychosocial risks related to AIWM vary according to the type of company or the sector. In this regard, further research is needed to better identify sector-specific risks associated with AIWM systems, beyond platform work and SMEs. In relation to the opportunities brought by AIWM to prevent or mitigate psychosocial risks, the review shows that this is an aspect which requires further research. Existing evidence shows that AIWM systems can improve job design and task allocation or be useful for burnout prevention (for example, by scheduling breaks and adjusting workloads based on relevant worker indicators). However, these use cases may conflict with GDPR and lead to unwanted or negative effects on OSH, such as managers using the same data to monitor performance, among other issues.

The findings also show that, although industrial democracy can contribute to the mitigation or prevention of psychosocial risk factors stemming from AIWM, there are several obstacles. In particular, AIWM technologies pose challenges to trade unions and workers' representatives to develop their activities due to the opacity and dynamic character of the technology. Moreover, the power imbalance between workers and employers, which also tends to vary across sectors and companies, has significant implications. In those sectors and companies where unions and workers' representatives have comparatively weaker power resources, the probability of achieving negotiated solutions to the challenges posed by AIWM is significantly lower.

Finally, the cases analysed show a diversity of situations in relation to psychosocial risks posed by the introduction of AIWM systems. First, the cases of manufacturing and mining demonstrate how the involvement of workers' representatives in the design of AIWM systems can help mitigate various risks. In the case of the Swedish mining company, the participation of workers' representatives enabled the potential detrimental effects associated with the use of personal data for performance and the monitoring of working hours to be addressed. In the case of the Danish manufacturing company, the involvement of workers helped refine the implementation of specific AIWM technologies, such as smartwatches for task allocation, and minimised potential detrimental effects on working conditions. Second, the case of the two small cooperatives of riders clearly shows how work organisation mediates the impact of technology on workers' wellbeing. Delivery platforms have been portrayed as clear examples of how algorithmic management leads to a deterioration in working conditions and exacerbates psychosocial risks. However, this impact is contingent on how work is organised. In the case analysed, management resting on social cooperative principles has facilitated a worker-friendly implementation of algorithmic management systems under human supervision as well as the inclusion of additional safeguards for riders. Finally, the two regulatory case studies provide relevant insights about how statutory legislation can support workers' representatives in co-regulating AIWM systems. In the case study of the German regulation, it is shown how new laws providing specific rights for workers' representatives regarding AI can favour different types of works council interventions in the introduction of AI technologies. The case of Spain shows how statutory regulations and other regulatory instruments may create a favourable environment for social partners at both sectoral and company level to detect and regulate risks arising out of the implementation of AIWM. The guide promoted by the government together with social partners acknowledges the need to go beyond statutory regulations to alleviate algorithmic opacity, which is a key obstacle that worker representation structures face with a view to identify and prevent psychosocial

risks stemming from AIWM. The case also provides two examples of collective bargaining that regulate algorithmic transparency, favoured by Spanish legislation, which recognises workers' legal representatives' right to access information on algorithmic management.

Policy pointers

- AIWM technologies can have beneficial effects in detecting and preventing psychosocial risk factors, but can also intensify some of these risks, especially those related to worker surveillance and performance assessment. To ensure that the benefits outweigh the risks, it is necessary to endow worker representation structures with the capacity to effectively access and negotiate over the algorithms behind these technologies.
- Work intensification and higher stress levels derived from constant surveillance and data gathering constitute the main threats associated with AIWM. Proper access by workers' representatives to the algorithm and to the data gathered is required to prevent these risks. However, some of the company cases analysed, show how the best approach to minimise these and other risks on workers is to involve them from the very early phases of technology adoption and implementation.
- Institutional capacities provide workers and their representatives with rights to be informed and/or consulted about the introduction and implementation of AIWM. However, institutional capacities alone do not suffice to ensure workers' representation can fully exercise these rights. To do so effectively, workers and their representatives need the technical knowledge required to monitor the use of AIWM and engage in negotiations regarding its implementation.
- The characteristics of AIWM technologies, including its opacity and dynamic nature, but also the diversity of applications in the workplace, call for more flexible regulatory approaches with a stronger role of collective bargaining. It is critical that current regulations on workers' involvement and representation evolve to incorporate these issues, as collective bargaining in the context of AIWM remains limited.

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